



DEPARTMENT OF MARINE SCIENCES

Annual Report 2023-2024

Prepared by

**Dr. Ernesto Weil, Director  
Administrative Staff: Maritza Pagán, Lilivette  
Valle, Nilda E. Ramírez, Monserrate Casiano,  
Zulma E. Martínez and Josefa Moulrier**

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# **Annual Report Department of Marine Sciences (2023-2024)**

## **1.- Executive Summary**

The Department of Marine Sciences (DMS) has provided graduate education in marine sciences for over 55 years. It was officially founded on August 19, 1968, after the first master's program in Marine Sciences at the Mayagüez Campus was approved by the Puerto Rico Higher Education Council. The doctorate (Ph.D) program in Marine Sciences was approved four years later, in 1972. These were the first graduate programs at the Mayagüez campus. By design, the DCM is the only department in the UPR system that concentrates 100% on graduate studies and research.

The mission and goals of the Department of Marine Sciences (DCM) follow those of the School of Arts and Sciences, and the university in general. They emphasize excellence in graduate education and training, the advance of scientific knowledge through high quality research in Marine Sciences, and the betterment of the people and economics of Puerto Rico, the USA and the Caribbean. The DCM thrives in promoting a better understanding of the marine environment within the areas of biological, physical, chemical and geological oceanography; training graduate students in marine science; serving the community and the interest of the UPR system and the government.

### **New Applications and Graduation numbers**

Sixteen (18) new applications (16 for Ms.C and two for Ph.D program) were received for the academic year 2023-24. The DMS accepted the two doctoral students but only 10 of Masters applications, for a total of 45 master's and 15 doctoral students (N= 60) in the program during the 2023-24 academic year. Four good applications were rejected because the faculty members are saturated supervising the already enrolled graduate students, and they could not attend any other students. This is the first time in 55 years that this has happened, and is a clear sign of the critical situation of the graduate program in Marine Sciences. There is an URGENT need to hire new professors to ensure the quality and survival of the program.

During the 2023-2024 academic year the Department of Marine Sciences awarded eleven (11) Master of Science Degrees (Plan I), two (2) Professional Masters in Marine Sciences (Plan II), two (2) Professional Masters in Marine Sciences (Plan III), and one Doctorate (Ph.D), for a total 16 graduates in Marine Sciences, an increase of just one more graduate from 2023. Only one Ph. D student finished her degree in this period, a significant decrease from 2023 (6).

This level of graduation represents 11% and 31% of the Doctorates and Masters graduated respectively by the Science Departments of the School of Arts and Sciences for 2023-24. A significant change from 2023 when the DMS graduates represented 70% of the Ph.Ds and 17% of the total masters graduated by the Science departments of the School of Arts and Sciences

All graduating students completed all the requirements to receive their diplomas, including the DMS-exit assessment forms, included in the **Student Learning Assessment Outcome manual.**

### **Faculty hiring and awards**

The Chancellor authorized a Job Announcement (23-04) to fill position 146-A1 left vacant by the passing

of Dr. Nadathur. Immediately after this, the DMS posted the announcement for the open position. The Personnel Committee selected three outstanding candidates from a pool of 18 applicants and completed the interview and selection process by June 30st, 2023. The selected candidate was informed and officially offered the Assistant Professor position on July 5, 2023. Due to delays with the immigration paperwork and other issues, Dr. Johana Rotterova, the new professor, officially started in January of 2024. So far, her performance has been excellent, a great addition to our program.

The DMS got another Assistant professor position to be filled this year from the administration, this one in Fisheries and Aquaculture. The DMS advertised (Announcement # 2428) the position and already received, and is reviewing five applications. We expect to call for interviews soon and have this new faculty start in January 2025.

The Personnel committee unanimously recommended granting Dr. Travis Courtney a promotion to Associate Professor. His case was presented to the Arts and Sciences Personnel Committee on June 13, 2024 and was approved during the A&S Personnel Meeting. The administrative board approved the promotion of Dr. Courtney to the rank of Associate Professor effective July 1, 2024 (Certification 22-23-215).

Dr. Travis Courtney was awarded a **2024 Sloan Research Fellowship**. He was among 126 early-career scholars that represent the most promising scientific researchers working today according to the Sloan selection committee., "Their achievements and potential place them among the next generation of scientific leaders in the US and Canada".

The 2024 Edition of Ranking of Top Scientists in the field of Ecology and Evolution ranked Dr. E. Weil at 1083 in the US and 2992 in the World. <https://research.com/scientists-rankings/ecology-and-evolution>.

## **Student support**

The financial aid to our graduate students improved significantly due to external funding linked to new research projects awarded to DMS faculty, and collaborative projects between the DMS, local government agencies (DNRA), NGOs and other institutions. A total of \$ 276,909 was provided for graduate student support which helped over 75% of the DMS students during the academic year 2023-24.

Thirty seven (37) research assistantships were funded with external funds provided by research grants awarded to DMS faculty members and other sources (appendix 1). The total amount of funding was \$188,530.12. A NASA-funded project to Dr. R. Armstrong provided \$17,835.00 for five undergraduate students working in different projects in Magueyes. Fifteen teaching assistantships were funded by the Department of Biology-UPRM, two research assistantships were funded by EcoElectrica through a collaborative agreement (MOU) and two were funded by the DMS through our collaborative agreement with CARICOOS. The total amount of funding for these 18 assistantships was \$58,676.66.

Twelve graduate students received hourly wages (jornal) to assist in different tasks, including research projects and maintenance of the invertebrate collection One (1) student worked for wages on the Maintenance of the Museum Collection of Marine Invertebrates, Magueyes Island. \$3,000. (**Appendix 1**).

The Maxwell-Hanrahan foundation from San Francisco donated \$15,000 to the DMS to be exclusively used to support field work of the research projects of the Graduate Students of the department. Six students (two Ph.D and four Ms.C submitted proposals to be evaluated for funding. All six received all the amounts the requested for different aspects of the field work and minor equipment needed.

### **New courses and programs**

The DMS Curriculum Committee has been helping and following the certification process of the new program “Professional Masters in Marine Sciences” with Plan II and Plan III. After the approval of the Program by the Senate in UPRM, the process is in the final steps of the approval by the Administration in Rio Piedras. These plans were designed to provide a shorter and more general education in marine sciences, adaptable to more flexible professional demands, to attract students with other work interests (other than research and university teaching) and who want to graduate in a shorter period of time. The program has been advertised little and there is high interest by advanced undergraduates.

Dra. Rotterova, our new Assistant professor, reactivated and updated the course syllabus and program for the courses Marine Microbiology and Marine Parasitology to be a curricular sequence, Marine Microbiology I (CMOB8635) and Marine Microbiology II (CMOB8636). She is also developing a new course in Marine Symbiosis (CMOB-XXXX), an extremely important topic for any marine biologist.

### **Proposals, projects and collaborations**

Eleven (11) research proposals submitted by DMS faculty (Pi and Co-PI) to Federal agencies (NSF, ONR, NASA and NOAA), were submitted during this academic year for a total of \$ 9,935,793.01 in research funding. Of these, three were funded for a total of \$ 1,544.411.00 in external funding (**Appendix 2**).

Two other proposals in which DMS faculty (Drs. Weil, Cruz-Motta and Courtney) are CoPIs and that include other collaborators and the DNRA, were submitted to NOAA by ISER-Caribe (an NGO) and were funded for a total \$ 11,189,000. Funding is expected to last for 4 years, until 2027, and the possibilities of renewal are very high. The project started in August 2023 and is making good progress through the initial stages. These stages include the improvement of basic infrastructure needed for the on-land culture of coral fragments, sea urchins and crabs mentioned above. It also provides training and financial support for many of our graduate students and some undergraduates from Biology.

In collaboration with ISER (Institute for Socio Ecological Research), the DMS is developing the largest on-land coral culture facility in Puerto Rico to support coral reef restoration programs and educational outreach around the island. The innovative holistic approach involves assisted evolution by using resistant (thermal anomalies and diseases) and genetically variable coral colonies together with other keystone species that control algal growth at the transplantation localities. Drs. Weil, Cruz-Motta and Courtney are CoPIs in this large, five year long project financed by NOAA.

The project is a collaborative effort with other NGOs, local and international institutions and the DNRA. The project has invested close to \$500,000 in updating the existing infrastructure in Magueyes (i.e. new sea water system, remodeling wet labs and tanks areas, a new larvae culture system, etc.), and is funding 12 DMS graduate students.

The first Inland Pilot Marine Integrated Multitrophic Aquaculture System in Puerto Rico was installed in Magueyes. The initial goal is to develop the protocol and train stakeholders in the area to culture and

produce *Trachinotus carolinus* a common jack in tropical reef systems. Dr. Otero is the CoPi directing this project which together with SeaGrant is organizing workshops and training activities for local stakeholders. [https://drive.google.com/file/d/1GmKWxSPDjdNEN9e\\_Ynoq7li8akTh29KY/view?usp=shari](https://drive.google.com/file/d/1GmKWxSPDjdNEN9e_Ynoq7li8akTh29KY/view?usp=shari) The DMS is also collaborating with Dr. Loretta Robertson and her team who are developing a pilot project for culturing commercially valuable algae in La Parguera.

### **Productivity workshops and seminars**

Peer-reviewed publication productivity was high again this year. A total of thirty-four (34) peer-reviewed manuscripts were submitted to recognized peer reviewed journals and one technical report was produced. Overall, 15 manuscripts were published, five are in print or accepted, and the rest are in the reviewing process. Five were submitted by professors and thirteen by students as senior authors. Students appear as senior or secondary authors in 57% of this year's publications (**appendix 3**).

Several seminars (hybrid format) and a workshop were provided by faculty, students and visitors. The DMS students carried out ten (10) (appendix 3) departmental seminars. Two seminars were offered by visiting researchers; Dr. Fabio Bulleri, Universitat di Pissa – Italia, "*Experimental Design in Marine Ecology*", November 21, 2023 and Dr. Jen McWhorter, NOAA, "*Biogeochemical Argo Research Applications*", February 1, 2024.

### **Education, Visitors and outreach**

The department has increased its outreach and community service activities thanks to the help of AECIMA and several professors and administrative personnel assistance. One major task was the involvement of the DMS in the development of a marine science "program" for the new Montessori School Alejandro Tapia Rivera in the community of La Parguera. The DMS has provided information, materials, talks and logistical support for several visits of the students to our lab facilities. Recently, DMS collaborated with a series of workshops on coastal marine ecosystems and environmental and scientific photo-journalism during June of 2024.

As part of the DMS outreach and educational programs, our facilities in Magueyes are open to organized visits so elementary and high school students, private citizens, managers, agency personnel, etc. can have a direct and personal experience of what a working marine lab. looks like, and what sort of different projects are being carried out in these facilities.

During the academic year of 2023-24, the DMS facilities at Isla Magueyes received a total of 419 visitors (down from 667 during 2022-23). Twenty people from Universities and Agencies of the United States and some International visited in nine groups. One hundred and ninety came from schools or community groups from around the island, twenty people from US Agencies visited the facilities, and 185 people from local universities and government agencies visited the DMS Magueyes facilities. (**Appendix 4**).

AECIMA continues to be very active in educational and outreach activities offering virtual talks, organizing and carrying out several educational and workshops for the communities. They organized the sixth Symposium in Marine Sciences on March 4<sup>th</sup>. 2023, for students and professors in the Communal Center of La Parguera so locals could attend and learn about the research programs in Marine Sciences, and community activities in which they can get involved and participate. AECIMA and Yanelle Silva, the student representative, collaborated with the 2024 Summer Camp organized by the School of Arts and Sciences.

## **Infrastructure and new equipment**

After three years of dealing with contractors, suppliers and the administration's bureaucracy, the broken generator (since 2019) was finally repaired with the DCM funds and technical personnel. This is an essential piece of equipment for the Marine Lab at Magueyes, it feeds half of our facilities with electricity when the main power (LUMA) is down, which is happening very often in the last years.

The department continues to have serious problems with damaged infrastructure since hurricane Maria and lack of regular maintenance to the buildings in Magueyes by the Lands and Buildings Dept in Mayaguez. The following is a list of the most urgent needs ranked from most important to highly important:

- 1- Demolition and removal of the second floor of the Chemical Oceanographic building destroyed by Maria.
- 2- Sealing and impermeabilization of the roof of the main building (MG831). Water leaks to floors below every time it rains, three quotes were submitted together with the request to OPIMI 18 months ago.
- 3- Repairs to all Windows damaged by hurricane Fiona in building MG836. The Chancellor made a commitment to attend this problem, never happened.
- 4- Cleaning and maintenance of eighteen ACs and fixing a 7.0 T AC the cools the Chemical Oceanography lab. And is being broken for over a year.
- 5- General pressure wash and painting of all building in Magueyes. These structures have not been painted for over 13 years and they look bad.

The Department purchased two new working vehicles to facilitate maintenance, moving materials and equipment around and construction work at Magueyes. A four-wheel drive Kawasaki Mule utility vehicle with all terrain tires (\$18,500) and a medium-size multi-use KIOTO tractor (\$39,200). Both vehicles are already helping the DMS physical plant workers to perform their maintenance tasks.

## **Revenues and financial balance**

The total revenue to the DMS for the use of lab/office space, wet table area space, classrooms and conference rooms by NGO's, SeaGrant, CARICOOS, and external visitors and institutions in 2023-24 was \$ 158,300.00. The use of the large and smaller boats generated \$ 7,233.60 and \$ 38,577.69 respectively (total of \$ 45,811.29). Diving support and tank use generated \$8,319, and the dormitories a total of \$3,733.25. The use of a photocopier at Isla Magueyes produced \$98.65. Total revenue for the fiscal year 2023-24 for the DM was \$207,943.19. **(Appendix 5)**

Institutional funds for maintenance of the Magueyes lab facilities in La Parguera were used for gasoline, diesel, motor oil, cleaning, spare parts, laboratory equipment and the update of our three (3) classrooms, one in Mayagüez and two Magueyes (\$45,000). The Faculty of Arts and Sciences provided \$20,473.16 for updating equipment for non-teaching staff. Through this, several pieces of equipment were acquired with the purpose of improving technological resources. The "Center of Technology Information (CTI)" provided funds (\$31,176) to improve the teaching laboratories and classroom to be able to provide local and distance teaching and conferences.

The dissemination of academic achievements was reduced to informing the faculty and students of the list of masters and doctorate graduates for the year. The DMS web page is being revised and reorganized to serve not only as a much better information platform of the DMS, its academic program,

the faculty members, research projects, productivity, student body and activities (AECIMA), but also to have sections of interactive new information, events, students' status, publications, and up-to-date dissemination of important news related to the marine environment etc.

## **2.- Mission and Vision of the DMS**

The mission of the Department of Marine Sciences is to promote a greater understanding of the marine environment within the core areas of biological oceanography, physical oceanography, chemical oceanography, and geological oceanography. The specific goals of the department are to increase knowledge in the marine sciences, to train graduate students in the marine sciences, and to serve the community. Original research by both faculty and students is the central focus of the department's program, emphasizes the complementary and mutualistic relationship among these goals.

The Department currently offers two postgraduate programs in Marine Sciences: Master and Doctorate. A new Professional Masters in Marine Science program is being developed and will be available for the Spring semester of 2025. This program does not require the development and completion of a research project or thesis as does Plan I. Plan II requires courses and a project (internship, seminar, or short project, and Plan III only require coursework and a final exam with a graduate committee.

Students successfully completing Plan I (Thesis) will be conferred the Master of Science degree (M.Sc.), whereas those completing Plan II (Project) or Plan III (Coursework) will be conferred a Professional Master in Marine Science degree (P.Mc). In addition, those students enrolled in Plan I (Thesis), will be able to specialize in one of the following areas: Biological, Chemical, Geophysical and Physical Oceanography. The Doctorate program leads to the degree of Doctor of Philosophy (Ph.D) in Marine Sciences and students enrolled in this program will also be able to specialize in one of the four oceanography areas listed above. These programs encompass both the full breadth of these disciplines and the specialization needed to develop specific technical and analytical skills within a larger scientific context. The program seeks to produce graduates with a strong background in marine sciences able to critically analyze problems and offer solutions through the application of scientific knowledge and research. Students are prepared for careers in teaching, research, and industry, as well as resource and environmental management.

### **2.1 The vision of the DMS:**

- To increase knowledge of the marine environment by means of scientific research and transmitting this knowledge to the larger academic and stakeholder community.
- To contribute to social and economic development of Puerto Rico through the conservation and sustainable uses of the marine environment and its resources.
- To provide leadership and serve as a model department for graduate education on the Mayagüez Campus.

## **3.- To institutionalize a culture of strategic planning and assessment**

The last version of the DMS strategic plan was valid from 2014-until 2022. We are currently updating the plan for the next six years. The plan included eight objectives, each one described in terms of the



strategies to develop and the metrics to evaluate the success of achieving the Objectives (appendix 6). Objective one and two are of critical importance because they include strategies to increase the quality, number, diversity and expertise of professors in the department, strengthen links with other academic units, provide teaching experience through Graduate teaching assistantships and support research assistantships by increasing external funding supplies and equipment, develop efficient administrative/reporting/evaluation protocols appropriate for a graduate/research program. The metrics to evaluate this objective include: number, composition and area of expertise of the DMS faculty, number of formal and new agreements with other departments (UPRM) and/or institutions, number of new TAs and RAs available to the DMS students, number of research theses supported with external funds, number and funding of external grants, and number of new courses created and offered.

There are several examples fitting the metrics established to evaluate the compliance of the DMS with the goals established in the UPRM and the DMS strategic plans. The number of new student applications to the program, the number of graduates per year, number of peer-reviewed manuscripts published and the number of externally funded projects are the most important metrics to assess the performance and success of the Graduate Program in Marine Sciences at UPRM. For example, the number of new student applications to the DMS Graduate program has been steadily increasing in the last few years (Figure 1). Total number of students accepted into the program was higher during 2023-2024 compared to previous years, eighteen (18) applications were received in 2023, the highest in many years.

The valuation committee of DMS is developing an assessment protocol and metrics to evaluate the status (i.e. full or partial completion) of the different objectives in our strategic plan. However, we consider that the various important metrics mentioned above are good indicators and valuable components of this process, and we use them as a measurement of improvement (or not) and success of the program.

In terms of the critical number of faculty (Fig. 2), the department has been pressuring the administration to provide new faculty positions to increase and diversify the actual numbers to maintain and/or increase the quality of the program. This is the weakest part of the program at this moment because it affects the overall quality of the program and the total number of students the MS can accept each year. In 2023, for example, the Graduate Committee had to reject four of the 16 application to the Master's program because most professors are already saturated with students under their advice and they do not want more.

Part of this problem might be solved when the new program "Professional Masters in Marine Sciences" with two plans (Plan II and Plan III) is approved and offered in our graduate program. It is in the final steps of the approval process. The two new plans were designed to provide a more general education in marine sciences adaptable to more flexible professional demands to attract students with more extensive preparations. the DCM benefits from a greater demand for admissions to the Department (30% increase in applications the first semester offered), a reduction in graduation time, an increase in the graduation rate, and an increase in collaborations between departments and with the private industry in general.

This program does not require a master's thesis, which makes it attractive to students who do not want, or cannot develop a research project to graduate. Many of our regular students are waiting to switch to this program, which essentially eliminated the requirement of a theses research project.

Dra. Johana Rotterova, our new Assistant Professor updated the course syllabus and program for both courses, Marine Microbiology and Marine Parasitology and organized them to be a curricular sequence, Marine Microbiology I (CMOB8635) and Marine Microbiology II (CMOB8636). She is also developing a new course in Marine Symbiosis (CMOB-XXXX), an extremely important topic for any marine biologist. The first two are already in the program for students to register.

The DMS metrics to assess yearly success in the academic and research activities include number of graduating students, number of proposals submitted and approved, amount of new external funding, status of ongoing projects, financial aid to our students, peer-reviewed publications, new professors in the DMS, outreach activities, and number of researchers visiting and using our facilities. Other metrics are also used to assess the productivity of our administrative staff and the status and improvements of the infrastructure and logistical support of the Magueyes Marine Laboratory, and the overall revenues produced by the use of the facilities, boats, dive tanks, etc.

Most of the resources needed to fulfill the objectives come from the DMS regular budget, the rotative accounts, and the external funds from research grants.

#### **4.- To lead higher education throughout Puerto Rico while guaranteeing the best education for our students.**

The educational goals of the DMS are clearly stated in the mission and vision statements, the Student Outcome Learning Assessment (2016) and the DMS Strategic Plan (2026-2022), and in the Student Manual (2021).

The Department of Marine Sciences (DMS) is the only one offering a bi-lingual, comprehensive, high quality graduate program in marine sciences in Puerto Rico and the Caribbean. Graduates from this program are highly competitive professionals and most of them have found jobs in local government and federal agencies, higher education/research institutions, and the private sector. Therefore, the UPRM-DMS is the leader institution providing graduate training in Marine Sciences to Puerto Rican and Caribbean students.

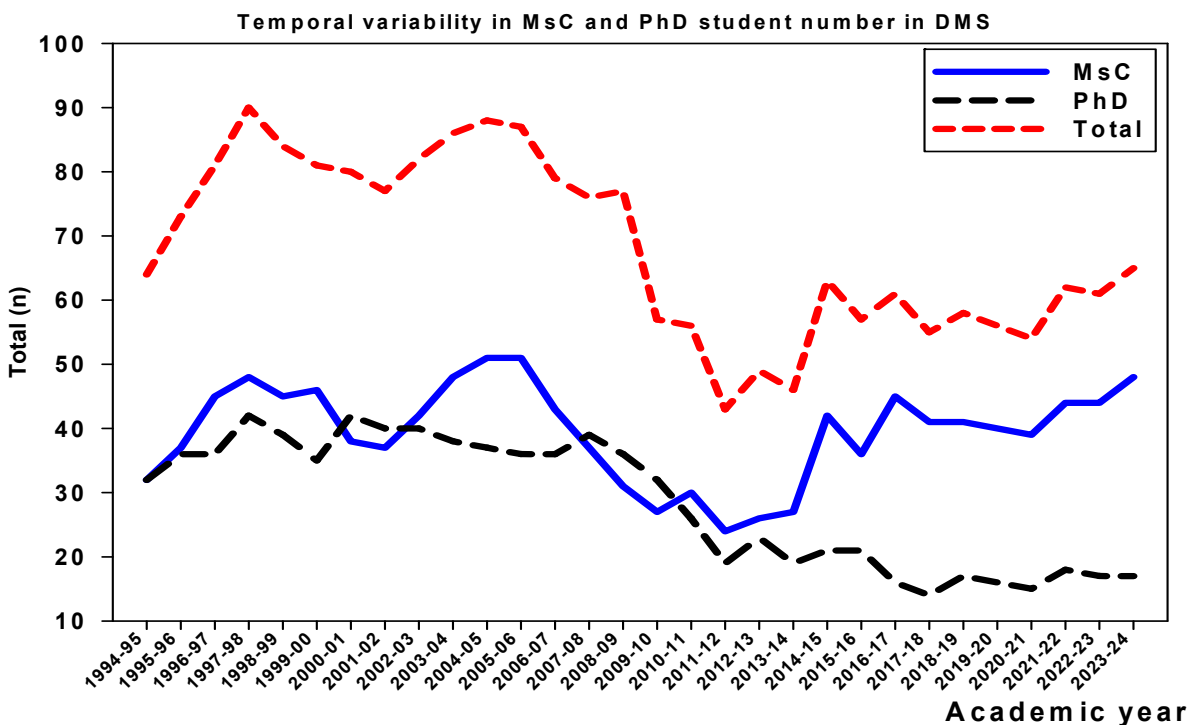
The DMS is well known across the marine science academic and research circles because of the high-quality of our program represented by our graduates, and the innovative and highly productive research activities represented by close to a thousand peer-reviewed manuscripts. The department is completing a curricular review, and is waiting on the approval of the new Professional Masters in Marine Science program, it continues to update and improve the academic and training coursework (field work, experimental designs).

Adding to our academic and training program, the DMS is at the front line of researching and finding answers and viable solutions to the current problems affecting marine ecosystems in Puerto Rico and the Caribbean.

During the last year (2023-24) the DMS faculty and students have been involved with relevant large projects, some new and some older, including water quality assessment, coral reef diseases and community declines, *Sargassum* impact on coastal communities, economically important algae cultures,

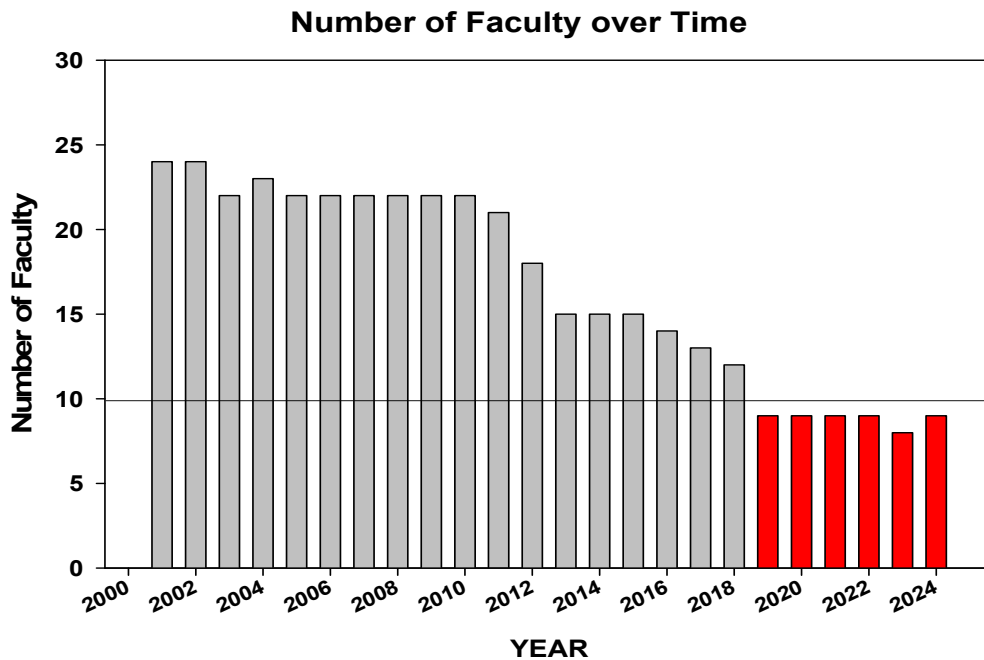
and holistic approaches to coral reef restoration. A generous financing from NOAA has allowed the development of the first and more extensive on-land culture of corals, sea urchins, crabs and fish for coral reef restoration in collaboration with the Institute for Socio-Ecological Research (ISER), other NGO's, institutions and local and Federal Government agencies. All these activities ended up being transmitted to local schools, dive enthusiast and communities throughout the DMS outreach and community training activities. The information is passed to government agencies so they can engage on developing protection and managing plans for Puerto Rico's coastal marine communities.

The number of applications and registered students has varied across semesters and years, with the higher number of applications usually for the Fall semester. The trend over time (Fig. 1) shows the temporal variability in total number of accepted students into the program. This variability responds to different factors such as the total number of professors in the DMS (that can take and advise graduate students), the financial situation of Puerto Rico and the University, and the lack of stability of the university with student and employee strikes that tend to scare away current and potential students. The maximum number of registered students was in 2004 when the DMS had a full complement of 24 professors (Fig.2) covering all sorts of research and academic areas in marine sciences. The lowest number was in 2012 with 46 students, a 50% reduction. It has been varying between 50 and 65 since 2015, even though the number of professors have dropped to a critical number of 8 ( a 65% decline) by 2023-24.



**Figure 1.** Temporal variability in the number of active graduate students in the DMS over time.

The Graduate program in Marine Sciences continues to be in high demand. The DMS received eighteen applications for the Fall semester of the 2023-24 academic year and another six for the Spring semester for a total of 24 students accepted into the program this year, the highest in recent history. Unfortunately, the DMS had to reject some good applications because there are not enough faculty members to mentor all the students. On average, each faculty should be advising 6+ students each, however, this is not the case because most of our students are in the Biological Oceanography specialty, so professors in this area average 8-10 graduate students, a high overload.



**Figure 2.** Temporal decline in the total number of active professors in the DMS between 2001 and 2024. The graph shows a decline of 63% in the number of faculty (from 24 to 9 in 2021). The red line indicates a critical number of professors under which the quality and diversity of the graduate program is suffering

The other concerning trend is the decline in the number of Ph.D students until 2017, when we had the lowest number (12). It has remained low since then, averaging 12-16 with no current trend to increase (Fig. 1). The DMS had 15 doctorate students over the last academic year, one finished in December 2023, two finished in July 2024, and two were accepted into the program to start in the Fall 2024.

#### 4.1- Curricular reviews

A curricular revision of the graduate program of the Department of Marine Sciences was approved by the Academic Senate on June 19, 2020 [Certification 20-52 (SA-RUM)]. The DMS faculty has been revising and updating the list of courses offered for our graduate program. Several courses were eliminated (old, or have no professor), and others were inactivated for lack of professors to teach them. This is a major problem the graduate program is facing and it will not improve until the Administration allows the DMS to hire new professors. The current professors (8) teach a total of 33 courses (not including special topics or theses) between the two semesters of each academic year. Some of these courses are not offered every semester because of the curricular sequence, or due to lack of professors. The very important areas such as marine botany, marine physiology, ichthyology, aquaculture, and fisheries biology do not have active courses due to a lack of professors.

#### 4.2- New courses

Dra. Rotterova, our new Assistant professor updated the course syllabus and program for the course Marine Microbiology and Marine Parasitology to be a curricular sequence, Marine Microbiology I (CMOB8635) and Marine Microbiology II (CMOB8636). She is also developing a new course in Marine Symbiosis (CMOB-XXXX), an extremely important topic for any marine biologist. The first two are already in the program for students to register.

There is a limit to how many new courses can be developed by the DMS faculty because of the low numbers and potential time overlaps and/or restrictions. The Faculty continues to develop courses at the 5000 and 6000 level to attract upper-level undergraduate students and motivate them to apply to our graduate program. These courses also add diversity and opportunity for our students to complement their academic programs given the low number of courses currently available due to lack of professors.

Biological oceanography is the area with the most demand receiving the bulk of the new applications. Other specialization areas within the program such as physical, geological and chemical oceanography are receiving very few, or none, new students, which pose a problem for professors in these areas if they are not advising a high number of students. Lack of professors in these areas also produces another problem, the low number of specialization courses for the few students in these three areas.

#### 4.3- New academic programs

The Department is pushing the administration to finish the process and certify the new **Professional Master's in Marine Sciences** program, with Plan II (with project) and Plan III (courses and final exam). The program was offered one semester and attracted several new students to the Department, furthermore,

several of the current students enrolled in the master's program (Plan I) switched or want to switch to this new program. The DMS hopes that the program will be certified and will be available for the second semester of the 2024-25 academic year.

#### **4.4- Recognition of Faculty staff**

Professor Aurelio Mercado Irizarry was honored with a Doctor Honoris Causa by the University in a ceremony at the Mayagüez Campus (RUM). Dr. Mercado Irizarry had a Masters and worked at the department for 30 years until his retirement. He was a pioneer in Physical Oceanography issues in Puerto Rico, working on the threats of Tsunamis in the region, contributed significantly to the Curricular Sequence of Atmospheric Sciences and Meteorology of the Mayaguez Campus. His prolific scientific carrier has served as the basis for the development of public policy with a view to reducing the vulnerability of coastal communities and residents of flood-prone areas during extreme events such as hurricanes, torrential rains, and tsunamis within a climate change scenario.

Dr. Travis Courtney was awarded a **2024 Sloan Research Fellowship**. He was among 126 early-career scholars that represent the most promising scientific researchers working today according to the Sloan selection committee., "Their achievements and potential place them among the next generation of scientific leaders in the US and Canada".

A leading academic platform for **Ranking of Top Scientists in the field of Ecology and Evolution researchers** ([Research.com](https://research.com)), in its 2024 Edition ranked Dr. E. Weil at 1083 in the US and 2992 in the World. <https://research.com/scientists-rankings/ecology-and-evolution>, an improving ranking since the 2023 edition. The ranking is based on D-index (Discipline H-index) metric, which only includes papers and citation values for an examined discipline. The ranking includes only leading scientists with D-index of at least 30 for academic publications made in the area of Ecology and Evolution.

#### **5.- Initiatives to strengthen teaching - Collaborative Agreements**

The most important initiative to strengthen teaching and the quality of the graduate program is hiring new professors to fill the gaps in important topics in the four different areas of the DMS graduate program in marine sciences.

The DMS hired Dr. Johana Rotterova as a new Professor in microbiology and marine symbiosis last to replace the position of Dr. G. Nadathur who unfortunately passed away. The DMS got another Assistant professor position to be filled this year from the administration, this one in Fisheries and Aquaculture. The DMS advertised (Announcement # 24-28) the position and already received, and is reviewing five applications. We expect to call for interviews soon and have this new faculty start in January 2025.

The DMS personnel committee continues to review the CVs of several candidates to be appointed as Adjunct professors. Adjunct professors can teach and advise graduate students, write proposals and develop research projects with DMS faculty. It could increase and complement our academic offerings for new students.

The DMS has no program for training professors, most of whom have achieved the highest academic degree (Ph. D). The new training activities are usually sought by the professors' initiatives in the form of workshops, seminar series, training programs in new instrumentation and techniques, etc. Dr. W. Schmidt participated in a workshop for the region of the South Atlantic (between the African and American coasts) and the Wider Caribbean area on the United Nations Regular Process – World Ocean Assessment in 2023. Dr. Weil participated in a couple of workshops dealing with the treatment of a new coral disease (SCTLD) producing high mortalities and the restoration of coral communities.

### **5.1- Infrastructure and equipment support**

The upgrade of classrooms and Conference rooms to be “Virtual Classrooms) Was completed. State of the art equipment (Camera, projector, computer, modem, TV screens, fast fiber optics internet) and support for remote teaching has been available since 2022. The next step is ongoing already which includes to upgrade the fiber-optic network and bandwidth in the main Building MG831, and extend it to all the facilities (areas) of the Magueyes Marine lab. This will allow students, professors, visitors and personnel to access fast internet connection from any area of Magueyes. It also will allow the installation of sophisticated measuring and recording equipment for monitoring and security video recordings.

The upgrade and refitting of the fleet of small boats (new outboard engines, central consoles, cables and electrical system, and the re-arrangement of the distribution of sitting and working space inside the boats was finished. Boats are now safer and more efficient (gas consumption has been reduced significantly by the four strokes engines saving money to the DMS. Tip-tops for three of our medium size boats are planned for this year.

Maintenance of the air compressor and nitrox facilities was done and spare parts and materials purchased for last year functioning allowed the continuous diving support for the DMS students, professors and research visitors and the new research and restoration projects that demand frequent diving. The DMS has enough dive tanks to support the current activities, however, if the demand for air and nitrox continues to increase, a second compressor and more tank will be purchased.

The physical plant personnel continue to provide support to the students, professors and visitors helping with many different tasks (wood and steel work, rebar cutting, keeping the sea water system working, the boats in good working conditions, and the general maintenance of the infrastructure in Magueyes.

The replacement of all the old air conditioning units with new inverter units is continuing. During this year the most old units were replaced. Personnel from the refrigeration unit of the Planta Física dept. did maintenance to half the units that have not been maintained for over three years. We are waiting for the rest of the units to be maintained this coming semester. Physical Plant in Mayaguez has the list and quotations to purchase and install the rest of the units. This is another way by which the DMS is trying to save money reducing the electrical bill.

After three years of dealing with contractors, suppliers and the administration's bureaucracy, the broken generator (since 2019) was finally repaired with DCM funds and technical personnel. This is an

essential piece of equipment for the Marine Lab at Magueyes, it feeds half of our facilities with electricity when the main power (LUMA) is down, which is happening very often in the last years.

The Department purchased two working vehicles to facilitate maintenance, moving materials and equipment around and construction work in Magueyes. A four-wheel drive Kawasaki Mule utility vehicle with all terrain tires (\$18,500) and a medium-size multi-use KIOTO tractor (\$39,200). Both vehicles are already helping the DMS physical plant workers to perform their maintenance tasks.

Talks and meetings with the PR Council of Research and the Dept. Of Energy and Development to install a photovoltaic system (auto-consume) to energize the main building (MG831) in Magueyes produce a MOU that is now in the hands of the legal Department and the Chancellor. This is the first phase of an ambitious project to convert Isla Magueyes to green energy within the next few years.

## **6.- To increase and diversify the Institution's sources of revenue**

Faculty members are constantly encouraged to write and submit as many proposals as they can to bring funds to the DMS to support our students and infrastructure. They are also looking for new sources of funding, including private foundations, private companies, and joining as Co-PIs with local NGOs to increase potential sources of research and academic funding.

Mou's with CARICOOS and Ecoelectrica were renewed. New MOUs with ISER and DNRA are in progress for the Coral reefs restoration projects. A new MOU with the Puerto Rico Council on Research and the Department of Energy and development for the installation of a photovoltaic system to cover yet electrical needs of the main building (MG831) in Magueyes was developed and is in the legal department for review.

### **6.1- External funding, internal revenues, proposals and active projects**

Even though the DMS has only nine (9) active, full-time professors, eleven (11) research proposals were submitted during this year to Federal agencies (NOAA, ONR, NSF and NASA) for a total of \$10,235,793.01.01 in external research funding. Of these, three were approved with a total funding of \$1,544,411.00.

Two projects in which DMS faculty are collaborators (co-PIs) with NGO's and the DNRA started in 2023. The largest one (\$ 10,500,000) is entitled "*multi-strategic approaches to scaling-up ecosystem-based restoration to improve coral reef recovery and resilience around Puerto Rico*", will allow the expansion and improvement of the current on-land coral-, sea-urchins and crab cultures, and expanding the out-planting protocols to increase survivorship of the bleaching and disease resistant cultured fragments, to aid in the restoration of impacted coral reefs around Puerto Rico.

ISER will be the official administrator, with the other collaborators, including the DMS, as subcontractors or participants, for four years (2023-2027). The DMS will benefit by several infrastructural improvements, including a new, more efficient sea-water system with enough seawater pumping and storage capacity to last several days feeding the culture tanks if there is a power failure. Twelve research assistantships/hourly wage contracts will be available (> \$ 120,000 per year for 3 years) for DMS graduate- and BIO undergraduate students, and funds to pay for use of DMS space, boats and dive



facilities, and equipment is also included. The new water system will help other aquaculture projects on Magueyes such as the fish and mangrove, and algae cultures. The fish and mangrove cultures re for academic and outreach purposes. These projects will also provide opportunities for the DMS students to develop research thesis projects.

The Maxwell-Hanrahan foundation from San Francisco donated \$15,000 to the DMS to be exclusively used to support field work of the research projects of the Graduate Students of the department. Six students (two Ph.D and four Ms.C submitted proposals to be evaluated for funding. All six received all the amounts the requested for different aspects of the field work and minor equipment needed.

## **6.2- Recurrent accounts – intended use**

The total income to the DMS for the use of lab/office space, wet table area space, classrooms and conference rooms by NGO's, SeaGrant, CARICOOS, and external visitors and institutions in 2023-24 was \$ 158,300.00. The use of the large and smaller boats generated \$ 7,233.60 and \$ 38,577.69 respectively (total of \$ 45,811.29). Diving support and tank use generated \$8 ,319, and the dormitories a total of \$3,733.25. The use of a photocopier at Isla Magueyes produced \$98.65. Total revenue for the fiscal year 2023-24 for the DM was \$207,943.19.

The balance of expenditures of the recurrent account for maintenance, repairs, gasoline, diesel, oils and lubricants, purchasing minor equipment for the different workshops (Electricity, carpentry, plumbing, general woks and landscaping) and the purchase of two new vehicles (a multi-use, medium sized tractor and a utility vehicle) was \$45,000.

The DMS fleet of small and medium sized boats serve a wide range of users, starting with our faculty and students who use the boats for their classes and training, and their externally funded, or non-funded, thesis and other research projects, and for the outreach program, providing an opportunity to some groups to visit some of the nearby shallow marine communities. The boats are also available to visiting researchers and students from universities abroad and from other educational and government agencies from PR. During this academic year the small boats were used in 171 research trips transporting 1,052 people. Nine trips were scheduled for educational, 63 for departmental classes (field trips), and 53 field trips for work on the thesis research projects of the DMS students.

Overall, the boats were used a total of 1,022.30 hours. The larger research vessel (Sultana) has been out of commission for over two years due to lack of availability of a dry dock in the southwest coast. The Sultana needs repairs that can only be made on dry dock. The other RV (Gaviota) is dedicated to our dive programs but is also used when DMS has large visiting groups of when researchers need a larger platform to carry equipment and conduct their research.

The maintenance of these boats is paid for entirely with the funds generated from the usage-fees charged (see below).

The dormitories received 31 people for research and educational purposes. They are in the process of renovation again. The DMS needs to overhaul the dormitories and lab. Space up the hill to offer more facilities to our visitors in the near future. Use of dormitories is increasing slowly to the levels of the pre-pandemic times when the DMS had many visiting groups of students and researchers. These funds are

deposited in the rotative accounts and are mainly used for the maintenance of the boats and the diving facilities, including the air/nitrox compressor.

Funds from the “time purchase” (compra de tiempo) account (\$14,000) were used to increase the start-up award (\$8,000) provided by the Chancellors office to Dr. Johana Rotterova, the new Assistant Professor that started in January of 2024. Some funds from this account were used for student support (hourly wages) during the past year. Some extra funds might be used to purchase some basic equipment that the new professor would need to start her research as soon as possible.

**Table 1a – Recurrent account DMS-balance 2023-24**

Accounts DMS	FSR #	Balance 06/2023	Expenses 2023-24	total
Fish	3-50840	\$ 17,205.29	\$ 2,615.00	\$ 14,950.00
Indirect costs	3-90293	\$ 17,819.29	\$ 8,957.50	\$ 8,861.79
Time purchase	2-78273	\$ 128,156.70	\$ 11,238.00	\$ 116,918.70
<b>Total</b>				<b>\$ 140,730.49</b>

**7.- To implement efficient and expedient administrative procedures.**

Administrative staff has been working to simplify the flow of information and run administrative tasks more efficiently across employees, faculty, and students. A Spreadsheet summarizing information related to the different steps of the purchase process has been created, for example. It includes all information needed to follow the process from the company quote to the date the merchandise or service is received; company and quote date, number and date of requisition, number and date of purchase order, cheque, and date the merchandize or service was received. This table is in OneDrive for easy access to everyone. The administrative staff continues to keep important internal statistics up to date. These include employees’ attendance, illness leave, vacations, accumulated balances, extra hours, other leave, etc. Balances are then prepared every month. This information together with the individual requests are used to prepare the projection of excesses, vacation planning without affecting work, and the vacation dates for all employees.

The department was able hire three new guards this year, completing the needed number to cover the three daily turns 365 days a year. A new janitor was also hired which will help to keep facilities clean and well maintained. The DMS still needs other workers such as a refrigeration technician, small boat fiberglass repair, work on the general maintenance of facilities, small construction projects, maintenance of the boats and docks. A Magueyes supervisor is also essential.

Two members of our personnel retired this year, both of whom must be replaced quickly because they had essential positions in the DMS. Mrs. Monserrate Casiano, the Student Affairs Officer in charge of all the student’s retired this year on May 2024. Jorge D. Ramos “Peje”, a Magueyes worker in charge of repairing and maintaining the boats also retired on December 2023.

The administrative personnel performed extremely well during 2023-24 given the amount of work the DMS has and the few of them. They attended most of the training workshops related to the improvement of the different academic (registration) administrative (sign-request, use of programs, etc.) processes that were provided by the administration during 2023-24.

## **8.- To strengthen research and competitive creative endeavors**

Many aspects of this subtitle have been already presented above. The DMS has evolved into a hybrid institution where the best, bilingual graduate program in Marine Sciences in the Caribbean is provided, basic and applied research in marine sciences is conducted, educational outreach programs for the community are carried and services are provided to external local and Federal Agencies, universities, NGO's and private institutions externa students and researchers.

Several MOU's for collaborations both with research and applied science as well as assistance to the SeaGrant program local schools and communities in outreach educational programs in marine sciences. These include research collaborations, the leasing facilities and logistical support in important applied activities such as coral reef restoration (ISER, DNRA, NOAA, etc.), sargassum arrivals (NASA, DNRA), sea urchin and crabs larval rearing (ISER), assessment of changing environmental variables and coastal conditions (CARICOOS) and algae cultures (Woodshole Research Institution).

### **8.1- Collaborations for research and development**

Collaboration agreements are still in development between the DMS and the California State University, NothRidge Campus (Dr. Peter Edmunds) and SCRIPS Institute of Oceanography, University of California, San Diego. One with the Department of Anthropology (Dra. Isabel Collazo), and one with the department of biology (Dr. Dahiana Arcilla). This agreement will include student exchange, remote teaching of courses, research collaborations and summer courses.

Collaboration agreement with the University of Southern Mississippi (USM) and the Marine Consortium of the University of Louisiana (LUMCON). This link opens collaboration doors in aspects related to oceanography, possibilities to interact with other institutions and the opportunity for all UPR students.

The Sea Grant College Program has formalized a collaboration agreement with the DMS, through which we will join efforts to increase the impact of both programs in the community with a perspective of education, applied research and marine extension.

CoHemis Consortium Framework Agreement, between the UPR-Mayagüez and the University of Málaga, the purpose of which is to expand hemispheric collaboration by facilitating institutional and professional relations and faculty and student exchanges. In addition to supporting various investigations and information transfer through conferences and workshops.

Cooperative Agreement between the Woods Hole Oceanographic Institute and the UPR-Mayagüez for the purpose of promoting education and research through the establishment of academic exchange programs Academic exchange, visits by professors, research staff and students, particularly in association with joint research, workshops. Exchange of publications, scientific materials, academic articles, and research information resulting from joint activities, etc.

The DMS is a participating member of the Gulf of Mexico University Research Collaborative (GOMURC) which allows us to expand our collaboration ties in oceanographic activities (Letter of Support).

An MOU was signed between the DMS and the CARICOOS program. It establishes cooperation with infrastructure and logistical support, and an agreement for use of space in Magueyes, and use of DMS boats and diving support for the projects sponsored by the organization. CARICOOS provides several research assistantships for DMS students, and has helped with some equipment and upgrading of infrastructure.

An understanding agreement is maintained with the University of Rhode Island with which a migratory bird monitoring station was established that will allow the development of studies related to seabirds (Validity: 2019). In the Marine Sciences facilities on Isla Magueyes, the NOAA tide station with older data in this area of the Caribbean is maintained.  
(<https://tidesandcurrents.noaa.gov/stationhome.htmlid=9759110>) (Undefined)

A collaborative agreement is in force under the East Coast Oceanographic Consortium (ECOC) agency to guide and supervise the utilization, operation and administration of a currently active UNOLS research vessel, the R/V Endeavor; to promote cooperation and collaboration in marine science and education.

## **9.- To impact our Puerto Rican society**

The department has increased its outreach and community service activities thanks to the help and assistance of professors and administrative personnel, and the initiatives of AECIMA, the student organization and our local collaborators. One major accomplishment was the involvement of the DMS in the development of a high school marine science “program” for the new Montessori School Alejandro Tapia Rivera in the community of La Parguera. The DMS, the school principal, the San Juan headquarters and Mr. Efrain Figueroa and the Sea Grant program and CARICOOS are collaborating with this project. The DMS has provided information, materials, talks and logistical support for several visits of the students to our lab facilities, specially during the summer camps. This is an important collaboration because we are training and motivating the future graduate students of the department, and the community leaders to protect our marine natural resources. Recently, DMS collaborated with a series of workshops on coastal marine ecosystems and environmental and scientific photo-journalism for the school during June of 2024 lead by Mr. E. Figueroa.

The Department has been contacted many times in the last year to give local and international TV and journalist interviews about the current problems facing the coastal marine communities of Puerto Rico. This is part of our outreach activities and the one that reaches the most people.

The DMS has strengthened the collaboration with the Department of Natural Resources. During the last year we have had meetings and discussion about the critical situation of the La Parguera Natural Reserve (LPNR) due to the combination of stressful conditions linked to climate change (high temperatures, storms, diseases and bleaching) and the direct impact of human activities through the uncontrolled tourism activities. The LPNR has become a tourist nightmare due to the lack of law reinforcement and the ignorance of the users. The DNRA and the DMS are now working closely to increase the environmental education levels of the users, establish usage regulations to ameliorate the human impact (Noise control, speed limits in manatee areas, night lighting, carrying capacity in some highly visited localities, etc.) while we finish the Management plan for the reserve.

The DMS has a couple of projects dealing with the influx of the floating seaweed Sargassum, which has increased significantly every year since 2016. The idea is to use the results of these studies to forecast the

arrival of the big floating rafts and plan how to prevent the accumulation of the seaweed in areas where it can produce extensive mortalities due to the lack of oxygen during decomposition.

### **10.- To strengthen school spirit, pride, and identity**

The DMS is compiling information to develop courses that will help our graduate students to write research proposals and scientific publications. The revision student's manual and the DMS web page are being updated with recent important information on the Professional Masters in Marine Sciences program, new courses, changes in the official protocols and curriculum sequences, deadlines etc. that will provide better and easier information to our current and potential students.

The DMS has one student organization, AECIMA, which has been doing excellent work with community services and training, tours of our facilities, talks, organizing the DMS annual Scientific Symposium, workshops, and organizing open houses in the department, music nights and beach cleaning activities. Also, AECIMA participates in the promoting activities of the DMS in other institutions around Puerto Rico.

The Department has been contacted many times in the last year to give local and international TV and journalist interviews about the current problems facing the coastal marine communities of Puerto Rico. This is part of our outreach activities and the one that actually reaches the most people.

The DMS does not receive any recurrent donations from Alumni. However, we were just informed last year that in the year 2012, The Rita Walsh MD Scholarship was established to aid graduate students from the department of marine sciences and the school of medicine in Ponce. The agreement was signed by the then President of the University Dr. Miguel Munoz and Mrs. Carmen Walsh Rivera. The funds come from the dividends of Mrs. Walsh investments and the only information we could get from the Central administration is two deposits into the endowment for \$ 452,838.79, which we assume are from two years. We have not been able to find out what the deposits for the other ten years are and how much is the total endowment for assistantships in the scholarship fund.

### **11.- International activity**

During the academic year 2023-24 The DMS had few international students. Only seven (7) or 12 % of the students were from foreign countries, mostly from central and south America. Two masters (one male one female) and one Ph. D (female) students were from Colombia, two male Ph. D students were from Mexico, one female Ph. D student was from Ecuador and one from Costa Rica, one male and one female.

#### **International Visit**

Dr. Fabio Bulleri, Marine Biologist, University of Pissa, Italia; participate in two conferences; (1) Global Changes to Biodiversity and (2) Experimental design in Marine Sciences. Collaborated in other activities during his visit: Participate in the field implementation of the research titled: Inhibition effects of introduced algae on the recruitment of sea urchins in La Parguera Natural Reserve, SW Puerto Rico. Be available for individual consultation to students of DMS on topics related to marine ecology, statistics, and sampling design. November 6-23, 2023, Invited by Dr. Juan Cruz Motta, Professor.

Three of the faculty members are originally from foreign countries, two from Venezuela and one from Greece. Our new faculty member is from Czechoslovakia.

Most of the faculty have collaborations with researchers from other institutions, some from foreign countries, and have published joint manuscripts with them. Last year publication list (appendix 3 ) at least 22 of the 41 (53%) manuscripts published and in revision in peer-reviewed journal av at least one international coauthor. The DMS has no courses in collaboration with international colleagues.

# APPENDIX LIST

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## Academic Programs (appendix 1)

Master and Doctor of Philosophy in Marine Sciences

### Graduate tuition by academic program

The department only has graduate enrollment. For the 2023-2024 academic year, graduate student enrollment was **45 M.S.** and **15 Ph.D.** Two (2) new applications for admission for Ph.D. and sixteen (16) new applications for M.S. were processed. The year culminated with an **overall enrollment of 60 graduate students.**

During the 2023-2024 academic year the Department of Marine Sciences awarded 12 Master of Science Degrees:

### M.S. (12)

**Nicolle Lebrón López, MS.** Culturable Actinobacteria in Two Marine Sponges from the Genus *Aplysina* in Puerto Rico. Advisors; Dr. Nikolaos V. Schizas/ Dr. Govind Nadathur (RIP).

**Khrystall Ramos Callejas, MS.** Variabilidad Metabólica de Dos Corales Masivos Constructores de Arrecifes *Orbicella faveolata* y *Siderastrea siderea* en el Gradiente de Profundidad en la Reserva Natural La Parguera, Lajas, Puerto Rico. Advisor; Dr. Ernesto Weil.

**María del Pilar González García, MS.** Weak population structure detected in the commercially important Deep-sea queen snapper (*Etelis oculatus*) in Puerto Rico Advisor; Dr. Nikolaos Schizas.

**Hunter B. Howard, MS.** Caribbean Sea Urchins *Tripneustes ventricosus* and *Diadema antillarum* Philippi can act as Biological Controls for the Invasive Seagrass, *Halophila stipulacea*. Advisor; Dr. Juan J. Cruz Motta.

**Iremar Fernández Vázquez, MS.** Spatial and Temporal Patterns of Recreational Boating Use and Associated Impact on Seagrass Meadows in La Parguera, Puerto Rico. Advisor; Dr. Juan J. Cruz Motta.

**Francisco E. González Casañas, MS.** Assessing metabolic changes in the Caribbean coral *Orbicella faveolata* during gametogenesis using the CISME (Community in Situ Metabolism device)". Advisor; Dr. Ernesto Weil.

**Kiara Acevedo, MS.** Fishers' Perception of Local Marine Fishery Ecosystem in the U.S. Caribbean Through Social-Ecological Network. Advisor; Dr. Juan J. Cruz Motta.

**Alba Guzmán Morales, MS.** Spatial and Temporal Patterns of Diffuse Attenuation Coefficient in Guánica, PR: 15 Years After Development of a Watershed Management Plan. Advisor; Dr. Roy A. Armstrong



**Roy Marengo, MS.** Numerical Modeling of Wave Transformation in San Juan, Puerto Rico: Comparison Between Swan and Swash. Advisor; Dr. Miguel A. Canals.

**Ana G. Medina Martínez, MS.** Determining the Age-Size Relationship of *Panulirus Argus* in the Southwest Area of Puerto Rico. Advisor; Dr. Juan J. Cruz Motta.

**Juliebeth Ramos González, MS.** Characterization of Recreational and Commercial Swordfish (*Xiphias Gladius*) Fishery in PR. Advisor; Juan J. Cruz Motta, PhD.

**Omar Zayas; MS.** High Genetic Connectivity and Moderate Diversity Detected in the Common Octopus (*Octopus Vulgaris*) Cuvier, 1797 in Puerto Rico Through Reduced-Representation DNA Sequencing. Advisor; Dr. Nikolaos Schizas.

#### **Professional Master Degree Plan III (2)**

**Mairim Ramírez Cruz.** Plan III, courses only. Dr. Ernesto Weil

**Mileisha L. Velázquez López.** Plan III, courses only. Dr. Ernesto Weil

#### **Professional Master Degree PLAN II (2) (with project)**

**Leira J. Centeno Mejías.** Project Title: EcoEléctrica Biological Monitoring Project Plan Report: 2022. Advisor; Dr. Travis Courtney.

**Priscilla N. Molina Cora, MS.** Observations of *Sargassum* Carbon Influx and Biogeochemical Impact in La Parguera Marine Reserve. Advisor; Prof. Julio M. Morell.

#### **Doctor of Philosophy (Ph.D.) (2)**

**Suhey Ortiz Rosa, PhD.** Bio-Optical and Biogeochemical Characterization of “Dark Water” Events in Southwestern Puerto Rico. Advisor: Dr. Roy Armstrong.

**Jaaziel García-Hernández, PhD.** The ecological importance of marine sponges inhabiting Puerto Rican shallow and mesophotic coral reef ecosystems. Advisor; Dr. Nikolaos V. Schizas.

**Graduate assistantships from institutional funds (16) \$58,676.66**

Fourteen (14) assistantships were processed for teaching with institutional funds from the Department of Biology. Two (2) assistantships were granted for Research by a private entity donation EcoEléctrica/Research.

<b>INSTITUTIONALS AND PRIVATE FUNDS 2023-2024</b>		
BIOLOGY/TEACHING	14	\$48,516.66
ECOELECTRICA/RESEARCH	2	10,160.00
<b>TOTAL</b>	<b>16</b>	<b>\$58,676.66</b>

**Assistantships: External Funds Research. (\$188,530.12)**

During the period August 2023 - June 2024; 32 graduate assistantships were processed plus five (5) undergraduates for a total of 37 with external funds sponsored by faculty members from the Department of Marine Sciences and other Departments.

<b>SOURCE FUNDS</b>	<b>ASSISTANTSHIPS GRANTED</b>	<b>TOTAL</b>
DRNA	6	\$ 23,569.00
FLORIDA INSTITUTE	1	1,700.00
NASA	8	41,504.50
NASA (UNDERGRAD)	5	17,835.00
NOAA	1	6,250.00
NOAA/CARICOOS	1	6,250.00
NOAA/NMFS	1	5,000.00
NOAA/SEA GRANT	3	22,500.00
NOAA/SEAMAP	2	15,425.00
NTHMP	3	16,166.62
OFFICE OF NAVAL RES.	2	20,830.00
PURDUE	4	11,500.00
<b>TOTAL</b>	<b>37</b>	<b>\$188,530.12</b>

**Student Labor Payment; External Funds**

Twelve (12) graduate students wages will work on various externally funded research projects at a total cost of \$21,253.88.

Student Labor Payment, Institutional Funds (1) \$3,000.00

One (1) student worked for wages on the Maintenance of the Museum Collection of Marine Invertebrates, Magueyes Island. \$3,000.

**SUBMITTED PROPOSALS  
2023-2024**

**(Appendix 2)**

<b>Cruz Motta, Juan J.</b>	AGENCY	AMOUNT
Seara, Tarsila and Cruz-Motta J.J. Developing a Stakeholder Driven Approach for Co-Production of Knowledge and Increased Adaptive Capacity in the U.S. Caribbean Fisheries Management. NOAA. 750,000\$. Two years.	NOAA	\$ 750,000.00
Luciano Castillo (Purdue-LEAD), Miguel Velez-Rubio (University of Puerto Rico-Bayamon), Juan J. Cruz (University of Puerto Rico-Mayaguez), Luis Gomez (Purdue); and Rosny Jean (FAMU). BIP Summer Institute and Conference for Climate Change, Coastal Resiliency & Innovation: Building a STEM Workforce for Tomorrow's Grand Challenges in the Americas. Office of Naval Research (ONR). 3,500,000.00 \$. Five years	ONR	\$ 3,500,000.00
Schizas, N; Weil, E., Cruz-Motta, J.J. The galloping expansion of the new invasive octocoral species in US Caribbean. RAPID NSF. 200,000.00\$. Two years	Rapid NSF	\$ 200,000.00
<b>Courtney, Travis A.</b>		
Leonardo S, Roberson L, Ciri U. Senior Personnel: Travis Courtney. NRT: Empowering Students to become innovators in energy sustainability. \$2,996,012. National Science Foundation. 5 years.	NSF	\$ 2,996.01
Courtney TA. Seafloor classification and elevation changes on coral reefs in La Parguera, Puerto Rico using an autonomous surface vehicle. Office of Naval Research. \$524,637. 3 years.	ONR	\$ 524,637.00
Courtney TA, Rotterova J, Amador A. Inclusion and Belonging in Ocean Science (IBOS) Collaborative: The East Coast Division of the D-ENTERPRISE Initiative – University of Puerto Rico Mayagüez. Office of Naval Research. \$1,443,816. 5 years.	ONR	\$ 1,469,712.00
Amador A & Courtney TA. Influence of coral reef restoration on reef-growth capacity, wave transformation, and shoreline protection in Puerto Rico. United States Geological Survey. \$319,999. 3 years.	USGS	\$ 319,999.00
<b>Schizas, Nikolaos</b>		
Nikolaos V Schizas (Pi) NASA-Bridge: Genomic studies on hypometabolism: developing solutions for microgravity and radiation exposure in space. NASA, \$300,000, 2 years	NASA	\$ 300,000.00
<b>Schmidt, Wilford</b>		
Wilford Schmidt and Frieder Klein, Chris German, Jeffrey S Seewald, Anna P Michel, Masako Tominaga, Timothy J Schroeder. Collaborative Research: Constraining the Modes of Crustal Accretion, Aqueous Alteration, and Fluid Flow at the North Wall of the Puerto Rico Trench using HOV Alvin and AUV Sentry, NSF MG&G, 1,629,903, 3 yrs.		\$ 1,629,903.00
<b>Rotterová, Johanna</b>		
Collaborative Research: EDGE FGT: Developing functional genomic tools in radiolarians, important contributors to biogeochemical cycles and indicators of climate change. NSF/iv. Requested amount: \$ 338,546.00 UPRM (\$ 2,397,765.00 across institutions) 4yrs		\$ 338,546.00
<b>Weil, Ernesto</b>		
The galloping expansion of a new invasive octocoral species in the US Caribbean/NSF RAPID/\$200,000./ 1yr.	NSF	\$ 200,000.00
Emergency Xeniid Response: a national plan for opportune eradication of nuisance Xeniiids in Puerto Rico. Collaborative project with TNC. Agency: NOAA/ Funds: 1,000,000 Total, (102,00 – Weil's Lab.) 3 Yrs.	NOAA	\$ 1,000,000.00
<b>TOTAL(9)</b>		<b>\$ 10,235,793.01</b>

## Approved Proposals

### Armstrong

Augmentation Proposal to: Ocean Community Engagement and Awareness using NASA Observations and Science for Hispanic/Latino students (OCEANOS), Juan Torres (PI- NASA), Roy Armstrong (UPRM PI). January 2023 to December 2026, Approved UPRM Budget, 3Yrs

NASA \$ 357,502.00

### Courtney

“Classification and structural complexity of marine substrates across spatial scales in Hawai’i using next-generation autonomous mapping vehicles” Office of Naval Research. 2 years

ONR \$ 208,025.00

### Schizas

Marco A. De Jesús (Pi); Oscar Marcelo Suarez (Co-PI); Mónica Alfaro (Co-Pi); Nikolaos V Schizas (Co-Pi) MRI: Acquisition of a Zeiss 560 VP FE-SEM for chemical and surface characterization and training. NSF, 2 years

NSF 988,884.00

TOTAL(3)

\$ 1,554,411.00

## PUBLICATIONS 2023-2024 (Appendix 3)

\*= Student participation

PUBLICATIONS 2023-2024	
Published Manuscripts	15
Manuscripts accepted and/or in print	5
Manuscripts submitted for review (professors)	5
Submitted manuscripts, under review (students)	13
Other Publications (Books and Book Chapters, Technical Reports)	1
TOTAL (publicadas + aceptadas + otras)	34

## PEER REVIEWED PUBLICATIONS

### A. FULL CITATIONS

#### Armstrong, Roy

Lockwood, Ronald., Charles M. Bachmann, Michael Chrisp, Corrie Smeaton, Nima Pahlaven, Eric Hochberg, Marcos J. Montes, Bo-Cai Gao, Robert Frouin, Anthony Vodacek, Cedric Fichot, Tom W. Bell, Roy A. Armstrong, Chunyan Li, Laura Kennedy, Steven Gillmer, Linda Fuhrman, Derrick Brouhard, Jade Wang, Kurtis Thome, "Aquatic ecosystems science using an imaging spectrometer," *Proc. SPIE 12688, Imaging Spectrometry XXVI: Applications, Sensors, and Processing, 126880D (20 October 2023)*; <https://doi.org/10.1117/12.2676124>

#### Cruz Motta, Juan J.

Appeldoorn, E.; Scharer-Umpierre, M; **Cruz-Motta, J.J.** 2023. Passive acoustics as a tool to quantify/characterize vessel activity at fish spawning aggregation sites. *Ocean and Coastal Management. 226.* <https://doi.org/10.1016/j.ocecoaman.2022.106270>

#### Courtney, Travis A.

\*Mejias-Rivera CL, Armstrong RA, Balint S, García-Troche E, McKinney RA, Morell JM, Oczkowski A, **Courtney TA.** 2023. Localized inshore warming, acidification, and elevated particulate organic matter across a coupled mangrove, seagrass, and coral reef ecosystem in La Parguera, Puerto Rico. *Coral Reefs.* <https://doi.org/10.1007/s00338-023-02435-y>

Toth LT, **Courtney TA,** Colella M, Ruzicka RR. 2023. Stony coral tissue loss disease accelerated shifts in coral composition and declines in reef accretion potential in the Florida Keys. *Frontiers in Marine Science.* <https://doi.org/10.3389/fmars.2023.1276400>

#### Otero, Ernesto

Ayala-Torres, R., & Otero, E. (2023). Seasonal dissolved oxygen depletion in bottom waters may be linked to bioluminescence in a shallow Caribbean Bay. *Regional Studies In Marine Science*, 66, 103139. <https://doi.org/10.1016/j.rsma.2023.103139>

#### Schizas, Nikolaos

\*Rodríguez-Ferrer G, Appeldoorn RS, Mignucci-Giannoni AA, Rinaldi R, NV Schizas (2024), The presence of two distinct mitochondrial lineages in the bottlenose dolphin (*Tursiops truncatus*) in Puerto Rico and their affinities with previously reported lineages. *Mammalian Biology*-  
<https://doi.org/10.1007/s42991-024-00423-5>

\*Lebrón-López NE, Nadathur, GS, NV Schizas (2024) Culturable actinobacteria from two marine sponges from the genus *Aplysina* in southwest Puerto Rico. *Caribbean Journal of Science* 54: 57-76  
<https://doi.org/10.18475/cjos.v54i1.a9>

#### Schmidt, Wilford

Zero publications

#### Sherman, Clark

McCulloch, M.T., Winter, A., Sherman, C.E. and Trotter, J.A., 2024. 300 years of sclerosponge thermometry shows global warming has exceeded 1.5 °C. *Nature Climate Change*, 14(2): 171-177. <https://doi.org/10.1038/s41558-023-01919-7>

Sherman, C.E., Carlo, M., Tuohy, E. and Adey, W.H., 2023. Styles and rates of mesophotic reef accretion on a Caribbean insular slope. *Coral Reefs*, 42(5): 1025-1044  
. <https://doi.org/10.1007/s00338-023-02402-7>

#### Rotterová, Johana

**Rotterová, J.\***, Pánek, T., Salomaki, E.D., Kotyk, M., Táborský, P., Kolísko, M. and Čepička, I., 2024. Single cell transcriptomics reveals UAR codon reassignment in *Palmarella salina* (Metopida, Armophorea) and confirms Armophorida belongs to APM clade. *Molecular Phylogenetics and Evolution*, 191, p.107991. Impact factor 4.1. \*Dual affiliation – UPRM, CU

Feng, X., Méndez-Sánchez, D., Zhuang, W., Li, R., Pomahač, O., Čepička, I., **Rotterová, J.\*** and Hu, X., 2024. Morphology, morphogenesis, and molecular characterization of *Castula specialis* sp. nov. (Ciliophora, Armophorea, Metopida). *Journal of Eukaryotic Microbiology*, p.e13014. Impact factor 2.2. \*\*GSO URI affiliation, UPRM as current address

## Weil, Ernesto

Toledo DA, Veglia A, Jimenes NM, Gomes-Samor JM, McFaden C, **Weil E**, Schizas N. (2024). Shadows over Caribbean Reefs: Identification of a new invasive soft coral species, *Xeniia umbellate*, in Southwest Puerto Rico. doi: bioRxiv preprint <https://doi.org/10.1101/2024.05.07.592775>

Rodríguez-Matos LR, Andras JP, **Weil E**, Schizas NV (2023). Genetic Connectivity among *Gorgonia ventalina* (Linnaeus, 1758 (Cnidaria: Octocorallia: Gosroniidae) populations of the Caribbean Sea. *The Excitement of Biology (10-3)*. <https://blaypublishers.files.wordpress.com/2023/05/rodriguez-matos-et-al. leb103-4.pdf>.

Raker C, Olmeda-Saldaña M, Williams S, **Weil E**, Prada C (2023). Corallivory and genotype differences drive *Orbicella faveolata* micro-fragment survivorship and growth during restoration. *Front. Mar. Sci.* 10:1122369. doi: 10.3389/fmars.2023.1122369

Lucas MQ, Collazo DL, Mercado MA, Fain EJ, Toledo DA, **Weil E** (2023). Stony Coral Tissue Loss Disease (SCTLD) induced mass mortality at Peñón de Mera and Cueva del Indio, Arecibo, Puerto Rico" *Marine Biodiversity*, <https://doi.org/10.1007/s12526-023-01393-6>

## B. IN PRESS/ACCEPTED

### Armstrong, Roy

\*Mejias-Rivera, C., **R.A. Armstrong**, S. Balint, E. García-Troche, R.A. McKinney, J. M. Morell, A. Oczkowski, T.A. Courtney. *In Press*. Localized inshore warming, acidification, and elevated particulate organic matter across a coupled mangrove, seagrass, and coral reef ecosystem in La Parguera, Puerto Rico. *Coral Reefs*.

### Cruz Motta, Juan J.

\*Alba Lis Guzmán-Morales, Roy A Armstrong, **Juan J Cruz-Motta**, William J Hernández. 2024. Spatial and temporal patterns of diffuse attenuation coefficient in Guánica, Puerto Rico: 15 years after development of a watershed management plan. *Frontiers in Remote Sensing*.

Tarsila Seara, Stacey M. Williams, Kiara Acevedo, Graciela Garcia-Molliner, Orian Tzadik, Michelle Duval, **Juan J. Cruz-Motta**. 2024. Development and analyses of stakeholder driven conceptual models to support the implementation of Ecosystem-Based Fisheries Management in the U.S. Caribbean. *PLOSone*.

### Schizas, Nikolaos

\*Domenech Ramos JP, PHC Corgosinho, NV Schizas Autecology and genetic diversity of Cletocamptus copepods in coastal hypersaline lagoons of Puerto Rico. *Caribbean Journal of Science*.

## Weil, Ernesto

Ricaurte ML, Schizas NV, **Weil E**, Ciborowski P, Boukli NM (2024). Proteome profiling under temperature seasonality fluctuations reveal acclimation mechanisms in the coral *Orbicella faveolata*.



C. SUBMITTED

**Armstrong, Roy**

- \*Ortiz-Rosa, S., **R.A. Armstrong**, W.J. Hernández, and S.M. Williams. *In review*. Remote Sensing of “Black Water Events” in Puerto Rican Oligotrophic Waters. [Remote Sensing Letters](#).
- \*Perez-Perez J., **R.A. Armstrong**, and W. Hernandez. *In review*. Using High-Resolution Sentinel 2 Multispectral Images to Monitor Sargassum Accumulations in Coastal Areas of Southwestern Puerto Rico. [Remote Sensing Letters](#).

**Cruz Motta, Juan J.**

- \*Hunter H. 1, 2; Williams, S.; Olmeda-Saldana, M; **Cruz-Motta, J.J.** . 2023. Caribbean Sea Urchins *Triplaneustes ventricosus* and *Diadema antillarum* can act as Biological Controls for the Invasive Seagrass, *Halophila stipulacea*. [Journal of Experimental marine Biology and Ecology](#).
- \*Fernández-Vázquez, Iremar; Padilla Montalvo, James A.; Hernández-López, William J.; López-Ocasio, Darien; López-Marrero, Tania del Mar; **Cruz-Motta, Juan J.** 2023. Spatio-temporal Patterns of Recreational Boating Use in a Caribbean Marine Protected Area. [Environmental Management](#).
- \*Ana G. Medina Martinez, Thomas Matthews, Travis A. Courtney, Verónica Seda, Aida Rosario, **Juan J. Cruz-Motta**. 2024. Determining the age-size relationship of the Caribbean Spiny Lobster *Panulirus argus* in southwest Puerto Rico. [ICES Journal of Marine Science](#).
- \*Juliebeth Ramos-González, Grisel Rodriguez Ferrer, René A. Esteves-Amador, Glorimar Franqui-Rivera, Alex Veglia, Juan J. Cruz-Motta. 2024. Characterization of recreational and commercial swordfish (*Xiphias gladius*) fishery in Puerto Rico. [Caribbean Journal of Science](#).

**Courtney, Travis A.**

- Ariel Katharine Pezner; **Travis A Courtney**; Wen-Chen Chou; Hui-Chuan Chu; Benjamin W Frable; Samuel AH Kekuewa; Keryea Soong; Yi Wei; Andreas J Andersson. Coral growth along a natural gradient of seawater temperature, pH, and oxygen in a nearshore seagrass bed on Dongsha Atoll, Taiwan. [PLoS ONE](#)
- Toth LT, **Courtney TA**, Colella M, Ruzicka RR. 2023. Stony coral tissue loss disease accelerated shifts in coral composition and declines in reef accretion potential in the Florida Keys. [Frontiers in Marine Science](#).
- \*Mejias-Rivera CL & Courtney TA. Ocean warming, heat stress, and coral bleaching in Puerto Rico. [Caribbean Journal of Science](#).

Ariel Katharine Pezner; **Travis A Courtney**; Wen-Chen Chou; Hui-Chuan Chu; Benjamin W Frable; Samuel

AH Kekuewa; Keryea Soong; Yi Wei; Andreas J Andersson. Coral growth along a natural gradient of seawater temperature, pH, and oxygen in a nearshore seagrass bed on Dongsha Atoll, Taiwan. [PLoS ONE](#)

### Rotterová, Johana

Schrecengost, A., Poláková, K., **Rotterová, J.\***, Čepička, I. and Beinart, R.A. 2024. Divergent marine anaerobic ciliates harbor closely related *Methanocorpusculum* endosymbionts. [ISME. Impact factor 11.0. \\*Dual affiliation – UPRM, GSO URI](#)

Méndez-Sánchez, D., Schrecengost, A., **Rotterová, J.\***, Poláková, K., Beinart, R.A., Čepička, I. 2024. A large-scale survey of anaerobic ciliates (Ciliophora, Metopida) reveals their methanogenic symbionts are habitat- and host-specific. [ISME. Impact factor 11.0. \\*Dual affiliation – GSO URI, CU; UPRM as current address](#)

### Schizas, Nikolaos

\*Daniel A. Toledo-Rodriguez, Alex J. Veglia, Nilda M. Jimenez-Marrero, \*Joyce M. Gomez-Samot, Catherine S. McFadden, Ernesto F. Weil, **Nikolaos V. Schizas**. Shadows over Caribbean reefs: Identification of a new invasive soft coral species, *Xenia umbellata*, in southwest Puerto Rico.

\*Ricaurte LM, **Schizas NV**, Weil E, P Ciborowski, NM Boukli. Proteome profiling under temperature seasonality fluctuations reveal acclimation mechanisms in the coral *Orbicella faveolata*. [Proteonomes](#).

Corgosinho PHC, ...**NV Schizas**. A New Genus and Species of Parastenocarididae Chappuis, 1940 (Copepoda, Harpacticoida) from the Espinhaço Mountain Range (Brazil) with an Unclear Phylogenetic Position within the Fontinalicaridinae Schminke, 2010. [Zootaxa](#)

\*José J. Orozco Juarbe, Paulo Henrique Costa Corgosinho, M Alfaro, **NV. Schizas** (2024). Checklist of the Marine Copepods of Puerto Rico. [Caribbean Journal of Science](#)

\*González-García María del Pilar, García-Sais JR, García-Moliner G, **Schizas NV** (2024) RAD-Seq derived SNPs reveal a weak population structure in the commercially important deep-sea queen snapper in Puerto Rico. [Marine Life Science & Technology](#).

### Weil, Ernesto

\*Ramos K, Gonzales FE, **Weil E**. (2024) Using CISME (Coral In Situ Metabolism) to assess metabolic variability in two massive, reef-building coral species *Orbicella faveolata* and *Siderastrea siderea*, along a depth gradient in La Parguera, Puerto Rico. [Caribbean Journal of Science](#)

\*Gonzales FG, Szmant AM, Whitehead R, Croquer A, Cruz-Motta JJ, **Weil E** (2024). Assessing metabolic changes in the Caribbean coral *Orbicella faveolata* during gametogenesis using the CISME (Coral In Situ Metabolism) diver-portable underwater respirometer. [Caribbean Journal of Science](#)

## D. OTHER PUBLICATIONS

### Weil, Ernesto

Croquer A, Zambrano Someira. **Edited by E. Weil** y Y. Rodríguez (2023). Guía práctica para identificar enfermedades de coral y especies asociadas en la Republica Dominicana

Department of Marine Science  
University of Puerto Rico  
Mayagüez Campus

Annual Report  
Magueyes Island

**(Appendix 4)**

**Education, Visitors and Outreach**  
**1<sup>st</sup> July 2023 to 29<sup>th</sup> February 2024**  
**By Lilivette Valle**

In the DMS facilities in Isla Magueyes, a total of 419 visitors were received in 9 groups (20 people) from Universities and Agencies of the United States and International, 10 groups (190 people) from schools or community groups, 11 groups (20 people) from US Agencies and 19 groups (185 people) from local universities and agencies.

The small boats served 1,052 people, for a total of 171 outings for research purposes, 9 outings for educational purposes, 63 outings for class purposes and 53 outings as part of thesis work. They offered a total of 1,022.30 hours of use.

The dormitories received 31 people for research and educational purposes. The

larger and medium-sized vessels made 4 sorties, for research purposes.

**Local, National and International Visitors for research or Education (Total Visitors = 49 groups; 419 visitors)**

**EU and International Universities and Agencies for Education or Research Affairs (14 groups; 26 visitors)**

1. Joyah Watkins, Rice University, 12-28-July-2023, (1)
2. Dra. Loretta Roberson, The Bell Center – Marine Biological Laboratory, 13-18-July-2023, (3)
3. Joyah Watkins, Rice University, 21-28-September-2023, (1)
4. Simon Walsh, Dominica, 28-September-2023, (2)
5. Dra. Gretchen Grebe, The Bell Center – Marine Biological Laboratory, 23-27-October-2023, (3)
6. Dr. Fabio Bulleri, Universidad de Pissa - Italia, 6-23-november-2023, (1)
7. Dra. Loretta Roberson, The Bell Center – Marine Biological Laboratory, 6-15-november-2023, (2)
8. Dra. Victoria Preston, Northeastern University, 3-9-december-2023, (1)
9. Dr. Phillip Matich, Texas A&M University, 12-14-december-2023, (2)
10. Caitlyn Bozza, Mote Marine Laboratory – Florida, 12-15-december-2023, (2)
11. Dra. Loretta Roberson, The Bell Center – Marine Biological Laboratory, 1-15-dicember-2023, (4)
12. Todd Oakley, University of California – Santa Bárbara, 25-27-January-2024, (1)
13. Dra. Loretta Roberson, The Bell Center – Marine Biological Laboratory, 29-January to 6-February-2024, (2)
14. Nils Haentjens, Universidad de Maine, 15-16-February-2024, (1)

**Universities and Agencies of Puerto Rico (19 group; 185 people)**

1. Dr. Nelson Cardona Martínez, Chemical Engineering Department - UPRM, 19-July-2023, (15)
2. Janeliz Martínez Ruiz, Interamerican University – Arecibo, 22-July-2023, (4)
3. Rosario del Pilar Fernández, Catholic University– Ponce, 9-September-2023, (12)
4. Dra. Lizzette M. Velázquez, University of Puerto Rico – Rio Piedras, 15-September-2023, (16)
5. Dr. Matthew Q. Lucas, Interamerican University – Arecibo, 16-September-2023, (12)
6. Dr. Matthew Q. Lucas, Interamerican University – Arecibo, 28-30-September-2023, (1)
7. Marangelly Torres Mercado, Impacto Juventud / Aula en la montaña, 30-September-2023, (33)
8. Andrea C. Torres Santiago, Biology Department – UPRM, 13-October-2023, (11)
9. José D. Cancel Casiano, Puerto Rico Seismic Network – UPR-RUM, 18-19-October-2023, (4)
10. Héctor E. Rivera Vientos, MyPecera.com Store – Ponce, 19-October-2023, (3)
11. Alok Arun, Interamerican University, 13-November-2023, (2)
12. Noemí Peña, Universidad Católica – Mayagüez, 17-November-2023, (6)
13. Lizmar Luna, University of Puerto Rico – Humacao, 18-November-2023, (10)
14. Joel Meléndez, University of Puerto Rico – Humacao, 2-4-December-2023, (10)
15. Joel Meléndez, University of Puerto Rico – Humacao, 9-11-December-2023, (8)
16. Dr. René Esteves, Programa de Colegio Sea Grant – Mayagüez, 12-13-December-2023, (15)
17. Damaris Negrón, Ecoeléctrica – LP, 19-December-2023, (18)
18. Catalina Aponte Cartagena, University of Puerto Rico – Cayey, 2-February-2024, (1)
19. Dr. Juan López Garriga, University of Puerto Rico – Mayagüez, 3-February-2024, (4)

#### **Schools and community groups (10 group; 190 people)**

1. Dr. Juan J. Cruz Motta, Summer Institute for Climate Change Coastal Resilience, 1-29-July-2023, (15)
2. Tania Metz, The Nature Conservancy, 14-July-2023, (30)
3. Dra. Aurea E. Rodríguez, Taller Ecológico de Puerto Rico, 17-21-July-2023, (20)
4. Tamaris Garcia, Girls Scouts – Tropa 432 G, 31-July-2023, (35)
5. Jamie Lauer, Hartford Union High School, 1-3-August-2023, (1)
6. Ana M. Garcia, Alejandro Tapia y Rivera School, 4-August-2023, (9)
7. Gerardier Martínez Pérez, Camuy, 13-October-2023, (3)
8. Dra. Yasmín Detrés Cardona, Geoambiente y Alejandro Tapia y Rivera School, 18-October-2023, (20)
9. Dr. Ernesto Otero, Group of teachers from different schools in Puerto Rico, 4-November-2023, (23)
10. Sheila G. Cruz, Instituto Nueva Escuela – Río Piedras, 10-November-2024, (34)

#### **US Agencies (6 group; 18 people)**

1. Daniel Deitz, Naval Research, 18-August-2023, (2)
2. Matthew Von Bargen, NASA, 20-September-2023, (2)
3. Dr. Juan Torres Pérez, NASA Oceanos, 11-12-January-2024, (10)
4. Jen McWhorter, NOAA, 1-February-2024, (1)
5. Ben Fiscella Meissner, Los Cheneques, 5-10-February-2024, (1)
6. Hannah Fisher, BBC Audio Science, 19-February-2024, (2)

## Services:

### Research/Education Courses (per vessel)

R/V Sultana (0)

R/V Gaviota (4)

1. Dr. Victor Huérfano, Puerto Rico Seismic Network – UPR-RUM, 13 hours, 18-October-2023
2. Frank Lazú Amáez, Dive class for the departmental students, 2.5 hours, 30-November-2023
3. Dr. Roy Armstrong, Department of Marine Sciences – Class, 3 hours, 5-February-2024
4. Dr. William J. Hernández, Environmental Mapping Consultants, LLC, 15-February-2024

### Departmental Seminars (2 by invitation; 10 per student; 0 by AECiMa):

Seminars by students of the seminar course (0):

1. Raymond Infante Rosa, UPR-RUM / CIMA, *“Pelagic Sargassum Fluxes and causes in the Caribbean”*, October 5, 2023.
2. Hernán Porras Espinosa, UPR-RUM / CIMA, *“Current Tectonic Deformation in the Caribbean Plate”*, October 5, 2023.
3. Juanita Carballeira Martínez, UPR-RUM / CIMA, *“Global Warming Effects in Puerto Rico: Contributions and Future Projections”*, October 5, 2023.
4. José Martínez Ortiz, UPR-RUM / CIMA, *“How Anthropogenic climate change influences sargassum and brown tide in Puerto Rico”*, October 5, 2023.
5. Aliyah Chabrier Alpi, UPR-RUM / CIMA, *“Coral Reef Degradation in the Caribbean”*, October 5, 2023.
6. Juanita Carballeira Martínez, UPR-RUM / CIMA, *“Quantifying Depth Gradients of Seawater Temperature, Salinity, Biological Oxygen Demand, and Carbonate Chemistry on Shallow Coral Reefs in Puerto Rico”*, November 2, 2023.
7. José Martínez Ortiz, UPR-RUM / CIMA, *“Analyzing Hypoxic Events Caused By Sargassum Blooms influenced By Winds From Hurricanes in Parguera, Puerto Rico”*, November 2, 2023.
8. Raymond Infante Rosa, UPR-RUM / CIMA, *“Microplastic Coastal Gradient On Surface Waters of La Parguera Puerto Rico”*, November 2, 2023.
9. Hernán Porras Espinosa, UPR-RUM / CIMA, *“Tectonic Contexto of Puerto Rico and the US Virgin Islands: A Review of Active Offshore Structures as a Base for Tsunami Modeling”*, November 2, 2023.
10. Aliyah Chabrier Alpi, UPR-RUM / CIMA, *“Settlement Behavior of the Laboratory – Reared Sea Urchin (*Echinometra Viridis*) in two Natural Microbial Biofilms of La Parguera Puerto Rico”*, November 2, 2023.

Seminars by invitation (2):

1. Dr. Fabio Bulleri, Universitat di Pissa – Italia, *“Experimental Design in Marine Ecology”*, November 21, 2023.
2. Dr. Jen McWhorter, NOAA, *“Biogeochemical Argo Research Applications”*, February 1, 2024.

Seminars by AECiMA (0):

**Seminars for employees (0):**

Departamento de Ciencias Marinas  
Isla Maguëyes  
Depósitos  
Depósitos 2023-2024

**(Appendix 5)**

Fecha	Recibo	Factura	Nombre	Agencia/Escuela	350000-	039110-	350002-	039640-	355161-0482 facilidades			Total
					0499	4272	0499	0499	dormitorios	fotocopias	facilidades	
					Gaviota	Buceo	Botes	Sultana				
14 julio 2023	683648	4991	Dra. Stacey Williams	Institute for Socio Ecological		3,000.00						3,000.00
14 julio 2023	683649	4959	Julio M. Morell	Caricoos			1,852.07					1,852.07
14 julio 2023	683650	4962	Julio M. Morell	Caricoos							6,667.00	6,667.00
14 julio 2023	683651	4976	Julio M. Morell	Caricoos							6,667.00	6,667.00
14 julio 2023	683652	4978	Julio M. Morell	Caricoos		32.00	674.02					706.02
14 julio 2023	683653	4997	Jennifer Perez	Ciencias Marinas						20.85		20.85
14 julio 2023	683654	4999	Daniel Toledo	Ciencias Marinas						0.20		0.20
14 julio 2023	683655	4998	Carla Mejias	Ciencias Marinas						0.50		0.50
14 julio 2023	683656	5001	Rosamar Ayala	Ciencias Marinas						0.25		0.25
14 julio 2023	683657	5002	Amanda Prieto	Ciencias Marinas						0.75		0.75
14 julio 2023	683658	5003	Glorimar Frankie	Ciencias Marinas						20.00		20.00
14 julio 2023	683659	5004	Tito Rodríguez	Ciencias Marinas						3.50		3.50
14 julio 2023	683660	5000	Juliebeth Ramos	Ciencias Marinas						2.35		2.35
16 ago 2023	683661	4971	Kimberly Edwards	NOAA							160.00	160.00
16 ago 2023	683662	4972	Yoana Newman	UW River falls			500.00					609.00
16 ago 2023	683663	4974									109.00	
16 ago 2023	683663	4990	Julio Morell	Caricoos, Inc.							6,667.00	6,667.00
16 ago 2023	683664	5010	Lisa J. Rodriguez	Villanova University			211.84					211.84
16 ago 2023	683665	5012	Tamaris Garcia	Gurabo, PR							100.00	100.00
16 ago 2023	683666	5014	Jamie Lauer	Hartfort Union High School			125.00					125.00
16 ago 2023	683667	4986	Jorge R Garcia Sais	Reef Reseach, Inc.		320.00						320.00
16 ago 2023	683668	4913	Damaris Negrón	DNA Environment, LLC		24.00	527.94					3,113.33
		4925			700.00							
		4935				16.00	307.31					
		4948				16.00	530.25					
		4965				16.00	480.23					
		4980				16.00	471.60					
		5019				8.00						
21-Sep-23	683669	4963	Dr. Carlos Prada	University of Rhode Island		64.00	190.00					254.00
21-Sep-23	683670	4973	Graham Kolodziej	University of Miami		200.00	1,136.52					1,336.52
21-Sep-23	683671	4988	Gretchen Grebe	The Bell Center		104.00	500.00					604.00
21-Sep-23	683672	4995	Dr. Carlos Prada	University of Rhode Island		24.00	190.00					214.00
21-Sep-23	683673	5005	Tania Metz	The Nature Conservancy						90.00		90.00
21-Sep-23	683674	5009	Dra. Aurea Rodriguez	Taller Ecológico de PR						250.00		250.00
21-Sep-23	683675		VOID									0.00
21-Sep-23	683676	5029	Dra. Lizzette M Velazquez	Educación- UPR-RP							375.00	375.00
21-Sep-23	683677	4957	Xiaodong Zhang	University of Southern Mississippi	5,800.00				1,471.50		880.00	8,151.50
21-Sep-23	683678	5030	Evan Tuohy	Ciencias Marinas						15.25		15.25
21-Sep-23	683679	5031	Jaaziel García	Ciencias Marinas						35.00		35.00
21-Sep-23	683680	5033	Dra. Stacey Williams	NCRMP		360.00						360.00
21-Sep-23	683681	5034	Dra. Stacey Williams	NOAA Transformational			5,000.00					5,000.00
21-Sep-23	683682	996 y 5020	Catalina Morales	Sea Ventures		144.00	540.00					684.00
3 octubre 2023	683683	4921	Damaris Negrón	DNA Environment, LLC							650.00	650.00
		4941								650.00	650.00	
		4961								650.00	650.00	
		4975								650.00	650.00	
		4989								650.00	650.00	
		5011								650.00	650.00	
3 octubre 2023	683684	5037	Dr. Matthew Lucas	Universidad Interamericana de PR Arecibo					54.50			54.50
3 octubre 2023	683685	5032	Dr. Matthew Lucas	Universidad Interamericana de PR Arecibo			250.00					250.00
19-Oct-23	686686	5049	Andrea C Torres Santiago	Biología UPRM			250.00					250.00
7-Nov-23	683687		VOID									
7-Nov-23	686688	5044	Miguel c Figuerola Hernán	San Germán, PR		168.00	200.00					368.00
7 dic 2023	683689	5043	Evan Tuohy	IslaMar Research Expeditions, LLC		32.00	217.80					249.80
7 dic 2023	683690	5022	Julio M Morell	Caricoos			875.84					875.84
7 dic 2023	683691	5036	Julio M Morell	Caricoos			371.93					371.93
7 dic 2023	683692	5046	Julio M Morell	Caricoos		16.00	938.94					954.94
19 dic 2023	683693	5053	Evan Tuohy	Isla Mar Research		72.00	125.00					197.00
19 dic 2023	683694	5068	Julio M Morell	Caricoos Inc.			130.33					130.33
19 dic 2023	683695	5070 y 5071	Joel O Meléndez	UPR-Humacao					490.50			490.50
19 dic 2023	683696	5072	Dr. Phillip Matich	Texas A&M Galveston			250.00					250.00
12 feb. 2024	683697	5088	Ben Fiscella Meissner	Los Chanques SD					109.00			109.00
12 feb. 2024	683698	5045	Cartalina Morales Ruiz	Sea Ventures		32.00	125.00					157.00
12 feb. 2024	683699	5061	Julio Morell	Caricoos			126.75					126.75
12 feb. 2024	683700	5078	Dra. Stacey Williams	NOAA Transformational			5,000.00					5,000.00
21 marzo 2024	683701	5084	Catalina Aponte Cartagena	Depto Biología UPR Cayey					27.25			27.25
21 marzo 2024	683702	5089	William J. Hernández	Environmental Mapping Consultants, LLC	733.60							733.60
21 marzo 2024	683703	5097	Dra. Stacey Williams	NOAA Transformational		2,000.00						2,000.00
21 marzo 2024	683704	5099	Dennis Ferraro	University of Nebraska, Lincoln, NE			250.00					250.00
21 marzo 2024	683705	5102	María E Vélez	Texas A&M University			250.00					250.00
21 marzo 2024	683706	5104	Dra. Stacey Williams	Institute for Socio Ecological Research			5,000.00					5,000.00



## PRESENTATIONS (Appendix 6)

### **Armstrong, Roy**

Dávila, D., **R.A. Armstrong**, and W.J. Hernández. 2023. **Change detection analysis of seagrass benthic cover in areas of accumulating sargassum in southwestern Puerto Rico. Oral Presentation, PRYSIG Annual Meeting, 3 November 2023, Mayaguez.**

Torres-Pérez, JL, Suleimán, S, Barberena-Arias, MF, Maldonado, P, Rodríguez, A, Detrés, Y, **Armstrong, R**, Hernández, W, Beaudry, B, Guevara, J, Chirayath, V, Tárrano, A, Hirsch, H, Cusick, A, Mascioni, M, Ramos, Y, and Allende, R. 2023. OCEANOS: Engaging Hispanic/Latino students in STEM by integrating NASA Observations and Science with hands-on field experiences. Abstract, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.

Lockwood, R., C.M. Bachmann, M. Chrisp, C. Smeaton, N. Pahlaven, E. Hochberg, M.J. Montes, Bo-Cai Gao, R. Frouin, A. Vodacek, C. Fichot, T.W. Bell, **R.A. Armstrong**, C. Li, L. Kennedy, S. Gillmer, L. Fuhrman, D. Brouhard, J. Wang, and K. Thome. 2023. Improving the Characterization of Aquatic Ecosystems with an Enhanced Imaging Spectrometer. Abstract, American Geophysical Union (AGU) Fall Meeting, San Francisco, CA.

### **Cruz Motta, Juan J.**

Tarsila Seara (University of New Haven), **Juan J Cruz-Motta** (University of Puerto Rico), and Stacey M. Williams (ISER Caribe). Development of Stakeholder Driven Conceptual Models to Support EBFM in the U.S. Caribbean. March 2024. Seattle, USA.

### **Courtney, Travis**

Courtney TA. Coral reef calcification and biogeochemistry under environmental change. UPRM Department of Chemistry Seminar Series. December 1, 2023.

### **Schizas, Nikolaos**

Workshop on Phylogenomics from January 21 to February 3, 2024. Czech Republic

[\(https://evomics.org/2024-workshop-on-phylogenomics-cesky-krumlov/\)](https://evomics.org/2024-workshop-on-phylogenomics-cesky-krumlov/)

### **Schmidt, Wilford**

Oral - Wilford Schmidt, Cross-cutting themes in ocean governance, 16May 2023, Regular Process Workshop on capacity building and in support of the development of the 3rd World Ocean Assessment for the South Atlantic (between the African and American coasts) and the Wider Caribbean regions. Santos, Brazil. v

- Wilford Schmidt, HOV Alvin in the Puerto Rico Trench, 15Apr 2024, UPRM Student Geology Society Symposium, Mayaguez, PR.



## Sherman, Clark

a. Oral

*Raiders of the lost Arca: An early foraging landscape in Cabo Rojo/Lajas, southwestern Puerto Rico*

William J. Pestle, Carmen Laguer-Díaz, M. Jesse Schneider, Stephen E. Jankiewicz, **Clark E. Sherman**

Society for American Archaeology's 89th Annual Meeting, New Orleans, Louisiana, USA, April 17-21, 2024.

## Rotterová, Johana

a. Oral

Johana Rotterová, *Where oxygen is not popular – marine anoxic sediments are full of life and symbiosis might be the key*, March 21<sup>st</sup> 2024, Seminar at Biology Department, University of Puerto Rico Mayagüez

Johana Rotterová, *Ocean life without oxygen: Who lives in oxygen-depleted marine environments and how do they do it?* April 13<sup>th</sup> 2024, Seventh Marine Science Symposium, La Parguera Community Center

## Weil, Ernesto

a. Oral

Townsend JP, Carrera-Yulfo N, Ramos KK, Williams SM, Cruz-Motta JJ, Weil E. ***Pre-Restoration Benthic Composition and Structure of Inshore Coral Reefs in La Parguera Following Major Thermal Stress.***

**[7mo. Simposio Ciencias Marinas \(AECIMA\) La Parguera, 13 abril, 2024.](#)**

Carrera-Yulfo N, Williams SM, Cruz-Motta JJ, Weil E. (2024) ***Novel coral – sea urchin restoration practice in La Parguera Natural Reserve, Puerto Rico.*** **[ASLO Ocean Sciences Meeting, New Orleans, March 2024.](#)**

Williams, SM, Starkey L, Banaszak AT, Cohen D, Colón Rodríguez RJ, Courtney T, Cruz Motta JJ, Esteves Amador R, Jimenez N, Nemeth M, Rodriguez P, Ruiz Torres H, Spadaro AJ, Harms-Tuohy C, Weil E, Williams M, Vega Rodriguez M. ***Caribbean Reef project Advancing Coral Reef Restoration Through Ecosystem-Based Approaches.*** **[Reef Futures Symposium](#)**

## B. PARTICIPATION IN SYMPOSIA, SCIENTIFIC CONGRESSES, WORKSHOPS

### Armstrong, Roy

Participated in the PRYSIG Annual Meeting, 3 November 2023, Mayaguez, PR.

### Schizas, Nikolaos

Participated in a research expedition aboard Schmidt Ocean Institute's (SOI) research vessel (R/V) *Falkor (too)* entitled "Unveiling the Lost Living Fossil Ecosystems of the Atacama Trench" led by Dr. Armando Azua-Bustos. Dr. Schizas explored the ecosystem biodiversity in a largely

unknown region of the Atacama Trench, Chile. (May 20-June 8, 2024).

<https://schmidtocean.org/cruise/living-fossils-of-the-atacama-trench/>

**Schmidt, Wilford**

U.S. representative to the United Nations Group of Experts, 3rd World Ocean Assessment for the Wider Caribbean.

**Rotterová, Johana**

Seventh Marine Science Symposium, April 13<sup>th</sup> 2024, La Parguera Community Center  
Marine Science Career Day, March 14<sup>th</sup> 2024, University of Puerto Rico Mayagüez

**Weil, Ernesto**

AMLC Executive Board Meeting. May 27-31<sup>st</sup>. Grenada.

**C. HONORS OR SPECIAL AWARDS RECEIVED**

**Armstrong, Roy**

Invited and accepted to be a Board Member of “The Puerto Rico Space Foundation”. (PRSF)

**Cruz Motta, Juan J.**

1. BIP leadership award. Granted by Purdue University.

**Courtney, Travis**

Sloan Research Fellowship in Earth System Science

**Rotterová, Johana**

New Lab Startup Program Award ZymoResearch

**Weil, Ernesto**

*The 2024 Edition of Ranking of Top Scientists in the field of Ecology and Evolution ranked Dr. E. Weil at 1083 in the US and 2992 in the World.*

<https://research.com/scientists-rankings/ecology-and-evolution>

**D. VISITORS TO YOUR LABORATORY (Visiting students, collaborators)**

**Armstrong, Roy**

On August 2, 2023 Dr. James Harrington (NASA GSFC) and MUREP Program Manager, visited the Bio-optical Oceanography Laboratory at Magueyes Island to discuss new ideas and possible future research opportunities.

September 15, 2023 – Visit of UPR-Rio Piedras Campus to the Bio-optical Oceanography Laboratory.

September 20, 2023 – Visit of Matt Von Bargen from NASA’s Ames Research Center to the Bio-optical Oceanography Laboratory.

December 6, 2023 – Visit of Dr. Carlos Del Castillo (NASA GSFC) to the Bio-optical Oceanography Laboratory.

**Cruz Motta, Juan J.**

Dr. Fabio Bulleri. Universitat di Pissa

**Sherman, Clark**

William J. Pestle, Department of Anthropology, University of Miami. Dr. Pestle and students used the laboratory as a base of operations for field work on a collaborative research project.

**Rotterová, Johana**

Catalina Aponte-Cartagena, student, University of Puerto Rico Cayey, March 2024  
Gina Fuller, student, Weber University, March 2024  
Anna Schrecengost, collaborator, Graduate School of Oceanography, University of Rhode Island, April 2024

**E. COMMUNITY ACTIVITIES (SERVICE)**

**Armstrong, Roy**

Member of the “Comité de Control de Contaminación por Ruidos de La Parguera”

**Weil, Ernesto**

- a. Workshops Escuela José Tadeo La Parguera.
- b. A 7th Scientific Symposium, La Parguera Community Center

**F. ANY RELEVANT INFORMATION CONCERNING YOUR ACADEMIC ENDEAVORS (new courses, collaborations, etc)**

**Armstrong, Roy**

Collaboration with Paul Jobsis (University of the US Virgin Islands) and Edwin Cruz-Rivera (CoPI for UVI at Morgan State University). I travelled to St. Thomas, USVI during August 23 and 25, 2023 to conduct in person training on how to search and download satellite data products, basics of image processing, water quality, ocean color products, and detection of *Sargassum*.

**Cruz Motta, Juan J.**

- a. Member of the Statistical and Science Committee (SSC) of the Caribbean Fisheries Management Council (CFMC).
- b. Member of the Technical Advisory Panel (TAP) on Ecosystem Based Fisheries Management of the CFCM.
- c. Member of the steering committee of the Southeast Assessment and Monitoring Program for the Caribbean (SEAMAP-C).

**Schizas, Nikolaos**

The following undergraduate students conducted research in the lab: Catherine C Vega-Chacon, Edrick J Correa Medina, Jose J Vazquez Rodriguez, Gabriel A Jimenez-Soto, Giancarlo Diaz-Bidot,

Luis M Bahamundi-Rivera, Jayson J Rodriguez Brown, Beatrice I De Leon Gomez, Diego F Santiago-Jimenez, Yaneris E Negron-Baez, Alejandro I Calderon-Perez, Gabriel A Mercado-Deliz, Steven Melendez-Rosario, Andrea I Velez-Rivera, Natalia S Flores-Carrasquillo

**Rotterová, Johana**

- a. Preparation of materials for course Marine Microbiology CMOB8635
- b. Preparation of materials and application for a new course Marine Symbioses CMOB
- c. Preparation of materials for modification of courses Marine Microbiology CMOB8635 and Marine Parasitology CMOB8636 to Marine Microbiology I CMOB8635 and Marine Microbiology II CMOB8636

**G. Student Thesis Defense and others**

**Armstrong, Roy**

Suhey Ortiz Rosa: Thesis Defense (Ph.D.) December 4, 2023.

Infante, R., H. Porras, D. Dávila, and M. Velázquez. 2023. **Coastal water quality analysis using the Planet Scope satellite constellation. Oral Presentation, PRYSIG Annual Meeting, 3 November 2023, Mayaguez, PR.**