CERTIFICACIÓN NÚMERO 24-18

La que suscribe, Secretaria del Senado Académico del Recinto Universitario de Mayagüez de la Universidad de Puerto Rico, **CERTIFICA** que, en la reunión ordinaria celebrada el martes, 19 de marzo de 2024, este organismo **APROBÓ** la **PROPUESTA DE CREACIÓN DEL PROGRAMA DE MAESTRÍA PROFESIONAL EN CIENCIAS MARINAS, PLAN II CON PROYECTO.**

La propuesta se hace formar parte de esta certificación.

Y para que así conste expido y remito la presente certificación a las autoridades universitarias correspondientes, bajo el Sello de la Universidad de Puerto Rico a los veinte días del mes de marzo del año dos mil veinticuatro, en Mayagüez, Puerto Rico.

Carmen A. Negrón Moure

Carmen A. Negrón Moure
Secretaria

bvm

Anejo

UPR - Mayagüez
Senado Académico, Junta Administrativa y Claustro

COMITÉ DE ASUNTOS CURRICULARES

15 de febrero de 2024

Creación del programa de MAESTRÍA PROFESIONAL en CIENCIAS MARINAS, PLAN II CON PROYECTO.

El Comité de Asuntos Curriculares dialogó el jueves 15 de febrero a las 2:00pm sobre la certificación número 20-52, aprobada por el Senado Académico el 19 de junio de 2020. Esta gestión no permitió crear un nuevo programa de MAESTRÍA PROFESIONAL en CIENCIAS MARINAS, PLAN II CON PROYECTO.

El decano asociado interino de Asuntos Académicos del RUM, Héctor O López Méndez, ya sometió la carta de intención para dicho programa a Administración Central, por lo cual podemos continuar con el proceso. Por tanto, el comité de Asuntos Curriculares recomienda al Senado Académico **que se apruebe** dicha gestión.

Atentamente,

Pedro Resto Batalla
Presidente Comité de Asuntos Curriculares

Propuesta Para la Creación del Programa de Maestría Profesional en Ciencias Marinas, Plan II con Proyecto (MP Plan II)

Departamento de Ciencias Marinas

UPRM

6 de septiembre de 2022

Según Aprobado por el Departamento de Ciencias Marinas

Índice de Contenido

Resumen Ejecutivo

Desde su creación, el Departamento de Ciencias Marinas (DCM) cuenta con una maestría conducente al grado de Maestría en Ciencias enfocado en un Plan 1 (con tesis), según las certificaciones 09-09 y 15-21. A lo largo del tiempo el DCM ha discutido opciones adicionales a este tipo de maestría. En el 2018 y como parte del 50 aniversario de la fundación del DCM, se inició un proceso intenso y consultivo que incluía reuniones y seminarios donde se discutieron diferentes opciones que redundarían en reducciones de tiempo de graduación, un perfil profesional en Oceanografía aumentaría el número de alumnos matriculados, añadiría al número de instituciones colaboradoras y expandiría el alcance del Departamento en diferentes sectores económicos. Estas discusiones incluyeron tanto los profesores activos y estudiantes, profesores jubilados, profesores activos de otras facultades, exalumnos, personal de la industria privada, miembros de organizaciones no gubernamentales y funcionarios de agencias de gobierno estatal y federal. Además, se llevó a cabo comparaciones con programas de educación superior en EE.UU.AA similares al DCM.

Como resultado del proceso anterior, el DCM trabajó una reforma curricular para crear una Maestría en Ciencias Plan II (con proyecto) como parte de sus ofrecimientos (Certificación 20-52 del Senado Académico) cumpliendo con todos los requisitos para la misma. Como paso adicional, y debido a las diferencias de lo que representa el desarrollo de una tesis de carácter científico, se presenta la propuesta de creación de un Grado de Maestría Profesional en Ciencias Marinas Aplicadas centrado en el Plan II

(con Proyecto) ya aprobado anteriormente para así distinguir claramente grados que actualmente son ofrecidos.

Esta propuesta no representa costos adicionales a la UPR ya que todos los recursos existen. Por el contrario, se espera que resulte en economías debido a que los proyectos de los estudiantes son de menor alcance por lo que requieren menores recursos y no conllevan revisiones de manuscritos en revistas científicas lo cual aminora el tiempo de graduación.

Introducción

Por este medio se propone la creación del Programa de ***Maestría Profesional en Ciencias Marinas (MPCM)*** como parte de la oferta académica del Departamento de Ciencias Marinas (DCM) de la Universidad de Puerto Rico, Recinto Universitario de Mayagüez. La creación del programa responde a un proceso consultivo que se inicia hace unos años a raíz de la celebración del 50 aniversario del DCM en el 2018.

Actualmente el DCM ofrece una Maestria en Ciencias con Concentración en Ciencias Marinas (M.S. en Ciencias Marinas) bajo cuatro subespecialidades de la Oceanografía, Biología, Fisica, Quimica, y Geología. Esta maestría, la cual fue revisada durante el 2020 requiere la preparación de una tesis que representa en esencia la culminación de estudios que conllevan un entendimiento de carácter más afín a una de las disciplinas.

Este estudio requiere de la formulación de una propuesta que indique la iniciativa del estudiante en formulación de preguntas científicas basadas en la aplicación del método científico y que demuestre la capacidad del estudiante en llevar un estudio de tal naturaleza de manera independiente. Además, como parte de los requisitos de esta maestría, un artículo científico derivado de la tesis del estudiante debe haber sido aceptado formalmente para revisión en una revista científica arbitrada como parte del proceso de publicación.

La génesis de esta propuesta se deriva de la actual M.S. Tipo 2 (con Proyecto) aprobada recientemente (Certificación 20-52 del Senado Académico), la cual requiere de estudios dirigidos a que el estudiantado derive un conocimiento general de las Ciencias Marinas sin que conduzcan necesariamente a una especialización dentro de las ramas de Oceanografía. La necesidad de la presente propuesta surge de que a través de discusiones con diversos sectores, incluyendo el académico, profesionales que se desempeñan en agencias de gobierno en el área ambiental marino, con profesionales de agencias federales y de organizaciones privadas se identificó la deseabilidad de entrenamiento de estudiantes para emplearse principalmente como profesionales en las Ciencias Marinas con un entendimiento general y con la capacidad técnica de empeñarse en el sector laboral aplicando los conocimientos adquiridos como parte de sus estudios. Dichos estudios requieren que el estudiante lleve a cabo un proyecto practico de un alcance limitado, digamos un prácticum o tarea supervisada, preferencialmente en organizaciones externas a la UPR, aunque sin excluir practicas

internas en la UPR. Dichas prácticas pudieran surgir a base de algunas necesidades de dichas organizaciones, pudieran ser internados, pagos o voluntarios o trabajo técnico donde el estudiante no haya necesariamente participado en el diseño de la práctica. Finalmente, no se requiere la publicación de sus trabajos en revistas científicas arbitradas. La revisión curricular del 2020 dio paso a nuevas discusiones dentro del DCM, cuyo consenso fue que debiera existir una distinción mayor entre los grados ofrecidos que distinga las maestrías cuyo fuerte sea el cultivo de la creación de un pensamiento científico académico más amplio, versus un enfoque técnico, aplicado a diversos ambientes profesionales. La nueva propuesta *pretende:* 1) fomentar un perfil profesional en Oceanografía eficiente y contemporáneo donde los estudiantes puedan seguir carreras de ciencias marinas aplicadas incluyendo, pero no limitadas a la industria, gobierno y organizaciones no gubernamentales 2) reducir tiempo de graduación, 3) aumentar el número de matriculados, 4) Aumentar el número de instituciones colaboradoras y 5) aumentar el alcance del Departamento en diferentes sectores económicos.

El programa propuesto es similar al de otras instituciones fuera de Puerto Rico, incluyendo:

Professional Science Master (U. Miami; https://mps.rsmas.miami.edu/index.html)

Professional Master in Aquatic Environmental Sciences (Florida State University; https://www.eoas.fsu.edu/wpcontent/documents/grad/AQES/PROFESSIONAL_AES_MASTERS_GUIDELINES_2015.pdf)

Professional Master in Science (California State University- Monte Rey Bay; https://catalog.csumb.edu/preview_program.php?catoid=7&poid=1427)

Master of Environmental Sciences (Miami University; http://miamioh.edu/cas/academics/ programs/ies/academics/masters/index.html)

Professional Science Master's (PSM) Degree in Marine Sciences **(University of Maine; https://umaine.edu/marine/graduate-programs/professional-science-master-psm/)**

Título y grados para otorgarse en el programa académico nuevo

Como parte del ofrecimiento del DCM de la Facultad de Artes y Ciencias se ofrecería una alternativa de grado titulada *Maestría Profesional en Ciencias Marinas*. Este título no conlleva especialidad en ninguna de las ramas de las oceanografías.

Fecha de comienzo y duración del programa académico nuevo.

Segundo semestre 2022-2023 (enero, 2023). Esta fecha de comienzo es factible debido a que ya se ha aprobado el Plan II en el Senado Académico del RUM (Cert. 20-52 SA), el cual constituye en su totalidad el contenido del nuevo programa a crearse. El programa está diseñado para que el estudiante pueda terminar en un periodo de 3 años a partir de su primera fecha de matrícula.

Los estudiantes de otras maestrías ofrecidas en Ciencias Marinas pueden transferirse al programa descrito aquí utilizando los procedimientos delineados por Escuela Graduada preferiblemente dentro de un periodo menor a dos años del inicio de sus estudios para que el estudiante pueda llevar a cabo ajustes y pueda cumplir sus requisitos en el término establecido por la Escuela Graduada. Los créditos para

convalidarse serán evaluados por el Comité de Asuntos Graduados Departamental siguiendo la Certificación 09-09 de Estudios Graduados.

Justificación y pertinencia del programa académico nuevo.

El nuevo programa provee nuevas oportunidades educativas a estudiantes cuya motivación principal sea desempeñarse en trabajos técnicos del amplio campo de las ciencias marinas. El programa instruye al estudiante en los conocimientos generales del área y añade un componente de entrenamiento técnico basado en la aplicación de sus destrezas. Según la opinión de la mayoría (>65%) de los participantes de seminarios y discusiones focales llevados a cabo en noviembre 2018, el perfil actual del estudiante está diseñado para que los egresados sigan una carrera en la academia y ofrece muy pocas herramientas para aquellos graduados que quieran trabajar en organizaciones estatales (e.g. Departamento de Recursos Naturales de Puerto Rico), federales (e.g. *Administración Nacional Oceánica y Atmosférica, Servicio Geológico de los Estados Unidos, Agencia de Protección Ambiental de los Estados Unidos*), organizaciones no gubernamentales o la industria privada. El programa propuesto provee la oportunidad para que le estudiante pueda desarrollar dichas destrezas al incluir como requisito un proyecto practico dentro o fuera del ambiente universitario que se enfoque en contestar preguntas aplicadas de alcance menor a lo que es una tesis de maestría en ciencias. Estas prácticas pueden ser llevadas a cabo como parte de proyectos externos o prácticas en agencias o entidades privadas en temas de interés a las ciencias marinas.

Adicionalmente, el nuevo grado provee para disminuir el tiempo de graduación actual. Actualmente, de acuerdo con datos provistos por OPIMI, el promedio de graduación es de 4.5 años. El programa propuesto ayudará a disminuir el tiempo de graduación a tres años o menos.

Relación del programa académico nuevo con la misión y el plan estratégico vigente de la UPR, así como con la misión y plan estratégico del recinto o unidad donde se propondrá.

El programa propuesto se relaciona de las siguientes maneras con la Misión y Plan estratégico de UPR

A. Relación con la Misión UPR (https://www.upr.edu/plan-estrategico-upr-2016-2021-proceso-y-propuesta/plan-estrategico-upr-2016-2021-mision-vision-y-retos/):

- *Transmitir e incrementar el saber por medio de las ciencias y de las artes, poniéndolo al servicio de la comunidad a través de la acción de sus profesores, investigadores, estudiantes y egresados.*

  Los aspectos de las Ciencias Marinas y la aplicación de sus conocimientos al manejo de recursos marinos es un tema en el cual el programa propuesto tiene un potencial mayor. A través de las interacciones creadas por los proyectos de

los estudiantes y sus prácticas coordinadas con diversos sectores, se amplía el impacto al servicio a la comunidad.

- *Procurar la formación plena del estudiante, en relación a su responsabilidad como servidor de la comunidad.*

  El programa procura ampliar la formación del estudiante al fomentar la aplicación de sus conocimientos en asuntos aplicados de las Ciencias Marinas. Se estima que la creación del nuevo programa genere un interés mayor que se refleje en las admisiones al programa. Según información provista por el DCM, más de 1/6 parte de los estudiantes del departamento escogerían este grado de tener la alternativa.

- *Colaborar con otros organismos, dentro de las esferas de acción que le son propias, en el estudio de los problemas de Puerto Rico.*

  A través de sus proyectos aplicados el estudiante apoya los diferentes aspectos de asuntos de interés relacionados a los Sistemas Marinos y costeros de Puerto Rico.

B. *Relación con los Asuntos Estratégicos del Plan estratégico UPR (https://www.upr.edu/plan-estrategico-upr-2016-2021-proceso-y-propuesta/)*

- Innovación Académica: oferta académica actualizada para asegurar la pertinencia de esta y el desarrollo de programas de avanzada.

  La creación del Programa responde a la diversificación de alternativas educativas y de practica a sectores del sector graduado de estudiantes. Esta alternativa tiene un enfoque dirigido para que los estudiantes desarrollen carreras prácticas que les sirva a diversificar sus oportunidades profesionales.

- Éxito Estudiantil: Reducción de la brecha entre tasas de admisión, retención y graduación en cumplimiento con la responsabilidad de hacer uso eficiente de sus recursos y de garantizar la excelencia académica.

  El nuevo programa logrará reducir el tiempo de graduación mientras se espera poder aumentar el número de estudiantes interesados. Al presente se ha registrado un interés

Relación del programa académico propuesto con otros existentes dentro del recinto o unidad del sistema en el País.

El programa propuesto evoluciona del programa de Maestría en Ciencias (M.S.) actual del DCM. Este programa comparte muchos de los recursos didácticos y de infraestructura. Existe una posibilidad de “fertilización cruzada” entre el programa propuesto y el de M.S.

No existe ningún otro programa graduado de Ciencias Marinas (Oceanografía) en el sistema de la UPR. Un programa subgraduado afín al del DCM es el Programa de Biología Marina Costanera (UPR-Humacao). Muchos estudiantes de este programa han expresado interés en continuar estudios en el DCM. El programa de Ciencias Ambientales de la facultad de Ciencias Naturales de UPR-RP ofrece cursos y experiencias con un mínimo de elementos comunes. En general no existe programa comparable al propuesto fuera de UPRM.

Componentes del currículo: secuencia curricular a tiempo completo o parcial.

Tabla 1. Cursos de la Maestría Profesional en Ciencias Marinas Aplicada

Cursos	***Créditos***
Cursos medulares: CMOB 6618 oceanografía biológica, CMOB 6617 oceanografía física, CMOG 6616, oceanografía geológica, CMOQ 6615 oceanografía química. Aprobados con B o más.	12
CIMA 6900 – Proyecto: consiste en un estudio comprensivo de un problema en ciencias marinas (biología, física, geología y/o química) seleccionado de forma tal que integre los conocimientos adquiridos	6

durante los cursos. El proyecto podrá realizarse en el departamento o fuera del mismo y será aprobado por el comité graduado como proyecto de grado. De realizarse fuera de CIMA, el comité graduado incluirá una persona (supervisor externo) de esa institución/agencia/organización. Al final del proyecto, deberá entregarse un informe técnico final, el cual revele los resultados principales, experiencia adquirida y aplicaciones de la misma. Este informe final deberá ser aprobado por el comité graduado.	
Cursos Obligatorios: tres créditos por cada una de las especialidades del programa (Biológica, Física, Geológica y Química). En particular: Todos estos cursos aprobados con B o más.	12
Cursos Electivos: Cualesquiera de los cursos departamentales o extra departamentales de ser necesario para cumplir con el mínimo de requerido y aprobado por el Comité Graduado del estudiante.	2
Total de Créditos	32

Modalidad en la que se ofrecerá: a tiempo parcial o en línea, entre otras.

El programa está diseñado una oferta de cursos presencial, hibrido o a distancia dependiendo de la descripción de los cursos. Sin embargo, se requiere un año de residencia. También requiere un periodo de practica que pudiera ser externo a la UPRM en o fuera de Puerto Rico, dependiendo de las condiciones de la práctica de investigación, las oportunidades de intercambio y acceso a fondos.

Criterios para otorgar el grado académico. Incluirá tiempo mínimo y máximo para completar el mismo.

a. El estudiante debe cumplir con la cantidad de créditos (32) con la distribución según la Tabla 1
b. Debe mantener un promedio de grado mayor a B
c. Todos los cursos medulares deben ser aprobados con B o más.
d. El estudiante debe completar su proyecto según aprobado por su Comité Graduado a través de una propuesta de Proyecto
e. El estudiante debe llevar a cabo una presentación de su Proyecto ante el Departamento y tomará un examen oral final basado en su proyecto
f. El estudiante debe cumplir con el requisito de un año de residencia
g. Se espera que el estudiante pueda terminar su grado normalmente en un periodo de 3 años.
h. El estudiante debe cumplir con los requisitos de la Certificación 09-09 de la Escuela Graduada.

Aparte de lo anterior, los estudiantes de otras maestrías ofrecidas en Ciencias Marinas pueden transferirse al programa descrito aquí utilizando los procedimientos delineados por la Escuela Graduada y preferiblemente dentro de un periodo menor a dos años del inicio de sus estudios. De esta forma se facilita que el estudiante pueda llevar a cabo ajustes y cumpla con los requisitos del grado en el término establecido por la Escuela

Graduada. Los créditos para convalidarse serán evaluados por el Comité de Asuntos Graduados Departamental siguiendo la Certificación 09-09 de Estudios Graduados.

Proyección de matrícula a base de un estudio de mercado o información que sustente la demanda del programa.

No se conoce con certeza la proyección de matrícula en este programa de maestría profesional. Sin embargo, se conoce que estudiantes dentro del DCM han expresado interés de transferirse de la Maestría en Ciencias en Ciencias Marinas (Plan I) a la Maestría Ciencias Marinas Plan II el cual es afín a lo aquí propuesto. En específico, hasta abril de 2022, el DCM cuenta con 46 estudiante de maestría. De estos, el 4% solicitaron cambiar al programa de M.S. Plan II, y estos serían los primeros que se graduarían en el programa aquí propuesto. Por otro lado, incluyendo los anteriores, el 15% del total de estudiantes se han aceptado para la M.S. en Ciencias Marinas Plan II. Estos números representan un mínimo de estudiantes que pudieran cualificar para graduarse según el programa propuesto y sin que ocurriera una divulgación masiva de esta alternativa, por lo que se espera una mayor aceptación entre los futuros solicitantes.

Prontuarios de los Cursos del Programa Propuesto

La información de los cursos medulares, los sugeridos y otros posibles electivos del departamento se encuentra en el Apéndice 1.

Perfil de la Facultad

Actualmente, el DCM cuenta con siete (5) Catedráticos, un (1) Catedrático Asociado, un (1) Catedrático Auxiliar a tiempo completo, un (1) Catedrático en conjunto con la Facultad de Ingeniería y un (21) Investigador Docente. Entre éstos se cubre la teoría y práctica de las disciplinas de Oceanografía Biológica, Física, Química y Física. Ver los CV's en el Apéndice 2.

Plan de evaluación de la efectividad del programa.

Se someterán evaluaciones periódicas del Programa de Maestría Profesional en Ciencias Marinas (Plan II) para asegurar la calidad de sus ofrecimientos y estándares académicos. El director del DCM, el Comité Graduado y la facultad adscrita al Programa implementarán un plan de las mejores prácticas para la medición y el mejoramiento continuo. Para la evaluación del Programa se recopilará la siguiente información:

a. Número de estudiantes de nuevo ingreso
b. Número de estudiantes retenidos
c. Programas académicos de procedencia de los estudiantes de traslado

d. Progreso académico de los estudiantes del Programa por año académico
e. Número de estudiantes que completan el Programa por año académico
f. Tiempo de graduación de cada estudiante

El análisis se hará de acuerdo con las estrategias de avalúo descritas en la Tabla 2. En esta se describen los objetivos operacionales, los instrumentos, los parámetros de medición, el personal que implementa el análisis, y el itinerario de avalúo.

Tabla 2. Lista de Objetivos, Instrumentos y Parámetros de medición para los nuevos planes del programa de Maestría en Ciencias Marinas.

Objetivo operacional	*Instrumento*	*Parámetros de medición*	*Personal de implementación*	*Itinerario de avalúo*
1. Generar una demanda estable para el Programa	Registro de los estudiantes admitidos al Programa	Admitir al menos 10 estudiantes graduados a partir del tercer año de implementación de los nuevos planes	Director, Consejero académico, Comité graduado	Anual
2. Mantener una tasa alta de retención estudiantil	Proporción de estudiantes que completan el Programa en el tiempo establecido	Al menos el 67% de los estudiantes habrá completado el Programa en el tiempo establecido (3 años).	Director, Consejero académico, Comité graduado	Anual

Objetivo operacional	*Instrumento*	*Parámetros de medición*	*Personal de implementación*	*Itinerario de avalúo*
3. Lograr un impacto positivo sobre egresados	Cuestionario de Satisfacción para estudiantes que completen el Programa	Al menos 75% de los egresados consideran que el Programa ha sido efectivo como instrumento de mejoramiento profesional en su disciplina y le recomendarían el Programa a otro estudiante	Consejero Académico, Comité de Avalúo	Anual
4. Obtener una colocación rápida pos-graduación	Cuestionario de Seguimiento de egresados	Al menos 75% de los egresados prosiguen estudios avanzados u obtienen trabajo en el sector público o privado	Consejero Académico, Comité de Avalúo	Anual
5. Atraer Profesionales Activos	Proporción de nuevos ingresos que sean profesionales activos	Al menos 40% de los nuevos ingresos provendrán del sector profesional.	Director, Consejero académico, Comité graduado, Comité de avalúo	Anual

Apéndice 1: Cursos Disponibles para el Programa de Maestría Profesional en Ciencias Marinas Aplicadas (Plan Tipo 2)

Advanced Undergraduate Courses

CIMA 5005. INTRODUCTION TO OCEANOGRAPHY (I, II) (On demand).
Three credit hours. Three hours of lecture per week. Prerequisite: authorization of the Director of the Department.
Basic knowledge, techniques, and areas of interest of the different disciplines of marine sciences. The interaction and research aims in Physical, Geological, Chemical and Biological Oceanography.

CIMA 5007 INTRODUCTION TO OCEAN OBSERVATION.
Three credit hours. Three hours of lecture per week.
Discussion of the scientific and practical applications of ocean observation. Evaluation of the different types of observation platforms form the most traditional such as buoys and ships to the modern autonomous submersible vehicles and satellites in polar and geostationary orbits. Investigation of the different types of physical, chemical, and biological sensors installed on these platforms, as well as their principles of operation, limitations and environmental and energy requirements. Evaluation of telemetry protocols and data storage in the operation of the observation system.

CIMA 5008. LABORATORY OF INTRODUCTION TO OCEANOGRAPHY.
One credit hour. Three hours of laboratory per week. Corequisite: CIMA 5005
Application of basic knowledge and techniques in different areas and disciplines of interest within marine sciences. The application exercises present the research aims, scopes, and interaction between Physical, Geological, Chemical, and Biological Oceanography.

CMOB 5017. MARINE ECOLOGY AND RESOURCE MANAGEMENT.
Five credit hours. Three hours of lecture and two three-hour laboratories per week. Prerequisite: authorization of the Director of the Department.
Description of the marine environment and familiarization with the major tropical marine communities; data-gathering and biological sampling techniques; human impact on the marine environment from the standpoint of pollution, exploitation, protection, and regulation; jurisprudence in major litigation involving marine resources; management practices.

CMOF 5015. PHYSICAL OCEANOGRAPHY FOR ATMOSPHERIC SCIENCES.
Three credit hours. Three hours of lecture per week. Prerequisites: MATE 4009 and (FISI 3272 or FISI 3162) or authorization of the Director of the Department.
Introduction to topics in physical oceanography such as heat budget, physical properties of seawater, oceanic mixing processes, and equations of conservation of heat, salt and momentum. Analysis of the origin of marine currents by applying the concepts of potential vorticity conservation and Sverdrup circulation. Description of the mechanics of surface and deep currents.

CMOG 5001. INTRODUCTION TO CLIMATE CHANGE.

Three credit hours. Three hours of lecture per week. Prerequisite: authorization of the Director of the Department. Overview of the principles of Earth's climate covering a broad range of phenomena that influence climate at various regional and global time scales and resolutions. Discussion of climate forced by external controls. Description of the effects of internal forces and their variability, and human-induced climate change. Emphasis on the role of greenhouse gases and rates of change of these processes. Discussion of the future climate change scenarios and possible mitigating steps.

CMOG 5002. LABORATORY OF INTRODUCTION TO CLIMATE CHANGE**.**
One credit hour. Three hours of laboratory per week. Corequisite: CMOG 5001.
Application and analyses of the principles of Earth's climate covering a broad range of phenomena forced by external controls. Laboratory exercises include the use of proxy data, climate modeling, and analysis of climate change impacts.

General Graduate Courses

CIMA 6900. GRADUATE RESEARCH PROJECT IN MARINE SCIENCES. Zero to six credit hours. One hour of discussion and eight hours of research per week. Prerequisites: Approve three of four core courses: (CMOB 6618-Biological Oceanography and CMOF 6617 –Physical Oceanography and CMOG 6616-Geological Oceanography and CMOQ 6615-Chemical Oceanography) or authorization of the Director of the Department. Comprehensive study of a problem related to any of the marine sciences disciplines, biological, physical, geological and/or chemical oceanography, which integrates the knowledge acquired in the program. The project could be done in house (CIMA) or in any other institution (public or private) and the selected topic will depend on the student's interest. At the end of the project, the student must submit a final report that shows main results, acquired experience and applications. This report will be evaluated by the student's graduate committee.

CIMA 8785. CURRENT TOPICS SEMINAR (II).
Two credit hours. Two hours of lecture per week.
Recent topics in marine sciences and related fields.

CIMA 8998. SPECIAL PROBLEMS (I, II, S).
One to three credit hours. One to three sessions per week.
Tutorial discussion and/or laboratory and library
research on a special topic.

Biological Oceanography (CMOB) Graduate Courses

CMOB 6018. MARINE ECOLOGY (I, II)
(On demand). Four credit hours. Three hours of lecture and one three-hour laboratory per week.

Structure and function of marine ecosystems; flux of energy and materials in biogeochemical cycles.

CMOB 6078. ANALYSIS OF SPATIAL DATA IN MARINE ECOLOGY.
Three credit hours. Three hours of lecture per week.
Collection and analysis of spatial data in marine ecology within a geographic information system and landscape ecological context with applications to ecological problems. Emphasis on ecological issues in the marine environment and their application to marine resources management. A research project is required.

CMOB 6079. DNA DATA ANALYSIS OF MARINE ORGANISMS
Six credit hours. Three hours of lecture and six hours of laboratory per week.
Introduction to modern marine population genetics and phylogenetics of marine species. Study of the different types of molecular data and their collection; phylogeny reconstruction by parsimony, distance, and likelihood methods; tests of the molecular clock for dating speciation events; Darwinian selection at the molecular level, interspecies variation, detection of population structure; and genomic evolution. Analysis of real data from the marine scientific literature with computer software in population genetics and phylogenetics.

CMOB 6618. BIOLOGICAL OCEANOGRAPHY(I).
Three credit hours. Two hours of lecture and one three-hour laboratory per week. Marine life and its relationship to geological, physical and chemical aspects of the ocean; basic techniques fundamental to marine research. Demonstrations and field trips.

CMOB 6619. BIO-OPTICAL OCEANOGRAPHY (I)
(On demand). Four credit hours. Three hours of lecture and one three-hour laboratory per week. Integrated study of the role of light in aquatic ecosystems including the physics of light transmission within water, the biochemistry and physiology of aquatic photosynthesis, and the ecological relationships that depend on the underwater light environment. Field trips required.

CMOB 6635. RESEARCH METHODS IN MARINE SCIENCES (II).
Three credit hours. Three hours of lecture per week.
Techniques of data collection, analysis, and interpretation with emphasis on research problems relevant to the marine ecosystems of Puerto Rico.

CMOB 6655. MOLECULAR MARINE BIOLOGY (I, II)
(On demand). Four credit hours. Two hours of lecture and two three-hour laboratories per week. Prerequisite: authorization of the Director of the Department.
Theory, practice, and applications of molecular marine biology.

CMOB 8635. MARINE MICROBIOLOGY.
Three credit hours. Two lectures and one three-hour laboratory per week.

Analysis of marine microorganisms with emphasis on their functions in nutrient cycling in the ocean, and the role of algae, bacteria, protozoans, fungi and viruses. Emphasis on the presence of non-culturable microorganisms in the marine environment and their research methods.

CMOB 8649. CRITICAL ANALYSIS OF READINGS IN MARINE ECOLOGY
Two credit hours. Four hours of seminar per week.
Study of classical and recent readings in marine ecology. Analysis of author's aims, methods, results, and interpretations.

CMOB 8665. MORPHOLOGY OF MARINE INVERTEBRATES
Three credit hours. Two hours of lecture and one three-hour laboratory per week. Form, structure and function of representative marine invertebrates.

CMOB 8676. SYSTEMATICS OF MARINE INVERTEBRATES (I)
(On demand). Four credit hours. Three hours of lecture and one four-hour laboratory per week. Taxonomy, phylogeny and distribution of marine invertebrates with special attention to local forms.

CMOB 8686. ICHTHYOLOGY I (II)
(On demand). Three credit hours. Two hours of lecture and one three-hour laboratory per week. A study of the morphology, physiology and ecology of fishes, with emphasis on marine forms.

CMOB 8687. ICHTHYOLOGY II (I)
(On demand). Three credit hours. Two hours of lecture and one three-hour laboratory per week. A study of the systematics, evolution and distribution of fishes, with emphasis on marine forms.

CMOB 8708. CORAL REEF BIOLOGY.
Five credit hours. Three hours of lecture and one five hours of laboratory per week.Exploration of the systemic, evolution, and biological characteristics (structure, modularity, life cycles, reproduction, etc.) of the main organisms forming coral reef communities. Field trips to coral reef communities and laboratory work are required.

CMOB 8709. ECOLOGY AND ZOOGEOGRAPHY OF CORAL REEFS.
Five credits hours. Three hours of lecture and one six hours laboratory per week.
Prerequisite: CMOB 8708 or authorization of the Director of the Department. Field trips are required.

CMOB 8715. ECOLOGICAL CONCEPTS IN MARINE SCIENCES.
Three credits hours. Two hours of lecture and one three hours laboratory per week. Field trips are required.

CMOB 8716. ECOLOGY OF MARINE COMMUNITIES SEMINAR (II)

(On demand). Two credit hours. Two sessions per week.
Composition and quantitative structure of selected marine assemblages, and their energetic and tropic relationships.

CMOB 8994. A, B, C. SPECIAL PROBLEMS IN MARINE INVERTEBRATES (I, II)
(On demand). One to three credit hours. One to three sessions per week.
Supervised study or research on specific selected aspects of marine invertebrates, or techniques pertaining to their study.

CMOB 8997. A, B, C. SPECIAL PROBLEMS IN ICHTHYOLOGY (I, II)
(On demand). One to three credit hours. One to three sessions per week.
Individual student research on marine fishes.

Chemical Oceanography (CMOQ) Graduate Courses

CMOQ 6615. CHEMICAL OCEANOGRAPHY (II).
Three credit hours. Three hours of lecture per week.
General survey of chemical oceanography, including application of basic concepts of physical and analytical chemistry to the marine environments, chemical interactions of major and minor constituents of seawater, the influence of chemical processes on physical, biological, and geological processes.

CMOQ 6617 MARINE POLLUTION
Three credit hours. Three hours of lecture per week.
Deleterious effects on living resources, human health, marine activities, and water quality caused by the anthropogenic introduction of substances or energy into the marine environment.

CMOQ 8638. CHEMICAL OCEANOGRAPHY LABORATORY (I).
Three credit hours. One hour of lecture and six hours of laboratory per week.
Laboratory experience in techniques of sampling and handling of marine samples, and the analyses of these samples for major, minor and trace constituents.

CMOQ 8991. A, B, C. SPECIAL PROBLEMS IN CHEMICAL OCEANOGRAPHY (I, II)
(On demand). One to three credit hours. One to three sessions per week.
Laboratory studies of specific problems in chemical oceanography. Topics to be chosen by the student and approved by the professor.

Geological Oceanography (CMOG) Graduate Courses

CMOG 6616. GEOLOGICAL OCEANOGRAPHY (II).
Three credit hours. Two hours of lecture and one three-hour laboratory per week. For students not majoring in Geological Oceanography.
A review of the basic concepts of geology; geomorphology and structure of the ocean basins and continental shelves; techniques of marine exploration and research; study of the tectonic theories on the origin of marine basins and structural processes; the distribution of sediments, and marine sedimentary processes.

CMOG 8606. COASTAL GEOMORPHOLOGY (II)
(On demand). Three credit hours.
Two hours of lecture and one three-hour laboratory per week. The origin of coastal features and their relationships with shore problems relative to the basic sciences; presentation of the forces that modify the shores. Discussion and field trips.

CMOG 8618. MARINE GEOLOGY OF THE CARIBBEAN (I, II) (On demand). Four credit hours. Two hours of lecture and two three-hour laboratory periods per week. Prerequisite: 15 credit hours in Geology.
Synthesis and analysis of the marine geology of the Caribbean, using published data and cruise information; survey of our present knowledge of bathymetry, and of the structure, sediments and stratigraphy of the Caribbean.

CMOG 8675. ADVANCED GEOLOGICAL OCEANOGRAPHY (I, II)
(On demand). Three credit hours. Two hours of lecture and one three hour laboratory per week.
A comprehensive review of the geomorphology and structure of the ocean basins; analysis of tectonic theories and structural processes operating in the marine environment; distribution of marine sediments.

CMOG 8706. STRUCTURE OF CORAL REEF.
Three credit hours. One hour of lecture and two three-hour laboratories per week.
Structure, development, and methods of study of coral reefs. Field trips required.

CMOG 8717. SPECIAL PROBLEMS IN MARINE GEOLOGY (II)
(On demand). One to three credit hours. One to three hours of lecture and one three-hour laboratory per week.
Supervised study or research on specific aspects in marine geology.

Physical Oceanography (CMOF) Graduate Courses

CMOF 6005. METHODS OF OCEANOGRAPHIC DATA ANALYSIS (II)
(On demand). Three credit hours. Three hours of lecture per week.

Oceanographic data analysis emphasizing computer techniques: exploratory data analysis, regression analysis, scalar and vector spectral analysis, maximum entropy spectral analysis, empirical orthogonal eigen functions, filters, complex demodulation.

CMOF 6445. REMOTE SENSING IN OCEANOGRAPHY I
Four credit hours. Two hours of lecture per week and two laboratories of three hours per week. Remote sensing and its application in oceanography, including comparison with field data. Field trips are required.

CMOF 6617. PHYSICAL OCEANOGRAPHY (I).
Three credit hours. Three hours of lecture per week.
General introduction to the study of physical processes in the sea; physical properties of sea water, heat budget, water budget, temperature salinity relationships, light in the sea, equations of motion, vertical stability, Coriolis effect geostrophic motion, general oceanic circulation, waves and tides.

CMOF 6631 GEOPHYSICAL FLUID DYNAMICS I-II.
Three credit hours. Three hours of lecture per week each semester. Prerequisite: authorization of the Director of the Department.
The dynamics of large-scale motions in the ocean and the atmosphere. Theories of stratified fluids in rotation and of geophysical waves.

CMOF 8446. REMOTE SENSING IN OCEANOGRAPHY II.
Four credit hours. Two hours of lecture and one six-hour laboratory per week. Prerequisite: CMOF6445. Advanced concepts of remote sensing and their application in oceanography, including comparison with field data. Field trips are required.

CMOF 8619. COASTAL OCEANOGRAPHY.
Three credit hours. Three hours of lecture per week.
Interactions between long and short period waves and the shore; tides, storm surges, seiches, shoaling wave theories, wave refraction and diffraction, breakers, run-up, longshore currents, near shore sediment transportation, foreshore processes.

CMOF 8990. A, B, C. SPECIAL PROBLEMS IN PHYSICAL OCEANOGRAPHY (I, II)
(On demand). One to three credit hours. One to three sessions per week.
Selected topics in physical oceanography.

Apéndice 2: Curricula Vitae de Docentes del Departamento de Ciencias Marinas

ROY A. ARMSTRONG

ADDRESS

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EDUCATION

University of Puerto Rico
Department of Marine Sciences
Mayaguez, Puerto Rico
Ph.D., 1990
MS, 1982

Boston University
Boston, Massachusetts
BA, Biology Major, 1976

AWARDS AND DISTINCTIONS

2002-Present	Guest Investigator – Woods Hole Oceanographic Institution
2004	Visiting Scholar, Boston University
2000-2004	Member, Habitat Advisory Panel – CFMC/NMFS/NOAA
2000	Scholarly Productivity Award – Office of the President, Univ. of Puerto Rico
1994-1998	Ames Associate, NASA Ames Research Center Associate Program
1993	Contractor Certificate of Excellence, NASA Ames Research Center
1990-1992	Research Associateship (NRC Post-Doc) Nat'l Academy of Sciences
1986-1988	Research Fellowship, NASA's Graduate Student Researchers Program
1984	Research Fellowship, Mississippi-Alabama Sea Grant Consortium
1984	NASA Planetary Biology Internship Award

PROFESSIONAL EXPERIENCE

Present Position:	Professor and Associate Director, Department of Marine Sciences
Employer:	University of Puerto Rico
Description:	Teaching and research in bio-optical oceanography and remote sensing

Position:	Researcher
Date:	July 15, 1994 to June 30, 1996
Employer:	University of Puerto Rico

Position:	Research Scientist
Date:	July 16, 1992 to June 23, 1994
Employer:	Johnson Controls World Services, Inc., NASA Ames Operations

Position:	Research Associate (Postdoctoral Fellowship)
Date:	July 15, 1990 to July 15, 1992
Employer:	National Research Council/NASA Ames Research Center

APPROVED PROPOSALS

NASA Ocean Biology and Biogeochemistry: Remote Sensing of Sargassum Accumulation and Impacts on Tropical Marine Ecosystems: A Multi-Scale Approach. PI: Roy Armstrong, Co-I: William Hernández, Emmanuel Arzuaga. (2021-2023), $749,721.

NASA Ocean Community Engagement and Awareness using NASA Observations and Science (OCEANOS). Juan Torres (PI- NASA), Roy Armstrong (UPRM PI). January 2022 to December 2026. $2,700,000.00 – Total Approved Budget, $645,737.00 (UPRM Budget)

NOAA-EPP: CESSRST Year-5 Supplemental Covid-19 Funding (2020-2021). PI: Rafael Rodriguez-Solis, CoPIs: Roy Armstrong. Tania Lopez. $444,852.00.

NOAA-EPP: NCAS-M Year-5 Supplemental Covid-19 Funding (2020-2021). PI: Roy Armstrong. 1-year, $329,912.00.

NOAA-EPP: NCAS-M Year 5 renewal proposal. PI: Roy Armstrong. Sept. 1, 2020 to August 31, 2021. $165,000.

NOAA-EPP: CESSRST Year 5 renewal proposal. PI: Rafael Rodriguez-Solis, CoPIs: Roy Armstrong, Tania Lopez. Sept. 1, 2020 to August 31, 2021. $220,000.

NOAA-Sea Grant: Developing Decision-Making Tools for Sargassum Management in Coastal Areas. PI: William Hernández, Co-PI: Roy Armstrong. May 2020 to December 2022. $117,288.00

PEER-REVIEWED PUBLICATIONS (65)

Pawlik, J., R. Armstrong, S. Farrington, J. Reed, S. Rivero-Calle, H. Singh, B. Walker, J. White. In Review. A comparison of recent survey techniques for estimating benthic cover on Caribbean mesophotic reefs. Marine Ecology Progress Series.

Torres-Perez, J.L., C.E. Ramos-Scharrón, W.J. Hernandez, R.A. Armstrong, M. Barreto-Orta, J. Ortiz-Zayas, L.S. Guild and R. Viqueira. 2021. River streamflow, remotely-sensed water quality, and benthic composition of two previously undescribed nearshore coral reefs in northern Puerto Rico. Frontiers in Marine Science, 05 October 2021. https://doi.org/10.3389/fmars.2021.720712

Hernandez, W.J, Armstrong, R.A., Morell, J. In Press. High-Resolution Satellite Imagery to Assess Sargassum Inundation Impacts to Coastal Areas. Remote Sensing Letters.

Mera, D.E., R.A. Rodríguez-Solís, L. Reyes, R.A. Armstrong, W. Hernandez, A. Guzmán-Morales. In Press. A Power and Performance Study of Compact L Band Total Power Radiometers for UAV Remote Sensing Based in the Processing on ZYNQ and ARM Architectures. IEEE Sensors Journal.

Geiger, E.F., S.F. Heron, W.J. Hernández, J. Caldwell, K. Falinski, T. Callender, A. Greene, G. Liu, J.L. De La Cour, R.A. Armstrong, M.J. Donahue, C.M. Eakin. 2021. Optimal Spatiotemporal Scales to Aggregate Satellite Ocean Color Data for Nearshore Reefs and Tropical Coastal Waters: Two Case Studies. Frontiers in Marine Science, section Coral Reef Research. https://doi.org/10.3389/fmars.2021.643302

Ortiz-Rosa, Suhey, William J. Hernández, Stacey M. Williams , Roy A. Armstrong. 2020. Water Quality Anomalies following the 2017 Hurricanes in Southwestern Puerto Rico: Absorption of Colored Detrital and Dissolved Material. Remote Sens.,12, 3596; doi:10.3390/rs12213596.

León-Pérez, M., R.A. Armstrong, W.J. Hernández, and A. Aguilar-Perera. 2020. Seagrass Cover Expansion off Caja de Muertos Island, Puerto Rico, as determined by Long-term Analysis of Historical Aerial and Satellite Images (1950 – 2014). Ecological Indicators, 117:10656, DOI: 10.1016/j.ecolind.2020.106561

Gomez, Andrea M.; McDonald, Kyle C.; Shein, Karsten; DeVries, Stephanie; Armstrong, Roy A.; Hernandez, William J.; Carlo, Milton. 2020. "Comparison of Satellite-Based Sea Surface Temperature to In Situ Observations Surrounding Coral Reefs in La Parguera, Puerto Rico." J. Mar. Sci. Eng. 8, no. 6: 453.

Waters, S.M., Purdue, S.K., DeLeon, N., Armstrong, R.A., and Detres, Y. 2020. Metagenomic Investigation of African Dust Events in the Caribbean. FEMS Microbiology Letters. DOI: 10.1093/femsle/fnaa051

William J. Hernandez, Suhey Ortiz-Rosa, Roy A. Armstrong, Erick F. Geiger, C. Mark Eakin, Robert A. Warner. 2020. Quantifying the Effects of Hurricanes Irma and María on Coastal Water Quality in Puerto Rico using Moderate Resolution Satellite Sensors. Remote Sens. 12(6), 964; https://doi.org/10.3390/rs12060964

León-Pérez, M.C., Hernández, W.J., and Armstrong, R.A., 2019. Characterization and distribution of seagrass habitats in a Caribbean nature reserve using high-resolution satellite imagery and field sampling. Journal of Coastal Research, 35(5), 937–947. Coconut Creek (Florida), ISSN 0749-0208.

Roman, M., Z. Wang, Q. Sun, V. Kalb, S.D. Miller, A.L. Molthan, L.A. Schultz, J.R. Bell, E. Stokes, K. Seto, B. Pandey, D.K. Hall, T. Oda, R.E. Wolfe, G. Lin, N. Golpayegani, S.

Devadiga, C.C. Davidson, S. Sarkar, C. Praderas, J. Schmaltz, R.A. Boller, J. Stevens, O.M. Ramos, E. Padilla, J. Alonso, Y. Detres, R. Armstrong, I. Miranda, Y. Conte, N. Marrero, K. MacManus, T. Esch, E.J. Masuoka. 2018. NASA's Black Marble Standard Product Suite. Remote Sensing of Environment 210,113-143.

Wei, J., Z. Lee, R. Garcia, L. Zoffoli, R.A. Armstrong, Z. Shang, P. Sheldon, and R. Chen. 2018. An assessment of Landsat 8 atmospheric correction schemes and remote sensing reflectance products in coral reefs and coastal turbid waters. Remote Sensing of Environment 215, 18-32.

Hosannah, N., J. Gonzalez, R. Rodriguez, H. Parsiani, F. Moshary; L. Aponte, R. Armstrong, E. Harmsen, P. Ramamurthy, M. Angeles, L. Leon, N. Ramirez, D. Niyogi, and B. Bornstein. 2017. The Convection, Aerosol, and Synoptic-Effects in the Tropics (CAST) Experiment: Building an Understanding of Multi-Scale Impacts on Caribbean Weather via Field Campaigns. Bulletin of the American Meteorological Society 98(8), doi:10.1175/BAMS-D-16-0192.1

Wei, J., Z. Lee, M. Ondrusek, A. Mannino, M. Tzortziou, and R. Armstrong. 2016. Spectral slopes of the absorption coefficient of colored dissolved and detrital material inverted from UV-visible remote sensing reflectance, J. Geophys. Res. Oceans, 121, doi:10.1002/2015JC011415.

Perez-Hoyos, I.C., N.Y. Krakauer, R. Khanbilvardi, and R.A. Armstrong. 2016. A review of advances in the identification and characterization of groundwater dependent ecosystems using geospatial technologies. Geosciences 6, 17, doi:10.3390.

Hernandez, W.J. and R.A. Armstrong. 2016. Deriving Bathymetry from Multispectral Remote Sensing Data. Journal of Marine Sciences and Engineering 4(1)8. http://www.mdpi.com/2077-1312/4/1/8/html

Torres-Pérez JL, Guild LS, Armstrong RA, Corredor J, Zuluaga-Montero A, Polanco R (2015) Relative Pigment Composition and Remote Sensing Reflectance of Caribbean Shallow-Water Corals. PLoS ONE 10(11): e0143709. doi:10.1371/journal.pone.0143709

Uri ten Brink, Dwight Coleman, Jason Chaytor, Amanda Demopoulos, Roy Armstrong, Graciela Garcia-Molinero, Nicole Reineault, Brian Andrews, Roger Chastain, Katherine Rodriguez, and Mathieu Mercier-Gingras. 2014. Earthquake, landslide, and tsunami hazards and benthic biology in the Greater Antilles. Oceanography Vol 27 (1) Supplement, pp.34-35.

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Torres-Pérez, J.L., L.S. Guild and R.A. Armstrong. 2012. Hyperspectral Distinction of Two Caribbean Shallow-Water Corals Based on Their Pigments and Corresponding Reflectance. Remote Sensing 4:3813-3832.

Torres J.L. and R.A. Armstrong. 2012. Effects of artificially-enhanced UV radiation on the growth, photosynthetic and photoprotective components, and reproduction of the Caribbean coral *Porites furcata*. Coral Reefs 31:1077-1091.

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Jiménez-Vélez B., Y. Detrés, R.A. Armstrong, and A. Gioda. 2009. Characterization of African Dust (PM 2.5) across the Atlantic Ocean during AEROSE 2004. Atmospheric Environment 43:2659–2664.

Armstrong, R.A., H. Singh, S. Rivero-Calle, and F. Gilbes. 2009. Monitoring Coral Reefs in Optically-Deep Waters. Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, July 2008: 593-597.

Rivero-Calle S, R.A. Armstrong, F.J. Soto-Santiago. 2009. Biological and physical characteristics of a mesophotic coral reef: Black Jack reef, Vieques, Puerto Rico. Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, July 2008: 567-571.

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Torres J.L., R.A. Armstrong, and E. Weil. 2008. Enhanced ultraviolet radiation can terminate sexual reproduction in the broadcasting coral species *Acropora cervicornis* Lamarck. Journal of Experimental Marine Biology and Ecology 358:39-45.

Armstrong, R.A. 2007. Deep zooxanthellate coral reefs of the Puerto Rico - U.S. Virgin Islands insular platform. Coral Reefs, 26(4):945.

Suarez, E., J. Matta, M. Rolon, L. Maldonado, Y. Detrés, A. de la Motta, M. Gelado, J. Ramos, and R. Armstrong. 2008. Molecular identification of the bacterial burden in Sahara Dust Samples using a new method to improve the evidence for the effective management of public health measures during an SD event. Journal of Environmental Health Research 7(2):99-106.

Torres J.L., R.A. Armstrong, J.E. Corredor, and F. Gilbes. 2007. Physiological responses of *Acropora cervicornis* to increased solar irradiance. Photochemistry and Photobiology 83:839-850.

Morris, V., T.W. Yu, E. Joseph, R. Armstrong, R. Fitzgerald, R. Karim, X.Z. Liang, and Q. Min. 2007. The NOAA Center for Atmospheric Sciences (NCAS): Programs and Achievements. Bulletin of the American Meteorological Society, 88(2):141-145.

Morris, V., T.W. Yu, E. Joseph, R. A. Armstrong, Y. Detres, R. Fitzgerald, R. Karim, X. Liang, and Q. Min. 2007. The NOAA Center for Atmospheric Sciences (NCAS): Its Mission, Current Status, and Significant Achievements from 2002-2005. *Bulletin of the American Meteorological Society (BAMS) 88*(2):141-145.

Matta, J.L., J. M. Ramos, R.A. Armstrong, and H. D'Antoni. 2007. Response of Human Fibroblasts to Very Low Doses of Environmental UV Radiation. Caribbean Journal of Dermatology and Therapeutics 2:16-27.

Morris, V., P. Clemente-Colon, N. Nalli, E. Joseph, R. Armstrong, Y. Detres, M. Goldberg, P. J. Minnett, R. Lumpkin. 2006. Measuring Trans-Atlantic Aerosol Transport From Africa. *EOS*, 565-566.

Costa, C. S. B., R. Armstrong, Y. Detrés, E. W. Koch, M. Bertiller, A. Beeskow, L. S. Neves, G. M. Tourn, O. A. Bianciotto, L. B. Pinedo, A. Y. Blessio, and N. San Roman. 2006. Effect of Ultraviolet-B Radiation on Salt Marsh Vegetation: Trends of the Genus Salicornia along the Americas. Photochemistry and Photobiology 82: 878–886.

Díaz, S., C. Camilion, G. Deferrari, H. Fuenzalida, R. Armstrong, C. Booth, A. Paladini, S. Cabrera, C. Casiccia, C. Lovengreen, J. Pedroni, A. Rosales, H. Zagarese, and M. Vernet. 2006. Ozone and UV Radiation over Southern South America: Climatology and Anomalies. Photochemistry and Photobiology 82: 834-843

Armstrong, R.A., H. Singh, J. Torres, R. Nemeth, A. Can, C. Roman, R. Eustice, L. Riggs, and G. Garcia-Moliner. 2006. Characterizing the deep insular shelf coral reef habitat of the Hind Bank Marine Conservation District (US Virgin Islands) using the Seabed Autonomous Underwater Vehicle. Continental Shelf Research 26, 194-205.

Díaz, S., C.R. Booth, R. Armstrong, C. Brunat, S. Cabrera, C. Camilion, C. Cassiccia, G. Deferrari, H. Fuenzalida, C. Lovengreen, A. Paladini, J. Pedroni, A. Rosales, H. Zagarese, and M. Vernet. 2005. Multi-channel radiometers calibration: A new approach. Applied Optics 44 (26): 5374-5380.

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Matta, J., J. Ramos, R. Armstrong, and H. D'Antoni. 2005. Environmental UVA and UVB Threshold Doses for Apoptosis and Necrosis in Human Fibroblasts. Photochemistry and Photobiology 81, 563-568.

Ramos, J., Villa, J., Ruiz, A., Armstrong, R., and J. L. Matta. 2004. UV dose determines key characteristics of non-melanoma skin cancer. Cancer Epidemiology, Biomarkers & Prevention 13(12): 2006-2011.

Armstrong, R.A., F. Gilbes, R. Guerrero, C. Lasta, and H. Miazán. 2004. Validation of SeaWiFS chlorophyll algorithm for the Rio de la Plata Estuary and adjacent waters. Intl. J. of Remote Sensing 25(7-8):1501-1505.

Gilbes, F. and R.A. Armstrong. 2004. Phytoplankton dynamics in the eastern Caribbean Sea as detected by space remote sensing. Intl. J. of Remote Sensing 25(7-8):1449-1452.

Corredor, J., J. Morell, J. López, J. Capella and R.A. Armstrong. 2004. Cyclonic Eddy Entrains Orinoco River Plume in Eastern Caribbean. EOS Transactions, American Geophysical Union 85(20):197, 201-202.

Singh, H., R.A. Armstrong, R. Eustice, C. Roman, O. Pizarro, and J.Torres. 2004. Imaging Coral I: Imaging Coral Habitats with the SeaBED AUV. Subsurface Sensing Technologies and Applications 5(1):25-42.

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Guild, L., B. Ganapol, P. Kramer, R. Armstrong, A. Gleason, and J. Torres. 2004. Clues to coral reef ecosystem health: spectral analysis coupled with radiative transfer modeling. ASLO/TOS Ocean Research 2004 Conference, Honolulu, HI. Abstract Book, pg. 60.

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Guild, L., B. Ganapol, R. Furfaro, P. Kramer, R. Armstrong, A. Gleason, and J. Torres. 2004. Radiative Transfer Modeling, Spectral Analysis, and Remote Sensing of Coral Reefs. AGU Fall Meeting. San Francisco, CA.

Armstrong, R.A., B. Jimenez and Y. Detrés. 2003. Mass measurements of Saharan dust aerosols in Puerto Rico. Abstract and Poster, AGU Fall Meeting, San Francisco, CA, Dec. 8-12.

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De La Mota, A., C. Betancourt, Y. Detrés and R.A. Armstrong. 2003. Airborne Fungi in Sahara Dust Aerosols Reaching the Eastern Caribbean: II. Species Identification Using Molecular Techniques. Abstract and Poster, AGU Fall Meeting, San Francisco, CA, Dec. 8-12.

Guild, L., B. Ganapol, P. Kramer, R. Armstrong, A. Gleason, J. Torres, L. Johnson, and N. Garfield. 2003. Clues to coral reef ecosystem health: spectral analysis coupled with

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Torres, J.L., and R.A .Armstrong. 2001. Photosynthetic pigments associated with the endosymbionts of the shallow-water corals *Acropora cervicornis* and *Porites porites*. Accepted as oral presentation in ASLO 2001, Albuquerque, New Mexico, Feb. 12-16.

Matta, J.L., M. Morales, R.A. Armstrong, and H. D'Antoni. 2001. Mechanisms UV induced free radical oxidative damage in human skin fibroblasts. Published abstract in Free Radical Biology and Medicine 31:11, Suppl. 1.

García-Sais, J. Alfaro, M. Armstrong R. and Capella J. 2001. Evaluation of Marine Community Responses to a Water Quality Restoration Initiative in Mayagüez Bay, Puerto Rico. Proceedings of the IX Latinoamerican Congress of Marine Sciences. San Andrés, Colombia. IX Latinoamerican Congress of Marine Sciences.

Matta, J.L., R.A. Armstrong, and M. Morales. 2000. Mechanisms of UV-A and UV-B induced free radical oxidative damage in human skin fibroblasts. 7th Annual Meeting of the Oxygen Society. San Diego, CA, November 16-20.

Matta, J.L., M. Morales, and R. Armstrong. 2000. DNA adduct production in human skin fibroblasts after exposure to environmental levels of UVA and UVB in Puerto Rico. Presented at the 7th RCMI International Symposium, San Juan, Puerto Rico, November 12-16.

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Gilbes, F., and R.A. Armstrong. 2000. Space Remote Sensing of the Eastern Caribbean Sea. Oceans from Space "Venice 2000", 9-13 October.

Torres, J.L. and R.A. Armstrong. 2000. Spectral characteristics of *Acropora cervicornis* and *Porites porites* under laboratory conditions. In: Abstract volume of 9th Int. Coral Reef Symposium. Bali, Indonesia. Oct. 23-27, 2000. p. 240.

Detrés, Y. and R.A. Armstrong. 2000. Ultraviolet-induced photoinhibition and flavonoid synthesis in *Thalassia testudinum*. American Society of Limnology and Oceanography (ASLO) Meeting, Copenhagen, June 5-9.

Armstrong, R.A. and D. Cedeño. 2000. Optical Properties of a Toxic dinoflagellate in Southwestern Puerto Rico. Proceedings, Sixth International Conference Remote Sensing for Marine and Coastal Environments. ERIM, Charleston, South Carolina, May 1-3.

Sastre, M., and R. A. Armstrong. 2000. SeaWiFS Estimates of Ocean Primary Productivity in the Caribbean Sea. NASA University Research Conference (NANURC), April 7-10, Nashville, Tennessee.

Torres, J.L. and R.A. Armstrong. 2000. Preliminary study on the spectral response of some Caribbean coral species. 35th ACS Junior Technical Meeting and the 20th Puerto Rico Interdisciplinary Scientific Meeting, University of Puerto Rico, Rio Piedras, March 11.

Armstrong, R.A. 1999, Mesoscale Effects of the Orinoco River Plume. *Astrobiology: El Niño and South American Ecosystems*, INIDEP, Mar del Plata, April 7-9.

Armstrong R. A. and Y. Detrés. 1999. Attenuation coefficients of downwelling ultraviolet and visible irradiance in near shore tropical waters. ASLO '99 Santa Fe, NM. Feb. 1-5.

Detrés, Y. and R. A. Armstrong. 1999. Aging of filters used in UV-B supplementation and exclusion experiments**.** Poster presented at ASLO '99 Santa Fe, NM. Feb. 1-5.

Connelly, X. and R. A. Armstrong. 1999. Effects of ultraviolet radiation on the photoprotective pigments of the red mangrove (Rhizophora mangle). Poster presented at ASLO '99 Santa Fe, NM. Feb. 1-5.

Armstrong, R.A. 1999. Oceanographic remote sensing research in Puerto Rico: The first 15 years, XXI Congreso de Investigación Científica, February 11-12, San Juan, Puerto Rico.

Detrés, Y. and R. A. Armstrong. 1998. Measurements of UV-B radiation reaching tropical marine benthic ecosystems. Poster presented at the American Association of Limnology and Oceanography June 6-11.

Connelly, X. and R. A. Armstrong. 1998. Effects of ultraviolet radiation on red mangrove (*Rhizophora mangle*) optical properties. Poster presented at the American Association of Limnology and Oceanography. June 6-11.

Armstrong, R.A. 1997. Hyperspectral remote sensing of phytoplankton pigments in the eastern Caribbean. Fourth International Conference on Remote Sensing for Marine and Coastal Environments, Orlando, Florida, 17-19 March.

Jones, R.L., R.A. Armstrong and A.W. Stoner. 1997. The Application of GIS and remote sensing in a spatial analysis of queen conch nursury habitats. Fourth International Conference on Remote Sensing for Marine and Coastal Environments, Orlando, Florida, 17-19 March.

Armstrong, R.A., J.M. Morell, J.E. Corredor. 1997. Monitoring UV radiation in the tropics and the effect of UV-B on shallow water marine organisms. American Society of Limnology and Oceanography Aquatic Sciences Meeting, Santa Fe, New Mexico, Feb.10-14.

Detrés, Y. and R.A. Armstrong. 1997. Effects of ultraviolet radiation in photoprotective and photosynthetic pigments in the tropical marine macrophyte *Thalassia testudinum.* American Society of Limnology and Oceanography Aquatic Sciences Meeting, Santa Fe, New Mexico, Feb. 10-14.

Armstrong, R.A. 1997. UV photoprotection in tropical marine organisms. Proceedings of the NASA URC Technical Conference (URC-TC '97), Feb. 16-19, Alburquerque, New Mexico, Vol. 1, pp. 857-862.

Navarro, A., J. Corredor, R. Armstrong, and J. Morell. 1997. Optical properties of *Trichodesmium* sp. photosynthetic pigments in the Caribbean Sea south of Puerto Rico. Abstract, IX EPSCoR Annual Meeting, May 23-24, Fajardo, Puerto Rico.

Armstrong, R.A. 1997. Percepción remota de parámetros biofísicos del mangle rojo *Rhizophora mangle* (Rhizophoraceae). Proceedings, 28th Annual Meeting of the Association of Marine Laboratories of the Caribbean, San José, Costa Rica, July 21-25.

Armstrong, R.A., J.M. Morell, J.E. Corredor, and J.M. López. 1996. Remote sensing reflectance of eastern Caribbean waters influenced by the Orinoco River plume. EOS, Transactions, American Geophysical Union, Vol. 76, No. 3.

Corredor, J.E., J.M. Morell, R.A. Armstrong, and J.M. López. 1996. Influenced of the Orinoco River plume on mixed layer features of the eastern Caribbean. EOS, Transactions, American Geophysical Union, Vol. 76, No. 3.

Gilbes, F. and R.A. Armstrong. 1996. AVHRR detection of Orinoco River plume waters in the eastern Caribbean. EOS, Transactions, American Geophysical Union, Vol. 76, No. 3.

Morell, J.M., J.E. Corredor, R.A. Armstrong, and J.M. Lopez. 1996. The effects of massive riverine input upon planktonic respiration in the eastern Caribbean. EOS, Transactions, American Geophysical Union, Vol. 76, No. 3.

López, J.M., A. Dieppa, E. Alfonso, R.A. Armstrong, J.M. Morell, and J.E. Corredor, 1996. Bio-optical observations of the eastern Caribbean Sea. EOS, Transactions, American Geophysical Union, Vol. 76, No. 3.

Armstrong, R.A. and D.W. Bolgrien. 1995. Hyperspectral remote sensing of organic and inorganic material in optically-complex waters. Proc. Conference for Remote Sensing and Environmental Monitoring for the Sustained Development of the Americas, March 21-22, San Juan, Puerto Rico.

Armstrong, R.A. 1981. Changes in a Puerto Rican coral reef from 1936-1979 using aerial photoanalysis. Proceedings of the 4th International Coral Reef Symposium, Manila, Vol. 1:309-315.

BIOGRAPHICAL SKETCH – MIGUEL CANALS

RESUME – MIGUEL F CANALS SILANDER, Ph.D.

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464 Calle Jose Perez, Rincon, PR, 00677
Phone: (787) 393-3283
E-mail: miguelf.canals@gmail.com

PROFESSIONAL QUALIFICATIONS

Dr. Miguel Canals is an oceanographer and numerical modeler with 13 years of experience in coastal hydrodynamics, numerical ocean modeling and forensic oceanography. He has extensive experience in numerical model implementation and development and has conducted numerical modeling, instrument deployment, data analysis and met-ocean hindcast analyses for projects in Puerto Rico, the US Caribbean and Latin America. He has extensive experience with the following numerical models: BOUSS2D, CMS-FLOW, CMS-WAVE, STWAVE, SWAN, SWASH. Dr. Canals is also professor of physical oceanography and ocean/coastal engineering at the University of Puerto Rico at Mayaguez. His work focuses on coastal hydrodynamics, coastal wave transformation, geophysical fluid dynamics and renewable ocean energy. From 2012 to 2017 he served as the Technical Director of the Caribbean Coastal Ocean Observing System (CARICOOS; https://www.caricoos.org) and co-led the design and implementation of the observational and numerical modeling components of CARICOOS. He is the Director of the UPRM Center for Applied Ocean Science and Engineering and leads a portfolio of externally funded research projects focusing on nearshore wave modeling, coral reef restoration, coastal circulation and hydrodynamics, numerical marine connectivity studies, and ocean energy resource characterization projects. He is also directly involved in several projects related to coastal hazards and shoreline protection led by the USACE in Puerto Rico.

Memberships: American Shoreline Beach Preservation Association, American Society of Limnology and Oceanography

Training: USACE Surface Modeling System (CMS FLOW, CMS WAVE, BOUSS2D, STWAVE)

PROFESSIONAL PREPARATION

University of Hawaii at Manoa Ph.D. in Ocean (Coastal) Engineering, 2008

Dissertation: *Three-dimensional vortex dynamics in oscillating flows*

University of Puerto Rico at Mayagüez M.Sc. in Oceanography, 2005

Thesis: *On the three-dimensional structure of Caribbean mesoscale vortices*

University of Puerto Rico at Mayagüez B.Sc. in Biology, 2003

Biographical Sketch – Miguel Canals

Professional Experience

December 2017 - Present: Full Professor of Physical Oceanography (Joint Appointment), Department of Marine Sciences, University of Puerto Rico at Mayagüez

December 2017 - Present: Full Professor, Department of Engineering Science and Materials, University of Puerto Rico at Mayagüez

January 2015 - 2017: Associate Professor of Physical Oceanography (Joint Appointment), Department of Marine Sciences, University of Puerto Rico at Mayagüez

July 2014 - 2017: Associate Professor, Department of Engineering Science and Materials, University of Puerto Rico at Mayagüez

January 2012 – December 2017: Technical Director, Caribbean Coastal Ocean Observing System

January 2011 - Present: Founder & Director, UPRM Center for Applied Ocean Science and Engineering, Department of Engineering Science and Materials, University of Puerto Rico at Mayagüez

January 2009 – December 2014: Director, Fluid Mechanics Laboratory, Department of Engineering Science and Materials, University of Puerto Rico at Mayagüez

January 2009 – July 2014: Assistant Professor, Department of Engineering Science and Materials, University of Puerto Rico at Mayagüez

Awards / Recognitions

- 2007 American Physical Society Gallery of Fluid Motion Award
- Cover of Physics of Fluids Journal (http://pof.aip.org/pof/covers/20_9.jsp)
- Cover of Journal of Fluid Mechanics, May 2011
- 2011 Distinguished Professor Award, Department of Engineering Science and Materials, College of Engineering, UPRM
- US Coral Reef Task Force Research Award, 2015

Biographical Sketch – Miguel Canals

Recent Peer-reviewed Publications

Solano, M., Canals, M. and Leonardi, S. Barotropic boundary conditions and tide forcing in split-explicit high resolution coastal ocean models. Journal of Ocean Engineering and Science, Volume 5, Issue 3, 2020. Pages 249-260,

Hernandez, E., Toledo-Hernandez, C., Ruiz-Diaz, C., Gomez-Andujar, N., Medina-Muñiz, J., and Canals, M. Hurricane Impacts and the Resilience of the Invasive Sea Vine, Halophila stipulacea: a Case Study from Puerto Rico. Estuaries and Coasts (2020). https://doi.org/10.1007/s12237-019-00673-4

Browning, T., Sawyer, D., Brooks, G., Larson, R., Ramos-Scharron, C., and Canals, M. Widespread Deposition in a Coastal Bay Following Three Major 2017 Hurricanes (Irma, Jose, and Maria). Scientific Reports, Vol 9, Article number: 7101, 2019. (https://www.nature.com/articles/s41598-019-43062-4)

Canals, M. and C. García. On the spatial distribution of the wave energy resource in Puerto Rico and the United States Virgin Islands, Journal of Renewable Energy, Volume 136, Pages 442-451, 2019.

Solano, M., Canals, M. and Leonardi, S. Development and validation of a coastal ocean forecast system for Puerto Rico and the U.S. Virgin Islands. Journal of Ocean Engineering and Science, Volume 3, Issue 3, Pages 223-236, 2018.

Loeffler, C. R., A. Robertson, H. A. Flores Quintana, M. Canals, T. B. Smith, and D. Olsen. Ciguatoxin prevalence in four commercial fish species along an oceanic exposure gradient in the U.S. Virgin Islands. Environmental Toxicology and Chemistry, Vol 37(7):1852-1863. doi: 10.1002/etc.4137, 2018

Smith TB, Brandtneris VW, Canals MC, Brandt ME, Martens J, Brewer R, Kadison E, Kammann M, Keller J and DM Holstein. Potential structuring forces on a shelf edge upper mesophotic coral ecosystem in the US Virgin Islands. Frontiers in Marine Science, 3:115 DOI: 10.3389/fmars.2016.00115, 2016.

Amador, A. and Canals. M., Design and development of an instrumented drifter for Lagrangian measurements of inertial particle dynamics in breaking waves, IEEE Journal of Oceanic Engineering,, vol.PP, no.99, pp.1-1, 2015.

Anselmi, C., Canals, M., Morell, J., Gonzalez, J., Capella, J., and Mercado, A. Development of a nearshore wave forecasting system for Puerto Rico, Journal of Coastal Research: Volume 28, Issue 5: 1049-1056. 2012

Corredor, J. Amador, A., Canals, M., Rivera, S., Capella, J., Morell, J., Glenn, S., Roarty, H., Handel, E., Lemus, E. Optimizing and Validating High-Frequency Radar Surface Current Measurements in the Mona Passage, Marine Technology Society Journal, Vol. 45, No. 3, pp. 49-58, 2011

Canals, M. and Pawlak, G. Three-dimensional vortex dynamics in oscillatory flow separation. Journal of Fluid Mechanics, Vol. 674, pp. 408-432, 2011.

Biographical Sketch – Miguel Canals

Canals, M., Pawlak, G. and MacCready, P. Tilted baroclinic tidal vortices. Journal of Physical Oceanography, Vol. 39, No. 2, pp. 333-350, 2009.

Canals, M. and Pawlak, G. Topology and breakdown of Görtler vortices on an oscillating cylinder. Physics of Fluids, Vol. 20, No. 9, pp 091102, 2008.

Synergistic Activities

- Member of the Puerto Rico Government's Interagency Beach Management Board (2017-present)
- Member of the Puerto Rico Climate Change Council (2016-Present)
- Member of the Puerto Rico Conservation Trust Advisory Council (Appointed April 2021 by UPR President)
- Coordinator of the Fluid Mechanics Teaching Committee, Department of General Engineering, January 2009-Fall 2012
- Developed the Vortex Visualization Facility at the Environmental Fluid Dynamics Laboratory of the University of Hawaii at Manoa. Developed novel flow visualization techniques to capture complex time-dependent fluid-structure interactions. The resulting flow visualization images have been used by the American Institute of Physics, the American Physical Society's Holiday Card, the cover of the Physics of Fluids journal and several University of Hawaii brochures. This research earned Dr. Canals the American Physical Society Gallery of Fluid Motion Award (2007).
- Referee for Journal of Engineering for the Marine Environment, Limnology and Oceanography, Marine Technology Society Journal
- Invited proposal reviewer for the National Science Foundation (NSF) and the National Oceanographic and Atmospheric Administration
- Active in management activities of several marine reserves in the Caribbean, including the Desecheo Island Marine Natural Reserve (member of Pilot Committee) and the Tres Palmas Marine Natural Reserve (elected member of Management Committee). Responsible for integration of coastal hydrodynamics into management plans and research activities in sensitive coral reef areas.
- Have served as expert witness in forensic oceanography in several court cases
- Have provided several continued education courses and workshops to the Puerto Rico College of Architects and Engineers in the field of coastal hydrodynamics and oceanography

Biographical Sketch – Miguel Canals

Teaching Experience

- INGE 4015 - Fluid Mechanics for Civil Engineering
- INGE 4010 - Fluid Mechanics for Mechanical Engineering
- INGE 3016 - Algorithms and MATLAB Programming
- INGE 5185 - Introduction to Coastal Engineering
- INGE 5996 - Special Topics: Advanced Coastal Hydrodynamics
- INGE 5027 - Ocean Wave Dynamics for Engineers
- CMOF 6631 – Geophysical Fluid Dynamics I
- CMOF 6632 – Geophysical Fluid Dynamics II

Thesis advisor and post-graduate scholars

Graduate:

- Colin Evans, Biological Oceanography, UPRM - now Auxiliary Researcher at CAOSE, UPRM
- Estefania Quiñones, Physical Oceanography, UPRM - now PhD student in College of Earth, Ocean & Atmospheric Sciences, Oregon State University
- Gabriela Salgado, Civil Engineering, UPRM - now engineer at USACE Engineering Research and Development Center
- Carlos García, Electrical Engineering, UPRM - now Systems Engineer at CORDC, Scripps Institute of Oceanography
- Andre Amador, Mechanical Engineering, UPRM - received PhD (2020) in Applied Ocean Science and Mechanical Engineering at UC San Diego
- Patricia Chardon, Civil Engineering, UPRM - received PhD (2016) in Coastal Engineering at University of Delaware
- Christian Rojas, Civil Engineering, UPRM - now PhD student in CoastalEngineering at University of Florida

- Francisco Velez, Civil Engineering, UPRM - now engineer at CH2MHILL.
- Carlos Anselmi, Marine Sciences, UPRM - now meteorologist at NWS San Juan. (Co-advised with Prof. Aurelio Mercado)

Undergraduate:

- Omar Lopez, Civil Engineering, UPRM - now PhD student in Coastal Engineering at Stevens Institute of Technology, coastal engineer at Taylor Engineering
- Daniel Martinez, Mechanical Engineering, UPRM - now engineer at USACE Engineering Research and Development Center
- Fabian Garcia, Mechanical Engineering, UPRM - now engineer at USACE Engineering Research and Development Center

EXTERNALLY FUNDED RESEARCH GRANTS (UPRM)

Enhancing Coastal Intelligence in the US Caribbean Archipelago: the Caribbean Coastal Ocean Observing System

- Funding: $1.7M / yr, 2016 - 2021, NOAA
- Investigators: PI: Julio Morell, Co-PIs: Miguel Canals, Sylvia Rodriguez, Patricia Chardón
- Description: This project seeks to maintain and expand the Caribbean Coastal Ocean Observing System

Low Tech Rehabilitation of Coral Reef Ecosystem Services: An Alternative Test Bed to Reduce Coastal Vulnerability

- Funding: $200k, Oct 2017 - Nov 2019, NOAA
- Investigators: PI Edwin Hernandez, Co-PIs: Miguel Canals, Elvira Cuevas
- Description: This project seeks to evaluate, through computational fluid dynamics and detailed field observations, the feasibility of restoring coral reefs to enhance wave dissipation and enhance coastal resilience

Oceanographic Pathways and Hydrodynamic Connectivity Between Marine Protected Areas in the US Virgin Islands and Eastern Puerto Rico

- Funding: $247k, March 2018 - March 2020, NOAA (through Caribbean Fishery Management Council)

- Investigators: PI Miguel Canals
- Description: This project will analyze the hydrodynamic connectivity of fish eggs and larvae between MPAs in the US Virgin Islands and Eastern Puerto Rico

The Puerto Rico very high-resolution wave energy atlas: A 40-year wave hindcast simulation and analysis in support of coastal zone management, engineering, design and conservation

- Funding: $85k, August 2019 - July 2020, Puerto Rico Department of Natural and Environmental Resources
- Investigators: PI Miguel Canals

Development of the Puerto Rico Digital Ocean Energy Atlas: Unlocking Puerto Rico's Marine Renewable Energy Potential

- Funding: $150k, August 2019 - July 2021, Puerto Rico Science and Technology Research Trust
- Investigators: PI Miguel Canals

A wave modeling test bed for Puerto Rico

- Funding: $271k, August 2019 - July 2022, United States Geological Survey
- Investigators: PI Miguel Canals, Co-PI Patricia Chardon

Puerto Rico Beach Recovery Post-María 2017: Phase 1 - Erosion Assessment, Control and Management

- Funding: $78k, April 2018 - July 2018, FEMA
- Investigators: PI Luis Aponte, Co-PIs: Miguel Canals, Jonathan Muñoz, Patricia Chardón
- Description: This rapid response project will evaluate the status of several beaches in Puerto Rico after Hurricane María using field observations and numerical modeling

NSF RAPID: Hurricane Maria Rapid Response: Field Observations of Post-storm Beach Recovery Dynamics in Rincón, Puerto Rico

- Funding: $94k, November 2017 - October 2018, NSF
- Investigators: PI Patricia Chardon, Co-PIs Miguel Canals, Sylvia Rodriguez
- Description: This rapid response project will analyze in detail the beach recovery and sediment transport mechanisms in Rincón, Puerto Rico after Hurricane María

Enhancing coastal intelligence in the US Caribbean: The Caribbean Coastal Ocean Observing System

Schedule: July 2017 - June 2022

Researchers: Julio Morell (PI), Miguel Canals (Co-PI & Technical Director), Sylvia Rodriguez (Co-PI)

Funding: NOAA, ~$18,000,000, 5 years

Model and data based hydrodynamic connectivity study for the marine protected area network off western Puerto Rico

Researchers: *Miguel Canals* (PI), Jorge Capella, & Julio Morell (Co-PI)
Funding: NOAA, $140,774

Towards potential beach nourishment in Rincón: Developing RTK beach mapping capabilities, sediment compatibility and an online sediments database
Researchers: *Miguel Canals (PI), Sylvia Rodriguez (Co-PI)*
Funding: NOAA, $41,600

Life-cycle analysis of beach nourishment
Researchers: Luis Aponte (PI), *Miguel Canals* (Co-PI)
Funding: NOAA, $41,500

Advancing the Caribbean Coastal Ocean Observing System
Schedule: July 2011 - June 2016
Researchers: Julio Morell (PI), Jorge Corredor, Miguel Canals (Associate Director), Aurelio Mercado, Luis Aponte
Funding: NOAA, FY 2011: $1,367,000, FY 2012-2016: ~$1,500,000 per year

Lagrangian observations of turbulence in breaking surface waves
Schedule: September 2011 - August 2013
Researchers: Miguel Canals (PI)
Funding: NSF, $227,000

Development of the Puerto Rico beach and surfzone currents warning system
Schedule: February 2012 – January 2014
Researchers: Miguel Canals (PI), Julio Morell
Funding: NSF, $84,586

MRI: Acquisition of a Particle Image Velocimetry (PIV) system to promote state-of-the-art experimental techniques for fluid dynamics research and education at UPRM
Schedule: November 2010 - October 2013
Researchers: Silvina Cancelos (PI), Stefano Leonardi (Co-PI), Ubaldo Cordova (Co-PI), Miguel Canals (Co-PI), Luis Aponte (Co-PI)
Funding: NSF, $184,979

Center for Secure and Resilient Maritime Commerce
Schedule: April 2011 - March 2014
Researchers: Jorge Corredor (PI), Julio Morell (Co-PI), Miguel Canals (Co-PI),
Funding: DHS, $250,000

BIOGRAPHICAL SKETCH – MIGUEL CANALS

Education and training of students on port security at UPRM

Schedule: April 2011 - March 2014
Researchers: Vidya Manian (PI), Miguel Canals (Co-PI), Hector Carlo (Co-PI),
Funding: DHS, $400,000

The hydrodynamics of Guánica Bay

Schedule: November 2011 - October 2012
Researchers: Miguel Canals (PI)
Funding: NFWF / NOAA, $16,432

Implementing the Caribbean Coastal Ocean Observing System

Schedule: July 2008 - June 2011
Researchers: Julio Morell (PI), Jorge Corredor, Miguel Canals, Aurelio Mercado, Luis Aponte
Funding: NOAA, ~$4,000,000

The Caribbean Ocean Data Distribution and Visualization Laboratory

Schedule: August 2009 - July 2010
Researchers: Miguel Canals (PI)
Funding: UNIDATA / NSF, $19,432

Operational models and tools

- The Puerto Rico High-Resolution Wave Climate Atlas
- CARICOOS FVCOM Coastal Circulation Model (A. Rivera and M. Canals): https://www.caricoos.org/currents/forecast/FVCOM/PRVI/Currents
- The CARICOOS Nearshore Wave Model: http://www.caricoos.org/map/swan-point-forecast and http://www.caricoos.org/waves/forecast/SWAN/PRVI/hsig
- The CARICOOS - Sea Grant Breaker Height Prediction System: http://www.caricoos.org/map/nearshore-breaker-model
- The Yabucoa Port Metocean Observation and Prediction System: http://www.caricoos.org/ports/yabucoa/us

Biographical Sketch – Miguel Canals

Other Skills

- AAUS Scientific diver
- NAUI Master Scuba Diver
- NAUI Rescue Diver
- NAUI Nitrox certified
- 15 years of experience as lead scientific diver
- Over 200 hours of research ship time
- USCG & DRNA Licensed Boat Operator

Other

- Member of 2001 Puerto Rico National Surfing Team
- 2008 Hawaii Jiu Jitsu Triple Crown Champion (Amateur no-gi division)

Travis Courtney

Assistant Professor, University of Puerto Rico Mayagüez
Email: traviscourtney@gmail.com, Web: www.traviscourtney.com, Twitter: @tacourtne

Appointments and professional experience:

2021–present **Assistant Professor: Chemical Oceanography**, University of Puerto Rico Mayagüez
2019–2021 **Postdoctoral Scholar**, Scripps Institution of Oceanography
2015–2019 **National Science Foundation Graduate Research Fellow**, Scripps Institution of Oceanography
2013–2014 **Visiting Scientist**, University of North Carolina at Chapel Hill
2013–2014 **Laboratory Technician**, Northeastern University
2010–2013 **Undergraduate Research Assistant**, University of North Carolina at Chapel Hill

Education:

2019 **Ph.D. Oceanography**, Scripps Institution of Oceanography
Thesis: "Quantifying the rates and drivers of coral and coral reef calcification in the Anthropocene"
Advisor: Dr. Andreas J. Andersson

2013 **B.S. Geological + Environmental Sciences**, University of North Carolina at Chapel Hill
Thesis: "Impact of atmospheric pCO_2 and seawater temperature on the stable isotopic composition ($\partial^{18}O$, $\partial^{13}O$) of echinoid calcite (*Echinometra viridis*)"
Research advisor: Dr. Justin B. Ries

Successful research grants and fellowships:

2019	National Oceanographic and Atmospheric Administration	$249,055‡
	"Quantifying coral reef net calcification capacity and vulnerability in the context of ocean acidification"	
2018	National Science Foundation Biological Oceanography	$265,466‡
	"Drivers of coral and reef-scale calcification in the North Atlantic"	
2016	Shepard Foundation Student Fieldwork	$1,840
	"Seasonal variability of net coral reef calcification in Kāne'ohe Bay, Hawai'i"	
2016	Shepard Foundation Student Fieldwork	$1,985
	"Impacts of widespread bleaching on net coral reef calcification in Kāne'ohe Bay, Hawai'i"	
2015	National Science Foundation Graduate Research Fellowship Program	$138,000

‡ contributed significantly to proposal led by Ph.D. advisor Dr. Andreas Andersson

Honors, scholarships, and awards:

2020 **Chancellor's Dissertation Medal**, University of California San Diego
2019 **Graduate Student Excellence Research Award**, Scripps Institution of Oceanography
2019 **Travel Grant**, University of California San Diego Graduate Student Association
2018 **Graduate Student Excellence Travel Award**, Scripps Institution of Oceanography
2018 **Outstanding Mentor Award**, Scripps Graduate Peer Mentor Program
2016 **Outstanding Presentation Award**, Scripps Student Symposium
2016 **Scripps Fellowship**, Scripps Institution of Oceanography
2015 **Cody Fellowship**, Scripps Institution of Oceanography
2015 **Graduate Research Fellowship,** National Science Foundation
2013 **Graduated with Highest Honors and Distinction**, UNC at Chapel Hill
2013 **Environmental Excellence Award**, UNC at Chapel Hill Institute for the Environment
2013 **Carolina Research Scholar**, UNC at Chapel Hill Office of Undergraduate Research
2013 **1st Place Undergraduate Poster Award**, Anadarko Research Symposium
2012 **Roy L. Ingram Geology Fund Scholarship**, UNC at Chapel Hill Dept. of Geological Science
2012 **Judson Mead Geologic Field Station Scholarship**, Indiana University at Bloomington
2011 **Harrington Scholar**, UNC at Chapel Hill
2009 **Wrightsville Beach Longboard Association Scholarship**

Peer-reviewed publications:

20. Kekuewa SAH, **Courtney TA**, Cyronak T, Kindeberg T, Eyre BD, Stoltenberg L, Andersson AJ. 2021. Temporal and Spatial Variabilities of Chemical and Physical Parameters on the Heron Island Coral Reef Platform. Aquatic Geochemistry.

19. **Courtney TA**, Guest JR, Edwards AJ, Dizon RM. 2021. Linear extension, skeletal density, and calcification rates of the blue coral *Heliopora coerulea*. Coral Reefs.

18. Pezner AK, **Courtney TA**, Page HN, Giddings SN, Beatty CM, DeGrandpre MD, Andersson AJ. 2021. Lateral, Vertical, and Temporal Variability of Seawater Carbonate Chemistry at Hog Reef, Bermuda. Frontiers in Marine Science.

17. **Courtney TA**, Kindeberg T, Andersson AJ. 2020. Coral calcification responses to the North Atlantic Oscillation and coral bleaching in Bermuda. PLOS ONE.

16. Kindeberg T, Bates NR, **Courtney TA**, Cyronak T, Griffin A, Mackenzie FT, Paulsen M-L, Andersson AJ. 2020. Porewater Carbonate Chemistry Dynamics in a Temperate and a Subtropical Seagrass System. Aquatic Geochemistry.

15. **Courtney TA**, Barnes BB, Chollett I, Elahi R, Gross K, Guest JR, Kuffner IB, Lenz EA, Nelson HR, Rogers CS, Toth LT, Andersson AJ. 2020. Disturbances drive changes in coral community assemblages and coral calcification capacity. Ecosphere.

14. Cyronak T, Takeshita Y, **Courtney TA**, DeCarlo EH, Eyre BD, Kline DI, Martz T, Page H, Price NN, Smith J, Stoltenberg L, Tresguerres M, Andersson AJ. 2020. Diel temperature and pH variability scale with depth across diverse coral reef habitats. Limnology and Oceanography Letters.

13. Baumann JH, Ries JB, Rippe JP, **Courtney TA**, Aichelman HE, Westfield I, Castillo KD. 2019. Nearshore coral growth declining on the Mesoamerican Barrier Reef System. Global Change Biology, 25: 3932–3945.

12. **Courtney TA** & Andersson AJ. 2019. Evaluating measurements of coral reef net ecosystem calcification rates. Coral Reefs, 38(5):997–1006.

11. Page HN, **Courtney TA**, De Carlo EH, Howins NM, Koester I, Andersson AJ. 2019. Spatiotemporal variability in seawater carbon chemistry for a coral reef flat in Kāne'ohe Bay, Hawai'i. Limnology and Oceanography, 63:913–934.

10. Guest JR, Edmunds PJ, Gates RD, Kuffner IB, Andersson AJ, Barnes BB, Chollett I, **Courtney TA**, Elahi R, Gross K, Lenz EA, Mitarai S, Mumby PJ, Nelson HR, Parker BA, Putnam HM, Rogers CS, Toth LT. 2018. A framework for identifying and characterising coral reef "oases" against a backdrop of degradation. Journal of Applied Ecology, 00:1-11.

9. **Courtney TA**, De Carlo EH, Page HN, Bahr KD, Barro A, Howins N, Tabata R, Terlouw G, Rodgers KS, Andersson AJ. 2018. Recovery of reef-scale calcification following a bleaching event in Kāne'ohe Bay, Hawai'i. Limnology & Oceanography Letters, 3:1–9.

8. **Courtney TA**, Lebrato M, Bates NR, Collins A, de Putron SJ, Garley R, Johnson, R, Molinero JC, Noyes TJ, Sabine CL, Andersson AJ. 2017. Environmental controls on modern scleractinian coral and reef-scale calcification. Science Advances, 3(11), p.e1701356.

7. Page HN, **Courtney TA**, Collins A, De Carlo EH, Andersson AJ. 2017. Net community metabolism and seawater carbonate chemistry scale non-intuitively with coral cover. Frontiers in Marine Science, 4:161.

6. **Courtney TA**, Andersson AJ, Bates NB, Collins A, Cyronak T, de Putron SJ, Eyre BD, Garley R, Hochberg EJ, Johnson R, Musielewicz S, Noyes T, Sabine CL, Sutton AJ, Toncin J, Tribollet A. 2016. Comparing Chemistry and Census-based Estimates of Net Ecosystem Calcification on a Rim Reef in Bermuda. Frontiers in Marine Science, 3:181.

5. Baumann JH, Townsend JE, **Courtney TA**, Aichelman HE, Davies SW, Lima FP, Castillo KD. 2016. Temperature Regimes Impact Coral Assemblages along Environmental Gradients on Lagoonal Reefs in Belize. PLoS ONE, 11(9): e0162098.

4. Aichelman HE, Townsend JE, **Courtney TA**, Baumann JH, Davies SW, Castillo KD. 2016. Heterotrophy mitigates the response of the temperate coral *Oculina arbuscula* to temperature stress. Ecology and Evolution, 6(18): 6758-6769.

3. Horvath KM, Castillo KD, Armstrong P, Westfield IT, **Courtney T**, Ries JB. 2016. Next-century ocean acidification and warming both reduce calcification rate, but only acidification alters skeletal morphology of reef-building coral *Siderastrea siderea*. Scientific Reports, 6:29613.

2. **Courtney T** and Ries JB. 2015. Impact of atmospheric pCO_2, seawater temperature, and calcification rate on the $\delta^{18}O$ and $\delta^{13}C$ composition of echinoid calcite (*Echinometra viridis*). Chemical Geology, 411: 228-239.

1. **Courtney T**, Ries JB, Westfield I. 2013. Predicted end of 21st century CO_2-induced ocean acidification decreases calcification rates in the tropical urchin *Echinometra viridis*. Journal of Experimental Marine Biology and Ecology, 440: 169-175.

Computational tools and datasets:

2. Chan S, **Courtney TA**, Andersson AJ, Kriegman DJ. "CoralNet now estimates carbonate production rates." CoralNet, 30 July 2021, https://coralnet.ucsd.edu/blog/coralnet-now-estimates-carbonate-production-rates/

1. **Courtney TA**, Chan S, Lange ID, Perry CT, Kriegman DJ, Andersson AJ (2021) Area-normalized scaling of ReefBudget calcification, macrobioerosion, and microbioerosion rates for use with CoralNet Version 1.0. Zenodo. https://doi.org/10.5281/zenodo.5140477

Conference presentations and invited talks:

18. **Courtney TA** & Andersson AJ. 2021. Tools to assess coral reef calcification. NOAA Ocean Acidification Working Group Meeting.

17. **Courtney TA**. 2021. Coral reef calcification under rapid environmental change. AECiMA Outreach Talks: University of Puerto Rico, Mayagüez.

16. **Courtney TA**. 2021. Coral reef metabolism and biogeochemistry under rapid environmental change. University of Puerto Rico, Mayagüez.

15. **Courtney TA**. 2021. Rapid estimates of coral reef calcification. Guest presentation for SIO 119 Undergraduate Course.

14. **Courtney TA**. 2020. Disturbances drive changes in coral community assemblages and coral calcification capacity (and the development of tools to assess reef-scale calcification under OA). NOAA Ocean Acidification Community Meeting.

13. **Courtney TA**. 2019. Coral calcification and climate change. Scripps Education Association.

12. **Courtney TA** and Andersson AJ. 2019. Evaluating measurements of ecosystem-scale coral reef calcification under global environmental change. ASLO Aquatic Sciences Meeting.

11. **Courtney TA**. 2018. The science (and value) of coral reef calcification. San Diego State Environmental Business Society.

10. **Courtney TA**. 2018. Environmental controls on coral and reef-scale calcification. National Sun Yat-sen University lunch seminar.

9. **Courtney TA**, Lebrato M, Bates NR, Collins A, de Putron SJ, Garley R, Johnson, R, Molinero JC, Noyes TJ, Sabine CL, Andersson AJ. 2018. New insights into the drivers of coral and reef-scale calcification from Bermuda. Ocean Sciences Meeting.

8. **Courtney TA**. 2017. Environmental controls on coral and reef-scale calcification. San Diego Coral Club.

7. **Courtney TA**, Andersson AJ, De Carlo EH, Page HN, Koester I, Terlouw G, Tabata R, Bahr KD, Rodgers KS. 2017. Coral bleaching impacts on reef-scale net calcification and net community production in Kāneʻohe Bay, HI. ASLO Ocean Sciences Meeting.

6. **Courtney TA** and Andersson AJ. 2016. Seasonal patterns in calcium carbonate production of a Bermuda coral reef. Scripps Student Symposium.

5. **Courtney TA**, Andersson AJ, Cyronak T, Noyes T, Bates NR, Collins A, de Putron S, Garley R, Hochberg EJ, Johnson R. 2016. Comparing chemistry and census-based estimates of net ecosystem calcification on a rim reef in Bermuda. 13th International Coral Reef Symposium.

4. **Courtney T**, Baumann J, Foguel AD, Horvath K, Westfield I, Castillo KD, Ries JB. 2014. Characterizing 21st century growth trends of the scleractinian coral *Siderastrea siderea* throughout the Belize barrier reef and atoll system. Benthic Ecology Meeting.

3. **Courtney T**, Ries JB, Westfield I. 2013. Impact of atmospheric pCO_2 and seawater temperature on calcification rate and stable isotopic composition ($\delta^{18}O$, $\delta^{13}C$) of echinoid calcite (*Echinometra viridis*). UNC at Chapel Hill Anadarko Research Symposium.

2. **Courtney T**, Ries JB, Westfield I. 2012. *Echinometra viridis* exhibits seasonal response in calcification rates to predicted end of 21st century CO_2-induced ocean acidification. Geological Society of America Fall Meeting.

1. **Courtney T**, Ries JB, Westfield I. 2012. Effects of warming and CO_2-induced acidification on the tropical urchin *Echinometra viridis*. UNC at Chapel Hill Department of Marine Sciences Seminar Series.

Fieldwork experience:

2019 **Okinawa, Japan**: Chemistry surveys, instrument deployments, and lab experiments
2019 **Taiping Island, Taiwan (lead)**: Chemistry surveys, instrument deployments, and benthic surveys
2018 **Bermuda (lead)**: MAPCO2 buoy servicing

2018 **Dongsha Atoll, Taiwan**: Chemistry surveys, porewaters, instrument deployments, and coral coring
2017 **Bermuda**: MAPCO2 buoy servicing, seawater chemistry surveys, and instrument deployments
2017–2021 **La Jolla Bight, California:** Chemistry surveys and instrument deployments
2017–2018 **Mission Bay, California:** Chemistry surveys, porewaters, and instrument deployments
2017 **Kāne'ohe Bay, Hawai'i (lead)**: Chemistry surveys
2016 **Kāne'ohe Bay, Hawai'i**: Chemistry surveys, porewaters, and instrument deployments
2016 **Bermuda**: MAPCO2 buoy servicing and coral coring
2016 **Kāne'ohe Bay, Hawai'i**: Chemistry surveys, benthic surveys, and mesocosm experiments
2014 **Belize Barrier Reef System**: Coral reef community benthic surveys
2014 **Southern Outer Banks, North Carolina**: Coral sample collection for lab experiments
2013 **Southern Outer Banks, North Carolina**: Benthic habitat surveys
2012 **Belize Barrier Reef System**: Coral coring

Teaching experience:

2021 Fall **Instructor:** Marine Pollution, University of Puerto Rico Mayagüez
2021 Fall **Instructor:** Professional Ethics in Marine Sciences, University of Puerto Rico Mayagüez
2021 **Virtual Teacher Certificate**: University of California Irvine
2021 **Guest lecture**: Ocean Briefs Feedback and Discussion for University of Montana Story Lab
2020 **Certificate of Completion**: Introduction to College Teaching
2020 **Guest lecture**: "Disturbances and coral reef calcification" for NSF REU
2020 **Guest lecture**: "The chemistry (and physics) of quantifying net coral reef calcification" for SIO 119
2019 **Guest lecture**: "Marine Chemistry Basics" for SIO Master of Advanced Studies
2018 **Instructor**: SIO 90 Perspectives on Ocean Science
2018 **Guest lecture**: "Paleoclimatology Lab" for SIO Master of Advanced Studies (with Dr. Art Miller)
2013 **Summer Education Intern**: NC Aquarium at Pine Knoll Shores
2013 **Teaching Assistant**: GEOL 101L Introductory Geology Lab, UNC

Working groups, workshops, and field courses:

2017 **Local-scale coral reef resilience under global-scale ocean change**, USGS Powell Center
2017 **Coral In Situ MEtabolism (CISME) workshop**, Kāne'ohe Bay, Hawai'i Institute of Marine Biology
2016 **Natural History Below the Tides,** La Jolla, Scripps Institution of Oceanography
2012 **Field Geology in the Rocky Mountains**, Montana, Judson Mead Geologic Field Station
2011 **Human and Marine Ecology,** Galápagos Islands, Universidad San Francisco de Quito
2011 **Marine Resources Population Dynamics Workshop**, NOAA NMFS
2010 **Alternative Fall Break Environmental Trip Co-Leader**: UNC APPLES Service Learning

Graduate student committees:

2021–present **Yvette Arias Delfi**, UPRM MS in Marine Sciences (Committee Chair)
2021–present **Leira Centeno Mejias**, UPRM MS Plan 2 in Marine Sciences (Committee Chair)
2021–present **Omayra Rodriguez Ruiz**, UPRM PhD in Marine Sciences

Graduate students mentored:

2021–present **Yvette Arias Delfi**, Carbon cycling by sea cucumbers
2021–present **Leira Centeno Mejias**, Water quality monitoring compliance project
2019–2021 **Ariel Pezner**, Impacts of hypoxia on coral reefs
2019–2021 **Sam Kekuewa**, Spatiotemporal variability of seawater chemistry in coastal ecosystems
2018–2019 **Thompson Banez**, SIO MAS in Marine Biodiversity and Conservation
2017–2018 **Emily Parker**, SIO MAS in Marine Biodiversity and Conservation
2017–2018 **Sam Kekuewa**, SIO Graduate Peer Mentor Program

2017–2018 **Wiley Wolfe**, SIO Graduate Peer Mentor Program

Undergraduate students mentored:

Summer 2020 **Analysis of coral cover following coral bleaching, NSF Research Experiences for Undergraduates (UCSD):**
Audrey Ellias Zach Ferris

2020–present **Seawater carbonate chemistry and inshore-offshore gradients of coral reef biogeochemistry (UCSD)**:
William Tallentire

2013–2014 **Coral skeletal geochemistry, growth rate analysis, and marine aquarium facilities (UNC-CH)**:

Hannah Aichelman	Courtney Anderson	Madelyn Roycroft
Pualani Armstrong	Jessica Boulton	Joseph Townsend
Carissa Campbell	Kathryn Cobleigh	Vallari Eastman
Ashley Foguel	Hannah Knight	

Job related certifications:

2020–present Freediving Instructors International Level 1 Freediver
2018–present California Boater License
2017–present Motorboat Operator Certification Course
2011–present AAUS Science Diver to 60 ft. + nitrox (>150 dives)
2011–present First Aid, CPR, Emergency O_2, and Diving Neurological Assessment Certified
2010–present North Carolina Boater Education Certified

Diversity, Equity, and Inclusion Trainings

2020 **Introduction to College Teaching,** UC San Diego Teaching + Learning Commons
2020 **Self-Guided Foundational Safe Zone Training**, Safe Zone Project
2020 **Transfer Ally Training**, UC San Diego
2020 **Undocu-Ally Training**, UC San Diego
2020 **Conflict de-escalation Training**, Hollaback!

Outreach and service:

2020 SciREN scientist participant, created lesson plan on coral reef growth for K-12 teachers
2020–2021 Mentor for Científico Latino Graduate Student Mentorship Initiative
2019 University of California delegate to the 25th United Nations Conference of Parties
2019–2021 Letters to a Pre-Scientist participant
2018 Panelist for San Diego State University Earth Week Chasing Coral screening
2018 Ocean Acidification lecture for UCSD Retirement Association
2018 Panelist for UCSD Retirement Association Chasing Coral screening
2017 Panelist for Citizens Climate Lobby Chasing Coral screening
2017 Panelist for Smartfin + Changing Tides Chasing Coral screening
2015–present Smartfin project surfboard fin sensors ß–tester
2015–2020 Scripps Community Outreach Program for Education (SCOPE) volunteer
2015–2016 Rosa Parks Elementary School volunteer tutor
2015-6, 2018 Ocean Discovery Institute volunteer scientist
2014 SciREN scientist participant, created lesson plan on ocean acidification for K-12 teachers
2012 NC Museum Natural Sciences Marine Mammal Day volunteer

Academic service:

2021–Present UPRM Department of Marine Sciences – Valuation Committee
2021–Present UPRM Department of Marine Sciences – Underwater Operations Committee
2021 Sea Grant Puerto Rico Technical Review Panelist

Peer reviewer:	Global Change Biology – Nature Climate Change – Frontiers in Marine Science – Hydrobiologia – Limnology and Oceanography – PeerJ – Proceedings of the Royal Society B – Coral Reefs – Marine Environmental Research – Geophysical Research Letters – Bulletin of Marine Science – PLOS ONE – National Science Foundation – Marine Chemistry – Palaeogeography, Palaeoclimatology, Palaeoecology – Journal of Experimental Marine Biology and Ecology – Marine Ecology Progress Series – Marine Ecology – One Earth – Hawai'i Sea Grant
2019	Session co-chair: Coral Reef Ecosystems, ASLO Aquatic Sciences Meeting
2017–2019	Treasurer + Operations, Scripps Academic Club

Last updated November 2021

CURRICULUM VITAE

Juan Jose Cruz Motta
DOB: 24-02-1971
email: juan.cruz13@upr.edu

1) EDUCATION

2001 – 2005. **PhD, Science** (Experimental Ecology). Centre for Research on Ecological Impacts of Coastal Cities, University of Sydney, Australia. Final Thesis: Benthic ecology in sediments associated with boulder-fields. Supervisors: Prof. A. J. Underwood and Dr. G. Chapman

1997 – 2000. **Msc, Tropical Marine Biology**. Marine Biology Department, James Cook University, Townsville, Australia. Final Thesis: Dredged material disposal impacts on the soft-bottom benthic community of Cleveland Bay. Supervisor: Dr. J. Collins.

1988 – 1994. "**Licentiate" in Biology** (Five years degree + final thesis). Simón Bolívar University, Caracas, Venezuela. Final Thesis: Re-colonisation processes and succession in a soft-bottom benthic community. Prof. D. Bone.

Other courses. Statistical Design of Sampling Surveys in Coral Reef Ecosystems (2017), Project management (2016), Legal issues in funded research (2015), Anemone taxonomy (2012), Update on PRIMER V7 (2015), Tunicate taxonomy (2009), Multivariate analyses, PERMANOVA (2009), Effective teaching and active learning (2007), Project management (2005), Multivariate analyses (2003), Effective demonstrating (2002), Numerically intensive methods (2001), PRIMER (2001), Experimental design (2001), Program R (2000),Statistical analyses (1999).

2) WORK EXPERIENCE

2.1) Academic and research

July 2015 – present. Assistant Professor. Department of Marine Sciences. University of Puerto Rico at Mayaguez. Area of expertise: General Ecology, Marine Ecology, Quantitative Ecology, Experimental Design and Statistics, Detection of environmental impacts in marine ecosystems.

January 2005 – June 2014. Associate Professor and director of the Experimental Ecology Laboratory**.** Simón Bolívar University, Caracas, Venezuela**. Area of expertise:** *General Ecology, Marine Ecology, Quantitative Ecology, Experimental Design and Statistics, Detection of environmental impacts in marine ecosystems* (Complete list of research projects below).

January 2010 – present. Latin-American representative for the software PRIMER-e and PERMANOVA add on. RIMER-e, Plymouth, UK.

2.2) Consultancy

February 2013 – August 2015. Independent consultant. BioAnalysis: Marine, Estuarine & Freshwater Ecology, Sydney, Australia. **Area of expertise:** *Monitoring programs and data analyses for coal mines, power plants and aquaculture farms.*

January 2005 – June 2014. Senior Scientific Advisor and Consultant. Technological and Scientific Foundation of Simón Bolívar University. **Area of expertise:** *EIA, Monitoring programs, Sampling designs, Data analyses, Stakeholder engagement for the oil industry.* (Complete list of projects below).

2.3) Research

January 2003 – December 2004. Research Assistant. Centre for Research on Ecological Impacts of Coastal Cities Centre for Research on Ecological Impacts of Coastal Cities. University of Sydney, Australia. **Area of expertise:** *Intertidal Rocky Shores, Statistical analyses.*

October 1998 – March 2001. Associate Researcher. School of Marine Biology and Aquaculture, James Cook University and the Cooperative Research Centre (CRC Reef), Townsville, Australia. **Area of expertise:** *Introduced Marine Species, Invertebrate Taxonomy*.

October 1995 – May 1997. Research Assistant. Institute of Technology and Marine Sciences (INTECMAR). Simón Bolívar University, Caracas, Venezuela. **Area of expertise:** Marine Ecology, Monitoring Programs.

January 1995 – July 1995. Research Assistant. Institute of Renewable Resources, Simón Bolívar University Caracas, Venezuela. **Area of expertise:** Limnology.

2.4) Teaching

January 2010 - Present. Official Representative for Latin America of the company PRIMER-E, ltd. to teach the statistical software PRIMER and PERMANOVA *add on.*

December 2017. Mexican workshop on multivariate data analysis for Biologists, Ecologist and Environmental Scientists using PRIMER V7 & PERMANOVA add on, Merida, Mexico.

July 2017. Sampling and Experimental Design for Marine Sciences. Red Interinstitucional para el estudio de Ecosistemas Acuáticos del Ecuador (RIEAE) and South American Research Group on Coastal Ecosystems (SARCE-Ecuador). Guayaquil, Ecuador.

July-August 2017. Latin-American Workshop on multivariate data analysis for Biologists, Ecologist and Environmental Scientists using PRIMER V7 & PERMANOVA add on. Merida, Mexico.

July 2016. First Caribbean Workshop on multivariate data analysis for Biologists, Ecologist and Environmental Scientists using PRIMER V7. Department of Marine Sciences, University of Puerto Rico. Mayaguez, Puerto Rico.

January 2016. II Mexican workshop on multivariate data analysis for Biologists, Ecologist and Environmental Scientists using PERMANOVA add on. Universidad Autónoma de México y Centro de Investigaciones Científicas de Yucatán, Mérida, México.

October 2014. I Mexican workshop on multivariate data analysis for Biologists, Ecologist and Environmental Scientists using PRIMER V6. Universidad Autónoma de México y Centro de Investigaciones Científicas de Yucatán, Mérida, México.

September 2013. III Venezuelan workshop on multivariate data analysis for Biologists, Ecologist and Environmental Scientists using PRIMER V6 & PERMANOVA *add on*. Western University, Boca de Rio, Venezuela.

May 2013. Logic and Experimental design for Environmental Managers. Course dictated for government officials of the Ministry of Environment and Ministry of Energy of Peru. Lima, Peru.

September 2012. Theoretical and practical course on experimental design. Venezuelan Institute of Scientific Investigations (IVIC). Altos de Pipe, Venezuela.

April 2012. First Latin-American course on Multivariate data analysis for Biologist, Ecologists and Environmental Scientists using PRIMER V6 and PERMANOVA. International Center for Tropical Studies, Margarita, Venezuela.

February 2012. Theoretical and practical course on experimental design. School of Biology, Los Andes University. Mérida, Venezuela.

August 2011. II Venezuelan workshop on multivariate data analysis for Biologists, Ecologist and Environmental Scientists using PRIMER V6 & PERMANOVA add on. Venezuelan Institute of Scientific Investigations (IVIC). Altos de Pipe, Venezuela.

September 2010. I Venezuelan workshop on multivariate data analysis for Biologists, Ecologist and Environmental Scientists using PRIMER V6 & PERMANOVA *add on*. Western University, Boca de Rio, Venezuela.

February-June 2004, 2003, 2002. Academic Assistant **Marine Biology**. School of Biological Sciences. University of Sydney, Australia.

August - November 2002, 2003. Academic Assistant **Quantitative Methods for Ecology**. School of Biological Sciences, University of Sydney, Australia.

August - November 2003. Academic Assistant **Marine Ecology**. School of Biological Sciences, University of Sydney, Australia).

February-June 2002. Demonstrator **Biology Concepts**. School of Biological Sciences. University of Sydney, Australia.

August-October 2000, 1998. Academic Assistant **Biology of Marine Invertebrates.** School of Marine Biology and Aquaculture, James Cook University, Townsville, Australia.

August-October 2000, 1999, 1998. Academic Assistant **Benthic Ecology**. School of Marine Biology and Aquaculture, James Cook University.

March-June 2000, 1999. Academic Assistant **Biometry**. School of Tropical Biology. James Cook University.

March-June 1998. Demonstrator **Introductory Zoology**. Department of Zoology, James Cook University.

2.5) Ad hoc and honorary positions

2017-Present Member of the advisory board to the Southeast Area Monitoring and Assessment Program of the Caribbean (SEAMAP-C) project.

2010 - Present Co-coordinator of the South American Research Group on Coastal Ecosystems (SARCE).

2006 – 2010. Coordinator of the Natural Geography in Shore Areas program (NAGISA Caribbean Region) of the Census of Marine Life Initiative Research Program

2008 – 2010. Coordinator of the Natural Geography in Shore Areas program (NAGISA South American Region) of the Census of Marine Life Initiative Research Program

2005 - 2013. Member of the advisory committee for the undergraduate and postgraduate programs of the School of Biology of Universidad Simon Bolivar, Caracas Venezuela.

2005 – 2008. Honorary Associated Academic Staff of the Centre for Research on Ecological Impacts of Coastal Cities, USYD.

3 PUBLICATIONS

3.1) Peer-reviewed

1) Guerra-Castro, E., **Cruz-Motta, J.J.** (2018) Colonization and succession as drivers of small-scale spatial variability in epibionts on mangrove roots in the Southern Caribbean. ***Marine Ecology Progress Series***. 588: 15-27.

2) Glasby, T. M., Gibson, P. T., **Cruz-Motta, J. J.** (2017). Differences in rocky reef habitats related to human disturbances across a latitudinal gradient. ***Marine Environmental Research***, 129, 291–303.

3) García-Hernández, J.E., Hammerman, N.M., **Cruz-Motta, J.J.,** Schizas, N. (2017). Infaunal organisms inhabiting the calcareous sponge Clathrina sp. nov. (Gray 1867) in southwest Puerto Rico. ***Caribbean Journal of Science***. *In press.*

4) Cinner JE, Huchery C, MacNeil MA, Graham NAJ, McClanahan TR, Maina J, Maire E, Kittinger JN, Hicks CC, Mora C, Allison EH, D'Agata S, Hoey A, Feary DA, Crowder L, Williams ID, Kulbicki M, Vigliola L, Wantiez L, Edgar G, Stuart-Smith RD, Sandin SA, Green AL, Hardt MJ, Beger M, Friedlander A, Campbell SJ, Holmes KE, Wilson SK, Brokovich E, Brooks AJ, **Cruz-Motta JJ**, Booth DJ, Chabanet P, Gough C, Tupper M, Ferse SCA, Sumaila UR, Mouillot D (2016) Bright spots among the world's coral reefs. ***Nature*** 535:416–419

5) C. Sherman, W. Schmidt, R. Appeldoorn, Y. Hutchinson, H.,Ruiz, M. Nemeth, I. Bejarano, **J.J. Cruz Motta** and H. Xu, (2016) Sediment Dynamics and their Potential Influence on Insular-Slope Mesophotic Coral Ecosystems, ***Continental Shelf Research***, http://dx.doi.org/10.1016/j.csr.2016.09.012

6) Edlin J. Guerra-Castro; Jesús Eloy Conde; **Juan J. Cruz-Motta**. 2016. Scales of spatial variation in tropical benthic assemblages and their ecological relevance: epibionts on Caribbean mangrove roots as a model system. ***Marine Ecology Progress Series***. 548:97–110

7) Ricardo González-Muñoz, Nuno Simões, Edlin J. Guerra-Castro, Carlos Hernández-Ortíz, Gabriela, Carrasquel, Enio Mendez, Carlos Lira, Martin Rada, Iván Hernández, Sheila M. Pauls, Aldo Croquer, **Juan J. Cruz-Motta.** 2016. Sea anemones (Cnidaria: Actiniaria, Corallimorpharia, Ceriantharia, Zoanthidea) from marine shallow-water environments in Venezuela: new records and an updated inventory. ***Marine Biodiversity Records***. *9: 35*

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5 RESEARCH PROJECTS

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2) **Cruz-Motta, J.J.** 2017-2018. Comparison of Video Camera Sled with Diver Surveys & Efficacy of Marine Protected Areas for Conservation of Queen Conch. Funding Sub award from University of Maryland (35.000 US $)

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6) **Cruz-Motta, J.J.** 2015. Spatial Analysis of incrusting assemblages associated with mangrove roots in La Parguera Natural Reserve. Funding: Faculty of Arts and Sciences (RUM): 2.500 US $.

7) **Cruz Motta, JJ.** 2012. Development of a simplified sampling protocol of biodiversity to be used by public high-school students. Funding: FONACIT. 150.000 BsF (35.000 US $).

8) Klein, E; **Cruz Motta, JJ**; Diaz, Y.; Kazandjian, A.; Martín, A; Miloslavich, P.; Molinet, Ricardo; Posada, J. 2008-2014. Marine Biodiversity center. Funding: LOCTI: Chevron, Conoco Phillips Venezuela. 15.000.000 BsF (3.500.000 Us $).

9) Miloslavich, P. and **Cruz Motta, J.J.** 2006-2010. Natural Geography in Shore Areas (NaGISA)". A Census of marine Life project. Funding: A. P. Sloan Foundation, NaGISA Internacional Headquarters, Seto Marine Biological Laboratory, University of Kyoto y el Decanato de Investigaciones de la Universidad Simón Bolívar. 110.00 US $

10) Miloslavich, P. and **Cruz Motta, J.J.** 2006-2008. Natural Geography in Shore Areas (NaGISA)". Venezuela. Funding: LOCTI: Chevron. 1.117.000 BsF (260.000 Us $).

11) **Cruz-Motta, J.J.** and P. Miloslavich. 2010-2013. South –American Research Group on Coastal Ecosystems (SARCE). Funding: Total foundation 250.000 US $.

12) **Cruz Motta, J.J.** 2010-2011. Assemblages associated with Mangroves. Funding: Laboratorio de Ecología Experimental (USB). 50.000 BsF (8.000 US $)

13) **Cruz Motta, J.J.** 2005-2007. Spatial and Temporal distribution of benthic communities associated with intertidal rocky shores. Funding: Decanato de Investigaciones de la USB. 15.000 BsF (3500 Us $).

6 CONGRESS AND MEETINGS

65 oral presentations and 10 posters in international (Argentina, Australia, Brasil, Canada, Costa Rica, Cuba, Curacao, Italy, Japan, Panama, Peru, Portugal, Spain, UK, USA) and national congresses (PR, Australia, Venezuela).

5.1) Invited key note speeches

1) **Cruz-Motta, J.J.** 2017. Detection of environmental impacts in a heterogeneous and variable world. National Institute of Fisheries of Ecuador. July 2017

2) **Cruz-Motta, J.J.** 2017. ECO-LOGY: Importance of logic and experimental design in Ecology. University of Guayaquil, Ecuador. July 2017

3) **Cruz Motta, J.J.** SARCE (South American Research Group on Coastal Ecosystems): A legacy of the Census of Marine Life in South America. Bicentenary of the Museum of Natural Sciences of Argentina. Buenos Aires, Argentina 26-28 June 2012.

4) **Cruz Motta, J.J.** Considerations on the use of experimental evidence to establish patterns-processes relationships in mammals populations. First Simposium on methods to study large mammals. Porlamar, Venezuela. November 2011.

5) **Cruz Motta, J.J.** Incorporating logic into eco-logical conscience: the importance of experimental design in ecology. IX Venezuelan Congress of Ecology. Porlamar, Venezuela. November 2011.

6) **Cruz Motta, J.J.** Ecological experiments on unconsolidated substrates: closing the gaps. VII Encontro de Bioincrustação Ecologia Bêntica e Corrosão. Rio de Janeiro, Brasil. November 2007.

7) **Cruz Motta, J.J.** Postgraduate studies of Simon Bolivar University. XXXV aniversary of postgraduate studies on marine sciences at Western University, Cumana, Venezuela. June 2006.

8) **Cruz Motta, J.J.** Environmental problems at “Morrocy” National Park. II Simposia on Coastal Ecology. “Lisandro Alvarado” University, Barquisimeto, Venezuela. November 2000

9) Problemas en el Parque Nacional Morrocoy. II Jornadas de Ecología Costera. Universidad Centroccidental “Lisandro Alvarado”, 03-04 November 2000.

5.2) Workshops (as coordinator or co-coordinator):

1) **Cruz Motta, J.J.**; Miloslavich, P. South American Reserach Group on Coastal Ecosystems (SARCE). Third general workshop and second analytical workshop. Buenos Aires, Argentina. 2-5 Oct 2013.

2) **Cruz Motta, J.J.**; Miloslavich, P. South American Reserach Group on Coastal Ecosystems (SARCE). Second protocol workshop and first analytical workshop. Sao Sebastiao, Brasil. 23-30 Sep 2012.

3) **Cruz-Motta, J.J**. Results of the project NaGISA: Global, regional and local results. Workshop on Census of Marine of Marine Life Tools for environmental managers in Venezuela. Caracas, Venezuela. May 2011.

4) **Cruz-Motta, J.J.** Implementation of SARCE protocol in South America. Workshop on Census of Marine of Marine Life Tools for environmental managers in Venezuela. Caracas, Venezuela. May 2011.

5) **Cruz-Motta, J.J.** The coastal monitoring Project NaGISA: global, regional and local results. Workshop on Census of Marine Life Tools for Environmental Managers in the Caribbean Region. Centro de Investigaciones en Ciencias del Mar y Limnología (CIMAR), Universidad de Costa Rica, San José. May 2011.

6) **Cruz-Motta, J.J.** Implementation of the SARCE protocol in South-America. Workshop on Census of Marine Life Tools for Environmental Managers in the Caribbean Region. Centro de Investigaciones en Ciencias del Mar y Limnología (CIMAR), Universidad de Costa Rica, San José. May 2011

7) First workshop of the Global Taxonomic Partnership. Paris, Francia. Jun 2009.

8) Synthesis Workshops and CoML SSC Meeting. Long Beach, USA. Feb 2009.

9) Natural geography in shore areas (NaGISA) protocol´s workshop. Discovery Bay, Jamaica. Jun 2006. Organizer.

10) Natural geography in shore areas (NaGISA) protocol´s workshop. Caracas, Venezuela. Jan 2006. Co-organizer

7 SUPERVISED THESIS

1) Carolina Aragones, **Cruz Motta, J.J.** (Supervisor). Ontogenic shift of Lionfishes (*Pterois volitans*). Msc.

2) Manuel Nieves, **Cruz Motta, J.J.** (Supervisor). Comparison of fish assemblages associated with artificial, transplanted and natural reefs. Msc.

3) Wanda Ortiz, **Cruz Motta, J.J.** (Supervisor). Shark fisheries and ecology in Puerto Rico. Msc.

4) Manuel Olmeda., **Cruz Motta, J.J.** (Supervisor). Herbivorous effects of *Diadema antillarum* in SW Puerto Rico. Msc.

5) Jeannette Pérez., **Cruz Motta, J.J.** (Supervisor). Sponge assemblages associated to mangrove's roots and competition processes. Msc

6) Edlin Guerra., J. E. Conde (Supervisor), **Cruz Motta, J.J.** (Co-supervisor). Paterns and processes of assemblages associated with mangrove's roots. PhD 2013.

7) Pedro Cádiz., **Cruz Motta, J.J.** (Supervisor), A. Kazandjian (Co-supervisor). Competition as structuring processes in assemblages associated with mangrove's roots. Msc

8) Rosana Sánchez., **Cruz Motta, J.J.** (Supervisor), S. Marquez (Co-supervisor). Historical variations of assemblages associated with seagrass beds in N.P. "Morrocoy". Honours 2013.

9) Carolina González., **Cruz Motta, J.J.** (Supervisor). Spatil analyses of phytoplankton assemblages and correlation with physic-chemical parameters of the water column in the Central coast of Venezuela. Honours 2012

10) Carlos Soucre, J. Posada (Supervisor), **Cruz Motta, J.J.** (Co-Supervisor). Historical analyses of spearfishing captures in Venezuela through photographic records. Honours 2012.

11) Luis Montilla., **Cruz Motta, J.J.** (Supervisor). Colonization processes in natural and artificial patches of *Thalassia testudinum* in N.P. "Morrocoy". Honours 2013.

12) Arturo Lucas Focardell. **Cruz Motta, JJ** (Supervisor), Klein E. (Co-supervisor), Pérez, A. (Co-supervisor). Patterns of spatial distribution and temporal variations of fish assemblages associate with mangroves in N.P."Morrocoy". Honours 2011. Universidad de Barcelona, España. 2011.

13) Rebecka Oscarsson. **Cruz Motta, JJ** (Supervisor). Effect of habitat heterogeneity on marine epibiont assemblages associated with mangrove roots. Bacherol on environmental sciences. University of Lund, Sweden. 2010.

14) Adriana Ramos. **Cruz Motta, JJ**; Bastidas, C. (Supervisor). Benthic community associated with subtidal rocky shores of the Central Coast of Venezuela. Honours 2010.

15) Nelson Fernández. Bastidas, C.; **Cruz Motta, JJ** (Supervisor). Benthic communities and substrate classification of the Central Coast of Venezuela. Honours 2010.

16) Agudo, Esteban. Klein, E; **Cruz Motta, JJ** (Supervisor). Spatial analyses of fish assemblages associated with subtidal rocky reef on the Central Coast of Venezuela. Honours 2010.

17) Ulloa, Y. **Cruz Motta, JJ** (Supervisor). Herbivory and spatial analyses of assemblages associated with coral reefs. Honours 2010

18) José Farias. Miloslavich, P.; **Cruz Motta, JJ** (supervisor). Structure of assemblages associated with intertidal rocky shores of the Cenrral Coast of Venezuela. Honours 2009.

19) Jenny Kanerva Anderson. **Cruz Motta, JJ** (Supervisor). Spatial analyses of fish assemblages associated with a coral reef in Venezuela. Msc. University of Lund, Sweden 2009.

20) Francoise Cavada. **Cruz Motta, JJ**; Bastidas, C. (Supervisor). Microalgae of the mucopolisacarid layers of two families of corals (Faviidae). Msc 2009.

21) Alejandro Rincón. Díaz, Y.; **Cruz Motta, JJ** (Supevisor). Temporal and spatial variation of macro benthic assemblages associated to algae in intertidal rocky shores of “Paraguana”. Honours 2008.

22) César Herrera. **Cruz Motta, JJ;** Klein, E (Supervisor). Cover, abundance and recruitment of macroalgae and sessile macroinvertebrates in intertidal rocky shores under the influence of upwelling. Honours 2007.

8 SCHOLARSHIPS AND AWARDS

1) 2009- 2013. Researcher in the national Promoting Research Program (Programa de Estímulo a la Investigacion). Currently in Level B.

2) 2012. Best lecturer award. Granted by the student union of Biology of USB

3) 2011. Best lecturer award. Granted by the student union of Biology of USB

4) 2010. Best lecturer award. Granted by the student union of Biology of USB

5) 2005 - 2009. Researcher in the national Promoting Research Program (Programa de Estímulo al Investigador, PEI). Currently in Level A.

6) 2001 -2004. International Postgraduate research Scholarship (IPRS) granted by the DEYTA to pay for the enrolling fees to complete a PhD at the University of Sydney (Sydney, Australia).

7) 2001- 2004. IPA Scholarship granted by the University of Sydney to pay live expenses while doing PhD studies at the University of Sydney (Sydney, Australia).

8) 1997-2000. Postgraduate scholarship granted by: Gran Mariscal de Ayacucho Foundation (FundAyacucho) (Caracas, Venezuela), to complete an Msc at James Cook University.

Employment History (Last 10 years)

February 2016- May 2020. Director, Department of Marine Sciences, , University of Puerto Rico, Mayaguez Campus

May 2015- February 2016. Interim Director, Department of Marine Sciences, , University of Puerto Rico, Mayaguez Campus

2014-2015: Associate Director, Department of Marine Sciences, University of Puerto Rico, Mayaguez Campus

2012- present: Researcher, Department of Marine Science, University of Puerto Rico, Mayaguez Campus

2005- 2011: Research Associate, Department of Marine Science, Universty of Puerto Rico, Mayaguez Campus

Presentations (Since 2000)

Otero, E., 2000. First Modeled Estimates of Carbon Flux Through Bacteria in the Caribbean Time Series Station. 12th AAAS & Epscor Annual Meeting May 26-28, 2000. Fajardo, Puerto Rico.

Otero, E. 2001. Flux of Carbon and Nitrogen Through Heterotrophic Picoplankton in the Caribbean Time Series Station (CaTS) and the Caribbean. 13th AAAS & Epscor Annual Meeting. April 20-22, 2001. Dorado, Puerto Rico.

Otero, E. 2001. Bacterial abundance and production in contrasting coastal systems of southwestern, Puerto Rico. ASLO Aquatic Sciences Meeting February 12-16, 2001, Albuquerque, NM. *http://aslo.org/albuquerque2001/1023.html*

Otero, E., 2002. Microbial patterns in different tropical seascapes in southwestern Puerto Rico. ASLO June 10-14, 2002 Summer Meeting, Victoria, Canada. *http://www.aslo.org/meetings/victoria2002/archive/252.html*

Otero, E., 2002. Oceanografia y Ecologia Microbiana del Caribe. Presentacion Semana de La Microbiología de Ortho-Biologics. 16-20 septiembre 2002. Toa Alta, PR.

Otero, E., 2002. Impacts of recreational boats in the reef area on seagrass and coral. Caribbean Regional Workshop on coral Reef Fisheries Management: Collaboration on Successful Management, Enforcement and Education Methods. September 30-October 1st, 2002. San Juan Puerto Rico.

Otero, E., Carrubba L., N. Jiménez and J. Bauzá. 2003. Cuantificacion de impactos de cicatrices de helices sobre praderas de yerbas marinas en reservas naturales del suroeste de Puerto Rico. *XXII Simposio de la Flora y Fauna de Puerto Rico y el Caribe,* Departamento de Biología, Universidad de Puerto Rico, Humacao, PR. 2 mayo 2003.

Ramírez, L.F & **Otero**, E. 2003. Diferentes fuentes de materia orgánica inducen diferentes respuestas de reducción de sulfato en sedimentos marinos superficiales del suroeste de Puerto Rico. *XXII Simposio de la Flora y Fauna de Puerto Rico y el Caribe,* Departamento de Biología, Universidad de Puerto Rico, Humacao, PR.

Otero, E. , K. Carbery, L. Perez and Y. Rivera. Chlorophyll *a* and turbidity patterns over coral reefs systems of La Parguera Reserve as derived from continuous water

quality sampling. 31st AMLC Scientific Meeting 14-18 July 2003. Port of Spain, Trinidad.

Carrubba, L. E. **Otero**, N. Jiménez and J. Bauza. Using GIS to quantify propeller scarring in seagrass beds of La Parguera and Guanica Natural reserves, Puerto Rico. 31st AMLC Scientific Meeting 14-18 July 2003. Port of Spain, Trinidad.

Carbery, K., E. **Otero**-Morales and Y. Rivera-Torres. 2004. Spatial and temporal water quality monitoring among coral populations in La Parguera, Puerto Rico. XXIII Simposio Fauna y Flora del Caribe. 30 April, 2004. Humacao, PR.

Otero, E. K. Carbery and Y. Rivera. 2003. Monitoreo instrumental semi-continuo de calidad de agua de sistemas arrecifales de La Parguera, Puerto Rico. XXIII Simposio Fauna y Flora del Caribe. 30 April, 2004. Humacao, PR.

Rivera-Torres, Y. K.Carbery and E.**Otero**. 2004. Determination of Nutrient Limitation of Phytoplankton at La Parguera, Puerto Rico. XXIII Simposio Fauna y Flora del Caribe. 30 April, 2004. Humacao, PR.

Peter.G. Hartel, K.Rodgers, J.A. Fisher, S.N.J. Hemigs, J.L. McDonald, K. Gates, S.H. Jones, T.L. Bryant, B. O'Hara, E. **Otero** and Y. Rivera-Torres. Dessication as a mechanism of fecal enterococcal survival and regrwoth for bacterial source tracking. ASM 23-28 May 2004.

Peter G. Hartel, Karen Rodgers, Jared A. Fisher, Sarah N. J. Hemmings, Jennifer L. McDonald, Keith W. Gates, Stephen H. Jones, Tamara L. Bryant, Bethany A. O'Hara, Ernesto **Otero**, Yaritza Rivera–Torres, and Yucheng Feng. 2004. SURVIVAL AND REGROWTH OF FECAL ENTEROCOCCI IN MOIST AND DESICCATED SEDIMENTS. National Beaches Conference October 13-15, 2004. San Diego, CA.

Garcia-Urueña, R.d.P. and E. **Otero**. 2004. Natural short-term environmental changes, growth and survival of *Acropora cervicornis* as viewed through continued monitoring. 10th ICRS. 28 Jun-2 Jul 2004.

Peter G. Hartel[1], Karen Rodgers[1], Jared A. Fisher[1], Jennifer L. McDonald[2], Lisa C. Gentit[2], Carolyn N. Belcher[2], Ernesto **Otero**[3], Yaritza Rivera-Torres[3], Tamara L. Bryant[4], and Stephen H. Jones[4]. 2005. SURVIVAL AND REGROWTH OF FECAL ENTEROCOCCI IN DESICCATED AND REWETTED SEDIMENTS. *Proceedings of the 2005 Georgia Water Resources Conference*, held April 25-27, 2005, at the University of Georgia. Kathryn J. Hatcher, editor, Institute Ecology, The University of Georgia, Athens, Georgia.

Otero, E., F. Pagan amd R. Appeldoorn. 2005. Automated and discrete water quality phytoplankton biomass and microbial parameter monitoring in coral reef habitats of La Parguera, Puerto Rico. 19-24 June 2005. ASLO Summer Meeting, Santiago de Compostela Spain.

Carbery, K.K., R.J. Owen, J.W. Readman, T. Frickers and E. **Otero**-Morales. Contamination of Caribbean coastal waters by the antifouling herbicide Irgarol 1051. The First Annual Sea Grant Symposium on Coastal and Marine Applied Research September 2, 2005. Mayagüez, PR.

Lebron, S., E. **Otero**, J.M. Lopez, A. Massol and E. Diaz. Accumulation and elimination of copper by the Flat-tree oyster Isognomon alatus.T he First Annual Sea Grant Symposium on Coastal and Marine Applied Research September 2, 2005. Mayagüez, PR.

Ramírez, L.F. and E. **Otero**. Propagation and establishment of Avicennia germinans seedlings in a disturbed subtropical coast, Jobos Bay National Etuarine Research Reserve, Puerto Rico. The First Annual Sea Grant Symposium on Coastal and Marine Applied Research September 2, 2005. Mayagüez, PR.

Detres, Y, R.A. Armstrong, and E. **Otero**. 2006. Remote sensing of episodic rainfall events impacting coral reef areas. ASLO Summer Meeting. June 4-9. Victoria, BC.

Otero, E., Carbery, K.K., R.J. Owen, J.W. Readman, and T. Frickers. Assessment of inter annual and spatial distribution of Irgarol 1051 in Southwestern Puerto Rico and St. Thomas, USVI. 2nd Annual Symposium for Coastal and Marine Applied Research October 5, 2006. Biology Building Auditorium, Mayaguez, PR.

Rodriguez, A.E., E. **Otero**, J.C. Martínez-Cruzado and J.T. Ramírez. Mithochondrial DNA analyses as a valid tool for family and species identification of fish larvae: emphasis on snappers. 2nd Annual Symposium for Coastal and Marine Applied Research October 5, 2006. Biology Building Auditorium, Mayaguez, PR.

Otero, E. and L. Carrubba. Daños Mecánicos a las Praderas de Yerbas Marinas de la Reserva Natural de La Cordillera. XXVI Symposio del Departamento de Recursos Naturales y Ambientales. San Juan PR. 24-25 Octubre del 2007.

Todd, B. R., D. L. Ballantine, E. **Otero**. 2008. Nutrient distribution across the insular shelf of Puerto Rico: Assessment by algal tissue nitrogen. 2008 ASLO Ocean Sciences Meeting. 2-7 March 2008, Orlando Florida.

Otero, E. 2008. Multiseasonal assessment of water quality in coral reef systems of southwestern Puerto Rico. 2008 ASLO Ocean Sciences Meeting. 2-7 March 2008, Orlando Florida.

Artigas, L.F., E. **Otero**, R. Paranhos, M.L. Gomez, C. Piccini, M. Costagliola, R. Silva, P. Suarez, V.A. Gallardo, , D.U. Hernandez Becerril. 2008. The LACAR-ICOMM Network: Identification of Research Capabilities and Opportunities for Assessing Marine Microbila Diversity in South America and the Caribbean. 2008 ASLO Ocean Sciences Meeting. 2-7 March 2008, Orlando Florida.

Todd, B. R., D. L. Ballantine, E. **Otero**. 2008. Nutrient distribution across the insular shelf of Puerto Rico: Assessment by algal tissue nitrogen. International Coral Reef Symposium, 7-11 July. Ft. Lauderdale, FL.

Padilla-Crespo, e. T.L. Shearer, A. Massol-Deya, E. **Otero**-Morales, K.M. Ritalahti and F.E. Loeffler. 2009. Detection of dechlorinating Chloroflexi in marine environments. ASLO Aquatic Sciences Meeting. 25-30 Jan 2009.

Otero, E. 2009. Spatial and temporal patterns of water quality indicators in reef systems of Southwestern, Puerto Rico. CRES Synthesis Meeting, 11-19 Feb 2009, La Parguera, PR.

Todd, B. R., D. L. Ballantine, E. **Otero**. 2009. Nutrient distribution across the insular shelf of Puerto Rico: Assessment by algal tissue nitrogen. CRES Synthesis Meeting, 11-19 Feb 2009, La Parguera, PR.

Artigas, L.F., C. Alonso, M. Costagliola, H.M. Dionisi, A. Gonzalez, C. Hozbor, E. **Otero**, R. Paranhoz, S. Peressutti, C. Piccini, M. Smith. 2009. The LACar cooperative project: microbial diversity in coastal systems along a latitudinal gradient from South America to the Caribbean. International census of Marine Microbes 454

User Spring Meeting April 6-9 2009. Marine Biological Laboratory, Woods Hole, MA, USA.

Kristen Green, Shanu Markand, **Otero**, E. **Otero**, Adash Ramsubagh, Gavin Perry and Dave S. Bachoon (2009) Comparison of Traditional and Molecular Methods for Assessing Fecal Pollution in Georgia and the Caribbean Region . 109th General Meeting, American Society of Microbiology Meeting. May, *2009*. Philadelphia, Pa.

Shanu Markand, E. **Otero**, Adash Ramsubagh, Gavin Perry and Dave S. Bachoon Enumeration and Molecular Source Tracking of Fecal Pollution in Popular Public Beaches and Estuaries in Georgia, Puerto Rico and Trinidad. Georgia College & State University Research Conference. April. 2009.

Artigas, L. F.; Alonso, C.; Costagliola, M.; Dionisi, H. M.; Hozbor, C.; **Otero**, E.; Paranhos, R.; Peressutti, S.; Piccini, C.; Thompson, F. L.2011. PROKARYOTIC DIVERSITY (EUBACTERIA AND ARCHAEA) IN COASTAL SYSTEMS ALONG A LATITUDINAL GRADIENT FROM SW ATLANTIC TO THE CARIBBEAN. ASLO Aquatic Sciences Meeting. San Juan, PR 13-18 Feb. 2011.

Soler-Figueroa, B. M.; **Otero**-Morales, E. 2011. DAILY, SPATIAL AND SEASONAL VARIABILITY . OF *PYRODINIUM BAHAMENSE* AND *CERATIUM FURCA* AT BAHIA FOSFORESCENTE, LA PARGUERA, PUERTO RICO. ASLO Aquatic Sciences Meeting. San Juan, PR 13-18 Feb. 2011.

Dave Bachoon, D. S.; **Otero**, E. **Otero**, E.; Adesh Ramsubaugh, A.; Trisha Philips, T.; Samendra Prasad Sherchan, S. 2011. RAPID DETECTION AND QUANTIFICATION OF FECAL INDICATOR BACTERIA ESCHERICHIA COLI O157:H7 AND ATRAZINE DEGRADERS IN THE CARIBBEAN. ASLO Aquatic Sciences Meeting. San Juan, PR 13-18 Feb. 2011.

Zepp, R. G.; Cyterski, M.; Molina, M.; White, E.; **Otero**, E.; Wolfe, K.; Parmar, R. 2011. PREDICTIVE MODELING OF CULTURABLE AND QPCR ENTEROCOCCI AT BOQUERNN BEACH, PUERTO RICO. ASLO Aquatic Sciences Meeting. San Juan, PR 13-18 Feb. 2011.

Otero-Morales, E.; Carbery, K. K. 2011. FURTHER RESULTS OF IRGAROL 1051 CONCENTRATION IN COASTAL WATERS OF PUERTO RICO AND US VIRGIN ISLANDS. ASLO Aquatic Sciences Meeting. San Juan, PR 13-18 Feb. 2011.

Otero Morales, E. 2012. EcoElectrica's 2011 Biological Monitoring Program Plan Studies Results. USEPA Region 2 Office. 31 June 2012.

Otero Morales, E. 2014. EcoElectrica's Review of Biological Monitoring Activities at USEPA Region 2 Office, Nov 2014.

Rosado, Gualberto and E. **Otero**. Marine Sponges and thier fungal associates as bioindicators of heavy metal pollution in coastal environments. 2015 Aquatic Sciences Meeting. 22-27 February 2015.

Rodriguez, A. and E. **Otero**. An evaluation of zooplankton entrainment by a cooling water intake system operated by EcoElectrica, LP. 22-27 February 2015. Granda, Spain.

Otero, E., S. Williams, W. Hernández, Y. Detrés-Cardona, R. Armstrong, M. Careli, L. Carrubba-MacPherson. Coastal and Marine Development Contribute to the Elimination of Nearshore Seagrass Habitats. CERF 2015: Grand Challenges in

Estuarine & Coastal Science: Securing our Future. Portland Oregon. 8-12 November 2015.

Soler Figueroa, B.M. and E. **Otero**. 2015. Patterns of variability of two potentially HAB dinoflagellates in Nahia Fosforescente, PR: role of seasonality. CERF 2015: Grand Challenges in Estuarine & Coastal Science: Securing our Future. Portland Oregon. 8-12 November 2015.

Otero, E. and L. Rodriguez. 2019. Detailed mapping of seagrass habitat distribution associated with coastal industrial facilities. 2019 ASLO Aquatic Sciences Meeting, 23 February-2 March 2019, San Juan, Puerto Rico.

Otero, E. 2019. WaterQuality Component: EcoElectrica's Biological Monitoring Program. ENVIRONMENTAL PROTECTION AGENCY MEETING REGION 2 HEADQUARTERS, NEW YORK, NY; DECEMBER 19, 2019

Most Pertinent Refereed Publications

Otero, E. , F. Nieves and J.E. Corredor, 1987. Patterns of tar ball accumulation on a Lunate Coral Key at La Parguera, Puerto Rico. Caribbean Journal of Science 23(1): 123-129.

Corredor, J.E., C.R. Wilkinson, V.P. Vicente, J. Morell, and E. **Otero**. 1988. Nitrate Release by Caribbean reef sponges. Limnology and Oceanography 33: 114-120.

Otero, E., R.L. Miller, and J.M. Lopez, 1992. Remote sensing of chlorophyll and sediments in coastal waters of Puerto Rico. Proceedings of the First Thematic Conference on Remote Sensing for Marine and Coastal Environments, Louisiana, USA. Vol 1: 353-364.

Miller, R.L., J.F. Cruise, E. **Otero** and J.M. Lopez, 1994. The water quality of Mayaguez Bay, Puerto Rico: Monitoring suspended particulate matter using field measurements and remote sensing. Water Resources Bulletin. 30(2): 271-282.

Culp, R.A., J.M. Legato, and E. **Otero**. 1998. Carbon isotope composition of selected flavoring compounds for the determination of natural origin by gas chromatography/isotope ratio mass spectrometer. p. 260-287. In: C.J. Mussinan and M.J. Morello (Eds.) Flavor Analysis: Developments in Isolation and Characterization. ACS Symposium Series 705. ACS Pub.

Otero, E., R. Culp, J. Noakes and R. Hodson. 2000. Allocation of particulate organic carbon from different sources in two contrasting estuaries of southeastern USA. Limnology and Oceanography 45: 1753-1763.

Otero, E. R. Culp, J.E. Noakes and R.E. Hodson. 2003. The distribution and delta 13-C of DOC and its humic fraction in estuaries of southeastern USA. Est. Coast. Shelf. Sci. 56:1185-1192.

Otero, E. and K.K. Carbery. 2005. Chlorophyll *a* and turbidity patterns over coral reef systems of La Parguera Reserve. Int. J. Trop. Biol. 53 (Suppl. 1): 25-32

Carbery, K., R. Owen, T. Frickers, E. **Otero** and J. Readman. 2006. Contamination of Caribbean Coastal Waters by the Antifouling Herbicide Irgarol 1051. Mar. Poll. Bull. 52: 635-644.

David L. Ballantine, Richard S. Appeldoorn, Paul Yoshioka, Ernesto Weil, Roy Armstrong, Jorge R. Garcia, Ernesto **Otero**, Francisco Pagan, Clark Sherman,

Edwin A. Hernandez-Delgado, Andrew Bruckner, and Craig Lilyestrom. 2008. Biology and ecology of Puerto Rican Coral reefs. In: B. Riegl and R.E. Dodge (Eds).Coral reefs of the USA. Springer. 806p.

Otero, E. 2009. Spatial and temporal patterns of water quality indicators in reef systems of southwestern Puerto Rico. Carib. J. Sci. 45:168-180.

Bachoon, D.S. S. Markand, E. **Otero**, G. Perry and A. Ramsubaugh. 2010. Assessment of non-point sources of fecal pollution in coastal waters of Puerto Rico and Trinidad. Mar. Poll. Bull. 60: 1117-1121.

Bachoon, D. C. Miller, C. Green and E. **Otero**. 2010. Comparison of Four Polymerase Chain Reaction Methods for the Rapid Detection of Human Fecal Pollution in Marine and Inland Waters. I. J. Microbiol. doi:10.1155/2010/595692

Sherchan, S.P., D.S. Bachoon, E. **Otero**, and A. Ramsubhag. 2013. Molecular detection of atrazine catabolism gene atzA in coastal waters of Georgia, Puerto Rico and Trinidad. Mar. Poll. Bull. 69: 215-218.

Walker, T.J., D.S. Bachoon, E. **Otero** and A. Ramsubhag. 2013. Detection of verotoxin producing E. coli in marine environments of the Caribbean. Marine Poll. Bull. 76: 406-410.

Holman, C.B., D.S. Bachoon, E. **Otero** and A. Ramsubhag. 2014. Detection of Helicobacter pylori in the coastal waters of Georgia, Puerto Rico and Trinidad. Mar Poll Bull 79: 354-358.

Soler-Figueroa, B and E. **Otero**. 2014. The Influence of Rain Regimes and Nutrient Loading on the Abundance of Two Dinoflagellate Species in a Tropical Bioluminescent Bay, Bahía Fosforescente, La Parguera, Puerto Rico. Estuaries and Coasts. 10.1007/s12237-014-9827-0

Wade, C., E. **Otero**, B. Poon-Kwong, R. Rozier and D. Bachoon. 2015. Detection of human-derived fecal contamination in Puerto Rico using carbamazepine, HF183 Bacteriodes, and fecal indicator bacteria. Mar. Poll. Bull. 101(Issue2) Page p.872-877

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Pantoja Agreda, Fernando and E. **Otero**. 2016. Autotrophic picoplankton assemblages in subtropical reservoir: temporal and vertical dynamics in abundance and biomass. J. Freshwater Ecology. http://dx.doi.org/10.1080/02705060.2016.1230894.

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Truitt, ZG, Poon-Kwong, B, Bachoon, DS, **Otero**, **E.** Seasonal shifts in the presence of pathogenic leptospires, *Escherichia coli*, and physicochemical properties in coastal rivers and streams of Puerto Rico. *J. Environ. Qual*. 2020; 1– 9. https://doi.org/10.1002/jeq2.20091

CURRICULUM VITAE

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Current Positions
2008 - present, Professor, University of Puerto Rico, Mayagüez
2011 – present, Adjunct Professor, Department of Fisheries Oceanography, Univ of Massachusetts Dartmouth

Professional Preparation
2003-2008, Associate Professor, University of Puerto Rico, Mayagüez
1999-2002 DOE/SLOAN Postdoctoral Fellow, Univ of Chicago and Field Museum of Natural History
1999 Ph.D. Biological Sciences, University of South Carolina. Dissertation title: Ecological genetics of a marine copepod inhabiting clean and contaminated intertidal mudflats
1995 M.S. Fisheries, University of Alaska Fairbanks
1991 B.S. Biological Sciences, University of Illinois at Chicago

Funding
2019
Microbiome and population dynamics in SCTLD infected corals in Puerto Rico. RAPID-NSF: (PI – E Weil; co-PIs NV Schizas, JJ Cruz-Motta)

2018
Investigating the use of eDNA sampling to locate fish spawning aggregations. NMFS - Saltonstall-Kennedy Grant Program. (PI - C Harms-Tuohy; co-PIs NV Schizas, R Appeldoorn, E Tuhoy)

The effects of Hurricane Maria on the mesophotic reefs of Puerto Rico. RAPID-NSF. (PI – NV Schizas; co-PIs JJ Cruz-Motta, C Sherman, W Schmidt, E Weil)

2017
Society of Systematic Biologists Mini-ARTS Grant. PI Schizas. Taxonomy of mesophotic harpacticoid copepods and other crustaceans

2016
The Dongsha Atoll Research Award to conduct fieldwork at Dongsha Atoll, Taiwan related to the population genomics of massive *Porites* spp. corals. (PI – Schizas, Co-PI Hans U. Dahms)

2015

Sustainability and recovery of groupers in Puerto Rico and the US Virgin Islands. NOAA-NMFS. (2016-2018) Ruiz, HJ, MT Schärer, RS Nemeth, RS Appeldoorn, Co-PI NV Schizas.

2014
Connectivity between shallow and mesophotic ecosystems in Puerto Rico and the US Virgin Islands: using corals and commensal fauna" PI Schizas, Co-PI Alfaro, SeaGrant (2014-2016)

Genetic structure and diversity of bottlenose dolphin, *Tursiops truncatus*, off Puerto Rico" PI Rodriguez, Co-PI Appeldoorn, Co-PI Schizas, SeaGrant (2014-2016)

Using phylotranscriptomics to resolve a 350 year old debate in the evolution of Caribbean fire corals. Seed Money College of Arts & Sciences (UPRM). (PI – Schizas)

2012
Linking microbial diversity to coral reef resilience and biodiversity under environmental change: a metagenomics and remote sensing approach. Seed Money College of Arts & Sciences (UPRM). (PI – Schizas)

2011
Dormancy regulation in space: Genetic Evidence from Copepod Diapause Embryos. PR-NASA Space Grant (PI – Schizas)

Nuclear phylogeny of the caridean shrimp genus *Lysmata*. Seed Money College of Arts & Sciences (UPRM). (PI – Schizas)

2010
Genetic Diversity of the Caribbean mesophotic coral *Agaricia lamarcki* and its endosymbiont (*Symbiodinium* spp.) Seed Money College of Arts & Sciences (UPRM). (PI – Schizas)

2008
BRC: A New Infrastructure for Invertebrate Biodiversity Research in Puerto Rico. NSF. Franz N (PI), Santos C (Co-PI), NV Schizas (Co-PI)

2007
Multigene phylogeny of the caridean shrimp genus *Lysmata*. Seed Money College of Arts & Sciences (UPRM). (PI – Schizas)

2006
Ecology, Integrity & Status of Deep Caribbean Coral Reefs. NOAA (Co-PI with 7 other colleagues from UPRM)

Development of microsatellite DNA markers for the hermatypic corals *Acropora cervicornis* and *A. palmata* and the gorgonian *Plexaura flexuosa*. Seed Money Sea Grant (UPRM), (PI – Schizas NV, Garcia J, Prada C)

2005
Population genetics of *Acropora cervicornis* and *A. palmata* NURP/NCRCP. (PI – Schizas)

2004

The extent of clonality in selected species of hermatypic corals in Puerto Rico. NOAA-CCRI (PI – Schizas)

The population genetic structure of copepods and nematodes associated with mangroves (*Rhizophora mangle*). Research & Development Seed Money (UPRM), (PI – Schizas)

Cellular, mitochondrial and microarray probes as tools for toxicity assessment in the flat tree oyster *Isognomon alatus*. Seed Money Sea Grant (UPRM), (PI – Schizas)

2003
The population genetic structure of meiobenthic taxa inhabiting epibiont algae on Caribbean mangroves. Research Initiation Grant PR-NSF Epscor, (PI – Schizas)

A multi-gene phylogeny of copepods to facilitate comparative study of evolution parasitism. Seed Money College of Arts & Sciences (UPRM). (PI – Schizas)

Research Interests
Marine biodiversity, Molecular evolution of marine invertebrates, Copepod taxonomy and phylogenetics

Teaching Experience (19 years)
DNA data analysis of Marine Organisms, Systematics of Marine Invertebrates, Biological Oceanography

Course Experience
12) Speciation-Based Delimitation Workshop, Univ of Michigan, March 13, 2020
11) Conservation Genetics in the Tropics, Biological Reserve of Donana, Spain, Jan 26- Feb 1, 2020
10) eDNA Metabarcoding Workshop, Laval University, Quebec, 19th-23rd November, 2018
9) NCGAS Spring Workshop on de Novo Transcriptome Assembly, Bloomington, IN, April 31-May1, 2018
8) IGS Metagenome Analysis Workshop-Baltimore, Maryland, March 3-6, 2015
7) Genome-wide SNP genotyping with 2bRAD, Wrigley Marine Center, Catalina Island, CA, August 23-31, 2014
6) Workshop on Next-generation sequencing for phylogenetics and phylogeography, June 3-9, 2013 National Evolutionary Synthesis Center (NESCent), Durham, NC
5) Workshop on Genes and Genomes with Ion Torrent™ Personal Genome Machine, Mayagüez, Puerto Rico, October 22-26, 2012
4) Workshop on Comparative Genomics, Cesky Krumlov, Czech Republic, January 9-21, 2011
3) Recent Advances in Conservation Genetics, Smithsonian Tropical Research Institute, Panama 2009
2) Statistical Genetics, Raleigh, NC 1997
1) Workshop on Molecular Evolution, Woods Hole, MA 1996

Services
2008-present Contributor Editor - Aquatic Biology
NSF panelist (2014, 2017), NOAA panelist (2018)

Reviewer for PLosOne, Mitochondrial DNA Part B: Resources, Aquaculture Research, Marine Ecology Progress Series, Marine Biology, Bulletin for Marine Science, BMC Evolutionary Biology, Journal of Experimental Marine Biology and Ecology, Journal of Crustacean Biology, Caribbean Journal of Science, Vie

et Milieu, Proceedings of the Biological Society of Washington, Micron, Zoological Studies, Journal of Marine Biological Marine Association U.K., PeerJ, J Heredity, Coral Reefs, Zootaxa, Frontiers in Marine Science

Ad-hoc reviewer for NOAA, NMFS, NSF, Fundação para a Ciência e a Tecnologia, I.P. (FCT) – Portuguese public funding agency for R&D, The Lewis and Clark Fund for Exploration and Field Research.
External reviewer of 2 PhD Dissertations and 1 MS Thesis (University of New South Wales, Australia, Universidad de los Andes – Colombia).

Synergistic Activities

- Mentor for the NSF funded "Puerto Rico Louis Stokes Alliance for Minority Participation (PR-LSAMP). This project supports small stipends for university undergraduate students to assist with sample and data processing while under the mentorship of Dr. Schizas. Five students have been funded through PR-LSAMP to work in Schizas Lab.
- Co-organizer of the Society of Molecular and Biological Evolution (SMBE) meeting, Puerto Rico, June 2014
- Co-founder of the Caribbean Genome Center, Univ of Puerto Rico Mayaguez

Publications (All pdf reprints available at www.schizaslab.com). **(Asterisks denote publications with students as first authors)**

Schizas NV, H-U Dahms, P Kangtia, A Galindo Estronza. PHC Corgosinho (2022) Comment on Bang et al. Two New Species of the Genus *Longipedia* Claus, 1863 (Copepoda: Harpacticoida: Longipediidae) from Korea, with an Update and a Key to Species. Diversity, 2021, 13, 590. Diversity 14(3), 200; https://doi.org/10.3390/d14030200

Appeldoorn RS, DL Ballantine, M Carlo, JJC Motta, M Nemeth, HJ Ruiz, NV Schizas, CE Sherman, E Weil, PM Yoshioka (2021). Intra-annual Variation in Mesophotic Benthic Assemblages on the Insular Slope of Southwest Puerto Rico as a Function of Depth and Geomorphology. Frontiers in Marine Science https://doi.org/10.3389/fmars.2021.732926

*García-Hernández JE, E Tuohy, D Toledo, C Sherman, NV Schizas, E Weil (2021). Detrimental conditions affecting *Xestospongia muta* across shallow and upper-mesophotic coral reefs off the southwest coast of Puerto Rico. Diseases of Aquatic Organisms DOI: https://doi.org/10.3354/dao03633

*Ortiz-Gonzalez IC, RE Rivera-Vicens, NV Schizas (2021) Description of four *Millepora* spp. transcriptomes and their potential to delimit the Caribbean fire coral species. Marine Genomics https://doi.org/10.1016/j.margen.2021.100863

*García-Hernández JE, NV Schizas (2021) Who are you? The "anemone shrimp" *Periclimenes rathbunae* perched on the stony coral *Mussa angulosa* in Puerto Rico. 51, 25. https://doi.org/10.1007/s12526-021-01171-2

*Veglia AJ, Milford CR, NV Schizas (2021) Isolation and genotyping of novel T4 cyanophages associated with diverse coral reef invertebrates. Coral Reefs https://doi.org/10.1007/s00338-021-02056-3

*Hammerman NM, SM Williams, AJ Veglia, JE García-Hernández, JC Lang and NV Schizas (2021) *Cladopsammia manuelensis* sensu Cairns, 2000 (Order: Scleractinia): A new distribution record for Hispaniola and Puerto Rico. Cahiers de Biologie Marine 62:1-10.

*González-García M del Pilar, NV Schizas, MV Concepción-Torres, and CE Diez (2021) *Lepidochelys olivacea* in Puerto Rico: Occurrence and Confirmed Nesting. Marine Turtle Newsletter No. 162: 13-17

Pesic V, T Chatterjee, M, NV Schizas (2020) A new marine mite of the genus *Litarachna* Walter, 1925 from Guadeloupe, Caribbean Sea (Acari, Hydrachnidia, Pontarachnidae). Ecologica Montenegrina 38: 205-209

*Rodríguez-Ferrer G, JJ Cruz-Motta, NV Schizas, RS Appeldoorn (2020) Modelling distribution of the common bottlenose dolphin, *Tursiops truncatus* off the southwest coast of Puerto Rico. Journal of Marine Systems DOI: 10.1016/j.jmarsys.2020.103371

Nieves-Rivera ÁM, JP Zegarra Vila, CE Figuerola Hernández, JE García Hernández and NV Schizas (2020) New Faunal Records and Recent Explorations of the Underwater Section of Cueva del Agua, Punta Los Ingleses, Mona Island (Puerto Rico). Life: The Excitement of Biology 8(1) DOI: 10.9784/LEB8(1)NievesRivera.01

Chatterjee T, Dovgal I, NV Schizas (2020). Report of epibiont ciliates (Ciliophora) on harpacticoid copepods from Caribbean mesophotic reefs. Cah. Biol. Mar. 61: 131-136.

Boisnoir A, Pavaux A-S, NV Schizas, S Marro, T Blasco, R Lemée, P-Y Pascal (2020). The use of stable isotopes to measure the ingestion rate of potentially toxic benthic dinoflagellates by harpacticoid copepods. Journal of Experimental Marine Biology and Ecology 524: 151285

Hadfield KA, NV Schizas, Tapas Chatterjee, NJ Smit (2019) A new gnathiid, *Gnathia bermudensis* sp. n. (Crustacea, Isopoda, Gnathiidae), from the mesophotic reefs of Bermuda, with a key to the *Gnathia* spp. from the Greater Caribbean biogeographic region. Zookeys 891: 1–16. https://doi.org/10.3897/zookeys.891.39564

*Rivera-García L, R Rivera-Vicéns, A Veglia, NV Schizas (2019) De novo transcriptome assembly of the digitate morphotype of *Briareum asbestinum* (Octocorallia: Alcyonacea) from the southwest shelf of Puerto Rico. Marine Genomics https://doi.org/10.1016/j.margen.2019.04.001

Pesic V, T Chatterjee, M, NV Schizas (2019). A Checklist of Pontarachnidae (Acari: Hydrachnidia) and notes on distributional patterns of the species. Zootaxa 4619 (3): 527–544

Appeldoorn RS, Alfaro M, Ballantine DL, Bejarano I, Ruíz HJ, Schizas NV, Schmidt WE, Sherman CE, Weil E. 2019. Puerto Rico. In: Loya Y, Puglise KA, Bridge TCL. (eds) Mesophotic Coral Ecosystems of the World. Springer Amsterdam.

Goulet TL, MQ Lucas, NV Schizas (2019). Symbiodiniaceae Genetic Diversity and Symbioses with Hosts from Shallow to Mesophotic Coral Ecosystems. In: Loya Y, Puglise KA, Bridge TCL (eds) Mesophotic Coral Ecosystems of the World. Springer Amsterdam https://doi.org/10.1016/j.oceano.2018.11.002

*Garcia-Hernandez JE, Hammerman NM, Cruz-Motta JJ, Schizas NV (2019). Endobiotic fauna inhabiting the calcareous sponge *Clathrina* sp. in southwest Puerto Rico. Caribbean Journal of Science 49: 239-254

*Veglia A, Hammerman NM, Rivera-Vicéns RE, NV Schizas. (2018) De novo transcriptome assembly of the coral *Agaricia lamarcki* (Lamarck's sheet coral) from mesophotic depths in southwest Puerto Rico. Marine Genomics. https://doi.org/10.1016/j.margen.2018.08.003

Schizas NV (2018) Hurricane Maria and its Impact on the Zoological and Botanical Collections of the University of Puerto Rico. Biodiversity Information Science and Standards 2: e26014 doi: 10.3897/biss.2.26014

*García-Hernández JE, Sanchez PJ, Hammerman NM, Schizas NV (2018). Fish, coral, and sponge assemblages associated with altiphotic and mesophotic reefs along the Guanica Biosphere Reserve continental shelf edge, southwest Puerto Rico. Frontiers in Marine Science doi: 10.3389/fmars.2018.00303

*Veglia A, Hammerman NM, Rivera Rosaly CR, Lucas M, Galindo Estronza A, Corgosinho PH, and NV Schizas (2018). Characterizing population structure of coral-associated fauna from mesophotic and shallow habitats in the Caribbean. Journal of the Marine Biological Association of the United Kingdom. doi:10.1017/S0025315418000413

Dahms H-U, NV Schizas, RA James, L Wang, J-S Hwang (2018). Marine hydrothermal vents as templates for global change scenarios. Hydrobiologia 818: 1–10 https://doi.org/10.1007/s10750-018-3598-8

Corgosinho P, TC Kihara, NV Schizas, A Ostmann, P Martínez Arbizu, S Ivanenko (2018). Traditional and confocal descriptions of a new genus and two new species of deep water Cerviniinae Sars, 1903 (Copepoda, Harpacticoida, Aegisthidae) from the Southern Atlantic and the Norwegian Sea: with a

discussion on the use of digital media in taxonomy. ZooKeys 13:(766):1-38. doi: 10.3897/zookeys.766.23899. eCollection 2018.

Hammerman NM, RE Rivera-Vicens, MP Galaska, E Weil, RS Appeldoorn, M Alfaro, NV Schizas (2017). Population connectivity of the plating coral, *Agaricia lamarcki* from southwest Puerto Rico. Coral Reefs DOI: 10.1007/s00338-017-1646-x

Corgosinho PHC, Schizas NV, Previattelli D, Falavigna da Rocha CE, Edinaldo Nelson dos Santos-Silva (2017). A new genus of Parastenocarididae (Copepoda, Harpacticoida) from the Tocantins River basin (Goiás, Brazil), and a phylogenetic analysis of the Parastenocaridinae. Zoosystematics and Evolution 93: (1) 167–187 | DOI 10.3897/zse.93.11602

*Beltran DR, NV Schizas, RS Appeldoorn, C Prada (2017). Effective Dispersal of a Caribbean Reef Fish is Smaller than Current Spacing Among Marine Protected Areas. Nature Scientific Reports | 7: 4689 | DOI:10.1038/s41598-017-04849-5 1

*Rodríguez-Ferrer G, RS Appeldoorn, NV Schizas (2017). Abundance of the common bottlenose dolphin, *Tursiops truncatus* (Montagu, 1821), off the south and west coasts of Puerto Rico. Life: The Excitement of Biology 4:(4) DOI: 10.9784/LEB4(4)RodriguezFerrer.01

Ortiz-Gonzalez IC, RE Rivera-Vicens, NV Schizas (2016). De novo transcriptome assembly of the Hydrocoral *Millepora alcicornis* (branching fire coral) from the Caribbean. Marine Genomics 10.1016/j.margen.2016.11.005

Petrescu, I, T Chatterjee, NV Schizas (2016). New species and new records of Cumacea (Crustacea: Peracarida: Cumacea) from mesophotic reefs of Puerto Rico and U.S. Virgin Islands, Caribbean Sea. Zootaxa 4199 (1): 001–078.

*Galindo AM, NV Schizas, M Alfaro (2016). Morphological and genetic species diversity in ostracods (Crustacea: Oligostraca) from Caribbean reefs. Marine Biodiversity doi:10.1007/s12526-016-0525-y

Appeldoorn R, D Ballantine, I Bejarano, H Ruiz, NV Schizas, W Schmidt, C Sherman, E Weil (2016). Mesophotic coral ecosystems examined: La Parguera, Puerto Rico, USA, in: Baker, E.K., Puglise, K.A. and Harris, P.T. (Eds.). (2016). Mesophotic Coral Ecosystems — A lifeboat for coral reefs? The United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal. www.unep.org,www.grida.no5 pp 45-49

*Harms-Tuohy CA, NV Schizas, Appeldoorn RS (2016). The use of DNA metabarcoding for stomach content analysis in the invasive lionfish (*Pterois volitans*) in Puerto Rico. Marine Ecology Progress Series doi: 10.3354/meps11738

*Ricaurte M, Schizas NV, P Ciborowski, NM Boukli (2016). Proteomic analysis of bleached and unbleached *Acropora palmata*, a threatened coral species of the Caribbean. Marine Pollution Bulletin 107: 224–232 doi: 10.1016/j.marpolbul.2016.03.068

Corgosinho PHC, M Alfaro, NV Schizas (2016). A new species of *Atergopedia* (Copepoda: Harpacticoida: Novocriniidae) from a Caribbean mesophotic reef. Marine Biodiversity DOI 10.1007/s12526-016-0446-9

Lucas MQ*, M Stat, M Smith, E Weil, NV Schizas (2016). *Symbiodinium* (internal transcribed spacer 2) diversity in the coral host *Agaricia lamarcki* (Cnidaria: Scleractinia) among shallow and mesophotic reefs in the Northern Caribbean (20–70 m). Marine Ecology doi: 10.1111/maec.12367

Petrescu I, T Chatterjee, NV Schizas (2016). A new species of the genus *Campylaspis* (Crustacea: Cumacea) from the mesophotic reefs of St. John, US Virgin Islands. Caribbean Journal of Science 49:17-26

Appeldoorn R, D Ballantine, I Bejarano, M Carlo, M Nemeth, E Otero, F Pagan, H Ruiz, NV Schizas, C Sherman, E Weil (2015). Mesophotic Coral Ecosystems and Impacts from Anthropogenic Stress: a case study at Ponce, Puerto Rico. Coral Reefs DOI: 10.1007/s00338-015-1360-5

Guerra-Garcia JM, T Chatterjee, NV Schizas (2015). New genus and new species of Caprellidae (Crustacea: Peracarida: Amphipoda) from mesophotic coral ecosystems of Puerto Rico and St. Croix, Caribbean Sea. Zootaxa 4018 (1):080-096

Pesic V, T Chatterjee, NV Schizas (2015). First record of *Litarachna caribica* Pesic et al. 2008 (Acari, Pontarachnidae) from the Pacific coast of Panama. Marine Biodiversity Records. Vol. 8: e85

Schizas NV, H-U Dahms, P Kangtia, PH Corgosinho, A Galindo Estronza (2015). A new species of *Longipedia* Claus, 1863 (Copepoda: Harpacticoida: Longipediidae) from Caribbean mesophotic reefs DOI: 10.1080/17451000.2015.1013556

Beltran D*, NV Schizas, Prada C, R Appeldoorn (2015). Isolation and characterization of twelve microsatellite loci to study connectivity in the yellow jawfish *Opistognathus autifrons*. Conservation Genetics Resources DOI: 10.1007/s12686-014-0419-x

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Senna AR, R Sorrentino, T Chatterjee, NV Schizas (2014). A new species of *Boca* Lowry & Stoddart, 1997 (Amphipoda: Lysianassoidea: Aristiidae) from a mesophotic coral ecosystem off Puerto Rico, Caribbean Sea. Zootaxa 3884 (5): 429-436

Petrescu, I, T Chatterjee, NV Schizas (2014). New records of Bodotridae (Crustacea: Cumacea) from Puerto Rico with description of three new species. Zootaxa 3873 (5): 526-540

Schizas NV, H-U Dahms, M Ricaurte Chica*, J-S Hwang (2014). Population Genetic Patterns of the Copepod *Calanus sinicus* in the NW Pacific. Hydrobiologia DOI:10.1007/s10750-014-2011-5

Pešić V, T Chatterjee, M Alfaro, NV Schizas. A new species of *Litarachna* (Acari, Hydrachnidia, Pontarachnidae) from a Caribbean mesophotic coral ecosystem. Zookeys 425: 89-97

Chatterjee T, Fernandez-Leborans G, NV Schizas (2014) Report of *Thecacineta calix* (Ciliophora: Suctorea) as epibiont on harpacticoid copepods from mesophotic reefs of Puerto Rico and St. John, U.S. Caribbean. Caribbean Journal of Science 48:(1) 44-48

Ruiz-Ramos DV*, E Weil, NV Schizas (2014). Morphological and genetic evaluation of the hydrocoral *Millepora* species complex in the Caribbean. Zoological Studies 53:4

Petrescu I, T Chatterjee, NV Schizas (2014). Three new Nannastacidae (Crustacea: Cumacea) species from a Caribbean mesophotic ecosystem. Zootaxa 3765 (4): 360-370

Mege P*, Schizas NV, Garcia J, Hrbek T. (2014) Genetic seascape of the threatened Caribbean elkhorn coral, *Acropora palmata*, on the Puerto Rico Shelf. Marine Ecology doi: 10.1111/maec.12135

Petrescu I, T Chatterjee, NV Schizas (2014) New species of *Cumella* (Crustacea: Cumacea: Nannastacidae) from mesophotic habitats of Mona Island, Puerto Rico, Caribbean Sea. Cahiers de Biologie Marine 55(2): 183-189

Sherman C, Appeldoorn R, Ballantine D, Bejarano I, Carlo M, Kesling D, Nemeth M, Pagan F, Ruiz H, Schizas NV, Weil E (2013) Exploring the mesophotic zone: Diving operations and scientific highlights of three research cruises across Puerto Rico and US Virgin Islands. In: Lang, MA & Sayer MDJ (ed.), Proceedings of the 2013 AAUS/AEDP Curacao Joint International Scientific Diving Symposium, Dauphin Island, AL: American Academy of Underwater Sciences, pp 297-312

Petrescu I, T Chatterjee & NV Schizas (2013). Two new species of the genus *Cumella* (Crustacea: Cumacea: Nannastacidae) associated with mesophotic reefs of Puerto Rico and St. Croix, Caribbean Sea. Cahiers de Biologie Marine 54: 257-262

Schizas NV (2012) Misconceptions regarding nuclear mitochondrial pseudogenes (numts) may obscure detection of mitochondrial evolutionary novelties. Aquatic Biology 17: 91-96

Petrescu I, T Chatterjee & NV Schizas (2012). New genus and new species of Cumaceans (Crustacea: Peracarida: Cumacea) from the mesophotic coral ecosystem of SW Puerto Rico, Caribbean Sea. Zootaxa 3476: 55-61

Corgosinho, PHC & Schizas, NV (2012) *Archeolourinia*, a new genus and species of Louriniidae Monard, 1927 (Copepoda, Harpacticoida) from a Caribbean mesophotic zone. Journal of the Marine Biological Association of the United Kingdom. doi:10.1017/S0025315412001336

Pesic V, Chatterjee T, Schizas NV. (2012) A new species of *Pontarachna* (Acari, Hydrachnidia, Pontarachnidea) from a mesophotic coral ecosystem off Vieques Island, Puerto Rico, Caribbean Sea Zootaxa 3440: 63–67

Chullasorn S, H-U Dahms, K-W Lee, J-S Ki, N Schizas, P Kangtia, HG Park, and J-S Lee (2011) Description of *Tisbe alaskensis* sp. nov. (Crustacea: Copepoda) Combining Structural and Molecular Traits. Zoological Studies 50(1): 103-117

Torres-Pratts H, T Lado-Insua, AL Rhyne, L Rodriguez-Matos, NV Schizas (2011). Two distinct, geographically overlapping lineages of the corallimorpharian *Ricordea florida* (Cnidaria: Hexacorallia: Ricordeidae). Coral Reefs DOI: 10.1007/s00338-010-0709-z

Ruiz-Ramos D, E Hernandez, NV Schizas (2011). Population status of the long-spined urchin *Diadema antillarum* in Puerto Rico 20 years after a mass mortality event. Bulletin of Marine Science 87: 113-127

Fiedler GC, AL Rhyne, R Segawa, T Aotsuka, NV Schizas (2010). The evolution of euhermaphroditism in caridean shrimps: a molecular perspective of sexual systems and systematics. BMC Evolutionary Biology 10:297

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Milligan PJ, EA Stahl, NV Schizas, JT Turner (2010). Phylogeography of the copepod *Acartia hudsonica* in estuaries of the northeastern United States. Hydrobiologia doi: 10.1007/s10750-010-0097-y

Rhyne AL, Dong Zhang, J Lin, NV Schizas (2009). Not any two will do: DNA divergence and interpopulation reproductive compatibility in a simultaneous hermaphroditic shrimp, *Lysmata wurdemanni*. Marine Ecology Progress Series 388:185-195

Dahms H-U, S Chullasorn, NV Schizas, P Kangtia, W Anansatitporn, Wan-Xi Yang (2009). Review of naupliar development among Tisbidae (Copepoda: Harpacticoida) with a phylogenetic analysis and naupliar description of *Tisbe thailandensis* from Thailand. Zoological Studies 48:(6) 780-796

Torres-Pratts H, MT Schärer and NV Schizas (2009) Genetic diversity of *Chelonibia caretta*, commensal barnacles of the endangered hawksbill sea turtle *Eretmochelys imbricata* from the Caribbean (Puerto Rico). Journal of the Marine Biological Association of the UK 89:(4) 719-725

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Schizas, NV and TC Shirley (2006). *Apolethon hippoperus*, (Copepoda, Harpacticoida)- a new species from southeastern Alaska. Journal of Crustacean Biology 26 (3): 341-354

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Staton JL, Schizas NV, Klosterhaus SL, Griffitt RJ, Chandler GT, Coull BC (2002). Effect of salinity variation and pesticide exposure on an estuarine harpacticoid copepod, *Microarthridion littorale* (Poppe), in the southeastern US. Journal of Experimental Marine Biology & Ecology 278: 101-110.

Schizas NV, Coull BC, Chandler GT, Quattro JM (2002). Sympatry of distinct mitochondrial lineages in a copepod inhabiting estuarine creeks in the southeastern USA. Marine Biology 140: 585-594

Schizas NV, Chandler GT,Coull BC, Klosterhaus SL Quattro JM (2001). Differential survival of three mitochondrial lineages in a marine copepod exposed to a mixture of pesticides. Environmental Science and Technology. 35: 535-538

Steinbachs J, Schizas, NV, JWO Ballard (2001). Efficiencies of genes and accuracy of tree-building methods in recovering a known *Drosophila* genealogy. Pacific Symposium on Biocomputing 6: 606-617

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Kovatch CE, Schizas NV, Chandler GT, Coull BC (2000). Tolerance and genetic relatedness of three meiobenthic copepod populations exposed to sediment-associated contaminant mixtures: Role of environmental history. Environmental Chemistry and Toxicology 19: (4) 912-919

Schizas NV, Street GT, Coull BC, Chandler GT, Quattro JM (1999). Molecular population structure of the benthic copepod *Microarthridion littorale* along the Southeastern and Gulf coasts of the United States. Marine Biology 135: 399-405

Schizas NV, Street GT, Coull BC, Chandler GT, Quattro JM (1997). An efficient DNA extraction method for small metazoans. Molecular Marine Biology and Biotechnology 6: 381-383

Chandler, GT, Coull BC, Schizas NV and Donelan, TL (1997). A culture-based assessment of the effects of chlorpyrifos on multiple meiobenthic copepods using microcosms of intact estuarine sediments. Environmental Chemistry and Toxicology 16: 2339-2346

Schizas, NV and TC Shirley (1996). Seasonal changes in structure of an Alaskan intertidal meiofauna assemblage. Marine Ecology Progress Series 133: 115-124

Schizas, NV and TC Shirley (1994). Autecology of an intertidal Alaskan harpacticoid copepod, *Apolethon* sp. Hydrobiologia 292/293: 361-367

Schizas, NV and TC Shirley (1994). *Acrenhydrosoma maccalli*, (Copepoda, Harpacticoida) a new species from Auke Bay, Alaska. Crustaceana 67: 329-340

Schizas, NV and TC Shirley (1994). *Onychocamptus krusensterni* (Copepoda, Harpacticoida, Laophontidae)- a new species from Krusenstern Lagoon, Alaska. Crustaceana 66: 227-239

Schizas, NV and TC Shirley (1994). *Elapholaophonte decaceros* n gen and n sp (Copepoda, Harpacticoida) from the Philippines. Journal of the American Microscopical Society 113: 127-141

Schizas, NV and TC Shirley (1994). Two new species of *Laophontodes* (Copepoda, Harpacticoida, Ancorabolidae) from McMurdo Sound, Antarctica. Zoologica Scripta 23: 205-216

Shirley, TC, M Carls, JW Fleeger and N Schizas (1993). Meiofaunal recolonization experiment with oiled sediments: major meiofauna taxa. Exxon Valdez Oil Symposium, February 2-5, 1993, Anchorage AK, USA pp 350-353

Advisors

MS - Thomas C. Shirley (University of Alaska, Fairbanks) - Retired

Ph.D. - Bruce C. Coull (University of South Carolina) - Retired

Ph.D. - Joseph Quattro (University of South Carolina)

Postdoc - Richard Hudson (University of Chicago) –Retired

Postdoc - Bill Ballard (The University of New South Wales)

Undergraduate Students
Research Supervisor of 70 undergraduate students, 5 of which were supported by the PR-LSAMP program

Students Graduated
Glorimar Franqui (MS, 2010). Biodiversity of sharks
Griselle Rodriguez (PhD, 2019 - Co-Advisor)
Alex Veglia (MS, 2019)
Liajay Rivera (MS, 2019)
Juan Laverde (MS, 2018)
Ingrid Ortiz Gonzalez (MS, 2018) - Phylotranscriptomics of Caribbean fire corals (*Millepora* spp.)
Jaaziel Garcia (MS, 2017 – Co-Advisor*)
Mariel Cruz (MS, 2017) - Population structure of the fireworm *Hermodice carunculata*
Nick Hammerman (MS, 2016) – Population genomics of the mesophotic coral *Agaricia lamarcki*
Dr. Chelsea Harms (PhD, 2016 – Co-Advisor*)
Dr. Matt Lucas (PhD, 2016 – Co-Advisor*)
Alexandra Galindo (MS, 2015 - Co-Advisor*)
Dr. Diana Beltran (PhD, 2015 - Co-Advisor*)
Dr. Wess B. Merten (PhD, 2014 - Co-Advisor*)
Alexandre Jassoud (MS, 2010) – Trans-Atlantic population structure of the common octopus *Octopus vulgaris*
Dr. Monica Rojas (MS, 2010) – Molecular population structure of Caribbean ophiurids
Dr. Danisse Ruiz-Ramos (MS, 2009) - Caribbean-wide molecular variation in the hydrocoral genus *Millepora*
Dr. Hernan Torres-Pratts (PhD, 2009) – Molecular ecology of Caribbean benthic species
Joselyd Garcia (MS, 2008)- Genetic variability and fine-scale population structure in the threatened species *Acropora palmata* and *A. cervicornis* around Puerto Rico
Dr. Carlos Prada (MS, 2007 - Co-advisor*) – Morphological and genetic variation in the octocoral *Plexaura flexuosa*
* I was the secondary advisor of these students and co-authored at least 1 manuscript from their Thesis.

Current Students
Martha Ricaurte (Ph.D. student)
Jaaziel Garcia (Ph.D. student)
Glorimar Franqui (PhD student)
Luis Rodriguez Matos (MS candidate)
Jean Paul Domenech Ramos (MS student)
Alejandro J Gonzalez Montes (MS student)
Maria Del Pilar Gonzalez Garcia (M.S. student)
Natalie M Baez Rodriguez (M.S. student)
Omar M Zayas Cruz (M.S. student)
Giovanna Gonzalez, (MS student - Co-Advisor)
David Repollet (MS student - Co-Advisor)
Daniel Toledo Rodriguez (MS student - Co-Advisor)

Invited Seminars

1. Mesophotic coral ecosystems of the Caribbean. National Museum of Marine Biology and Aquarium. Kenting, Taiwan, May 3, 2016.
2. Mesophotic coral ecosystems of Puerto Rico and adjacent islands. 12th International Congress on the Zoogeography and Ecology of Greece and Adjacent Regions, Athens, Greece, June 18-22, 2012 (plenary speaker).
3. Mesophotic coral ecosystems of Puerto Rico and adjacent islands - Spanish Scientific Research Council/Universidad de la Laguna, Tenerife, Spain, November 18, 2011
4. Mesophotic coral ecosystems of Puerto Rico and adjacent islands -National and Kapodistrian University of Athens, December 7, 2011
5. Sangmyung University, South Korea, June 2010
6. University of Massachusetts Dartmouth, February 11, 2005
7. University of Puerto Rico, Rio Piedras, November 5, 2003
8. University of Alabama, Birmingham, July 18, 2003

Presentations

2019

Schizas NV Recent advances of evolutionary studies at Caribbean mesophotic coral Reefs. 23th Evolutionary Biology Meeting – Marseilles (poster)

Alfaro M, NV Schizas, P Corgosinho Taxonomic Structure of the Meiofauna from Caribbean Mesophotic Reefs", 17th MEIOFAUNA CONFERENCE- SeventIMCO-17ThInternational Meiofauna Conference, 7-12th July 2019, Evora, Portugal (poster).

Schizas NV, RS Appeldoorn, JJ. Cruz-Motta, Wilford E. Schmidt, Clark E. Sherman, Ernesto Weil, Olivia M. Cheriton, Curt D. Storlazzi, Kurt J. Rosenberger, Mark Buckley. Effects of Hurricane Maria on the mesophotic reefs of Puerto Rico. 49th Benthic Ecology Meeting 2019, St. John's, Newfoundland (poster)

2018

Esquete P, Schizas N, Chatterjee T. Discovering the Tanaidacea of Caribbean Mesophotic Reefs. 9th International Crustacean Congress (ICC9), Washington, DC, USA, May 22-25, 2018 (talk)

2017

Schizas NV. The Cryptic Biodiversity of Mesophotic Reefs. European Coral Reef Symposium, Oxford, UK, December 12-16 (talk)

Ortiz-González IC, Rivera Vicens R, Schizas NV. de novo transcriptome assembly of the hydrocoral *Millepora alcicornis* (branching fire coral) from the Caribbean. 2017 Aquatic Sciences Meeting Honolulu, Hawaii February 26 - March 3. (poster)

Cruz M, Hammerman NM, Lucas MQ, Weil E, Schizas NV. Population structure of the octocoral predator, *Cyphoma gibbosum*, in the wider Caribbean. 2017 SICB meeting, 4-8 January, New Orleans, Louisiana (poster)

2016

Schizas NV, H-U Dahms, D Previattelli, PHC Corgosinho. Is the mitochondrial Cytochrome Oxidase subunit I, a useful phylogenetic marker in Copepoda? 16th International Meiofauna Conference (IçIMCo), 3-8 July Heraklion, Crete (poster)

Schizas NV, Galindo-Estronza A, Alfaro M, Morphological and genetic species diversity in ostracods (Crustacea: Oligostraca) from Caribbean mesophotic reefs. 16th International Meiofauna Conference (IçIMCo), 3-8 July, Heraklion, Crete (poster)

Hammerman NM, Schizas NV, Alfaro M. Population Structure of the coral, *Agaricia lamarcki* from SW Puerto Rico and U.S. Virgin Islands. The 13th International Coral Reef Symposium (ICRS), 19-24 June, Honolulu, Hawaii (poster)

Garcia-Hernandez JE, Schizas NV, Alfaro ML, de Voogd NJ. Mesophotic Reef Sponges (Porifera) from Puerto Rico and the US Virgin Islands. The 13th International Coral Reef Symposium (ICRS), 19-24 June, Honolulu, Hawaii (talk)

Gutierrez-Cala LM, Schizas NV, Sanchez JA. Divergence Through Species Interactions: The Role of the sponge *Clathria oxeota* in Ecological Speciation of the Octocoral *Briareum asbestinum.* The 13th International Coral Reef Symposium (ICRS), 19-24 June, Honolulu, Hawaii

Beltran DM, Appeldoorn, RS, Schizas, NV, Prada, CA. Effective Dispersal of Caribbean Reef Fish is Smaller than current Spacing among Marine Protected Areas. The 13th International Coral Reef Symposium (ICRS), 19-24 June, Honolulu, Hawaii (talk)

Schizas NV, Appeldoorn R, Nadathur G. Comparison of Bacterial Communities Associated with *Agaricia lamarcki* from Mesophotic and Shallow Water Reefs. The 13th International Coral Reef Symposium (ICRS), 19-24 June, Honolulu, Hawaii (poster)

Cruz MA and NV Schizas. Population Structure of the Coral-eating Fireworm *Hermodice carunculata* in the wider Caribbean, Atlantic and Mediterranean Sea. ASLO 2016, New Orleans, Louisiana, February 21-26 2016 (talk)

Pérez-Viscasillas JB, A Jassoud, NV Schizas. The Atlantic Ocean: An Impassable Barrier for the Common Octopus, *Octopus vulgaris.* ASLO 2016, New Orleans, Louisiana, February 21-26 2016 (poster)

Ricaurte M, Schizas, NV, Weil E, Ciborowski P, Boukli NM. The effect of ambient temperatures on two threatened Caribbean coral species: a proteomic study. ASLO 2016, New Orleans, Louisiana, February 21-26 2016 (poster)

Cruz MA and NV Schizas. Population Structure of the Fireworm *Hermodice carunculata* in the wider Caribbean, Atlantic and Mediterranean Sea. SICB 2016, Portland, Oregon, January 3-7, 2016 (poster)

Rivera García L, Majeske A, NV Schizas. Comparative transcriptomics in the soft Caribbean coral *Briareum asbestinum*. SICB 2016, Portland, Oregon, January 3-7, 2016 (poster)

García-Hernández JE, M Alfaro, and NV Schizas. Sponge-Microbe Symbiotic Associations in Puerto Rican Mesophotic Reefs. Puerto Rico Space Grant Consortium Symposium, UPR Rio Piedras, 2016

2015

Rodriguez-Ferrer G, Schizas NV, Appeldoorn RS et al. Genetic structure and diversity of the bottlenose dolphin, *Tursiops truncatus*, population of Puerto Rico. Workshop of the Network of Aquatic Mammal Specialists of Central America and the Caribbean. Society For Marine Mammalogy Biennial Meeting. San Francisco, CA December 18, 2015.

Harms Tuohy CA, Schizas NV, RS Appeldoorn. Pioneering the use of DNA metabarcoding in stomach content analysis of the invasive lionfish (*Pterois volitans*) in Puerto Rico. GCFI, Panama City, Panama, November 9-13. (talk)

Schizas NV, Ortiz-González IC, E Weil. Delineating the status of the hydrocoral *Millepora* species in the Caribbean. Evolution 2015, Guaruja, Brazil, June 25-June 31, 2015 (oral)

Hammerman N, Schizas NV, E Weil Population connectivity of *Agaricia lamarcki* from mesophotic and shallow reefs between Puerto Rico and the U.S. Virgin Islands. Evolution 2015, Guaruja, Brazil, June 25-June 31, 2015 (poster)

Galindo-Estronza A, Alfaro M, Schizas NV. A morphological and molecular contribution on benthic ostracods with emphasis on the populations of the mesophotic reefs. ASLO, Grenada, Spain, 2015 (poster)

2014

Quijano Cardé EM, Hernán Torres-Pratts, NV Schizas. Phylogeny of the *Mithrax-Mithraculus* Crab Complex. SMBE 2014, San Juan, Puerto Rico, June 8-12 (poster)

Majeske A, Oleksyk T, NV Schizas. Using transcriptomics to characterize immune genes in the Caribbean black-long spined sea urchin *Diadema antillarum*. SMBE 2014, San Juan, Puerto Rico, June 8-12 (poster)

Harms CA, RS Appeldoorn, NV Schizas. Metagenomic analysis of whole-gut contents of the invasive lionfish (*Pterois volitans*) in Puerto Rico. SMBE 2014, San Juan, Puerto Rico, June 8-12 (poster)

NV Schizas, H-U Dahms, B Hansen, A Majeske. Transcriptomic study in the diapaused copepod *Acartia tonsa*. SMBE 2014, San Juan, Puerto Rico, June 8-12 (poster)

Rivera García L, Majeske A, NV Schizas. Comparative transcriptomics in the soft Caribbean coral *Briareum asbestinum*. SMBE 2014, San Juan, Puerto Rico, June 8-12 (poster)

Ortiz-González IC, E Weil, NV Schizas A Ribosomal DNA Assessment of the Hydrocoral (*Millepora*) in the Caribbean. SMBE 2014, San Juan, Puerto Rico, June 8-12 (poster)

NV Schizas, Majeske A, Ortiz-González IC, E Weil. *De novo* transcriptome assembly with RNA-seq data. Using the Trinity pipeline transcriptomics to delineate the status of *Millepora* species in the Caribbean Sea. (Webinar)

NV Schizas, AM Galindo-Estronza, and M Alfaro. Diversity of benthic ostracods from Caribbean Mesophotic Reefs. 8th Caribbean Biodiversity Congress, Santo Domingo, January 29-February 1, 2014 (oral)

2013

NV Schizas, D Ruiz, E Weil, A Majeske. Using transcriptomics to delineate the status of *Millepora* species in the Caribbean. 8th International Conference on Coelenterate Biology (ICCB 8), Eilat, Israel, December 1-5, 2013 (oral)

CA Harms, RS Appeldoorn and NV Schizas. Metagenomic analysis of whole-gut contents of the invasive lionfish (*Pterois volitans*) in Puerto Rico. Joint Genome Institute's Microbial Genomics and Metagenomics Workshop, Walnut Creek, California, September 16-20, 2013 (poster)

NV Schizas, H-U Dahms, Pawana Kangtia. Mesophotic reefs in the Caribbean as a biodiversity hotspot. FIFTIMCo (15th International Meiofauna Conference, 22-26 July, 2013, Seoul, Korea (poster)

AM Galindo-Estronza, M Alfaro and NV Schizas. Morphologic and Molecular Characterization of Benthic Ostracods from Caribbean Mesophotic Reefs. Evolution 2013, Snowbird, Utah, USA June 21-25, 2013 (poster).

NV Schizas, M Lucas, M Smith, E Weil. Depth-related changes in coral zooxanthellae. "International Conference on Challenges in Aquatic Sciences" at Keelung, Taiwan, March 15-21, 2013 (poster)

NV Schizas, Hans-Uwe Dahms, Ricaurte M, J Hwang. "ITS-1 Gene Reveals Population Differences of The Copepod *Calanus sinicus*" in The NW-Pacific "International Conference on Challenges in Aquatic Sciences" at Keelung, Taiwan, March 15-21, 2013 (Invited Speaker)

AM Galindo-Estronza, M. Alfaro and NV Schizas. Diversity of benthic ostracods from Caribbean mesophotic reefs. ASLO 2013, New Orleans, Louisiana, 17-22 February 2013 (talk)

2012

NV Schizas. Applications of Next Generation Sequencing in Environmental and Marine Sciences. Workshop on Genes and Genomes with Ion Torrent™ Personal Genome Machine (PGM™) sequencing. UPR- Mayagüez, PR- October 22-26, 2012

Hans-Uwe Dahms, Sang H. Lee, Nikolaos Schizas
Dormancy regulation in polar regions – Genetic evidence from copepod diapause embryos. Presented at the 18th International Symposium on Polar Sciences May 22-24, 2012 Seogwipo KAL Hotel, Jeju Island Korea (http://symposium.kopri.re.kr)

Hans-Uwe Dahms, Nukul Saengphan, Nikolaos V. Schizas Diapause in freshwater copepods from Thailand International Workshop FISA (Mahasarakam, Thailand, 29th July to 4th August 2012). (poster)

N Schizas, M Lucas, E Weil. Genetic connectivity of *Symbiodinium* and its coral host *Agaricia lamarcki* ICRS 2012, July 9-13, Cairns, Australia

N Schizas, M Lucas, M Smith, E Weil. Depth-related changes in coral zooxanthellae. 2012 SMBE, Dublin, Ireland, June 23-26 (poster).

Rivera Vicens RE, Lucas MQ, Smith M, Weil E, Schizas NV. Genetic variation of *Symbiodinium* spp. of the coral host *Agaricia lamarcki* (Cnidaria: Scleractinia) between shallow and mesophotic habitats. 2012 SMBE, Dublin, Ireland, June 23-26 (poster).

2011

Schizas NV, Lucas M, Smith M, Weil E. Genetic variation of *Symbiodinium* of the coral host *Agaricia lamarcki* between shallow and mesophotic habitats. 35th AMLC meeting, Costa Rica, 23-28 May (talk)

Schizas NV, Lucas M. Genetic diversity and connectivity of shallow and mesophotic habitats. 35th AMLC meeting, Costa Rica, 23-28 May (poster)

Ramon E Rivera Vicens, M Lucas, E Weil, M Smith, N Schizas. Genetic variation of *Symbiodinium* spp. of the coral host *Agaricia lamarcki* between shallow and mesophotic habitats. Evolution 2011, Norman, Oklahoma June 17 - 21, 2011 (poster)

M Rojas and NV Schizas. Genetic Population Structure of two Brittle Stars (*Ophiocoma echinata* and *Amphipholis squamata*) with Contrasting Life Histories. ASLO 2011, February 13-17, San Juan, PR (talk)

Lucas M, Weil E, Smith M, Schizas N. Genetic variation of *Symbiodinium* spp of the coral host *Agaricia lamarcki* (Scleractinia:Cnidaria) between shallow and mesophotic habitats. ASLO 2011, February 13-17, San Juan, PR (talk)

L Rodriguez Matos, H Torres-Pratts, T Lado Insua, A Rhyne, NV Schizas. Two distinct, geographically overlapping lineages of the corallimorpharian *Ricordea florida* (Cnidaria: Hexacorallia: Ricordeidae). ASLO 2011, February 13-17, San Juan, PR (poster)

NV Schizas, Matt Lucas. Genetic diversity and connectivity of shallow and mesophotic reefs. ASLO 2011, February 13-17, San Juan, PR (poster)

M Ricaurte, N Boukli, N Rivera, N Schizas. Preliminary proteomic analysis of bleached and healthy Caribbean corals. ASLO 2011, February 13-17, San Juan, PR (poster)

2010

NV Schizas, PHC Corgosinho. Preliminary findings on the copepod fauna associated with the Caribbean mesophotic coral ecosystem of Puerto Rico 7th International Crustacean Conference, Qingdao China June 20-25, 2010 (poster)

M Rojas and NV Schizas. Genetic Population Structure of two Brittle Stars (*Ophiocoma echinata* and *Amphipholis squamata*) with Contrasting Life Histories. SICB 2010 Meeting, Seattle WA, January 3-7, 2010 (poster)

2009

GC Fiedler, AL Rhyne, NV Schizas Mitochondrial and nuclear ribosomal phylogeny of the genus *Lysmata* Risso and other selected hippolytid shrimp genera: the evolution of unique sexual patterns in the Hippolytidae. Crustacean Society Summer Meeting, 20-23 September 2009, Tokyo University of Marine Science and Technology, Tokyo, Japan (talk)

NV Schizas. One or two are not enough! A multispecies approach to the analysis of population structure of Caribbean fauna. Association of Marine Laboratories of the Caribbean 34th Scientific Conference, May 25-29, 2009 Roseau, Commonwealth of Dominica (talk)

Mege, P, J García Reyes, N Schizas and T Hrbek: Microsatellite and mitochondrial markers show low genetic structure in the elkhorn coral of Puerto Rico. Association of Marine Laboratories of the Caribbean 34th Scientific Conference, May 25-29, 2009 Roseau, Commonwealth of Dominica (poster)

NV Schizas. One or two are not enough! A multispecies approach to the analysis of population structure of Caribbean fauna Benthic Ecology Meeting 2009, March 4-7, Corpus Cristi, Texas (talk)

H Torres-Pratts and NV Schizas. Phylogeny of the *Mithrax-Mithraculus* (Crustacea: Brachyura: Majidae) crab complex. Benthic Ecology Meeting 2009, March 4-7, Corpus Cristi, Texas (talk)

M Rojas and NV Schizas. Patterns of genetic variability of brittle stars with contrasting life histories. Benthic Ecology Meeting 2009, March 4-7, Corpus Cristi, Texas (talk)

A Rhyne, H Torres-Pratts, Rodriguez L, Insua-Lado T, NV Schizas. Patterns of Genetic Variation of the Corallimopharian *Ricordea florida*. SICB 2009 Meeting, Boston MA, Jan. 3-7, 2009 (talk)

2008

JT Turner, PJ Milligan, EA Stahl and NV Schizas. Phylogeography of the copepod *Acartia hudsonica* in estuaries of the northeastern United States. 10th International Conference on Copepoda (ICOC), Pattaya, Thailand July 13-19. (talk)

D. Ruiz-Ramos, NV Schizas. Genetic variation of the hydrocoral *Millepora alcicornis* across the Caribbean. 11th International Coral Reef Symposium, Fort Lauderdale, FL. July 7-11 (poster).

H Torres-Pratts, Rodriguez L, Insua-Lado T, A Rhyne, NV Schizas. Patterns of Genetic Variation of the Corallimopharian *Ricordea florida*. 11th International Coral Reef Symposium, Fort Lauderdale, FL. July 7-11 (poster)

J Garcia, NV Schizas. Genetic Variability of *Acropora cervicornis* and *A. palmata* in Puerto Rico. 11th International Coral Reef Symposium, Fort Lauderdale, FL, July 7-11 (oral)

C. Prada and NV Schizas. Phylogenetic analysis of the Caribbean genera *Eunicea* and *Plexaura* (Octocorallia). 11th International Coral Reef Symposium, Fort Lauderdale, FL, July 7-11 (oral)

H Torres-Pratts, NV Schizas. Living in sympatry: evidence from genetic lineages of Caribbean marine taxa. Evolution 2008, University of Minnesota Minneapolis, Minnesota, USA
June 20-24, 2008 (oral)

Insua-Lado T, H Torres-Pratts, L Rodriguez Matos, A Rhyne, NV Schizas. Patterns Of Genetic Variation Of The Corallimopharian *Ricordea florida* Benthic Ecology Meeting 2008. April 9-13, Providence, RI (oral)

Ruiz-Ramos, DV, Schizas, NV. Is Mona Passage a biogeographic barrier? A hydrocoral's perspective. 2008 Ocean Sciences Meeting, 2-7 March 2008, Orlando, Florida (poster)

Garcia, J. Schizas, NV. Genetic variability of *Acropora cervicornis* and *A. palmata* in Puerto Rico. 2008 Ocean Sciences Meeting, 2-7 March 2008, Orlando, Florida (poster)

2007

Rhyne, AL., Zhang, D., Lin, J. Schizas, NV. Will Any Two Do? Genes and interbreeding studies with *Lysmata wurdemanni*. The Crustacean Society, Coquimbo - Chile 14- 17 October 2007 (poster)

Fiedler, G.C., Rhyne, A.L., Schizas, N.V. Multi-data phylogeny of the caridean genus *Lysmata* The Crustacean Society, Coquimbo - Chile 14- 17 October 2007 (oral)

Ruiz-Ramos, DV, Schizas, NV. Patterns of genetic polymorphism in the fire coral *Millepora*. 33rd Scientific Conference of the Association of Marine Laboratories of the Caribbean . June 4-8, 2007, St. Thomas, US Virgin Islands (oral)

Garcia, J. Schizas, NV. Genetic variability of *Acropora cervicornis* and *A. palmata* in Puerto Rico. 33rd Scientific Conference of the Association of Marine Laboratories of the Caribbean. June 4-8, 2007, St. Thomas, US Virgin Islands (oral)

Rhyne, AL, Zhang, D., Lin, J. Schizas, NV. Any two won't do, genes and interbreeding experiments with *Lysmata wurdemanni*. 2007 Benthic Ecology Meeting, March 21-25, Atlanta, Georgia. (poster)

Ruiz-Ramos, DV, Schizas, NV. Patterns of genetic polymorphism in the firecoral hydrozoan *Millepora*. 2007 Benthic Ecology Meeting, March 21-25, Atlanta, Georgia. (poster)

Schizas, NV, Rhyne, A, Fiedler, C. Multigene phylogeny of the caridean shrimp genus *Lysmata*. 2007 Benthic Ecology Meeting, March 21-25, Atlanta, Georgia. (oral)

Rhyne, AL, Schizas, NV, LIN, J. Revision of western Atlantic, peppermint shrimp, *Lysmata* spp. utilizing morphological and molecular characters. 2007 Benthic Ecology Meeting, March 21-25, Atlanta, Georgia. (oral)

Garcia, J, Schizas, NV. Genetic Variability of *Acropora cervicornis* and *A. palmata* in Puerto Rico. 2007 Benthic Ecology Meeting, March 21-25, Atlanta, Georgia. (oral)

Torres-Pratts, H, AL. Rhyne, NV. Schizas. Distinct mitochondrial lineages in two Caribbean species with vastly different dispersal potential. 2007 Benthic Ecology Meeting, March 21-25, Atlanta, Georgia. (oral)

Rhyne AL, Zhang D, Lin J. NV Schizas Any two won't do, genes and interbreeding experiments with *Lysmata wurdemanni.* SICB 2007 Meeting, Phoenix, AZ, Jan. 3-7, 2007 (poster)

NV Schizas, Rhyne AL, Fiedler C. Multidata phylogeny of the Western Atlantic *Lysmata*. SICB 2007 Meeting, Phoenix, AZ, Jan. 3-7, 2007 (talk)

Rhyne AL, NV Schizas, Lin J. Larval settlement and population ecology of a newly described sponge dwelling peppermint shrimp, *Lysmata pederseni*. SICB 2007 Meeting, Phoenix, AZ, Jan. 3-7, 2007 (talk)

Prada C, NV Schizas, Yoshioka P Genetic Variation and Phenotypic Plasticity of the Gorgonian *Plexaura flexuosa* in Puerto Rico. SICB 2007 Meeting, Phoenix, AZ, Jan. 3-7, 2007 (talk)

2006

Prada CA, PM Yoshioka, NV Schizas Patterns of phenotypic and genetic variability in the gorgonian *Plexaura flexuosa* Evolution 2006, June 23-27, 2006, Stony Brook University, New York (talk)

NV Schizas & William E. Browne. The genetic population structure of Caribbean populations of the banded coral shrimp *Stenopus hispidus*. SICB Annual Meeting, January 4-8, 2006, Orlando, FL (talk)

2005

NV Schizas & William E. Browne. Genetic divergence between Caribbean and Hawaiian populations of the coral red-banded shrimp *Stenopus hispidus.* Evolution 2005, Fairbanks, Alaska, June 10-14 2005 (talk)

NV Schizas. The population genetic structure of meiobenthic taxa inhabiting Caribbean mangroves. V Congress of the Caribbean Biodiversity, Santo Domingo, Dominican Republic. January 25-28 2005 (talk)

H Torres Pratts & NV Schizas. Succession of meiofaunal taxa on fallen, decaying leaves of red mangroves. V Congress of the Caribbean Biodiversity, Santo Domingo, Dominican Republic. January 25-28 2005 (talk)

2004

NV Schizas. The population genetic structure of meiobenthic taxa inhabiting Caribbean mangroves. TWIMCO (Twelfth International Meiofauna Conference) in Ravenna, Italy, July 11-16 2004 (talk)

NV Schizas & TC Shirley. *Apolethon hippoperus*, (Copepoda, Harpacticoida) - A new species from Southeastern Alaska. TWIMCO (Twelfth International Meiofauna Conference) in Ravenna, Italy, July 11-16 2004 (poster)

2002

NV Schizas, Steinbachs J, JWO Ballard. Efficiencies of Different Genes and Different Tree-Building Methods in Vertebrates and Invertebrates. Evolution, June 2002, Urbana, IL (talk)

2000

NV Schizas, Steinbachs J, Swofford D, JWO Ballard. Efficiencies of different genes and different tree-building methods in recovering a known *Drosophila* genealogy. Evolution 2000, Bloomington,IN (talk)

N.V. Schizas. The effect of population subdivision on some neutrality tests. Evolution 2000, Bloomington,IN (poster)

Before 2000

N.V. Schizas. A computational evaluation of the statistical properties of the neutral theory of molecular evolution. LJIS 1999, La Jolla, CA (poster)

N.V. Schizas, B.C. Coull, G.T. Chandler, J.M. Quattro. Ecological genetics of a marine copepod inhabiting clean and contaminated intertidal mudflats SETAC 20th Annual Meeting, 1999, Philadelphia, PA, USA (talk)

N.V. Schizas, B.C. Coull, G.T. Chandler, J.M. Quattro. Ecological genetics of a benthic copepod inhabiting contaminated and clean sediments. The 1999 Joint Meeting of The Society for the Study of Evolution, The American Society of Naturalists, The Society of Systematic Biologists, 22-26 June 1999 in Madison, Wisconsin USA (talk)

N.V. Schizas, B.C. Coull, G.T. Chandler, J.M. Quattro. Population genetics of a benthic copepod. 28th Annual Benthic Ecology Meeting, March 25 - 28 1999 Baton Rouge, Louisiana (talk)

N.V. Schizas, B.C. Coull, G.T. Chandler, J.M. Quattro. Recent advances on population genetic studies of meiofauna taxa inhabiting contaminated estuaries in southeast US. SETAC 19th Annual Meeting, 1998, Charlotte, NC, USA (talk)

B.C. Coull, G.T. Street, N.V. Schizas, M.A. Gordos, G.T. Chandler, J.M. Quattro. Using genetic variation to detect contaminant effects on meiofauna. Tenth International Meiofauna Conference University of Plymouth (U.K.) 26-30th July 1998

Schizas NV, Chandler TG, Coull BC, G.T. Street, J.M. Quattro. SETAC 18th Annual Meeting, 1997, San Francisco, USA Sediment contaminant effects on genetic diversity on estuarine meiofauna: New techniques and preliminary data. (Poster)

Schizas NV, Chandler TG, Coull BC, Donelan T. Summary of chlorpyrifos effects on estuarine meiobenthos cultured in whole sediment microcosms. SETAC 17th Annual Meeting, 1996, Washington DC, USA (Poster)

Schizas NV, Chandler TG, Coull BC, Donelan T. The effects of sediment toxicants in estuarine meiobenthos contained in whole sediment microcosms. 24th Benthic Ecology Meeting, March 7-10 1996, Columbia, South Carolina (talk)

Schizas NV and TC Shirley. Autecology of an intertidal Alaskan harpacticoid copepod, *Apolethon* sp. 5th International Conference on Copepoda, June 6-11 1993, Baltimore, Maryland (poster)

Schizas NV and TC Shirley. Western Society of Naturalists, 1993, Newport, OR (talk)

Curriculum Vitae

Clark E. Sherman
Department of Marine Sciences
University of Puerto Rico at Mayagüez
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(787) 899-2048 ext. 250
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Education

University of Rochester, Rochester, NY	Biology-Geology	B.S. (1987)
University of Hawaii at Manoa, Honolulu, HI	Marine Geology and Geophysics	M.S. (1992)
University of Hawaii at Manoa, Honolulu, HI	Marine Geology and Geophysics	Ph.D. (2000)

Appointments

2005–Present	Professor of Geological Oceanography, Department of Marine Sciences, University of Puerto Rico, Mayagüez Campus,
2002-2004	Assistant Professor of Geology; Director, Earthquake Education Center, Charleston Southern University
2001-2002	Geologist, Research Planning, Inc (RPI), Columbia, SC
2000-2001	Visiting Assistant Professor of Marine Geology, Department of Geological Sciences, The University of North Carolina at Chapel Hill
1997-2000	Graduate Assistant, Department of Geology and Geophysics, University of Hawaii at Manoa
1991-1997	Research Associate V, (full time) Department of Oceanography, School of Ocean and Earth Science and Technology (SOEST), University of Hawaii at Manoa, curator of SOEST Core Analysis Laboratory and manager of SOEST X-Ray Diffraction Facility
1988-1991	Graduate Assistant, Department of Geology and Geophysics, University of Hawaii at Manoa

Publications

Appeldoorn, R., Ballantine, D., Bejarano, I., Carlo, M., Nemeth, M., Otero, E., Pagan, F., Ruiz, H., Schizas, N., **Sherman, C.** and Weil, E., 2015. Mesophotic coral ecosystems under anthropogenic stress: a case study at Ponce, Puerto Rico. Coral Reefs: 1-13.

Baker, E. Puglise, K., Colin, P. L., Harris, P. T., Kahng, S. E., Rooney, J., **Sherman, C.,** Slattery, M. and Spalding, H. L., 2015. What are Mesophotic Coral Ecosystems? In: Baker, E.K., Puglise, K.A. and Harris, P.T. (Eds.). Mesophotic Reefs – A Life Boat For Coral Reefs? The United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal. www.unep.org, www.grida.no.

Sherman, C.E., Fletcher C.H., Rubin, K.H, Simmons, K.R., Adey, W.H. 2014. Sea-level and reef accretion history of Marine Isotope Stage 7 and late Stage 5 based on age and facies of submerged late Pleistocene reefs, Oahu, Hawaii. Quaternary Research 81:138-150.

Whitall, D., L.J. Bauer, **C. Sherman**, K. Edwards, A. Mason, T. Pait, and C. Caldow. 2013. Baseline Assessment of Guánica Bay, Puerto Rico in Support of Watershed Restoration. NOAA Technical Memorandum NOS NCCOS 176. Prepared by the NCCOS Center for Coastal Monitoring and Assessment Biogeography Branch. Silver Spring, MD. 169 pp.

Sherman C., R. Hernández, Y. Hutchinson and D. Whitall. 2013. Terrigenous Sedimentation Patterns at Reefs Adjacent to the Guánica Bay Watershed. pp. 103-112. In Whitall,D., L.J. Bauer, C. Sherman, K. Edwards, A. Mason, T. Pait, and C. Caldow. 2013. Baseline Assessment of Guánica Bay, Puerto Rico in Support of Watershed Restoration. NOAA Technical Memorandum NOS NCCOS 176. Prepared by the NCCOS Center for Coastal Monitoring and Assessment Biogeography Branch. Silver Spring, MD. 169 pp.

Sherman, C., Appeldoorn, R., Ballantine, D.L., Bejarano, I., Carlo, M., Kesling, D., Nemeth, M., Pagán, F., Ruiz, H., Schizas, N., Weil, E., 2013. Exploring the mesophotic zone: Diving operations and scientific highlights of three research cruises across Puerto Rico and US Virgin Islands, in: Lang, M.A., Sayer, M.D.J. (Eds.), Proceedings of the 2013 AAUS/ESDP Curaçao Joint International Scientific Diving Symposium. American Academy of Underwater Sciences, Curaçao, pp. 297-312.

Locker S, Armstrong R, Battista T, Rooney J, **Sherman C**, Zawada D (2010) Geomorphology of mesophotic coral ecosystems: current perspectives on morphology, distribution, and mapping strategies. Coral Reefs 29:329-345

Sherman C, Nemeth M, Ruíz H, Bejarano I, Appeldoorn R, Pagán F, Schärer M, Weil E (2010) Geomorphology and benthic cover of mesophotic coral ecosystems of the upper insular slope of southwest Puerto Rico. Coral Reefs 29:347-360

Sherman C, Appeldoorn R, Carlo M, Nemeth M, Ruiz H, Bejarano I (2009) Use of technical diving to study deep reef environments in Puerto Rico. Proc American Academy of Underwater Sciences 28th Scientific Symposium:58-65

*Cuevas DN, **Sherman CE**, Ramirez WR, Hubbard DK (2009) Coral growth rates from the Holocene Canada Honda fossil reef, southwestern Dominican Republic: comparisons with modern counterparts in high sedimentation settings. Caribbean Journal of Science 45:94-109

#Hernández R, **Sherman C**, Weil E, Yoshioka P (2009) Spatial and temporal patterns in reef sediment accumulation and composition, southwestern insular shelf of Puerto Rico. Caribbean Journal of Science 45:138-150

Ballantine DL, Appeldoorn RS, Yoshioka P, Weil E, Armstrong R, Garcia JR, Otero E, Pagan F, **Sherman C**, Hernandez-Delgado EA, Bruckner A, Lilyestrom C (2008) Biology and Ecology of Puerto Rican Coral Reefs. In: Riegl B, Dodge RE (eds) Coral Reefs of the USA. Springer, pp 375-406

*Cuevas DN, **Sherman CE**, Ramirez WR, Hubbard DK (2008) Environmental factors controlling community structure, morphology and linear extension of mid-Holocene reef corals from Canada Honda, Southwestern Dominican Republic. Proc 11th International Coral Reef Symposium:21-25

Fletcher CH, Bochicchio C, Conger CL, Engels MS, Feirstein EJ, Frazer N, Glenn CR, Grigg RW, Grossman EE, Harney JN, Isoun E, Murray-Wallace CV, Rooney JJ, Rubin KH,

Sherman CE, Vitousek S (2008) Geology of Hawaii Reefs. In: Riegl B, Dodge RE (eds) Coral Reefs of the USA. Springer, pp 435-488

Hubbard DK, Burke RB, Gill IP, Ramirez WR, **Sherman CE** (2008) Coral-reef geology: Puerto Rico and the US Virgin Islands. In: Riegl BM, Dodge RE (eds) Coral Reefs of the USA. Springer, pp 263-302

Fletcher, CH, III, Murray-Wallace, CV, Glenn, CR, **Sherman, CE**, Popp, B, Hessler, A (2005) Age and Origin of Late Quaternary Eolianite, Kaiehu Point (Moomomi), Molokai, Hawaii. Journal of Coastal Research SI 42:97-112

Rubin KH, Fletcher CH, III, **Sherman CE** (2000) Fossiliferous Lana'i deposts formed by multiple events rather than a single giant tsunami. Nature 408:675-681

McMurtry GM, Herrero-Bervera E, Cremer MD, Smith JR, Resig J, **Sherman C**, Torresan ME (1999) Stratigraphic constraints on the timing and emplacement of the Alika 2 giant Hawaiian submarine landslide. Journal of Volcanology and Geothermal Research 94:35-58

Sherman CE, Fletcher CH, III, Rubin KH (1999) Marine and meteoric diagenesis of Pleistocene carbonates from a nearshore submarine terrace, Oahu, Hawaii. Journal of Sedimentary Research 69:1083-1097

Fletcher CH, **Sherman CE** (1995) Submerged shorelines on O'ahu, Hawai'i: archive of episodic transgression during the last deglaciation? Journal of Coastal Research Special Issue 17:141-152

Sherman CE, Glenn CR, Jones AT, Burnett WC, Schwarcz, HP (1993) New evidence for two highstands of the sea during the last interglacial, oxygen isotope substage 5e. Geology 21:1079-1082

*PhD Advisee, #MS Advisee

Grants

- Assessment of geological and geochemical proxies of sources of terrigenous sediment reaching reefs adjacent to the Guanica Bay watershed, southwest Puerto Rico (PI)
  Source: NOAA Coral Reef Conservation Program
  Amount: $74,906 Duration: 1.5 years (1 Aug 2015 to 31 Jan 2017)
- Structure and development of mesophotic coral reefs, Southwest Puerto (PI)
  Source: National Geographic Society
  Amount: $20,000 Duration: 1 year (on no-cost extension)
- Sedimentation at Reefs Adjacent to the Guanica Bay Watershed (PI)
  Source: National Fish and Wildlife Foundation
  Amount: $41,999 Duration: 1 year, start date pending (completed)
- Structure and Connectivity of Mesophotic Reefs across a Longitudinal Gradient (Co-PI)
  Source: Caribbean Coral Reef Institute
  Amount: $136,297 Duration: September 2010-August 2012
- Terrigenous Sedimentation Patterns in Guanica Bay (PI)
  Source: Caribbean Coral Reef Institute
  Amount: $37,199 Duration: August 2010-July 2011
- A Sedimentary Record of Marine Flooding Events from Coastal Salt Ponds, Southwest Puerto Rico (PI)
  Source: UPR-Sea Grant

Amount: $114,044 Duration: March 2010-February 2012

- Terrigenous Sedimentation Patterns in Guanica Bay (PI)
  Source: Caribbean Coral Reef Institute
  Amount: $25,996 Duration: August 2009-July 2010
- Character and Timing of a Reef Give-Up Event on the Southwest Puerto Rico Shelf (PI)
  Source: UPR-Sea Grant
  Amount: $114,044 Duration: March 2008-February 2011
- SGER: Sclerosponges: a key to understanding the influence of global warming on ocean thermocline and mixed layer variability..an example from the Caribbean (Co-PI)
  Source: National Science Foundation-Marine Geology and Geophysics
  Duration: 08/08-07/09
- CRES 2006: Ecology, Integrity & Status of Deep Caribbean Coral Reefs (Co-PI)
  Source: NOAA Center for Sponsored Coastal Ocean Research
  Duration: 09/06-08/11
- Geochronology of Late Pleistocene Reefs on the Puerto Rico and St. Croix Shelves (PI)
  Source: UPRM-Research and Development Center
  Amount: $5,000 Duration: November 2006-December 2007
- Sedimentary Petrology of Beach Sands at Rincón, Puerto Rico (PI)
  Source: UPR Sea Grant
  Amount: $3,430 Duration: August 2006-July 2007
- CCRI-Cross-Shelf Sedimentation Patterns and Processes (Co-PI)
  Source: Caribbean Coral Reef Institute
  Amount: $42,703 Duration: September 2005-August 2008
- Late Quaternary Reef Accretion of Southwestern Puerto Rico (PI)
  Source: UPRM College Arts and Sciences
  Amount: $4,970 Duration: August 2005-July 2006

Recent Abstracts/Presentations

Sherman, C. and Appeldoorn, R., Geomorphology of mesophotic coral ecosystems in Puerto Rico and US Virgin Islands. 37th Scientific Meeting of the Association of Marine Laboratories of the Caribbean, Willemstad, Curaçao, 18-22 May 2015.

Sherman, C. and Fernández, J., A record of late Holocene coastal evolution and relative sea-level change from a coastal salt pond, southwest Puerto Rico. 2014 GSA Annual Meeting, Vancouver, British Columbia, 19–22 October 2014.

Sherman, C., Appeldoorn, R., Ballantine, D.L., Bejarano, I., Carlo, M., Kesling, D., Nemeth, M., Pagán, F., Ruiz, H., Schizas, N., Weil, E., 2013. Exploring the mesophotic zone: Diving operations and scientific highlights of three research cruises across Puerto Rico and US Virgin Islands, 2013 AAUS/ESDP Curaçao Joint International Scientific Diving Symposium. October 24-27, 2013, Curaçao.

Sherman, C., Hutchinson, Y., Hernández, R., Terrigenous sedimentation patterns at reefs adjacent to the Guanica Bay watershed, southwest Puerto Rico. 36th Scientific Meeting of the Association of Marine Laboratories of the Caribbean, Ocho Rios, Jamaica, 17-21 June 2013.

Sherman, C., and Appeldoorn, R., Geomorphology of mesophotic coral ecosystems in Puerto Rico and US Virgin Islands. 62nd Annual Meeting of the Southeastern Section of the Geological Society America, San Juan, Puerto Rico, 20-21 March 2013.

Sherman C, Ramírez, W, Mercado, M (2012) Reef accretion on the outer shelf of southwest Puerto Rico. 12th International Coral Reef Symposium, Cairns, Australia, July 9-13, 2012

Sherman C, Hernández R, Hutchinson Y, Rojas M (2011) Sedimentation patterns at reef sites adjacent to the Guanica Bay watershed, southwest Puerto Rico. 35th Scientific Meeting of the Association of Marine Laboratories of the Caribbean, San Jose, Costa Rica, May 23-27, 2011

Sherman C, Ramírez W (2011) Submerged outer-shelf hummock reefs, southwest Puerto Rico: Record of a regional reef give-up event? 35th Scientific Meeting of the Association of Marine Laboratories of the Caribbean, San Jose, Costa Rica, May 23-27, 2011

Sherman C, Nemeth M, Ruiz, H, Bejarano I, Appeldoorn R, Weil E, Hutchinson Y, Rojas M (2011) Geomorphology and sediment dynamics in mesophotic coral ecosystems of the upper insular slope of southwest Puerto Rico. 19th Caribbean Geological Conference, Le Gosier, Guadeloupe, March 21-24, 2011

Sherman C, Nemeth M, Ruiz, H, Bejarano I, Appeldoorn R, Weil E, Hutchinson Y, Rojas M (2011) Geomorphology and sediment dynamics in mesophotic coral ecosystems of the upper insular slope of southwest Puerto Rico. 2011 ASLO Aquatic Sciences Meeting, San Juan, Puerto Rico, February 13-18, 2011

Sherman C, Ramírez W (2010) Character and Timing of a Reef Give-Up Event on the Southwest Puerto Rico Shelf. Simposio de investigación, University of Puerto Rico Sea Grant Program, Mayagüez, Puerto Rico, October 29, 2010

Sherman C, Hernández R, Hutchinson Y (2010) Sedimentation patterns at reef sites adjacent to the Guanica Bay watershed, southwest Puerto Rico. Caribbean Coral Reef Institute 2010 Meeting, Lajas, Puerto Rico, November 12, 2010

Sherman C, Appeldoorn R, Carlo M, Nemeth M, Ruiz H, Bejarano I (2010) Use of Technical Diving to Study Mesophotic Coral Ecosystems in Puerto Rico. 1st International Technical Scientific Diving Workshop, Interuniversity Institute for Marine Sciences (IUI), Eilat, Israel, June 20-25, 2010

Sherman C, Ramírez W (2010) Character and Timing of a Reef Give-Up Event on the Southwest Puerto Rico Shelf. Conversatorio Marino, University of Puerto Rico Sea Grant Program, Mayagüez, Puerto Rico, April 20, 2010

Sherman C, Nemeth M, Ruiz H, Bejarano I, Appeldoorn R, Pagán F, Schärer M, Weil E (2009) Geomorphology and mesophotic coral ecosystems of the upper insular slope of southwest Puerto Rico. 34th Scientific Meeting of the Association of Marine Laboratories of the Caribbean, Roseau, Dominica, May 25-29, 2009

Sherman C, Appeldoorn R, Carlo M, Nemeth M, Ruíz H, Bejarano I (2009) Use of technical diving to study deep reef environments in Puerto Rico. American Academy of Underwater Sciences 28th Scientific Symposium, Atlanta, Georgia, March 13-14, 2009

Sherman C, Ruiz H, Nemeth M, Bejarano, I, Carlo, M, Appeldoorn, R, Ballantine D, Pagán F (2008) Preliminary Surveys of Deep-reef Habitats on the Upper Insular Slope of Southwest Puerto Rico. 18th Caribbean Geological Conference, Santo Domingo, Dominican Republic, March 24-29, 2008

Other Activities

- Editor, Caribbean Journal of Science
- Lead diver on NOAA-funded Deep Coral Reef Ecosystems Studies project and fully certified as technical, mixed-gas, rebreather diver. As part of this project, lead and coordinated deep-

diving operations off southwest Puerto Rico, surveying mesophotic coral habitats of the upper insular slope, collecting samples for laboratory analyses and precision deployment and recovery of on-bottom oceanographic instruments. This field work supported several related research projects being conducted by eight faculty within the Department of Marine Sciences (DMS).

- Lead diver and Co-PI (geomorphology and sedimentology) on three NOAA-CCRI funded cruises examining remote mesophotic coral habitats in Puerto Rico and US Virgin Islands. In addition to scientific duties, lead and coordinated ship-based deep-diving operations at remote sites. Diving activities included geomorphic characterization of sites, benthic photo surveys and collection of sample for laboratory analyses
- As Chair of the Department of Marine Sciences Diving Control Board oversaw the Department's application and subsequent acceptance as a full Organizational Member of the American Academy of Underwater Sciences (AAUS). This process included establishing and enacting AAUS protocols, such as diving medical exams and first-aid training, as well as a full revision of the DMS Diving Safety Manual to be in accordance with AAUS policies and protocols.
- Co-Chair of Mini-Symposium (Mini-Symposium 1: Lessons From the Past) at 11th International Coral Reef Symposium, Fort Lauderdale Florida, July 2008
- Invited participant (Geomorphology and Physical Processes) in the first Mesophotic Coral Ecosystems Workshop held in Jupiter, Florida, July 12-15, 2008. The workshop was hosted by the Perry Institute for Marine Science and organized by the NOAA National Centers for Coastal Ocean Science's Center for Sponsored Coastal Ocean Research and the Office of Ocean Exploration and Research's NOAA Undersea Research Program, and the US Geological Survey.

CURRICULUM VITAE

Ernesto Francisco Weil Machado

Place and Date of Birth: Caracas, Venezuela - August 29, 1954. **Nationality:** US Citizen / Venezuelan
Work: Dept. of Marine Sciences, University of Puerto Rico. PO BOX 9000 Mayaguez PR 00681.
Position: Full Professor / Researcher / Department Head
E-mail: *ernesto.weil@uprm.edu* / *reefpal@gmail.com*
Phone: (787) 899-2048 ext. 241 (Magueyes lab); (787) 265-3838 (Mayaguez campus)

EDUCATION

1994-1996. Postdoctoral Associate - RSMAS - U. of Miami. (Alina Szmant's laboratory).
1992. Ph.D. Department of Zoology, University of Texas at Austin, TX, USA and Smithsonian Tropical Research Institute, Panama (Judy Lang, David Hillis and Nancy Knowlton advisors).
1980. Licenciado in Biology, Facultad de Ciencias, Universidad Central de Venezuela (Dr. Freddy Losada advisor).

OTHER TRAINING

Scientific Scuba diver (1979-NAUI-CMAS)
Coastal Navigation (US coast guard)
- CPR-First Aid (Red-Cross, UM, 1994-1996)
- Nitrox diving (NOAA-Key Largo, 1996)

EMPLOYMENT

2020-	Director and Professor, Dept. Of Marine Sciences, University of Puerto Rico
2004-	Professor, Dept. Of Marine Sciences, University of Puerto Rico
1999-04	Associate Professor, Dept. Of Marine Sciences, University of Puerto Rico
1996-99	Assistant Professor, Dept. Of Marine Sciences, University of Puerto Rico
1994-96	Research Associate, University of Miami. RSMAS-MBF
1993-94	Instructor, Department of Biology, Austin Community College, Austin Texas.
1992-93	Lecturer, Dept. of Zoology, University of Texas. Austin, Texas.
1986-90	Research associate in the project "Effects of a Major Oil Spill on Panamanian coastal communities". Coral Reef section. Smithsonian Tropical Research Institute (1986-1990).
1985-86	Research Assistant to Dr. Jeremy Jackson, Smithsonian Trop. Research Institute, Panama.
1979-85	Director of the Dos Mosquises Marine Biology Station, Fund. Científica Los Roques, Caracas, Venezuela.

TEACHING EXPERIENCE

2004-	DCM-U. of Puerto Rico- Graduate courses in coral reef biology, ecology and biogeography
1999-01	Summer course in Coastal Pathology - Bermuda Biology Station for Research
1999	Summer course in coral reef biology and biogeography - Dos Mosquises Marine Biology Station, Los Roques, Venezuela
1996-02	DCM-U. of Puerto Rico- Graduate courses in coral reef biology, ecology and biogeography.

1993-94 Austin Community College. Instructor in environmental biology - cell biology
1992-93 University of Texas. Ecology. Lecturer in evolution and society.
1987-92 University of Texas. Cell and organism biology, human physiology, human genetics**.**
1981-89 Fundación Científica Los Roques. Professor and coordinator of advanced summer courses at the Dos Mosquises Marine Biology Station, Los Roques, Venezuela. Coral Reef Biology, Ichthyology, Ecology and Evolution of Coral Reefs, etc.
1975-80 Universidad Central de Venezuela. Teaching assistant and Assistant Instructor in biometry, Marine Ecology (1980), Problems in Marine Ecology.

CURRENT RESEARCH INTERESTS

- Can we really help degraded coral reefs ? Restoration vs. natural selection
- Spatial and temporal variability in the distribution, prevalence, incidence and virulence of coral reef diseases in the Caribbean and Indo-Pacific; climate Change and local environmental drivers.
- Roll of diseases in the current degradation trends of Caribbean and Indo-Pacific coral reefs. Impact at the community, species and population levels. Systemic effects and reproductive output (Fecundity).
- Reproductive Biology and ecology of Caribbean corals – Hermaphroditic vs. Gonochoric patterns
- Taxonomy, systematics, biodiversity, ecology, and evolution of Caribbean scleractinian corals.
- Characterization of scleractinian corals base-metabolism and their responses to local and GCC and local environmental changes using the Coral In-situ Metabolism Measurements (CISME) device.
- Community and population ecology, anthropogenic impacts, restoration, management and conservation of Caribbean coral reefs and other tropical marine communities
- Characterization and understanding of immune genes via Transcriptome of cnidarian genomes.
- Immune responses of cnidarians and adaptability to Global Climate Change and other stressful conditions

SYNERGISTIC ACTIVITIES

- Member Global Coral Reef Monitoring Network (GCRMN - Caribbean Node)
- Global and Regional Environmental Issues in Coastal Marine and Land Ecosystems – Environmental Leaders Program (ELSU) University of Shizuoka, Shizuoka, Japan. Participation as invited Professor to a workshop at the University of Shizuoka (September 23-28, 2013) and at the 3rd Asian Pacific Coral Reef Symposium, in Taiwan, June 22-28, 2014. The goal was to advice, teach students (future leaders in marine research) from the Asia region on the current problems of coral diseases and marine diseases in general and how to tackle them and contribute in their countries.
- Collaborator in the Coral Disease Research project (Cornell-NOAA) on the "Role of Environmental Conditions in Driving Spatial and Temporal Variation in Disease Prevalence" (2014-present) and member of the Disease Research Coordination Network (Cornell University) dealing with existing and new diagnostic techniques to expanding tools to ID new pathosystems and identify key laboratories to serve as diagnostic development centers (2014 -to- present).
- Invited expert to help on an EPA project to develop a reef classification system for use by Federal Agencies in the evaluation of Biological Condition Gradients (BCG) for Caribbean coral reefs September 2013 – present.
- Faculty Development program of Department of Biology, University of Puerto Rico –Program to enhance and complement Faculty members' and current students' knowledge and understanding of the current status and problems affecting Puerto Rico's and Caribbean coral reefs and other coastal communities. February 2014 -

- Executive Board Member of the Association of Marine Laboratories of the Caribbean (AMLC). A network program of Marine Laboratories that dedicates to promote marine sciences and help researchers and students from the Caribbean.
- Development of databases on Caribbean coral reef diseases and environmental drivers.

OTHER ACTIVITIES

- Associate Editor JEMSE (Journal of Marine Sciences and Engineering).
- Associate Editor Frontiers – Marine Biology and Ecology
- Reviewer in several peer reviewed journals: PloS1, Frontiers, Marine Biology, Coral Reefs, Marine Ecology Progress Series, Western Indian Ocean Journal of Marine Science, Diseases of Aquatic Organisms, Revista Biologia Tropical, Phyl. Trans. B, Marine Biology, PeerJ, etc.
- Editor of the Caribbean Marine Science Newsletter of the AMLC (1999 – 2012).
- Vice-President of the Association of Marine Laboratories of the Caribbean (2001- 2009)
- Guess Editor of the special volume of Diseases of Aquatic Organisms "Current Advances in Coral Reef Disease Research". Vol. 69 Number 1. (2006).
- Chair and lead convener of the "Historical aspects and impact of coral reef diseases" at the 14th International Coral reef Symposium, Bremen, Germany.
- Chair and lead convener of the "Diseases of Coral Reef Organisms; Evolutionary Aspects" at the 10th International Coral reef Symposium, Okinawa, Japan (2004).
- President Association of Marine Laboratories of the Caribbean (2000-2001)
- Director of the CARICOMP chapter for Puerto Rico (1997 - 2012)
- CESU representative for the University of Puerto Rico (1999-2005)
- Book reviews: Marine Biology by Castro and Huber, MacGraw Hill, 468 pp. 1-4 editions (1999-2002).

MEMBERSHIPS

- Member Editorial Board Frontiers
- Member Editorial Board of Journal of Marine Science and Engineering
- Member Editorial Board PeerJ
- International Society for Reef Studies (1991-)
- American Museum of Natural History (1992 – 2005)
- Board of Directors Association of Marine Laboratories of the Caribbean (Since 1999).
- National Geographic (Since 1997).

GRANTS - HONORS

2022-24**- Co-Pi -** Development and implementation of a water quality monitoring project in shallow coral reef areas around Puerto Rico (DNRA – $1,300.000)

2022-24- **Co-PI** - Spatial distribution, demographics, and genetic diversity of SCTLD threatened pillar coral (*Dendrogyra cylindrus*) in four regions of Puerto Rico. (DNRA-NOAA - $ 690,000)

2022-24- **Co-PI**- Genetic variability within the *Colpophyllia* ecomorphs **– PI** - Alicia Vollmer -

2021-2024 - **Co-PI –** Herbivore alternatives: Restocking of *Echinometra viridis* and *Tripneustes ventricosus*, on coral reefs to reduce the abundance of nuisance species. (ISER – NOAA) **PI** - Dr. S. Williams

($214.000)

2021-24 – **Co-PI** - Restocking herbivores to increase yield during coral restoration: Using multi-species synergies and diversity to enhance coral reef resiliency (ISER - NOAA - $ 455,330).

2019-2023 – **Co-PI** – On-land cultures and outplanting of resistant coral micro fragments – NOAA

2020 – **Co-PI** - Witnesses to the Climate Emergency: Ocean acidification crisis and warming observations from tropical corals (OASIS). German Grant – Make Our Planet Great Again – German Research Initiative - Leibniz Centre for Tropical Marine Research (ZMT) – **PI** - Prof. Henry C. WU

2019-23- **PI**- NSF-RAPID- Microbiome temporal dynamics in healthy and SCTLD diseased coral in La Parguera Puerto Rico ($197,830)

2018-20- **Co-PI** - NOAA grant (NA18NOS4820105). Effect of Hurricane Maria on resilience of Puerto Rico's Coral Reefs (08/01/2018—1/31/2020). ($70,926)

2018- **Co-PI-** Sea-Grant grant - Continued Monitoring of Marine Soundscapes to Assess Coral Reef Health (June-November 2018) ($3000)

2017-19 – **Co-PI**- NSF-RAPID grant: The impact of Hurricane Maria on the mesophotic reefs of southwest Puerto Rico ($200,000).

2017-21 – **Co-PI**- NOAA grant: Coral Community structure, health and calcification at near-shore reef adjacent to the Guánica Bay watershed. NOAA/CRCP ($70,000)

2010-13 – **Co-PI** - NSF grant Collaborative Research: Assessing the Effect of Environmental Stressors on Invertebrate Innate Immunity Using a Coral Pathosystem. PI - Laura Mydlarz (UT Arlington and JW Bruno, U, of North Carolina. ($ 143.600).

2010- 11- **Co-PI-** NSF-Grant. Collaborative Research: Impacts of the 2010 Caribbean Coral Bleaching Event: Assessing changes in Coral Immune Function. PI Dr. D. Harvell (Cornell University) and L. Mydlarz (UT-Arlington). ($ 28.100).

2007-11- **Co-PI** - NOAA- CCRI- Microbiological and etiological responses in *Montastraea faveolata* infected with Caribbean yellow band disease (YBD) to rising ocean temperature and nutrient pollution ($ 26,253).

2007-10- **Co-PI**- NOAA-DEEP CRES - Ecology, Integrity and Status of Deep Caribbean Coral Reefs. NOAA ($ 1,500.000) Co-PI with 5 others

2005-09- **Co-Pi** - Ocean warming, environmental impact and coral diseases: A Global disease assessment. Coral Reef Targeted Research GEF-World Bank ($ 130.000).

2003-08- **Co-Pi** - NOAA-CRES - Integrating Science and management in the Caribbean - ($ 5,000,000) Co-Pi with 5 other Co-PIs.

2005-06- **Pi** - Status and impact of coral diseases around Puerto Rico. NOAA-DNR ($ 75,000).

2002-03- Fish and Wildlife Foundation - Reproductive biology, recruitment and culture of corals as tools for restoration and management of reefs ($132.000).

1999-02- **Co-Pi** - UN-Diversitas program - Caribbean-wide surveys of disease incidence in coral reefs. ($ 25,000)

2000-02- **Co-Pi** - Colciencias - Colombia. Taxonomía del complejo de esponjas excavadoras de coral *Cliona aprica, C. langae y C. caribbaea* y su impacto sobre algunos arrecifes del Caribe Colombiano.

2000-01- **Pi** - NASA - Coral reef Monitoring by Remote Sensing of Coral Spawn ($ 5,000)

1999-01- **Pi** - SeaGrant Grant for research in reproductive biology of Caribbean Corals ($ 145.000)

1998-99- **Pi** - SeaGrant Grant for studies in the *Cliona* spp. impact on Caribbean reefs ($ 9,000).

1998-99- Seed Money Grant from School of Art and Sciences - RUM – UPR ($ 3,000)

1997-98- Seed Money Grant from School of Art and Sciences - RUM – UPR ($ 3,000)

1996-97- Seed Money Grant from CID - RUM – UPR ($ 3,000)

1996-97- Seed Money Grant from Sea Grant - RUM – UPR ($ 3,000)

1994-96- Postdoctoral associate. RSMAS, University of Miami.
1991 Short term fellowship, Smithsonian Tropical Research Institute, Panama. ($ 6,000)
1989-90- Pre-doctoral fellowship. Smithsonian Institute, Washington DC. ($ 25,000)
1986-88- PRA Scholarship from the Organization of the American States (OAS)
1985- Research Assistant Fellowship, Exxon Co. and The Smithsonian Trop. Research Institute.
1984- Order Andrés Bello in its Third Class, Presidency of the Republic of Venezuela.
1979-80- Research Grant from CONICIT, Thesis project.
1978-79- Research Assistant Fellowship, Instituto Venezolano de Inv. Cientificas, Venezuela.

Mentored / (*) Supervised Graduate Students

Masters (34/*26)

*Robin Bruckner – Ms.C- 1999
*Wilma Vargas – MsC – 2002
*Jorge Pinzón – Ms.C – 2004
*Miguel Lugo – Ms.C – 2004
*Hector Ruiz – Ms.C – 2004
*Emmanuel Irizarry – Ms.C – 2006
*Jose Morales – Ms.C – 2006
Carlos Prada - Ms.C - 2007
Alex Mercado – Ms.C – 2007
Joselyd Garcia – Ms.C – 2007
*Kathy Flynn – Ms.C – 2008
*R. Hernandez – Ms.C - 2008
Danise Ruiz – Ms.C - 2009
Rocio Garcia – Ms.C – 2009
*Francisco Soto – Ms.C - 2011
*Derek Soto – Ms.C – 2013
*Chatchanit Arif – Ms.C – King Abdullah University
*Christina Wade – Ms.C - 2015
Ingrid Ortiz – Ms.C - 2016
*Hanae Spathias – Ms.C – 2017
Mariel Cruz – Ms.C - 2017
Nick Hammerman – Ms.C - 2018
Liahay Rivera – Ms.C - 2018
Thay-Ling Moya – Ms.C – 2019 (abandoned)
*Jeffrey Morales – Ms.C - 2020
*Miguel Figuerola – Ms.C - 2019
*Duane Sanabria – Ms.C – 2019 (abandoned)
*Catalina Morales – Ms.C- (Colombia) – 2019
Luis Rodriguez – Ms.C - 2022
*Francisco Gonzales - MsC - (USB-Venezuela) 2022
*Khrystal Ramos – MsC - 2022

Ph.D (15/*11)

*Andrew Bruckner – Ph.D -1999
*Antonio Ortiz - Ph.D - 2005
Juan Torres – Ph.D - 2005
*Aldo Croquer – Ph.D 2005 - USB-Venezuela –
*Daisy Duran – Ph.D – 2005
*Sean Griffin- Ph.D - 2005
*Jan Locke – Ph.D - 2009
**Courtney Couch– Ph.D- 2013 Cornell– University
**Mohammed Suleiman-Ph.D -2016– U.Tanzania
*Matt Lucas – Ph.D – 2016
Chelsea Ham – Ph.D – 2016.
**Allison Tracy – Cornell University Ph.D -2018
Ingrid Ortiz – Ph.D 2018.
Martha Ricaurte – Ph.D 2022
* Omayra Rodriguez

Post Doctoral Advising (1)

Aldo Croquer – USB - Venezuela
Collen Burge – Cornell University

Manuel Olmeda – MsC – 2020
Manuel Nieves – Ms.C - 2021
*Daniel Toledo – Ms.C
*Noel Carrera – Ms.C
* Jahaziel Rivera
* Natasha
* Guilliana Hernandez
*Janelle Silva

External Reviewer of PhD Dissertations for:

Cathie Page - University of Queensland - Australia
Steve Dalton - University of New England, Armidale, NSW, Australia

COLLABORATORS

Drs. D. Anderson, R. Appeldoorn, P. Alcolado, D. Andradi-Brown. D. Ballantine, R. Beeden, A. Birth, D. Bone, AF. Budd, P. Bradley, J. Bruno, A. Bruckner, C. Burge; J. Cortes, A. Croquer, B. Casareto, K. Carpenter, K. Coates, CS. Couch, T. Courtney, JJ Cruz-Motta, CA Daniels, M. Eakin, NL. Foster, CS. Friedman, LE Fuess, J. Garzón-Ferreira, D. Gil-Agudelo, J. Garcia-Saiz, R. Ginsburg, M. Groner, HM. Guzmán, D. Harvell, A. Hooten, S. Heron, A. Irikawa, JBC Jackson, S. Jackson, E. Jordan-Dalhgreen, S. Kahn, N. Knowlton, J. Lang, M. Lucas, D. Lirman, S. Manuel, J. Maynard, T. McClanahan, M. Medina, M. Miller, P. Miloslavich, M. Morgan, P. Morris, P. Mumby, L. Mydlarz, FL. Nuñez, CA. Page, JM. Pandolfi, Carlos Prada, J. Pinzón, L. Raymundo, L. Richardson, K. Ritchie, C. Roder, CC. Rogers, E. Rosemberg, M. Ruiz-Ramos, F. Santavi D, Siniger, GW. Smith, MC Smith, C. Sherman, W. Schmith, N. Schyzas, D. Soto, F. Soto-Santiago, S. Sunagawa, A. Szmant, Y. Suzuki; M. Stat, A. Tracy, BL van Tussenbroek, I. Urreiztieta, C. Veron, CR. Voolstra, B. Willis, S. Williams, W. Wright, A. Winter, R. Whitehead, T. Work, P. Yoshioka and S. Zea.

PUBLICATIONS (up to Jan-2022) (Peer-reviewed journals = 145, peer-reviewed book chapters = 23)

Of the extensive list of publications (145), several had major impacts on the scientific community. Six publications contributed significantly to the taxonomic clarification of important Caribbean reef-building coral species complexes, and presented a multivariate approach as the best tool to solve taxonomic issues between closely related taxa. Some of these are: Weil (1992); Weil and Knowlton (1994); Knowlton et al (1992), Pinzon and Weil (2011), Budd et al. (2011). Other publications have contributed significantly to our knowledge of the recent emergence and impact of coral diseases and their relationship to Climate Change: Weil 2004; Carpenter at al. 2008; Weil et al. 2006, 2009 a, b; 2012, 2017, 2019; Gil-Agudelo et al. 2006; Harvell et al. 2007; 2009; Weil and Rogers 2011; Burge et al. 2014; Groner et al. 2015, Tracy et al. 2017, 2018, 2019, 2021; McClanahan et al. 2009; 2018, Vega-Thurber et al. 2020. Important contributions in coral reproduction include: Szmant et al. 1996; Weil et al. 2009b, Weil and Vargas 2010, Pinzon and Weil 2011; Soto and Weil, 2016, general reef ecology: Weil 2005; Chollet et al. 2018; Guzman et al. 2019; Tuohy et al, 2020; Bradley et al. 2021; Gottesman et al. 2021. Most recently, several publication have contributed to increase our knowledge about the structure and dynamics of mesophotic coral communities: Sherman et al. (2010); Kahn et al. (2010); Appeldoorn et al 2015, 2016, 2018, 2021; Sinniger et al. 2016; Andradi-Brown et al. (2016), and Weil (2018).

PEER REVIEWED PUBLICATIONS (148 peer reviewed ms. + 23 peer-reviewed book chapters + 29 reports, white papers and educational articles)

2022 (4)

Santavi DL, Jackson SK, Jessup B, Horstmann C, Rogers CS, **Weil E**, Szmant AM, Cuevas D, Walkeri BK, Jeffrey C, Ballantine D, Fisher WF, Clark R, Ruiz Torres H, Todd B, Raimondo S* (2022). A biological condition gradient for Caribbean coral reefs: Part II. Numeric rules using sessile benthic organisms. Ecol. Ind. 135: https://doi.org/10.1016/j.ecolind.2022.108576 R

Laverde-Castillo JJA, Alfaro M, **Weil E**, Schizas NV (2021) Polychaetes (annelida, polychaeta) associated with lithic and biogenic substrata in mesophotic coral ecosystems in Puerto Rico and the US Virgin Islands. (Accepted for publication in Carib. Jou. Scie)

Rodriguez-Matos LR, AndrasJP, **Weil E**, Schizas NV (2022). Genetic Connectivity among *Gorgonia ventalina* populations of the Caribbean Sea. (Accepted in for publication in *The Excitement of Biology*).

Raker C, Olmeda-Saldaña M, Williams S, **Weil E**, Prada C (2022). Corallivory and genotype differences drive *Orbicella faveolata* micro-fragment survivorship and growth during restoration. Accepted for publication in Restoration Ecology.

Lucas MQ, Collazo DL, Mercado MA, Fain EJ, Toledo-Rodriguez DA, **Weil E** (2021). Stony Coral Tissue Loss Disease (SCTLD) induced mass mortality at Peñón de Mera and Cueva del Indio, Arecibo, Puerto Rico. (Submitted to Inter Scientific (in review)

2021 (10)

Appeldoorn RS, Ballantine DL, Carlo M, Cruz Motta JJ, Nemeth M. Ruiz HJ, Schizas NL, Sherman CE, **Weil E**, Yoshioka PM (2021). Intra-annual Variation in Mesophotic Benthic Assemblages on the Insular Slope of Southwest Puerto Rico as a Function of Depth and Geomorphology Front. Mar. Sci. 8:732926. doi: 10.3389/fmars.2021.732926

Cróquer A**, Weil E** and Rogers CS (2021) Similarities and Differences Between Two Deadly Caribbean Coral Diseases: White Plague and Stony Coral Tissue Loss Disease. Front. Mar. Sci. 8:709544 doi: 10.3389/fmars.2021.709544

Bradley P, Jessup B, Santavy D, **Weil E**, Roger CS, Hortsmann C, Oliver L (2021). USEPA (U.S. Environmental Protection Agency). 2021. The Biological Condition Gradient (BCG) for Puerto Rico and U.S. Virgin Islands Coral Reefs. EPA 822-R2-1007. U.S. Environmental Protection Agency, Office of Water/Office of Science and Technology, Washington, D.C. 133 pp + appendixes.

Tracy AM, **Weil E** and Burge CA (2021). Ecological Factors Mediate Immunity and Parasitic Co-Infection in Sea Fan Octocorals. Front. Mar. Sc., Immunol. 11:608066. doi: 10.3389/fimmu.2020.608066

Gottesman BL, Olson JC; Yang S, Acevedo-Charry O, Francomano D, Martinez FA, Appeldoorn RS, Mason D, **Weil E**, Pijanowski BC (2021). What does resilience sound like? Coral reef and dry forest acoustic communities respond differently to Hurricane Maria. Ecological Indicators (126)

https://doi.org/10.1016/j.ecolind.2021.107635

Lopez PR, Ramirez WR, Huerfano VA, von Hildebrand C and **Weil EF** (2021). Interaction among Scientists, Engineers, and the affected communities about the impact of earthquakes and tsunamis in Pueto Rico. Rev. Nat. Des. Nat. Acc. Infr Civil. Vol. 19-20: 65-83.

Bradley P, Jeesup B, Santavy D, **Weil E**, Rogers C, Hortsman C, Oliver L (2021). USEPA (U.S. Environmental Protection Agency). Calibration of the Biological Condition Gradient for Caribbean Coral Reefs. EPA XXX-X-XX-XXX. U.S. Environmental Protection Agency, Office of Water/Office of Science and Technology, Washington, D.C

Olmeda-Saldana M, Williams SM, **Weil E**, Cruz-Motta JJ (2021). Experimental evaluation of *Diadema antillarum* herbivory effects on benthic community assemblages JEMBE. https://doi.org/10.1016/j.jembe.2021. 151566

Nieves-Ortiz, MA, Appeldoorn R, Weil E, Ruiz HJ, Cruz-Motta JJ (2021). Fish assemblages associated with natural, transplanted, artificial, and accidental reefs in Puerto Rico. Ocean and Coastal Management 21(4):1-15.. doi.org/10.1016/j.ocecoaman.2021.105901

Garcia Hernandez JE**,** Tuohy E, Toledo DA, Sherman C, Schizas N, **Weil E** (2021)**.** Detrimental conditions affecting *Xestospongia muta* across shallow and mesophotic coral reefs off the southwest coast of Puerto Rico. **DAO 147:47-61 (2021)**- DOI: https://doi.org/10.3354/dao03633

2020 (5)

Weil E, Hammerman NM, Becicka RL, Cruz-Motta JJ. 2020. Growth dynamics in *Acropora cervicornis* and *A. prolifera* in southwest Puerto Rico. **PeerJ 8**: e8435 http://doi.org/10.7717/peerj.8435

Tuohy E, Wade C, **Weil E**. 2020. Lack of recovery of the long-spined sea urchin *Diadema antillarum* Philippi in Puerto Rico 33 years after the Caribbean-wide mass mortality. **PeerJ 8**:e8428 http://doi.org/10.7717/peerj.8428

Vega Thurber R, Mydlarz L, Brandt M, Harvell D, **Weil E**, Raymundo L, Willis BL, Langevin S, Tracy AM, Littman R, Kemp KM, Dawkins P, Prager KC, Garren M and Lamb J. 2020. Deciphering Coral Disease Dynamics: Integrating Host, Microbiome, and the Changing Environment. Front. Ecol. Evol. 8:575927. doi: 10.3389/fevo.2020.575927

Alvarez, A., Alicea, E., Antoun, H., Blondeau, J., Diaz, E., Donovan, C., Edwards, K., Edwards, P., Enochs, I., Metz, T., Fleming, C., Formel, N., Garcia, R., Geiger, E., Gorstein, M., Gonzalez, M., Griffin, S., Grove, J., Groves, S., Figuerola, M., Johnson, M., Jeffrey, C., Justiniano-Santos, A., Kelsey, H., Jimenez, N., Manzello, D., Miller, N.; Nemeth, M., Ruiz, H., Sabater, J., Towle, E., Tzadik, O., Schärer, M., Viehman, S., **Weil, E**., Williams, S. (2020). Coral reef condition: A status report for Puerto Rico. United States, National Oceanic and Atmospheric Administration; Coral Reef Conservation Program (U.S.). https://doi.org/10.25923/nc9w-5716.

Figuerola M., Cruz-Motta JJ, Weil E.(2020). Coral reef community structure in La Parguera Natural Reserve ten years after the 2005-06 mass mortalities. Theses & Dissertations: College of Arts and Sciences-UPRM. https://scholar.uprm.edu/handle/20.500.11801/2620

2019 (6)

Weil E, Hernández-Delgado EA, Gonzalez M, Williams S, Suleimán-Ramos S, Figuerola M, Metz-Estrella T

(2019). Spread of the New Coral Disease "SCTLD" into the Caribbean: Implications for Puerto Rico . Reef Encounters. Vol. 34 (1):38-43.

Weil E (2019). Disease Problems. In Y. Loya, Puglise K and Bridge T (eds.), Mesophotic Coral Ecosystems, Coral Reefs of the World 12, (41): 777-798. Springer, Berlin. https://doi.org/10.1007/978-3-319-92735-0_41

Weil E, Weil-Allen A, Weil A (2019). *Coral and Cnidarian Welfare in a Changing Sea.* **In Carere C and Maher J (Editors) The Welfare of Invertebrate Animals**. **Springer DOI:10.1007/978-3-030-13947-6_6**

Guzman HM, Kaiser S, **Weil E** (2019). Assessing the long-term effects of a catastrophic oil spill on subtidal coral reef communities off the Caribbean coast of Panama (1985-2017**). Mar. Biodiv. 50:28. (doi.org/10.1007/s12526-020-01057-9).**

Tracy A, **Weil E** and Harvell DC (2019). Warming and pollutants interact to modulate octocoral immunity and shape disease outcomes. **Ecological Applications**. DOI: 10.1002/eap.2024

Appeldoorn RS, Alfaro M, Ballantine DL, Bejarano I, Ruíz HJ, Schizas NV, Schmidt W, Sherman CE**, Weil E** (2019). Puerto Rico**.** In Y. Loya, Puglise K and Bridge T (eds.) Mesophotic Coral Ecosystems. Springer. https://doi.org/10.1007/978-3-319-92735-0_41

2018 (2)

Chollett I, Collin R, Bastidas C, Cróquer A, Gayle PMH, Jordán-Dahlgren E, **Weil E**, et al. (2018). Correction: Widespread local chronic stressors in Caribbean coastal habitats. **PLoS ONE 13(1): e0192016.** https://doi.org/10.1371/journal.pone.0192016

McClanahan T, **Weil E,** Baird A (2018). *Impact of Bleaching on Coral Reefs*. In **Van Oppen M (Edit). Coral Bleaching (second edition). Springer. Pp.231-264.**

2017 (4)

Tracy A, **Weil E** and Harvell DC (2017.) Octocoral co-infection as a balance between host immunity and host environment. Oecologia, https://doi.org/10.1007/s00442-017-4051-9**.**

Fuess LE, Pinzon C JH, Weil E, Grinshpon RD, Mydlarz LD (2017). Life or death: disease-tolerant coral species activate autophagy following immune challenge. Proc. R. Soc. B 284: 20170777. http://dx.doi.org/10.1098/rspb.2017.0771.

Hammerman N, Galaska M, **Weil E**, Rivera-Vicens R, Appeldoorn R, Alfaro M and Schyzas N (2017). "Population connectivity of the plating coral, *Agaricia lamarcki* from southwest Puerto Rico", has been accepted for publication in Coral Reefs. Coral Reefs. DOI: 10.1007/s00338-017-1646-x

Weil E, Rogers CS and Croquer A (2017). *Octocoral diseases in a changing sea.* **In Marine Animal Forests : The Ecology of Benthic Biodiversity Hotspots. Rossi S, Gori A, Orejas Seco del Valle C (Editors). DOI: 10.1007/978-3-319-17001-5 Springer ISBN: 978-3-319-17001-5 (online).**

2016 (11)

Soto D and **Weil E** (2016), Sexual reproduction in the Caribbean coral genus *Isophyllia* (Scleractinia:

Mussidae). **PeerJ 4:e2665; DOI 10.7717/peerj.2665**

Lucas MQ, Stat M, Smith MC, **Weil E**, Schyzas N (**2016**). *Symbiodinium* (internal transcribed spacer 2) diversity in the coral host *Agaricia lamarcki* (Cnidaria: Scleractinia) between shallow and mesophotic reefs in the Northern Caribbean (20–70 m). **Mar. Ecol. doi: 10.1111/maec.12367**

Fuess LE, Pinzon JH, **Weil E** and Mydlarz LD (2016). *Associations between transcriptional changes and protein phenotypes provide insights into immune regulation in corals*. **Devel. Comp. Immunology**. **http://dx.doi.org/10.1016/j.dci.2016.04.017.**

Anderson D, Weeb M, Tonellato P, Smith MC, **Weil E (2016).** *RNA-Seq to expand models of innate immunity in the Caribbean reef-building coral Orbicella faveolata (Scleractinia-Merulinidae)* **PeerJ – DOI 10.7717/peerj.1616**

Groner M, Maynard J, Breyta R, Carnegie B, Dobson A, Friedman CS, Froelich B, Garren M, Gulland FMD, Heron SF, Noble RT, Revie CW, Shields JD, Vanderstichel R, **Weil E,** Wyllie-Echeverria S, Harvell CD **(2016).** *Managing Marine Disease Emergencies in an Era of Rapid Change*. **Phil.Trans. R. Soc. B371:20150364. http://dx.doi.org/10.1098/rstb.2015.0364**

Sinniger F, Ballantine D, Bajarano I, Colin P, Pochon X, Pomponi SA, Puglise KA, Pyle RL, Reaka M, Spalding HL, **Weil E** (2016). *Biodiversity of mesophotic coral ecosystems*. **Chapter 4** in **Baker EK, Puglise KA, Harris PT (eds). Mesophotic coral ecosystems** - A lifeboat for coral reefs? **The United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, p. 50-62.**

Appeldoorn R, Ballantine D, Bajarano I, Ruiz H, Schyzas N, Schmith W, Sherman C, **Weil E** (2016). *Mesophotic coral ecosystems examined: La Parguera, Puerto Rico, USA*. **Chapter 3 in Baker EK, Puglise KA, Harris PT (eds). Mesophotic coral ecosystems** - A lifeboat for coral reefs? **The United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, p. 45-49.**

Andradi-Brown D, Laverick J, Bejarano I, Bridge T, Colin PL, Eyal G, Jones R, Kahng SE, Reed J, Smith TB, Spalding HL, **Weil E,** Wood E (2016). *Threats to mesophotic coral ecosystems and management options*. **Chapter 6 In: Baker EK, Puglise KA, Harris PT (eds). Mesophotic coral ecosystems** - A lifeboat for coral reefs? **The United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 67-82**.

Page CA, Croquer A, Bastidas C, Rodríguez S, Neale SJ, **Weil E** and Willis BL (2016). Halofolliculina ciliate infections on corals. **In Diseases of Coral, First Edition. Edited by Cheryl M. Woodley, Craig A. Downs, Andrew W. Bruckner, James W. Porter and Sylvia B. Galloway. Chapter 26, pp 361-375. John Wiley & Sons, Inc**

Work T and **Weil E** (2016). *Dark Spots Disease (Endolithic hypermycosis).* **In Diseases of Coral, First Edition. Edited by Cheryl M. Woodley, Craig A. Downs, Andrew W. Bruckner, James W. Porter and Sylvia B. Galloway. Chapter 25, pp. 354 – 360. John Wiley & Sons, Inc**

Raymundo L and **Weil E** (2016). Indo-Pacific Band Diseases of Corals. **In Diseases of Coral, First Edition. Edited by Cheryl M. Woodley, Craig A. Downs, Andrew W. Bruckner, James W. Porter and Sylvia B. Galloway. Chapter 25, pp. 354 – 360. John Wiley & Sons, Inc**

2015 (9)

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Appeldoorn R, Ballantine D, Bejarano I, Carlo M, Nemeth M, Otero E, Pagan F, Ruiz H, Schizas N, Sherman, **Weil E** (2015). *Mesophotic coral ecosystems under anthropogenic stress: a case*

study at Ponce, Puerto Rico. **Coral Reefs. DOI 10.1007/s00338-015-1360-5**

Lucas M and **Weil E** (2015). *Recent recovery in Acropora cervicornis and abundance of A. prolifera off La Parguera, PR*. Mar. **Biod. Oceanarium** - **DOI: 10.1007/s12526-015-0399-4.**

Daniels CA, Baumgarten S, Yum LK, Michell CT, Bayer T, Arif C, Roder C, **Weil E** and Voolstra CR (2015). *Metatranscriptome analysis of the reef-building coral Orbicella faveolata indicates holobiont response to coral disease.* **Front. Mar. Sci. 2:62**. **doi: 10.3389/fmars.2015.00062**

Groner M, Breyta R, Dobson A, Friedmann C, Froelich B, Garren M, Gullard F, Maynar J, **Weil E**, Wyllie-Echeverria S, Harvell D (2015*). Emergency responses for Marine Diseases* **Science. Vol. 347, Issue 6227. p.1210**.

Tracy A, Koren O, Douglas N, **Weil E**, Harvell D (2015). *Persistent Shifts in Caribbean Coral Microbiota are Linked to the 2010 Warm Thermal Anomaly*. doi: **Environmental Microbiology Reports. DOI-10.1111/1758-2229.12274**

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Soto-Santiago F and **Weil E** (2015). Spatial and temporal variability of Caribbean yellow band disease prevalence in *Orbicella* spp. off La Parguera, Puerto Rico. **Caribbean Journal of Science, Vol. 48, No. 1, 81-102.**

2014 (9)

Pinzon J, Dornberger l, Beach-Letendre j, **Weil E** and Mydlarz L (2014). *The link between immunity and life history traits in scleractinian corals*. **PeerJ. DOI 10.7717/peerj.628**

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Lucas M, Rodriguez L, Sanabria D, **Weil E** (2014). *Natural Prey Preferences and Spatial Variability of Predation Pressure by Cyphoma gibbosum (Mollusca: Gastropoda) on Octocoral Communities off La Parguera, Puerto Rico.* **ISRN Ecology- Article ID 742387, 13 pags. DOI.org/10.1155/2014/ 742387**

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Raymundo L and **Weil E** (2016). *Indo-Pacific Band Diseases of Corals*. **In Diseases of Coral, First Edition. Edited by Cheryl M. Woodley, Craig A. Downs, Andrew W. Bruckner, James W. Porter and Sylvia B. Galloway. Chapter 25, pp. 354 – 360. John Wiley & Sons, Inc**

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Appeldoorn R, Ballantine D, Bajarano I, Ruiz H, Schyzas N, Schmith W, Sherman C, **Weil E** (2016). *Mesophotic coral ecosystems examined: La Parguera, Puerto Rico, USA*. **Chapter 3 in Baker EK, Puglise KA, Harris PT (eds). Mesophotic coral ecosystems - A lifeboat for coral reefs**? **The United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, p. 45-49.**

Andradi-Brown D, Laverick J, Bejarano I, Bridge T, Colin PL, Eyal G, Jones R, Kahng SE, Reed J, Smith TB, Spalding HL, **Weil E**, Wood E (2016). *Threats to mesophotic coral ecosystems and management options.* Chapter 6 **In: Baker EK, Puglise KA, Harris PT (eds). Mesophotic coral ecosystems - A lifeboat for coral reefs? The United Nations Environment Programme and GRID-Arendal, Nairobi and Arendal, 67-82.**

2013 (1)

Smith SR, Sarkis S, Murdoch TJT, **Weil E**, Croquer A , Bates NB , Johnson RJ , de Putron S, Andersson AJ **(2013)**. Threats to coral reefs in Bermuda. In C.R.C. Sheppard (ed.), Coral Reefs of the United Kingdom Overseas Territories, **Coral Reefs of the World 4, 17 DOI 10.1007/978-94-007-5965-7_13, © Springer Science+Business**

Media Dordrecht

2011 (1)

Weil, E., Rogers, C., (2011)**. Coral reef diseases in the Atlantic-Caribbean, in: Dubinsky, Z., Stambler, N. (Eds.), Coral Reefs: An Ecosystem in Transition., pp. 465-491.**

2009 (1)

McClanahan, TR, **Weil E**, Cortés J, Baird A and Ateweberhan M **(2009)**. Consequences of coral bleaching for sessile organisms. In M. van Oppen and J. Lough (editors) Coral Bleaching: Patterns, Processes, Causes and Consequences. **Ecological Studies. Pp:121-138. Springer-Verlag.**

2008 (3)

Weil E, Jordan-Dalhgreen E, Bruckner AW and Raymundo LJ (2008). *Assessment and monitoring protocols of coral reef diseases.* In Raymundo L, Couch CS, and Harvell D (Edits), *Coral Disease Handbook: guidelines for Assessment, Monitoring and Management.* **GEF-CRTR- Currie Communications Australia. pp 48-64.**

Ballantine D, Appeldoorn R, Yoshioka P, **Weil E**, Armstrong R, Garcia J, Otero E, Pagan F, Sherman C, Hernandez-Delgado E (2008). *Biology and Ecology of Puerto Rican Coral Reefs*. In: Riegl BM, Dodge RE (eds) **Coral Reefs of the USA. Springer, pp 375-406**

García-Sais J, Appeldoorn R, Battista T, Bauer L, Bruckner A, Caldow A, Carrubba L, Corredor J, Diaz E, Lilyestrom C, García-Moliner G, Hernández-Delgado E, Menza C, Morell J, Pait A , Sabater J, **Weil E**, Williams E and Williams S (2008). *The State of Coral Reef Ecosystems in Puerto Rico*. In: Wadell JE and Clarke AM (edits) *The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States*. **NOAA Technical Memorandum NOS NCCOS 73. Pp 75-116.**

2006 (1)

Zea S, Lopes M, **Weil E**, Chaves-Fonagra A, Marques JC, Diaspar C, Castellano L (2006). *Socavado EsquelÈtico y Mortalidad Coralina por Esponjas Excavadoras Incrustantes en San AndrÈs e Islas del Rosario.* In INVEMAR. Informe del Estado de los Ambientes Marinos y Costeros en Colombia. 2005. (Serie de Publicaciones periódicas, INVEMAR; (No. 8) Santa Marta. 360 p. ISBN:1692-5025

2005 (1)

Weil E 2005. *Current Status of the Marine Biodiversity of Puerto Rico*. In P. Miloslavich and E. Klein (Ed.). Caribbean Marine Biodiversity: The known and unknown**. DEStech Publications Inc. Lancaster, PA USA Pages 85-109**

2004 (3)

Weil E (2004). *Coral Reef Diseases in the Wider Caribbean*. In E. Rosemberg and Y. Loya (Eds.) **Coral**

reef health and diseases. Pp. 35-68. Springer-Verlag.

Gil-Agudelo D, G Smith, J Garzón-Ferreira, **E Weil** and D Petersen (2004). *Dark spots disease and yellow band disease, two poorly known coral diseases with high incidence in Caribbean reefs.* In E. Rosemberg and Y. Loya (Eds.) **Coral reef health and diseases. Pp. 337-348. Springer-Verlag**.

Smith G and **E Weil** (2004). *Aspergillosis in Gorgonians*. In E. Rosemberg and Y. Loya (Eds.) **Coral reef health and diseases. Pp. 279-286. Springer-Verlag**

2003 (1)

Weil E 2003. *The corals and coral reefs of Venezuela*. **In** Jorge Cortés (edit) *Latin American Coral Reefs* . **Pp 303- 330. Elsevier Press.**

1994 (1)

Weil E & RA Laughlin 1994. *Laboratory cultures of larvae of Strombus gigas* Linne*, in the Dos Mosquises Marine Station, Los Roques National Park, Venezuela*. Final Results. Queen Conch Biology, Fisheries, and Mariculture **(eds. RS Appeldorn & V Rodriguez), pp: 275-294. Fundación Cientifica Los Roques, Caracas, Venezuela.**

WHITE PAPERS (14)

2019 (1)

Weil E, Hernández-Delgado EA, Gonzalez M, Williams S, Suleimán-Ramos S, Figuerola M, Metz-Estrella T (2019). Spread of the New Coral Disease "SCTLD" into the Caribbean: Implications for Puerto Rico . Reef Encounters. Vol. 34 (1):38-43.

2014 (1)

Jackson JBC, Donovan MK, Cramer KL, Lam VY, Bak RPM, Chollett I, Connolly SR, Cortés J, Dustan P, Eakin CM, Friedlander AM, Greenstein BJ, Heron SF, Hughes T, Miller J, Mumby P, Pandolfi JM, Rogers CS, Steneck R, Weil E (+ 58 authors). *Status and Trends of Caribbean Coral Reefs: 1970-2012*. **Global Coral Reef Monitoring Network, IUCN, Gland, Switzerland. 304 pp.**

2008 (1)

Aronson, R., Bruckner, A., Moore, J., Precht, B., **Weil, E**., (2008). *Acropora palmata*, in: IUCN 2012. **IUCN Red List of Threatened Species. Version 2013.1** <www.iucnredlist.org>

2006 (2)

Weil E (2006). *Geographic differences in coral reef diseases*. **Proceedings of the GEF-World Bank workshop, Puerto Morelos, Mexico, 2006. 10.pp.**

Zea, S.; M. López-Victoria, **E. Weil,** A. Chaves-Fonnegra, J.C. Márquez, C. Duque, L. Castellanos (2006). *Socavado esquelético y mortalidad coralina por esponjas excavadoras incrustantes en San Andrés Islas del Rosario*. **Págs. 93-95 en: INVEMAR. Informe del estado de los ambientes marinos y costeros en Colombia. 2005. Serie Publicaciones Periódicas INVEMAR 8, Santa Marta, 360pp**

2005 (1)

Weil E and Jordán-Dalgreen E (2005). Status of coral reef diseases in Zanzibar and Kenya, western Indian Ocean. **Progress report, GEF-WB Coral Reef Targeted Research and Capacity Building-Coral Disease Working Group. 16 pp.**

2004 (3)

Weil E (2004). *Current status of the marine biodiversity of Puerto Rico*. Caribbean Marine Biodiversity: The known and the Unknown. Census for Marine Life - CoML and INTECMAR, **June 14-18, Margarita, Venezuela. 25 pp.**

Weil E, D Gil-Agudelo & GW Smith 2004. *The dark color syndromes in Caribbean corals: status and Field diagnostics.* **2nd CHDC Workshop on Coral Diseases, Madison, WI April 27-29, 17 pp.**

Weil E, GW Smith and J Cervino (2004). *Yellow blotch Syndrome in Caribbean corals*. **2nd CHDC Workshop on Coral Diseases, Madison, Wisconsin. April 27-29, 12 pp.**

2003 (1)

Weil E, E Hernandez, A. Bruckner, A. Ortiz, M. Nemeth and H. Ruiz (2003). *Status of Acroporid Populations in Puerto Rico*. **Proc. of the Caribbean *Acropora* Workshop: Potential Application of the US Endagered Species Act as a Conservation Strategy. NOAA technical Memorandum NMFS-OPR-24: 71-92.**

2002 (1)

Weil E (2002). *Coral disease epizootiology: Status and research needs*. **Coral Health and Disease: Developing a National Research Plan. Coral Health and Disease Consortium, Charleston South Carolina, 2002, 14 pp.**

2001 (1)

Weil E (2001). Caribbean coral reef diseases. Status and research needs. In McManus J (editor) *Priorities for Caribbean Coral Reef Research National Center for Caribbean Coral Reef Research*. **RSMAS, U. of Miami, Florida 10 pp**.

1999 (1)

Weil E (1999). *Diversidad y Abundancia relativa de Corales, Octocorales y Esponjas en el Parque Nacional Jaragua,República Dominicana.* **In Biodiversidad Marino-Costera de la República**

Dominicana, JA Ottenwalder (edit), 31 pp.

1996 (1)

Weil E & LA Weigt (1996). *Protein starch-gel electrophoresis in scleractinian corals: a report on techniques and troubleshooting*. **NOAA National Undersea Program. Caribbean Marine Research Center Technical Report Series # 96-13; 36 pp.**

1985 (1)

Weil E. and R. Laughlin (1985. *Ecologia, Cultivo y Repoblación del Botuto Strombus gigas L. en el Parque Nacional Archipielago de los Roques*. **Publicación especial de la Fundación Científica Los Roques # 17. 320 pp**

TECHNICAL REPORTS (7)

2009 (1)

Zimmer B, Duncan L, Aronson RB. Deslarzes KJP, Deis D, Robbart M, Precht WF, Kaufman L, Shank B, **Weil E**, Field J, Evans DJ, and Clift L (2009). *Long-term monitoring at the East and West Flower Garden Banks, 2004-2008* (2009). **Volume I: Technical report. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, Louisiana**. **OCS Study MMS 2009. 233 pp.**

1998 (1)

Weil E, Morell J and J Corredor (1998). *Benthic Community Census and Bathymetric Survey of AEE cable from Vieques to Culebra, Puerto Rico*. **A report prepared for the Puerto Rican Electric and Power Authority**. **25 pp.**

1997 (1)

Weil E (1997). *Coral, Octocoral and sponge diversity in the reefs of the Jaragua National Park, Dominican Republic.* **Report prepared for the Biodiversity of the Marine Coastal Zone of the Dominican Republic. 12 pp.**

1995 (1)

Weil E, M. Miller and AM Szmant (1995). *Community structure and environmental correlates of nine reefal areas in Biscayne National Park, Florida.* **Report to the Biscayne National Park, 85 pp**

1985 (3)

Weil E (1985). *Scleractinian corals of the Archipielago de los Roques National Park*. **Report series of the Fundación Cientifica Los Roques, Caracas. 5 pp.**

Laughlin, RA, **E Weil** and M Hauschild, 1985. *Pesquerias del botuto Strombus gigas* L. *en el Parque*

Nacional Archipiélago de los Roques: Pesquerias e impacto socioeconómico. **Publicación especial de la Fundación Científica Los Roques # 18, 32 pp.**

Laughlin RA & **E Weil** (1985). *Ecologia, cultivo y repoblacion del botuto Strombus gigas en el Parque Nacional Archipielago Los Roques*. **Final report. Fundación Cientifica Los Roques, Caracas.320 pp**.

EDUCATIONAL (5)

2008 (2)

Weil E and Hooten 2008. *Underwater Cards for Assessing Coral health on Caribbean Coral Reefs*. **GEF-CRTR-Currie Comm. Australia. 30 pp.**

Beeden R, Willlis BL, Raymundo LJ, Page CA and Weil E 2008. *Underwater Cards for Assessing Coral Health on Indo-Pacific Reefs*. **GEF-CRTR-Currie Comm. Australia. 28 pp**.

2004 (1)

Weil E and Ruiz H (2004). *Underwater Guide for the Identification of Shallow Water Corals of the Wider Caribbean*. **UNEP-CEP. 12 pp**.

1998 (2)

Ginsburg, R, S Lutz, P.Kramer, B Bischof and **E Weil** 1998. *Coral Reefs: Cities Under the Sea***. A set of Slides and text in English and Spanish prepared to introduce the Coral Reef community to different audiences.**

Bruckner A, R Bruckner and **E Weil** (1998). *Caribbean Coral Diseases*. *A set of laminated photographs with descriptions in Spanish and English of the different coral diseases and other coral problems in the Caribbean.* **SeaGrant and CARICOMP**

GENERAL INTEREST (2)

1984 (1)

Weil E and J Posada (1984). *Las pesquerías de arrastre en Venezuela*. **Geomundo**: 10 (84):12-17.

1983 (1)

Weil E and R Laughlin 1983. *Un recurso en extinción: las tortugas marinas*. **Ciencia al Día**, **NE 22** (1): 22-27.

ABSTRACTS-PAPERS-POSTERS PRESENTED – (O=oral presentation; P= Poster)

2022- ICRS- Bremen-Germany

2019- 39th. AMLC Meeting – Punta Cana , Dominican Republic May2-7-2019. **(1-O; 4-P**)
2018- ASLO Meeting San Juan, Puerto Rico **(1-O; 1-P)**
2017- XIII Congreso Internacional de Investigación Científica. 7-9 June University St. Domingo, DR. **(1-O)**
2017- ALMC 38th Scientific Meeting, Merida Mexico. May 20-27 2017. **Plenary speaker** and presenter **(2-O).**
2016- ASLO meeting **(1-O)**
2016- Society for Integrative and Comparative Biology Meeting. Portland, Oregon. January 3-7, 2016.**(1-O)**
2015- 37th AMLC Scientific Meeting, Curacao June 2015. **(2-O)**
2015- US EPA 3rd Coral Reef BCG Expert Workshop - October 13 – 15, 2015- San Juan, Puerto Rico **(1-O)**
2014- Ecology of Infectious Marine Disease. Friday Harbor Lab. Washington, USA **(1-O)**
2014- Advances y Forecasting bleaching and disease epizootics. NSF-NOAA, Friday Harbor Lab. Washington, USA
2014- ASLO meeting, February 2014, Hawaii **(2-O)**
2014- Faculty Development program - Department of Biology, University of Puerto Rico – Bayamon- **Invited Speaker (1-O)**
2014- 3rd Asian Pacific Coral Reef Symposium –, June 22-26, 2014, Kenting, Taiwan **(1-O)**
2014- Evolution Meeting, **(1-O)**
2014- EPA Biological Condition Gradient Workshop - University of Puerto Rico Field Station- El Yunque Conference Room – April 8 – 10, 2014. **(1-O).**
2013- 8th International Conference on Coelenterate Biology. Eilat, Israel, Dec. 1-5, 2013. **(2-O).**
2013- International Seminar on Regional and Global Environmental Issue in Coastal Marine and Land Ecosystems. Environmental Leaders Program (ELSU). Plenary Speaker. Shizuoka, Japan, Sept. 23-27, 2013. **(1-O)**.
2013 - 7th Mexican and 1st Pan American Coral Reef Congress, Merida, Yucatan Mexico (7-11 Octubre, 2013. Plenary Speaker. Plenary Speaker and **(2-P).**
2013- 36th Scientific Conference of the Association of Marine Laboratories of the Caribbean (AMLC) Discovery Bay, Jamaica. June 17-21. (**2-O**)
2013- AAUS Symposium Curacao, June 10-14, 2013. **(1-O)** .
2012- Evaluating the Impacts of a Changing Ocean on Management and Ecology of Infectious Marine Disease. RCN Workshop, Talaris Centre, Seatle, Oct. 26-29, 2012. **(1-O).**
2012- International Dialogue on Underwater Munitions (IDUM). Science Specialists' working meeting. San Juan, Puerto Rico, Sept. 27-29 and Oct. 1-3, 2012. **(1-O)**
2012- Department of Biological Sciences, Shizuoka University, Shizuoka, Japan. **Invited Speaker**, August,2012
2012- Quantifying Sustainability in Puerto Rico: A Scientific Discussion. Symposium/Workshop – Organized by the EPA - June 5-7, 2012, at the PR Convention Center, San Juan, Puerto Rico. **(O)**
2012- 12th International Coral Reef Symposium, Cairns Australia, July 9 – 16. **(O)** and **(P)**
2012- IUCN/GCRMN Tropical America Workshop 30 April – 4 May 2012 Smithsonian Tropical Research Institute, Panama City, Panama. **(O).**
2012- 37th Annual Eastern Fish Health Workshop High Peaks Resort, Lake Placid, New York -23 – 27. April 2012. **(O).**
2011- World University Network Workshop on Ocean Acidification, Poster presentation, Friday Harbor, WA. 2011. **(O).**
2011- 35th Scientific Meeting of the Association of Marine Laboratories of the Caribbean, Costa Rica.

Mayo 2011. **(O)** and **(2P)**

2011- ASLO Aquatic Sciences Meeting – San Juan Puerto Rico – February 13-18, 2011. (2 O)

2011- Ecology of Marine Infectious Diseases (EMID) Workshop – ASLO- February 12-13, 2011 (O)

2010- Climate Change and Biodiversity – Department of Natural Resources Puerto Rico. **Invited Speaker**.November 17, 2010 – San Juan, PR.

2010- Reef Resilience and Climate Change Workshop for Reef Managers, St. Thomas, US Virgin Islands. **Invited Speaker**. May 12, 2010..

2010- The Pan - Caribbean Reef Restoration Workshop. Discovery Bay Marine Laboratory, **Invited speaker**, St. Ann, Jamaica. June 21, 2010..

2010- Department of Biological Sciences, Shizuoka University, Shizuoka, and Department of Biological Sciences, Ryukyu University, Okinawa, Japan. **Invited Speaker** March 2010.

2009- Darwin, la selección natural del conocimiento: el orígen de grandes ideas. Bogota, Colombia – August 26-28, 2009. **Plenary Speaker** – C. Darwin anniversary celebration.

2009- 34th Scien. Meeting of the Assoc. of Marine Labs of the Caribbean. Dominica, May 24-29. **(O).**

2008- 11th International Coral Reef Symposium -5-10 July 2008. **(6-O**) and **(17 P)**

2007- ESA Meeting, San Fernando, California, 5-10 August, 2007. **(2-O).**

2007- EEID Meeting, Cornell University, Ithaca NY USA. May 28-30, 2007. **(O).**

2007- 33th AMLC Scientific Meeting, St Thomas, USVI June 4-8, 2007. **(3-O)** and **(4-P**)

2007- Conservation Inter. Workshop on Caribbean Coral species, Dominica, March 20-23, 2007**. (O)**.

2007 - Census of Marine Life – CoML – **Invited Speaker**. Panamá. 11-14 Feb, 2007..

2006- ITMES meeting, Cozumel, Mexico Oral . 10-10, 2006. **(O)**

2005. 32th. Scientific Meeting of the Association of Marine Laboratories of the Caribbean. Curacao. **(2-O) and (2-P)**

2004- 10th International Coral reef Symposium. Okinawa Japan. June 28 – July 3 2004. **(3-P)**.

2003- 31st. Scientific Meeting of the Association of Marine Laboratories of the Caribbean. Port of Spain, Trinidad, July 2003. (**2-O**).

2003- 7th International Conference on Cnidarians, Kansas University, Kansas . **(2-O).**

2002- CARICOMP meeting. Cayman Islands. O (1).

2002- ICRI workshop for the Tropical America, Cancún, Mexico, June 12 - 14, 2002. Invited speaker

2002- Coral Disease and Health Consortium workshop, Charleston, South Carolina, Jan-22-25. **(O).**

2001- NCORE workshop, RSMAS, University of Miami. Invited Speaker

2001- 30th. Scientific Meeting of the Association of Marine Laboratories of the Caribbean. Puerto Rico **(4-O).**

2001- ASLO Meeting, Albuquerque, NM.- (**O) and (P**)

2000- 9th International Coral Reef Symposium, Bali Indonesia. **(4-O).**

2000- 30th. ALMC Executive Board meeting. Bahamas. **Invited Speaker.**

2000- 29th Benthic Ecology Meetings - Wilmington, North Carolina - USA. **(2-O).**

1999- 29th Meeting of the Association of Marine Labs of the Caribbean, Cumaná, Venezuela. **(O).**

1999- IASI Meeting - Panama City, Panama. **Invited Speaker**.

1999- ICRI Meeting - Ft. Lauderdale - Florida. **(2-O) and (P).**

1999- 28th Benthic Ecology Meetings - Baton Rouge Louisiana. **(2-O) and (P).**

1998- Atlantic and Gulf Coral Rapid Assessment (AGRA) meeting. Miami. **(O) and (P).**

1998- UNESCO-CARICOMP meeting in Jamaica. **(O).**

1997- Association of Marine Labs of the Caribbean, Costa Rica**. (O).**

1997- European Union of Geosciences Biannual Meeting, 1997. Abstract (1).

1996- VIII International Coral Reef Symposium, Panamá. **(2-O) and (2-P).**
1996- 27th Benthic Ecology Meetings, Wilmington, North Carolina. **(P).**
1994- 26th Benthic Ecology Meetings, New Jersey**. (P).**
1994- Keystone Symposia, Molecular Approaches to Marine Ecology and Evolution, New Mexico. **(P).**
1992- VII International Coral Reef Symposium, Guam, **(O).**
1988- VI International Coral Reef Congress. Australia. **(O).**
1987- Sixty-third Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advance of Science. Austin, Texas. 1987. **(O).**
1984- XXXIV Congreso ASOVAC, Universidad de Oriente (UDO), Cumaná, Venezuela. **(O).**
1983- XXXIII Congreso ASOVAC, Universidad Central de Venezuela. Caracas. **(O).**
1982- XXXII Congreso ASOVAC; Universidad Simón Bolívar. Caracas. **(O).**
1982- Thirty fifth annual meeting of the Gulf and Caribbean Fisheries Institute, Bahamas. **(O)**.
1980- VIII Congreso Latinoamericano de Zoología, Mérida, Venezuela. **(O)**.

GENERAL RESEARCH EXPERIENCE

2008 –present Mesophotic coral ecosystems, coral species and population connectivity
2007- present- Environmental drivers of coral reef diseases
2006- present- Disease impact on the reproductive output of corals
2005- present- Epizootiology of coral reef diseases in the Indo-Pacific
2003- present- Impact of coral reef diseases in Caribbean coral reefs
2001- present- Epizootiology of coral reef diseases in the Caribbean and Indo-Pacific
2000- present- Remote sensing techniques to characterize coral spawn and fluorescence spectra of coral species.
1999- present- Diseases of corals and other reef organisms in the Caribbean
1999- present- Reproductive biology and ecology of Caribbean corals
1999- present- Latitudinal variation in incidence of coral diseases in the Caribbean
1996- present- Impact of the endolithic sponges *Cliona* spp on Caribbean Coral Reefs
1996- present- Distribution, abundance and diversity of coral juveniles in Puerto Rican coral reefs.
1994-96- Reproductive ecology and hybridization of the different species of *Montastraea* in Florida
1994-96 - Effects of Hurricane Andrew on the coral reefs of Biscayne National Park, Florida.
1989-90 - Molecular and morphological taxonomy of *Porites* in the Caribbean and the eastern Pacific.
1986-88- Multivariate taxonomy of the *Montastraea annularis* species complex in Panama
1985- present Systematics and evolution of scleractinian corals in the Caribbean and eastern Pacific.
1985-90 Coral Reef community structure and biodiversity of the Caribbean reefs of Panama.
1986-90 Oil spill effects on subtidal reef communities in the Caribbean coast of Panama.
1986- present- Coral mortality and substrate monopolization by the sponge complex *Cliona aprica*.
1980-85- Ecology, Culture and Stock Restoration of the queen conch, *Strombus gigas* L. in the Archipiélago de los Roques National Park, Venezuela.
1981-85- Ecology, Culture, fisheries and stock restoration of sea turtles in the Archipiélago de Los Roques National Park. Venezuela.
1983-presnt- Ecology, biodiversity and taxonomy of the coral reefs of Venezuela.
1979-85- Larval and juvenile rearing under laboratory conditions of commercially important Decapods and Gastropods in the Archipielago de los Roques National Park.Venezuela.
1979-85- Seagrass and rocky shore community ecology. Archipielago de los Roques National Park,

Venezuela.

1979-85- Biology and fisheries of commercially important fishes and mollusks in the Archipiélago de los Roques National Park. Venezuela.

1979-81- Ecology and Conservation of the Isla Aves Ecosystem with emphasis on the tagging of the green turtle (*Chelonia mydas*) and birds, both resident and migratory. FUDENA-WWF

1978-80- Effects of the black sea urchin *Diadema antillarum* on the community structure of reefs in the Morrocoy National Park, Venezuela.

Wilford Schmidt, PhD

<wilford.schmidt@upr.edu>

Personal Data

Nationality	**United States of America**
Languages	English, Mathematics
COVID-19	Fully vaccinated and boosted

Professional and Academic Positions

2021/22	**Selectee and Participant** – **RV Atlantis** and **HOV Alvin 6500 m SVE**
2021	**Chief Scientist –** RV Kruger B, PRT **Free vehicle deployments** (FVD)
2020 **COVID**	**Lead Scientist** – **NOAA Okeanos Explorer** EX Puerto Rico, (FVD)
2019	**Science Editor –** Waves and Beaches, 3rd ed., Patagonia Books
2018	**Lead Scientist – NOAA Nancy Foster**, Anegada Passage (FVD)
2015-present	**Director** – UPRM Center for Ocean Exploration, Research, and Education
2015	**Lead Scientist** – **NOAA Okeanos Explorer** EX1502 Leg 2, (FVD)
2013-present	**Graduate Professor**, UPRM Department of Marine Sciences
2013	Doctor on Call – OET **RV Nautilus** Cruises NA-35,37, and 39
2013-present	**Appointed** to **United Nations World Ocean Assessment** Pool of Experts, Wider Caribbean Region, **United States Representative**
2011	**Awarded tenure** and recommended for full professorship, promotion held until 2013 due to PR economic crisis.
2006-present	**Chief Scientist –** numerous UPRM small RV cruises in PR waters
2006-2013	**Associate Professor**, UPRM Department of Marine Sciences (DMS)
2006-2008	**Support Scientist** – DMS Coastal Hazard Center (**NOAA** tsunami modeling)
2005-2006	**Research Assist. Professor** - University of Florida, Coastal Engineering
2004-2005	**ASEE Research Fellow** – **ONR Naval Research Laboratory - Stennis**, Littoral Processes Group
2003-2004	**Post-Doctoral Research Associate - SIO Center for Coastal Studies**

Education

2003	**Ph.D.**	Oceanography, **Scripps Institution of Oceanography**, UCSD
2001	M.Sc.	Oceanography, Scripps Institution of Oceanography, UCSD
1996	B.Sc.	Environmental Science, Texas A&M University, Corpus Christi, ***Summa cum laude*, Minors – Geology, Chemistry, and Mathematics**

Research Interests

Oceanographic instrument design/development. Hadal research and instrumentation. Near-shore and coastal processes. Bathymetric influences on gravity-wave driven currents. Tsunami and hurricane coastal inundation. Internal wave and mesoscale eddy effects on mesophotic corals.

Courses

Marine Sciences (graduate = G, senior undergraduate = U)

- Physical Oceanography (G)
- Physical Oceanography Laboratory (G)
- Coastal Physical Oceanography (G)
- Physical Oceanographic Data Analysis (G)
- Special Topics – Hadal Free Vehicle Biota Trap Design (G)
  - Hadal Free Vehicle Payload Design (G)
  - Deep and Shallow Currents in Puerto Rico Coastal Waters (G)
  - Coastal Inundation Data Analysis Techniques (G)
  - Tsunami Inundation Modeling with Matlab (G)
- Introduction to Oceanography (U)
- Introduction to Oceanography Laboratory(U)
- Introduction to Climate Change (U)
- Oceanographic Mathematics with Applications (U)

Wilford Schmidt, PhD
<wilford.schmidt@upr.edu>

Courses (cont.)
Mechanical Engineering
Special Topics - Design of Oceanographic Instrumentation (U)

Professional Affiliations
American Geophysical Union
American Meteorological Society
Geological Society of America
Marine Technology Society
Association for the Sciences of Limnology and Oceanography

Professional Service
United States Representative – **UN World Ocean Assessment** Pool of Experts (Caribbean)
Proposal Reviewer – **NOAA Office of Ocean Exploration and Research**
Reviewer - Journal of Atmospheric and Oceanographic Technology
Reviewer - Journal of Geophysical Research - Oceans
Reviewer - Caribbean Journal of Science
Reviewer – Limnology and Oceanography: Methods
Chair - UPRM DMS Marine Operations Committee
- UPRM DMS Curriculum Committee
- UPRM DMS Evaluation Committee
Member - UPRM DMS Personnel Committee
- UPRM DMS Graduate Policy Committee
- UPRM DMS Applied Ocean Science Committee

Graduate/Undergraduate Advisees and Lab members
Haibo Xu, DMS, Ph.D., Graduate committee Chair and advisor
Zamara Fuentes, DMS Ph.D., Graduate committee Chair and advisor
Rolf Veiten DMS Ph.D. Graduate committee member
Oscar Ramos, M.Sc., Graduate committee Chair and advisor
Myrna Santiago, DMS M.Sc., Graduate committee member
Danilo Rojas, EE Ph.D. M.Sc., Graduate committee member
Jesus Torrado, EE M.Sc., Graduate committee member
Margarita Blandon Salazar, EE M.Sc., Lab member
Roberto Hernández Martinez, EE BSc., Lab member
Grabiel Cantres Rosario, EE BSc., Lab member
Carlos N. Abreu Takemura, EE BSc., Lab member
Luis Escobar Reyes, EE B.Sc., Lab member
Fabian Zapata, EE B.Sc., Lab member
Armando Vega, Ortiz, EE B.Sc., Lab member
Leonardo Ortiz, EE B.Sc., Lab member
Juan Santos, GEO MSc., Lab member

Publications
Fuentes Z, M Tuttle, and **W Schmidt**, **in revision**. Ecological changes and overwash events at three coastal ponds on St. Thomas, U.S. Virgin Islands. *Geosphere.*

Schmidt W, D Rojas, H Xu, R Veiten, Z Fuentes, and M Jimenez, **in revision**. An untethered free vehicle for oceanographic research. *IEEE Journal of Oceanic Engineering.*

Cheriton O, C Storlazzi, K Rosenberger, C Sherman, and **W Schmidt**, **2021.** Rapid observations of ocean dynamics and stratification along a steep island coast during Hurricane María. *Science Advances,* doi: 10.1126/sciadv.abf1552

Jimenez M, **W Schmidt**, and D Rojas, **2020.** A Fault-tolerant Free-vehicle Architecture for Hadal Zone Exploration. IEEE Global OCEANS 2020: Singapore - U.S. Gulf Coast. DOI: 10.1109/IEEECONF38699.2020.9389345

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Publications (cont.)

Schmidt W, Rojas D, Smith R, and Jimenez M, **2019.** Comparison of Free Vehicle and Conventional CTD. In: Raineault, N.A, and J. Flanders, eds. 2019. New frontiers in ocean exploration: The E/V Nautilus, **NOAA Ship Okeanos Explorer, NOAA Ship Nancy Foster** and R/V Falkor 2018 field season. *Oceanography 32(1)*.

Appeldoorn R, N Schizas, **W Schmidt**, C Sherman, and E Weil, **2019.** How MCEs vary geographically (Atlantic Ocean, Puerto Rico). In: B Riegel, K Puglise, and R Dodge (Editors), Mesophotic Coral Ecosystems (Coral Reefs of the World) 1st ed. Springer International Publishing AG.

Fuentes Z, M Tuttle, and **W Schmidt**, **2017.** Sand scripts of past tsunamis on the coast of St. Thomas, USVI. *Seismic Research Letters*.

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Recent Presentations (presenter underlined)

Schmidt W, M Jimenez, and D Rojas **2022.** 15 years of untethered free vehicle research in the Puerto Rico Trench and NE Caribbean. OSM 2022 Ocean Sciences Meeting. Honolulu, HI, March 2, 2022.

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Recent Presentations (cont.)

Schmidt W, M Jimenez, and D Rojas **2022. Keynote address.** Soundings, free vehicles, and Alvin: The past, present and future of Puerto Rico Trench research. 5th Marine Science AeCiMa Symposium, Mayaguez, PR, February 26, 2022

Schmidt W, M Jimenez, and D Rojas **2021. Webinar "**Deep Science in the Puerto Rico Trench". OTR International School, Luxembourg. March 13, 2021.

Schmidt W, M Jimenez, and D Rojas **2020. Webinar** "Puerto Rico Trench exploration with free vehicles". Planeta Oceano, La Serie, Sociedad Ambiental Marino. August 23, 2020.

Schmidt W, M Jimenez, D Rojas and R Smith **2019**. Free Vehicles. An oceanographic analog to weather balloons? 2019 American Society of Limnology and Oceanography Ocean Sciences Meeting. San Juan, PR.

Schmidt W and M Jimenez **2019**. Build it and they will come: Introducing engineering students to oceanography. Part 2, 2019 American Society of Limnology and Oceanography Ocean Sciences Meeting. San Juan, PR.

Rojas D, M Jimenez and **W Schmidt 2018.** A Modular Approach to the Development of Fault Tolerant Free-Vehicle. Latin American and Caribbean Consortium of Engineering Institutions (LACCEI) 16th International Multi-Conference for Engineering, Education, and Technology. Lima, Peru. July 2018.

Schmidt W, D Rojas, J Torrado, H Xu, and M Jimenez **2017**. Free vehicles: An oceanographic analog to weather balloons? **Invited Speaker,** John D. Weaver Seminar Series. Mayaguez, PR, Nov. 2017

Torrado J, M Jimenez, and **W Schmidt 2016**. A Navigation System for Free Descent-Ascent Autonomous Underwater Vehicles. HENAAC Conference - Great Minds in STEM. Anaheim CA, 9 Oct. 2016.

Rojas, D, M Jimenez, and **W Schmidt 2014**. Physical Design For Free a Decent-Ascent Deep Sea Vehicle. Conferencia del Caribe Innovación y Tecnología Bioprocess Development & Training Complex, Mayaguez, PR, USA. 10 Oct. 2014.

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Fuentes Z, M Tuttle, and **W Schmidt**, **2013**. St. Thomas, USVI Overwash Deposits From the Last 3,000 Years. 2013 Geological Society of America Southeastern Section Meeting, San Juan, PR.

Schmidt W, 2013. Observation and Parameterization of Rip Current Velocity Maxima and Extent. 8th International Multi-purpose Reef and Surfing Science Symposium, Rincón, PR.

Schmidt W, 2011. Evidence of internal waves and mesoscale eddies from mesophotic ADCP and temperature measurements, La Parguera, Puerto Rico. 2011 American Society of Limnology and Oceanography Ocean Sciences Meeting. San Juan, PR.

Jimenez M and **W Schmidt, 2011.** Interfacing Analog Sensors to Low-power MCUs for Cost Effective Oceanographic Instrumentation. Engibous Summit, Dallas, TX

Schmidt, W and E Siegel, **2011.** Voyage to the bottom of the Puerto Rico Trench: Tales from a free fall current meter. IEEE/OES 10th International Current, waves and turbulence measurement workshop. Monterrey, CA.

Colon, B, E Suarez, A Gomez, A Castilla, **W Schmidt,** P Quintero, and M Smith., **2011.** An "Open Source" autonomous archival instrument for aquatic sampling. 2011 American Society of Limnology and Oceanography Ocean Sciences Meeting. San Juan, PR.

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Recent Presentations (cont.)

Schmidt W, M Smith, F Rodriguez, and P Quintero, **2011**. Build it and they will come: Introducing engineering students to oceanography. 2011 American Society of Limnology and Oceanography Ocean Sciences Meeting. San Juan, PR.

Schmidt W and E Siegel, **2010**. On-bottom and free-fall ADCM measurements in the Puerto Rico Trench, 19.75° N, 66.40° W. Trench Connection, Tokyo, Japan.

Schmidt W, **2010**. Mesophotic ADCP and temperature measurements from the El Hoyo transect, La Parguera, Puerto Rico. American Geophysical Union Ocean Sciences Meeting. Portland, OR.

Eloe E, **W Schmidt**, and D Bartlett, **2009**. Isolation of a novel Puerto Rico Trench psychropiezophile.. Second Symposium: Frontiers in Environmental Microbiology: A Caribbean Perspective. Univ. of Turabo, Puerto Rico.

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Holland T, N Plant, J Calantoni, **W Schmidt**, T. Kooney, and A. Reed, **2006.** A field study of coastal dynamics on a muddy coast offshore of **Cassino Beach, Brazil**. 2006 American Geophysical Union Fall Meeting, San Francisco, CA.

Spydell M, F Feddersen, R Guza, and **W Schmidt**, **2006**. Drifter-based estimates of surfzone dispersion. 2006 American Geophysical Union Fall Meeting, San Francisco, CA.

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Schmidt W, R Guza, and D Slinn, **2004**. Observations of large, bathymetrically-controlled eddies in the surfzone. 2004 American Geophysical Union Fall Meeting, San Francisco, CA.

Schmidt W, D Slinn, and R Guza, **2002**. Surfzone currents over irregular bathymetry: Drifter observations and model results. 2002 American Geophysical Union Fall Meeting, San Francisco, CA. **Best Student Paper Award**

Schmidt W and R Guza, **2001**. Observations of surfzone currents with drifters. 2001 American Geophysical Union Fall Meeting, San Francisco, CA.

Schmidt W, B Woodward, K Millikan, R Guza, B Raubenheimer, and S Elgar, **2000**. A GPS-tracked surfzone drifter. 2000 American Geophysical Union Fall Meeting, San Francisco, CA.

Schmidt W, **1996**. Beach profiles along a seawall, North Padre Island, Corpus Christi, Texas. Texas Academy of Sciences 99th Annual Meeting, Galveston, TX.

Funding History (funded)

2017-2018, Co-PI, The impact of Hurricane Maria on the mesophotic reefs of southwest Puerto Rico, **NSF RAPID**, $200,000

2014-2021, PI, Exploration of the Muertos Trough and Puerto Rico Trench via untethered free vehicles, **NOAA OER**, $349,000

2011-2012, Co-PI, An Ultra-Deep Sea Water Buoy for Ocean Trench Studies, **IAP** $2,500

2011-2012, Co-PI, Surf Zone Drifters Sensing System for the Study of Ocean Currents, **IAP** $2,500

2010-2012, PI, Supplemental funding award, Collaborative Research: Pressure Effects on Microbial Life in the Puerto Rico Trench, **NSF** $20,750.

Funding History (cont.)

2009-2011, Co-PI, IDBR: An Auto-sampler for Aquatic Microbial Sampling and Archiving, **NSF**, $223,042.

2009-2011, PI, Collaborative Research: Pressure Effects on Microbial Life in the Puerto Rico Trench, **NSF** $107,831.

2006-2011, Co-PI, CRES 2006: Ecology, Integrity & Status of Deep Caribbean Coral Reefs, **NOAA CSCOR**, $1,499,999.

2006-2007, PI, A Partnership for Deep Sea Research, **UPRM** Research and Development Center Seed Money Program, $4,900.

Other Recently Submitted Proposals/Pre-Proposals (unfunded)

2020-2022, PI, Untethered free-vehicle sampling of abyssal/hadal invertebrate and sediment plastic in the Muertos Trough and Puerto Rico Trench. **NOAA OER**, $601,078.

2017-2019, PI, Development of a free-vehicle to profile the PRT water column biotic community via eDNA. **NOAA OER**, $601,642.

2017-2023, Senior Scientist, LTER: La Parguera Mesophotic Coral Ecosystem (PME). **NSF**, $1,100,000.

2014-2016, PI, Exploration of the Puerto Rico Trench via un-tethered free vehicles. **NOAA OER**, $444,000

2011-2015, Co-PI, The impacts of episodic rainfall events on coral reefs as determined with remote sensing, hydrological and coastal modeling and water quality monitoring, **NASA**, 1,715,411.

2010-2012, PI, Multi-disciplinary Exploration of the Muertos Trough and Puerto Rico Trench via Untethered Free-Descent/Ascent Vehicles, **NOAA OER**, $499,802

2010-2015, Co-PI, Hyperspectral, Radar, and EO/IR Signatures in the Littorals, **ONR**, $7,500,000 ($500,000 to UPRM).

2010-2012, PI, Hydrokinetic Energy Generation Using Vortex induced Vibrations. SRNL Sub- Contract, Environmental Measurements in Coastal Waters Over Prototype VIVACE. **DOE**, $493,612

2010-2012, PI, Lagrangian and Eulerian measurements of surfzone and nearshore currents in an Acropora palmata environment; Tres Palmas Marine Reserve, Rincón, Puerto Rico, PR **Sea Grant**, $218,039.

2009-2011, Co-PI, DURIP - An Autonomous Underwater Vehicle for Physical and Biological Oceanographic Research and Education, **ONR**, $198,831.

CERTIFICACIÓN NÚMERO 20-52

La que suscribe, Secretaria del Senado Académico del Recinto Universitario de Mayagüez de la Universidad de Puerto Rico, **CERTIFICA** que, en la reunión extraordinaria celebrada en la sesión del viernes, 19 de junio de 2020, este organismo **APROBÓ** la **PROPUESTA PARA UNA REVISIÓN CURRICULAR EN CIENCIAS MARINAS.**

La propuesta consiste en tres partes las cuales son modificar el Programa de Maestría en Ciencias en Ciencias Marinas (Plan I) y la creación de Programas Plan II y Plan III de Maestría. Los cambios más importantes se resumen a continuación:

a. **Modificar el Plan I de Maestría**. Se reduce el número total de créditos en el currículo. Se reduce el número de créditos en materias electivas de 12 a 9. Detalles de los cambios y sus ventajas se presentan en la sección 7 de la propuesta.

b. **Creación de un programa Plan II de Maestría con proyecto**. El Plan II es un programa de 32 créditos, que se diferencia fundamentalmente del Plan I en que se sustituye la realización de una tesis (CIMA6999) por un proyecto (CIMA 6900). Detalles del nuevo plan y sus ventajas se presentan en la sección 8 de la propuesta. Se propone que el estudiante que culmine la Maestría con el Plan II, se le confiera el grado de Maestría Profesional en Ciencias Marinas, el cual no es conducente a las especialidades que ofrece el Plan I.

c. **Creación de un programa Plan III de Maestría con cursos**. El Plan III consiste en un programa de 36 créditos, que se diferencia de los otros dos planes en que solamente se contemplan cursos para su finalización. Al igual que el Plan II, el Plan III sería conducente a una Maestría Profesional en

Ciencias Marinas, el cual no es conducente a las especialidades que ofrece el Plan I. Detalles de este Plan y sus ventajas, se presentan en la sección 9 de la propuesta.

Se espera que mediante la implementación de la propuesta se logre: (i) aumentar el alcance del perfil de los graduados; (ii) diversificar el grupo de interesados al programa; (iii) disminuir el tiempo de graduación.

La propuesta forma parte de la certificación.

Y para que así conste expido y remito la presente certificación a las autoridades universitarias correspondientes, bajo el Sello de la Universidad de Puerto Rico a los veintidós días del mes de junio del año dos mil veinte, en Mayagüez, Puerto Rico.

Jessica Pérez Crespo
Secretaria

BVM

Anejo

29 abril 2020

Miembros del Senado Académico
Recinto Universitario de Mayagüez

David Sotomayor Ramírez
Presidente, Comité Asuntos Curriculares

Propuesta para una revisión curricular en Ciencias Marinas

El Comité de Asuntos Curriculares recibió la propuesta de revisión curricular en el Departamento de Ciencias Marinas. La propuesta consiste en tres partes las cuales son modificar el Programa de Maestría en Ciencias en Ciencias Marinas (Plan I) y la creación de Programas Plan II y Plan III de Maestría. Los cambios más importantes se resumen a continuación.

a. **Modificar el Plan I de Maestría**. Se reduce el número total de créditos en el currículo. Se reduce el número de créditos en materias electivas de 12 a 9. Detalles de los cambios y sus ventajas se presentan en la sección 7 de la propuesta.
b. **Creación de un programa Plan II de Maestría con proyecto**. El Plan II es un programa de 32 créditos, que se diferencia fundamentalmente del Plan I en que se sustituye la realización de una tesis (CIMA6999) por un proyecto (CIMA 69XX). Detalles del nuevo plan y sus ventajas se presentan en la sección 8 de la propuesta. Se propone que el estudiante que culmine la Maestría con el Plan II, se le confiera el grado de Maestría Profesional en Ciencias Marinas, el cual no es conducente a las especialidades que ofrece el Plan I.
c. **Creación de un programa Plan III de Maestría con cursos**. El Plan III consiste en un programa de 36 créditos, que se diferencia de los otros dos planes en que solamente se contemplan cursos para su finalización. Al igual que el Plan II, el Plan III seria conducente a una Maestría Profesional en Ciencias Marinas, el cual no es conducente a las especialidades que ofrece el Plan I. Detalles de este Plan y sus ventajas, se presentan en la sección 9 de la propuesta.

La propuesta es el resultado de un proceso de avalúo institucional en donde participaron varios agentes, entre ellos: facultad del departamento, docentes jubilados, exalumnos, profesionales personal de la industria privada, miembros de organizaciones no gubernamentales y funcionarios de agencias de gobierno regional y federal, Se espera que mediante la implementación de la propuesta se logre: (i) aumentar el alcance del perfil de los graduados; (ii) diversificar el grupo de interesados al programa; (iii) disminuir del tiempo de graduación.

El Comité entiende que la propuesta cumple en contenido y formato con las certificaciones aplicables para la revisión curricular de programas en el Recinto Universitario de Mayagüez. También se entiende que el programa será de gran provecho para futuros estudiantes de Maestría que deseen optar por uno de los tres planes de estudio además que le dará mayor visibilidad e impactará las comunidades científicas de Puerto Rico y el Caribe. El Comité de Asuntos Curriculares recomienda con gran entusiasmo al Senado Academico la aprobación de la propuesta.

Anejo

Propuesta para una revisión curricular en Ciencias Marinas

Propuesta para la modificación del Programa de Maestría en Ciencias en Ciencias Marinas (Plan I) y creación de Programas Plan II y Plan III

Comité Graduado

Departamento de Ciencias Marinas, UPRM

29 abril 2020

1) Introducción:

El Departamento de Ciencias Marinas (CIMA) es un departamento graduado en la Facultad de Artes y Ciencias de la Universidad de Puerto Rico, Recinto Universitario de Mayagüez. El Departamento tiene programas conducentes a los grados en Maestría en Ciencias en Ciencias Marinas y Doctorado en Filosofía en Ciencias Marinas, los cuales tiene un enfoque interdisciplinario que se basa en el desarrollo de cuatro áreas principales: Oceanografía Biológica, Física, Geológica y Química. Desde el 1968 ha continuado expandiendo sus actividades académicas y de investigación y actualmente cuenta con 11 docentes, 18 no docentes y ofrece 27 cursos. Se espera que los estudiantes graduados obtengan conocimiento en la colección y análisis de datos y un entendimiento general en las ciencias teóricas y aplicadas del ambiente marino mediante la aprobación de cursos requisitos en las cuatro ramas de las Ciencias Marinas y un curso de seminario. Los estudiantes también profundizan sus conocimientos mediante cursos adicionales e investigación en una de cuatro disciplinas (o áreas de énfasis) de Ciencias Marinas. La siguiente propuesta se enfoca en el programa de Maestría, el cual otorga a los estudiantes que culminen todos los requisitos satisfactoriamente, el grado de Maestría en Ciencias en Ciencias Marinas (Plan I) con 4 posibles especialidades: Oceanografía Biológica, Física, Geológica o Química.

2) Objetivos:

a. Reducir el número de horas/crédito del programa de Maestría en Ciencias (M.Sc.) en Ciencias Marinas (Plan I/Tesis) de 35 a 32.
b. Crear los programas de (i) Maestría con opción de proyecto (Plan II) y Maestría con opción de cursos (Plan III). Los estudiantes que concluyan la Maestría siguiendo uno de los dos planes propuestos se les conferirá el grado de Maestría Profesional (M.P.) en Ciencias Marinas.

3) Motivación:

En el marco de amplias discusiones entre la Facultad de CIMA y, muy especialmente, de varios seminarios que se dieron con variados actores involucrados (i.e. profesores jubilados, profesores activos de otras facultades, exalumnos, personal

de la industria privada, miembros de organizaciones no gubernamentales y funcionarios de agencias de gobierno regional y federal) durante el año 2018; se identificaron tres áreas principales en los cuales el programa podría mejorar:

a. **Disminuir del tiempo de graduación**. Según datos provistos por UPRM OIIP, actualmente el promedio de graduación es de 4.5 años.

b. **Aumentar el alcance del perfil de nuestros graduados**. En base a la opinión de la mayoría (>65%) de los participantes a los seminarios y discusiones focales, el perfil actual está diseñado para que los egresados sigan una carrera en la academia y ofrece muy pocas herramientas para aquellos graduados que quieran trabajar en organizaciones estatales (e.g. Departamento de Recursos Naturales de Puerto Rico), federales (e.g. *National Oceanic and Atmospheric Administration*), organizaciones no gubernamentales o la industria privada.

c. **Diversificar el grupo de interesados al programa**. Según análisis de los datos internos del departamento, en los últimos cinco años la mayoría (82 %) de los nuevos estudiantes del programa viene directamente de haber terminado el bachillerato. Además, en base a la opinión de algunos participantes (≈ 30%) a los seminarios y discusiones focales, la estructura del currículo vigente limita las opciones de estudio a aquellas personas trabajando a tiempo completo.

En este sentido, la motivación central de esta propuesta es la de atender las áreas de mejoramiento identificadas. Se proyecta que los cambios propuestos no solo ayudaran a mejorar el Departamento en los tres aspectos descritos anteriormente, sino que también impactarán positivamente varías métricas de desempeño de CIMA evaluadas por la presidencia de la Universidad de Puerto Rico, como por ejemplo: 1) reducir tiempo de graduación, 2) fomentar un perfil profesional en oceanografía eficiente y contemporáneo, 3) aumentar el número de matrículas, 4) Aumentar el número de instituciones colaboradoras y 5) aumentar el alcance del Departamento en diferentes sectores económicos.

4) Cambios Propuestos:

a. Reducción del número total de créditos totales para el Plan I. Se reduce el número de créditos en materias electivas de 12 a 9. Detalles de los cambios y sus ventajas se presentan en la sección 7.

b. Creación de un programa Plan II con proyecto. El Plan II es un programa de 32 créditos, que se diferencia fundamentalmente del Plan I en que se sustituye la realización de una tesis (CIMA6999) por un proyecto (CIMA 69XX). Detalles del nuevo plan y sus ventajas se presentan en la sección 8. Se propone que el estudiante que culmine la Maestría con el Plan II, se le confiera el grado de Maestría Profesional en Ciencias Marinas, el cual no es conducente a las especialidades que ofrece el Plan I.

c. Creación de un programa Plan III con cursos. El Plan III consiste en un programa de 36 créditos, que se diferencia de los otros dos planes en que solamente se contemplan cursos para su finalización. Al igual que el Plan II, el Plan III seria conducente a una Maestría Profesional en Ciencias Marinas, el

cual no es conducente a las especialidades que ofrece el Plan I. Detalles de este Plan y sus ventajas, se presentan en la sección 9.

5) Marco de referencia:

La presente propuesta, tomó como referencia y/o base de comparación:

a. Marco legal interno del RUM (Certificación SA 09-09)

b. Plan estratégico UPR 2017-2022, específicamente a lo que se refiere a las metas 1 (Enriquecer la oferta académica con programas académicos pertinentes, diferenciados y competitivos a través de diversas modalidades…) y 2 (Atraer una población estudiantil diversa y retenerla mediante una experiencia universitaria innovadora…) del Asunto Estratégico: Ambiente Educativo.

c. Los programas de Maestría en Ciencias Marinas de siete instituciones de educación superior de EE. UU. (Tabla 1). De la misma se desprende que la mayoría de las instituciones analizadas (6 de 7) tienen por lo menos dos tipos de planes y que el promedio de créditos necesarios para graduación es de 32 (la moda es de 30).

Tabla 1. Requisitos para Maestrías en Ciencias Marinas (o similares) en otras instituciones de educación superior.

	Planes de Estudios		
Universidad	**Tesis**	**Proyecto**	**Examen**
	Créditos		
University of Connecticut	Cursos = 21 Tesis = 9	N/A	Cursos = 30 Examen (NC)
University of Hawaii	Cursos = 30 Tesis (NC)	N/A	Cursos = 30 Examen (NC)
University of North Carolina	Cursos = 30 Tesis = 6	N/A	N/A
University of Miami	Cursos = 26 Tesis (NC)	Cursos = 24 Proyecto = 6 MPS[1]	N/A
University of South Florida	Cursos = 32 Tesis = 6	N/A	N/A
Florida Atlantic University	Cursos = 25-31 Tesis = 6 - 12 Total = 37	N/A	Cursos = 31 Tópicos especiales = 6 Total = 37
NOVA Southeastern University	Cursos = 22 Tesis = 8	Cursos = 22 “Capstone” = 8	N/A

NC = Requisito de graduación que no conlleva créditos

MPS = Master of Professional Science

6) Programa Vigente en Ciencias Marinas

Actualmente el programa otorga el título de *Magister Scientarum* (*M.Sc.*) con posibilidad de especializarse en cuatro disciplinas de la Oceanografía: Biológica, Física, Geológica y Química. El currículo vigente para la Maestría en CIMA consiste de 35 créditos distribuidos según la Tabla 2, y solo considera la posibilidad de hacer tesis. Además de esos créditos, son requisitos para graduación: a) Un examen oral general, b) una tesis escrita y su defensa oral exitosa, c) haber sometido un artículo (relacionado con la tesis) a una revista arbitrada y haber sido enviado a revisión y d) un año de residencia en CIMA. El departamento sugiere un plan de ejecución del currículo de tres años, distribuidos en la forma que se detalla en la Tabla 3.

Tabla 2. Currículo vigente de la Maestría (M.Sc.) en Ciencias Marinas.

Créditos	***Cursos***
12	Cursos medulares (CMOB 6618 oceanografía biológica, CMOB 6617 oceanografía física, CMOG 6616, oceanografía geológica y CMOQ 6615 oceanografía química). Aprobados con B o más.
2	CIMA 8785 – Seminario
6	CIMA 6999 – Tesis *M.Sc.*, incluyendo el envío de un artículo para publicación a una revista arbitrada.
3	Créditos requeridos por la opción elegida por el estudiante Biológica: CMOB 6635 métodos de investigación en ciencias marinas. Física: CMOF 6005 métodos para el análisis de datos oceanográficos. Geológica: CMOG 8675 oceanografía geológica avanzada Química: CMOQ 8638 laboratorio de oceanografía química
12	Cursos electivos disponibles en CIMA y otros departamentos (escogidos por el estudiante en consulta con su supervisor(a) y el comité graduado). Por lo menos seis créditos deben ser fuera del área de estudios, pero en áreas relacionadas.

NOTA: 21 de los 35 créditos deben tomarse en UPRM.

Tabla 3. Plan de estudios sugerido para completar el currículo vigente de la Maestría en Ciencias Marinas. También se muestran las fechas límites sugeridas para completar los diferentes requisitos de graduación.

PRIMER AÑO			
Primer semestre		***Segundo semestre***	
Curso	**Créditos**	**Curso**	**Créditos**
CMOG 6616	3	CMOB 6618	3
CMOQ 6615	3	CMOF 6617	3
Electiva	Variable	Electiva	Variable
Total	Mínimo 9	Total	Mínimo 9
SEGUNDO AÑO			
Tercer semestre		***Cuarto semestre***	
Curso	**Créditos**	**Curso**	**Créditos**
Electiva	Variable	Obligatoria por opción	3
Tesis	Variable	Electiva	Variable
Seminario	2	Tesis	Variable
Total	Mínimo 6	Total	Mínimo 7
TERCER AÑO			

Quinto semestre		*Sexto semestre*	
Curso	**Créditos**	**Curso**	**Créditos**
Tesis	Variable	Tesis	Variable
Total	Mínimo 2	Total	Mínimo 2

Hitos importantes y fechas límites	
Requisito	***Fecha límite sugerida***
Cursos medulares aprobados	Fin segundo semestre
Selección Supervisor	Final primer semestre
Comité Graduado	Final segundo semestre
Examen Oral General	Final quinto semestre
Propuesta Tesis	Final cuarto semestre
Defensa Tesis	Final sexto semestre

7) Revisión curricular al programa Maestría (M.Sc.) en Ciencias Marinas (Plan I con tesis).

La revisión curricular al Plan I es muy similar al currículo vigente ya que solo implica reducir el número total de créditos de 35 a 32 a través de la reducción del número de créditos de cursos electivos que los estudiantes deben cursar (se propone reducir de 12 a 9). La reducción de créditos obedece a dos razones: a) adelantar el inicio de la tesis (entrega propuesta) en un semestre y b) ajustarlo al promedio de los otros programas analizados (Tabla 1). El hecho que sean 3 créditos obedece a que eso significa la reducción de una sola materia electiva (el promedio de número de créditos por curso en CIMA es de 3), lo cual no tiene influencia en el perfil de nuestros graduados. Siendo esta propuesta muy similar al currículo vigente, las cuatros especialidades se mantienen: *Magister Scientarum* (M.Sc.) en Ciencias Marinas con especialización en Oceanografía Biológica, Oceanografía Física, Oceanografía Geológica u Oceanografía Química. Los créditos de esta revisión curricular se distribuirían como se detalla en la Tabla 4 y los requisitos de graduación serían los mismos que para el currículo vigente: a) Un examen oral general, b) una tesis escrita y su defensa oral exitosa, c) haber sometido un artículo (relacionado con la tesis) a una revista arbitrada y haber sido enviado a revisión y d) un año de residencia en CIMA. El plan sugerido de ejecución de esta reforma curricular se muestra de forma comparativa en la Tabla 5.

Tabla 4. Reforma del Currículo de la Maestría (*M.Sc*.) en Ciencias Marinas (Plan I con tesis). El cambio en número de créditos se señala en paréntesis.

Créditos	***Cursos***
12	Cursos medulares (CMOB 6618 oceanografía biológica, CMOB 6617 oceanografía física, CMOG 6616, oceanografía geológica y CMOQ 6615 oceanografía química). Aprobados con B o más.
2	CIMA 8785 – Seminario
6	CIMA 6999 – Tesis M.sc., incluyendo el envío de un artículo para publicación a una revista arbitrada.
3	Créditos requeridos por la opción elegida por el estudiante Biológica: CMOB 6635 métodos de investigación en Ciencias Marinas.

Créditos	***Cursos***
	Física: CMOF 6005 métodos para el análisis de datos oceanográficos. Geológica: oceanografía Geológica Avanzada CMOG 8675 Química: laboratorio de Oceanografía Química CMOQ 8638
9 **(-3)**	Cursos electivos disponibles en CIMA y otros departamentos (escogidos por el estudiante en consulta con su supervisor(a) y el comité graduado). Por lo menos seis créditos deben ser fuera del área de estudios, pero en áreas relacionadas.

Tabla 5. Comparación entre los planes de estudios sugeridos del **currículo vigente** y el **propuesto** de la Maestría en Ciencias Marinas (Plan I con tesis). También se muestran las fechas límites sugeridas para completar los diferentes requisitos de graduación. Las diferencias se indican en azul. Var = crédito variable

*PROGRAMA DE ESTUDIOS **VIGENTE***			*PROGRAMA DE ESTUDIOS **PROPUESTO***		
1er. año 1er Semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
CMOG 6616	Oc. Geológica	3	CMOG 6616	Oc. Geológica	3
CMOQ 6615	Oc. Química	3	CMOQ 6615	Oc. Química	3
Electiva	Electiva	Var	Electiva	Electiva	Var
TOTAL	Mínimo	9	TOTAL	Mínimo	9
1er año 2do semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
CMOB 6618	Oc. Biológica	3	CMOB 6618	Oc. Biológica	3
CMOF 6617	Oc. Física	3	CMOF 6617	Oc. Física	3
Electiva	Electiva	Var	Obligatoria	CMOB6635, CMOF6005, CMOG8675 or CMOQ 8638	3
TOTAL	Mínimo	9	TOTAL	Mínimo	9
2do. año 3er semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
Electiva	Electiva	Var	Electiva	Electiva	Var
CIMA 6999	Tesis	Var	CIMA 6999	Tesis	Var
CIMA 8785	Seminario	2	CIMA 8785	Seminario	2
TOTAL	Mínimo	6	TOTAL	Mínimo	8
2do. año 4to semestre					
Obligatoria	CMOB6635, CMOF6005, CMOG8675 or CMOQ 8638	3	CIMA 6999	Tesis	Var
Electiva	Electiva	Var	Electiva	Electiva (de ser necesario)	Var
CIMA 6999	Tesis	Var	--	--	
TOTAL	Mínimo	7	TOTAL	Mínimo	2
3er año 5to semestre					
CIMA 6999	Tesis	Var	CIMA 6999	Tesis	Var
TOTAL	Mínimo	2	TOTAL	Mínimo	2
3er año 6to semestre					
CIMA 6999	Tesis	Var	CIMA 6999	Tesis	Var
TOTAL	Mínimo	2	TOTAL	Mínimo	2
TOTAL PROGRAMA VIGENTE		**35**	**TOTAL PROGRAMA PROPUESTO**		**32**

Hitos y Fechas Límites		
Requisito	**Vigente**	**Propuesto**
Cursos medulares aprobados	Final segundo semestre	Final segundo semestre.

Hitos y Fechas Límites		
Selección Supervisor	Final primer semestre	Final primer semestre.
Comité Graduado	Final segundo semestre	Final segundo semestre
Examen Oral General	Final quinto semestre	Final cuarto semestre
Propuesta Tesis	Final cuarto semestre	Final tercer semestre
Defensa Tesis y Graduación	Final sexto semestre	Final sexto semestre

Ventajas:

Con esta reducción de créditos, le es posible al estudiante adelantar un semestre la defensa del examen oral y la presentación de la propuesta de tesis, lo que a su vez le otorga más tiempo para ejecutar y finalizar la tesis de maestría. Este plan cubre la formación de aquellos estudiantes que quieran continuar con una carrera de investigación y/o docencia universitaria. Como se viene haciendo hasta ahora, las tesis estarían muy ligadas a los proyectos de investigación de la facultad de CIMA.

8) Creación del Programa: Maestría Profesional (M.P.) en Ciencias Marinas (Plan II con proyecto).

La creación de este nuevo plan como alternativa de culminación de la Maestría involucra principalmente cambiar el requisito de tesis por el de proyecto. Dado que un curso de proyectos no existe actualmente en CIMA, esta propuesta de revisión curricular viene acompañada de una propuesta de creación de curso nuevo: PROYECTO DE INVESTIGACIÓN GRADUADA EN CIENCIAS MARINAS (CIMA 69XX), discutido en Senado Académico (en espero de certificación). Para mantener el balance con el Plan I (descrito arriba), este plan también consistiría de 32 créditos distribuidos en la forma que se indica en la Tabla 6. En este caso se eliminan los 2 créditos asociados al seminario (CIMA 8785), ya que está relacionado al desarrollo de una tesis; y también se eliminan los 3 créditos obligatorios por especialidad ya que no se ofertan las mismas. Esta diferencia de 5 créditos se compensa elevando el número de créditos en cursos electivos a 14 (Tabla 6). Además de los créditos por cursos, serán requisitos para graduación:

a. Un examen oral general, el cual tendrá la misma estructura del examen que presentan los estudiantes del Plan I. Es decir, un examen sobre conocimientos generales en Ciencias Marinas y el área de especialización del proyecto que el estudiante haya decidido realizar.
b. Entrega de una propuesta de proyecto el semestre anterior a la inscripción de este. Esta propuesta tendrá diferentes alcances y estructura a la propuesta de tesis y sus detalles se establecerán en el manual del estudiante de CIMA, siguiendo las certificaciones vigentes de estudiados graduados.
c. Un reporte técnico sobre el proyecto y defensa oral exitosa.
d. Un año de residencia en CIMA.

Los estudiantes que decidan realizar un proyecto, podrán ejecutarlo tanto dentro como fuera de CIMA, sin embargo, se incentivará que el proyecto sea realizado fuera de CIMA, en organizaciones tales como agencias gubernamentales, federales, ONGs,

empresa privada, etc. La idea es que los estudiantes que opten por esta vía, empiecen a integrarse a potenciales fuentes de trabajo y que trabajen en problemas concretos que estén fuera del ambiento estrictamente académico. Con este cambio se busca ampliar el perfil de los egresados de CIMA y ofrecerles herramientas para un mejor desenvolvimiento en trabajos fuera de la academia. En paralelo a los cambios sugeridos en esta propuesta, se está trabajando en una cartera de proyectos con nuestros socios naturales en organizaciones tales como DRNA, NOAA, Laboratorio de Biología Pesquera, USGS diversas consultoras ambientales, otras universidades y ONGs, entre otras; para que, al momento de aprobarse esta reforma, los estudiantes siguiendo este plan, tengan alternativas de hacer sus proyectos fuera de CIMA.

Dada las características de flexibilidad en el tipo y forma de proyectos, los estudiantes que sigan esta opción culminarían una Maestría llamada: **Maestría Profesional en Ciencias Marinas (con proyecto)**, la cual no tendría las cuatro especialidades del Plan I (con tesis). El plan sugerido de ejecución de esta reforma curricular se muestra de forma comparativa en la Tabla 7. Dado que actualmente no existe un Plan II en CIMA, la comparación presentada se hace en relación al currículo vigente (Plan I).

Tabla 6. Propuesta del Currículo de la Maestría Profesional en Ciencias Marinas (Plan II con proyecto). El cambio, en relación al currículo vigente, en número de créditos se señala en paréntesis.

Créditos	***Cursos***
12	Cursos medulares: CMOB 6618 oceanografía biológica, CMOB 6617 oceanografía física, CMOG 6616, oceanografía geológica, CMOQ 6615 oceanografía química. Aprobados con B o más.
0 **(-2)**	CIMA 8785 – Seminario N/A
0 **(-6)**	CIMA 6999 – Tesis N/A
6 (+6)	CIMA 69XX – Proyecto: consiste en un estudio comprensivo de un problema en ciencias marinas (biología, física, geología y/o química) seleccionado de forma tal que integre los conocimientos adquiridos durante los cursos. El proyecto podrá realizarse en el departamento o fuera del mismo y será aprobado por el comité graduado como proyecto de grado. De realizarse fuera de CIMA, el comité graduado incluirá una persona (supervisor externo) de esa institución/agencia/organización. Al final del proyecto, deberá entregarse un informe técnico final, el cual revele los resultados principales, experiencia adquirida y aplicaciones de la misma. Este informe final deberá ser aprobado por el comité graduado.
0 **(-3)**	Créditos requeridos por la opción elegida por el estudiante Biológica: CMOB 6635 métodos de investigación en ciencias carinas. Física: CMOF 6005 métodos para el análisis de datos oceanográficos. Geológica: oceanografía geológica avanzada CMOG 8675 Química: laboratorio de oceanografía química CMOQ 8638
14 **(+2)**	Cursos electivos disponibles en CIMA y otros departamentos (escogidos por el estudiante en consulta con el comité graduado). Se deberán cursar por lo menos tres créditos por cada una de las especialidades del departamento (Biológica, Física, Geológica y Química). En particular: CMOB: Cualquiera, pero se recomienda métodos de investigación en ciencias marinas (CMOB 6635) CMOF: Cualquiera, pero se recomienda métodos para el análisis de datos oceanográficos (CMOF 6005)

Créditos	***Cursos***
	CMOG: Cualquiera, pero se recomienda oceanografía geológica avanzada (CMOG 8675) CMOQ: Cualquiera, pero se recomienda laboratorio de oceanografía química (CMOQ 8638). De esta forma se asegura que por lo menos seis créditos son fuera del área de estudios, pero en áreas relacionadas. Todos estos cursos aprobados con C o más.

Tabla 7. Comparación entre los planes de estudios sugeridos del **currículo vigente** y el **propuesto** de la Maestría Profesional en Ciencias Marinas (Plan II con proyecto). También se muestran las fechas límites sugeridas para completar los diferentes requisitos de graduación. Las diferencias se indican en azul. Var = crédito variable

*PROGRAMA DE ESTUDIOS **VIGENTE***			*PROGRAMA DE ESTUDIOS **PROPUESTO***		
1er. año 1er Semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
CMOG 6616	Oc. Geológica	3	CMOG 6616	Oc. Geológica	3
CMOQ 6615	Oc. Química	3	CMOQ 6615	Oc. Química	3
Electiva	Electiva	Var	CMOG ------	Electiva CMOG	Var
TOTAL	Mínimo	9	TOTAL	Mínimo	10
1er año 2do semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
CMOB 6618	Oc. Biológica	3	CMOB 6618	Oc. Biológica	3
CMOF 6617	Oc. Física	3	CMOF 6617	Oc. Física	3
Electiva	Electiva	Var	CMOB ------	Electiva CMOB	Var
TOTAL	Mínimo	9	TOTAL	Mínimo	10
2do. año 3er semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
Electiva	Electiva	Var	CMOF ------	Electiva CMOF	Var
CIMA 6999	Tesis	Var	CMOQ ------	Electiva CMOQ	Var
CIMA 8785	Seminario	2			
TOTAL	Mínimo	6	TOTAL	Mínimo	6
2do. año 4to semestre					
Obligatoria	CMOB6635, CMOF6005, CMOG8675 or CMOQ 8638	3	CIMA XXXX	Proyecto	3
Electiva	Electiva	Var			
CIMA 6999	Tesis	Var			
TOTAL	Mínimo	7	TOTAL	Mínimo	3
3er año 5to semestre					
CIMA 6999	Tesis	Var	CIMA XXXX	Proyecto	3
TOTAL	Mínimo	2	TOTAL	Mínimo	3
3er año 6to semestre					
CIMA 6999	Tesis	Var	----	----	
	Mínimo	2	----	----	
TOTAL PROGRAMA		35	TOTAL PROGRAMA		32

Hitos y fechas Limites		
Requisito	**Vigente**	**Propuesto**
Cursos medulares aprobados	Final segundo semestre	Final segundo semestre.
Selección Supervisor	Final primer semestre	Final tercer semestre (supervisor de proyecto)

Hitos y fechas Limites		
Comité Graduado	Final segundo semestre	Final segundo semestre
Examen Oral General	Final quinto semestre	Final tercer semestre
Propuesta Tesis	Final cuarto semestre	Final tercer semestre (propuesta proyecto)
Defensa Tesis y graduación	Final sexto semestre	Final quinto semestre

Ventajas:

Esta posibilidad de plan, le ofrece al estudiante lo oportunidad de enfrentarse a problemas concretos relacionados con el que hacer de las Ciencias Marinas en la región. Esto no solo va a contribuir directamente a ampliar el alcance del perfil de los graduados de CIMA, sino va a aumentar las probabilidades de insertarse rápidamente en el mercado laboral. Igualmente, se espera que esta opción atraiga a un sector de estudiantes que, si bien están interesados en hacer una Maestría, no quieren seguir un camino estrictamente académico. La introducción de un plan II (por proyecto), aunado a la reducción de créditos, permite que la Maestría Profesional en Ciencias Marinas (por proyecto) se pueda culminar en un tiempo de 2.5 años.

9) Creación del programa Maestría Profesional en Ciencias Marinas (Plan III sin tesis ni proyecto).

La creación de este nuevo plan como alternativa de culminación de la Maestría involucra principalmente remover los requisitos de tesis o proyecto. A diferencia de los planes anteriores, este plan consistiría de 36 créditos para compensar la ausencia de tesis o proyecto y se distribuirían en la forma que se indica en la Tabla 8. En relación al currículo vigente, se eliminan: a) los 2 créditos asociados al seminario (CIMA 8785), ya que está relacionado al desarrollo de una tesis; b) los 6 créditos correspondientes a Tesis (o Proyecto) y c) los 3 créditos obligatorios por especialidad, ya que no se ofertan las mismas. Todos estos créditos se suman a los cursos electivos los cuales pasan a tener un total de 24 créditos (Tabla 6). De estos 24 créditos, 4 tiene que ser en cada una de las disciplinas que actualmente ofrece CIMA. Además de los créditos por cursos, será requisito para graduación, un año de residencia en CIMA.

Dada las características de este plan, los estudiantes que sigan esta opción culminarían una Maestría llamada: **Maestría Profesional en Ciencias Marinas (sin tesis ni proyecto)**, la cual no tendría las cuatro especialidades del Plan I (con tesis). El plan sugerido de ejecución de esta reforma curricular se muestra de forma comparativa en la Tabla 9. Dado que actualmente no existe un Plan III en CIMA, la comparación presentada se hace en relación al currículo vigente.

Tabla 8. Propuesta del Currículo de la Maestría Profesional en Ciencias Marinas (Plan III sin tesis ni proyecto). El cambio, en relación al currículo vigente, en número de créditos se señala en paréntesis.

Créditos	***Cursos***
12	Cursos medulares: CMOB 6618 oceanografía biológica, CMOB 6617 oceanografía física, CMOG 6616, oceanografía geológica, CMOQ 6615 oceanografía química. Aprobados con B o más.
0 (-2)	CIMA 8785 – Seminario N/A
0 (-6)	CIMA 6999 – Tesis N/A
0 **(-3)**	Créditos requeridos por la opción elegida por el estudiante Biológica: CMOB 6635 métodos de investigación en ciencias marinas. Física: CMOF 6005 Métodos para el análisis de datos oceanográficos. Geológica: oceanografía geológica avanzada CMOG 8675 Química: laboratorio de oceanografía química CMOQ 8638
24 **(+12)**	Cursos electivos disponibles en CIMA y otros departamentos (escogidos por el estudiante en consulta con el comité graduado). Se deberán cursar por lo menos cuatro créditos por cada una de las especialidades del departamento (Biológica, Física, Geológica y Química). En particular: CMOB: Cualquiera, pero se recomienda métodos de investigación en ciencias marinas (CMOB 6635) CMOF: Cualquiera, pero se recomienda métodos para el análisis de datos oceanográficos (CMOF 6005) CMOG: Cualquiera, pero se recomienda oceanografía geológica avanzada (CMOG 8675) CMOQ: Cualquiera, pero se recomienda Laboratorio de oceanografía química (CMOQ 8638). Por lo menos seis créditos deberán tomarse fuera del área de estudios, pero en áreas relacionadas. Todos estos cursos aprobados con C o más.

Tabla 9. Comparación entre los planes de estudios sugeridos del **currículo vigente** y el **propuesto** de la Maestría Profesional en Ciencias Marinas (Plan III sin tesis ni proyecto). También se muestran las fechas límites sugeridas para completar los diferentes requisitos de graduación. Las diferencias se indican en azul. Var = crédito variable

*PROGRAMA DE ESTUDIOS **VIGENTE***			*PROGRAMA DE ESTUDIOS **PROPUESTO***		
1er. año 1er Semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
COMG 6616	Oc. Geológica	3	COMG 6616	Oc. Geológica	3
CMOQ 6615	Oc. Química	3	CMOQ 6615	Oc. Química	3
Electiva	Electiva	Var	CMOG ------	Electiva CMOG	Var
TOTAL	Mínimo	9	TOTAL	Mínimo	9
1er año 2do semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
CMOB 6618	Oc. Biológica	3	CMOB 6618	Oc. Biológica	3
CMOF 6617	Oc. Física	3	CMOF 6617	Oc. Física	3
Electiva	Electiva	Var	CMOB ------	Electiva CMOB	Var
TOTAL	Mínimo	9	TOTAL		9
2do. año 3er semestre					
Código	**Curso**	**Crs**	**Código**	**Curso**	**Crs**
Electiva	Electiva	Var	CMOQ ------	Electiva CMOQ	Var
CIMA 6999	Tesis	Var	CMOF -------	Electiva CMOF	Var

PROGRAMA DE ESTUDIOS ***VIGENTE***			*PROGRAMA DE ESTUDIOS* ***PROPUESTO***		
CIMA 8785	Seminario	2	Electiva	Electiva	Var
TOTAL	Mínimo	6	TOTAL	Mínimo	9
2do. año 4to semestre					
Obligatoria	CMOB6635, CMOF6005, CMOG8675 or CMOQ 8638	3	Electiva	Electiva	Var
Electiva	Electiva	Var	Electiva	Electiva	Var
CIMA 6999	Tesis	Var	Electiva	Electiva (de ser necesaria)	Var
TOTAL	Mínimo	7	TOTAL	Mínimo	9
3er año 5to semestre					
CIMA 6999	Tesis	Var	---	---	
TOTAL	Mínimo	2	---	---	
3er año 6to semestre					
CIMA 6999	Tesis	Var	---	---	
TOTAL	Mínimo	2			
TOTAL PROGRAMA		**35**	**TOTAL PROGRAMA**		**36**

Hitos importantes y fechas límites		
Requisito	***Vigente***	***Propuesto***
Cursos medulares aprobados	Final segundo semestre	Fin segundo semestre.
Selección Supervisor	Final primer semestre	N/A
Comité Graduado	Final segundo semestre	Final primer semestre
Examen Oral General	Final quinto semestre	Examen comprehensivo Final tercer semestre
Defensa Tesis/Proyecto	Final cuarto semestre	N/A
Graduación	Final sexto semestre	Final cuarto semestre

Ventajas:

Con este plan no solo se disminuye el tiempo posible de graduación en un año, sino que permitiría atraer un grupo potencial de nuevos estudiantes: aquellos profesionales que ya se encuentran trabajando en organizaciones relacionadas con las ciencias marinas. Además de los grupos tradicionales de aplicantes al programa de Maestría de CIMA, se espera que este plan sea atractivo a personas que actualmente se encuentren trabajando y que quieran continuar su formación profesional. Para tal fin, y de ser aprobada esta propuesta, CIMA considerara ofertar los cursos necesarios en horarios que le favorezcan a las personas que se encuentren trabajando (e.g. horarios vespertinos).

10) Plan de avalúo para los nuevos planes:

Para asegurar la calidad de sus ofrecimientos y estándares académicos, los nuevos planes de culminación del programa de Maestría del departamento de Ciencias Marinas, se someterán evaluaciones periódicas. El Director del Departamento de Ciencias Marinas, el Comité Graduado y la facultad adscrita al Programa implementarán un plan de las mejores prácticas para la medición y el mejoramiento continuo del Programa. El análisis se hará de acuerdo con las estrategias de avalúo

descritas en la Tabla 10, y aplicara a todos los planes propuestos (I, II y III).Para la evaluación del Programa se continuara recopilando la siguiente información:

a. Número de estudiantes de nuevo ingreso en el Programa (graduado, sub-graduado, secuencias curriculares) por año académico.
b. Número de estudiantes retenidos
c. Programas académicos de procedencia de los estudiantes de traslado.
d. Progreso académico de los estudiantes del Programa por año académico.
e. Número de estudiantes que completan el Programa por año académico y el tiempo que les toma para finalizarlo.
f. Publicaciones y proyectos de estudiantes y profesores afiliados al Programa
g. Propuestas de fondos externos generadas por profesores afiliados al Programa
h. Además de estos indicadores ya existentes, se propone añadir los siguientes:
i. Sector de procedencia del nuevo estudiante (e.g. estudiante sub-graduado vs profesional activo)
j. Satisfacción de los estudiantes en el Programa mediante un cuestionario de salida
k. Colocaciones de los estudiantes egresados del Programa
l. Tipo de plan seleccionado por el estudiante.

Tabla 10. Lista de Objetivos, Instrumentos y Parámetros de medición para los nuevos planes del programa de Maestría en Ciencias Marinas.

Objetivo operacional	*Instrumento*	*Parámetros de medición*	*Personal de implementación*	*Itinerario de avalúo*
Generar una demanda estable para el Programa	Registro de los estudiantes admitidos al Programa	Admitir al menos 10 estudiantes graduados a partir del tercer año de implementación de los nuevos planes	Director, Consejero académico, Comité graduado	Anual
Mantener una tasa alta de retención estudiantil	Proporción de estudiantes que completan el Programa en el tiempo establecido	Al menos el 67% de los estudiantes habrá completado el Programa en el tiempo establecido (3 años).	Director, Consejero académico, Comité graduado	Anual
Lograr un impacto positivo sobre egresados	Cuestionario de Satisfacción para estudiantes que completen el Programa	Al menos 75% de los egresados consideran que el Programa ha sido efectivo como instrumento de mejoramiento profesional en su disciplina y le recomendarían el	Consejero Académico, Comité de Avalúo	Anual

Objetivo operacional	*Instrumento*	*Parámetros de medición*	*Personal de implementación*	*Itinerario de avalúo*
		Programa a otro estudiante		
Obtener una colocación rápida pos-graduación	Cuestionario de Seguimiento de egresados	Al menos 75% de los egresados prosiguen estudios avanzados u obtienen trabajo en el sector público o privado	Consejero Académico, Comité de Avalúo	Anual
Atraer Profesionales Activos	Proporción de nuevos ingresos que sean profesionales activos	Al menos 40% de los nuevos ingresos provendrán del sector profesional.	Director, Consejero académico, Comité graduado, Comité de avalúo	Anual
Incrementar la colaboración con otros organismos públicos o privados	Proporción de estudiantes realizando proyectos o tesis en organizaciones diferentes a la UPRM	Al menos 30% de los estudiantes mantendrán proyectos con organizaciones diferentes a la UPRM al cumplirse 3 años de la implementación del programa y 50% después de 5 años de implementación		
Promover la investigación	Registro de publicaciones, proyectos	Al menos 50% de los estudiantes subgraduados y el 80% de los graduados participan en proyectos de investigación y diseminación en publicaciones y congresos	Consejero Académico, Coordinador del Programa	Bienal