

Reef Resilience Network Summary Report

2016-2020



Managers at resilience training

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Introduction

The Reef Resilience Network connects marine resource managers and practitioners with peers, content experts, tools, and operational knowledge to innovate and accelerate solutions for improved conservation and restoration of coral reefs and reef fisheries around the world. To achieve this, we:

- Synthesize and share the latest science and management strategies to keep busy managers inspired and in-the-know
- Connect managers and experts to share resources and lessons learned that inform and improve management decisions and inspire greater collaborations
- Provide training and seed funding to launch necessary education, monitoring, and threat abatement projects

This report summarizes the activities of the Network during a 4-year partnership (2016-2020) between The Nature Conservancy (TNC) and the NOAA Coral Reef Conservation Program.

Toolkit Review & Updates

To make sure busy resource managers have access to the latest coral reef and reef fishery science and management strategies—and are challenged and inspired by new ideas—the [Reef Resilience Online Toolkit](#) puts relevant, reliable information at their fingertips. Created and updated by global experts in coral reefs, fisheries, and climate change, the toolkit features:

- Synthesized information on science and management tools and techniques
- Easily searchable summaries of journal articles about reef resilience science
- Case studies highlighting successful management strategies

We added new toolkit content on:

- [Community-Based Climate Adaptation](#) – compiles the latest scientific guidance and tools to help managers to assess social and ecological vulnerability to climate change and other stressors. It focuses on simple and easy to use approaches to engage communities in assessing and responding to climate impacts. Key topics include climate change, vulnerability assessments, tools for assessing vulnerability, and case studies describing the implementation of vulnerability and adaptation tools, challenges, and actions taken.
- [Blue Carbon](#) – compiles the latest scientific guidance and tools to help managers, researchers, practitioners, and governments understand how blue carbon can be measured and utilized to promote conservation and restoration of coastal ecosystems.
- [Coral Reef Restoration](#) – featuring restoration guidance, best practices and tools to help ensure the maximum success of coral reef restoration efforts; also describes the steps involved with restoring coral populations through [Larval Propagation](#) methods utilizing the sexual reproduction process.
- [Communication](#) – provides guidance and tools to help managers achieve effective communication with a variety of stakeholders; includes a [Strategic Communication for Conservation](#) guidebook; and [Visual Design Best Practices for Conservation](#) featuring tips to strengthen managers' understanding of visual design as a tool for effective and impactful communication.
- [Resilience-Based Management](#) – includes the definition of this type of management strategy, how it differs from other forms of management, and actions managers can take that constitute its implementation.
- [Stony Coral Tissue Loss Disease](#) – includes resources developed by partner agencies to help managers accurately identify, report, and help mitigate the spread of the disease.

- [Rapid Response and Emergency Restoration](#) – produced from a new guidance document from TNC’s Mexico and Central America Program, summarizes a rapid response protocol to help local managers prepare for a hurricane or cyclone and then take action to mitigate damages and repair and restore coral reefs.
- [Sustainable Financing](#) – provides steps to develop and maintain a sustainable finance plan with examples of traditional and innovative funding solutions, to this section.
- [Aquaculture](#) –explains aquaculture concepts in the context of coastal environments and tropical reef ecosystems, with a special focus on finfish farming

The Reef Resilience Network compiles summaries of recent scientific publications that are relevant to resource managers working to address the impacts of global climate change and other stressors at local scales, and who are building resilience into daily management activities. Users can explore by scrolling through the list or using the search feature. Currently there are 170 [article summaries](#) in the database.

In December 2018 we launched a completely revamped Toolkit. We gave it an updated look and feel focusing on increasing functionality and organization, to highlight content that is the most relevant to managers.

The Toolkit continues to receive a high number of hits with an average of 155,000 unique visitors per month. We also distributed the toolkit content through local partners and TNC field offices and partners as requested.

Webinars

To connect resource managers and practitioners from around the world to each other and to leading experts in coral reefs, coral reef fisheries, reef restoration, and climate adaptation-related fields, the Reef Resilience Network hosts interactive [webinars](#) on hot topics in marine resource management. Twenty-nine webinars were held and posted on the Reef Resilience YouTube channel, where they have been viewed more than 22,000 times. See descriptions of webinars below:

Webinars 2016-2017:

[Fisheries Management for Non-Fisheries Managers](#)

Jeremy Rude, Fisheries Specialist with The Nature Conservancy, describes the fundamentals of fisheries management and its connection to marine conservation. This webinar provides an introduction to TNC’s recently released fisheries management guidebook and discusses how fisheries management can complement the work of marine conservationists. The presentation also explores case studies that highlight how fisheries management can advance the work of marine conservation.

[Building Reef Resilience with Green Fins](#)

Chloe Harvey describes Green Fins, a public-private partnership developed by UN Environment and The Reef-World Foundation that leads to sustainable marine tourism practices in the SCUBA diving and snorkeling sector. This webinar provides information on the Green Fins approach, shares successes, discusses lessons learned, and highlights newly released tools and resources.

[Coral Spawning Research & Larval Propagation](#)

The [Coral Restoration Consortium](#) is hosting a series of webinars and discussions focused on Caribbean coral restoration. The first webinar in the series highlights coral spawning research and larval propagation techniques being used in the Caribbean. The recording includes presentations from researchers, Kristen Marhaver, Valerie Chamberland and Nicole Fogarty, on the benefits, successes and challenges of coral spawning work followed by a Q&A and discussion session.

[Coral Genetics Research & Restoration](#)

The [Coral Restoration Consortium](#) is hosting a series of webinars and discussions focused on Caribbean coral restoration. For the second webinar in the series, Dr. Iliana Baums from Penn State University presents an overview of current genetics research, highlighting various methods of genetic analysis and providing guidance on when it is appropriate to use each method and how it can help support restoration work.

[New Techniques for Coral Restoration in the Caribbean](#)

Hear experts from the Global Coral Restoration Project provide an overview of coral restoration efforts around the world and discuss current obstacles and potential solutions. This seminar kicks off an in-person workshop designed to foster exchange between practitioners working in the fields of coral science, restoration, aquaculture and marine resource management. [Explore the seminar presentations](#) and learn about coral restoration from the experts!

[Western Indian Ocean Post-Bleaching Assessment Training](#)

Dr. David Obura and Mishal Gudka of CORDIO East Africa (supported through the Biodiversity Project of the Indian Ocean Commission) present a training on how to conduct a post-bleaching assessment in the Western Indian Ocean (WIO). This is part of a regional project in 6 WIO countries to assess the global impacts of the 2016 coral reef bleaching event. Contact mgudka@cordioea.net to learn more about the program.

[Restoration Workshop Live Stream](#)

This live stream of the Coral Reef Ecosystem Restoration Workshop at the U.S. Coral Reef Task Force meeting was broadcast as part of the [Coral Restoration Consortium](#) webinar series and features two panels highlighting research and restoration of sponge and coral communities and herbivore populations to promote the health and vitality of reef ecosystems. [Explore and watch](#) the workshop presentations.

[Climate Adaptation & Lessons Learned From Community Engagement in Belize](#)

Join Elizabeth McLeod, Climate Adaptation Scientist from The Nature Conservancy, to learn about the latest scientific guidance to help managers determine social and ecological vulnerabilities to climate change and other stressors. In addition, Dareece Chuc, Environmental Education and Communication Director from the Belize Audubon Society, shares successes, challenges and lessons learned implementing the LEAP (Local Early Action Planning and Management) Tool in Belize.

Webinars 2017-2018:

[Assisted Evolution: A Novel Tool to Overcome the Conservation Crisis?](#)

This 8-hour symposium was live streamed as part of the Coral Restoration Consortium webinar series in conjunction with The Geomar Helmholtz Centre for Ocean Research Kiel and “The Future Ocean” cluster.

[Building Restoration Programs to Withstand Hurricanes: Lessons Learned from Irma and Maria](#)

Experts from Florida and the Caribbean discussed impacts from hurricanes Irma and Maria, what worked and what didn't, and what they will do in the future to mitigate impacts both to coral nurseries and outplant sites. This [Coral Restoration Consortium](#) webinar featured six presentations followed by a panel Q&A session. Speakers include: Kemit-Amon Lewis, Shannon Gore, Sean Griffin, Kerry Maxwell, Jessica Levy, and Dalton Hesley.

[Insuring Nature: An Insurance Policy for the Mesoamerican Reef](#)

Fernando Secaira of The Nature Conservancy presented a pilot project underway in Mexico in partnership with Swiss Re and the Mexican state of Quintana Roo governments to insure coastal natural ecosystems that support tourism and offer an associated source of funding for ongoing reef protection and repair.

[Citizen Science to Improve Hawai'i's Water Quality](#)

This webinar featured the water quality monitoring program Hui O Ka Wai Ola (association of the living waters) which is comprised of community volunteers, scientists, supporters, and partner groups and regularly measures Maui's coastal waters for pollutants.

[Learning from Reef Restoration Experiences Around the World](#)

Broadcast live from the Great Barrier Reef Restoration Symposium in Cairns, Australia, experts from around the globe share lessons learned from years working on coral restoration. From offshore coral nurseries, to restoration mitigation techniques, to climate change adaptation, this presentation session seeks to foster knowledge sharing and exchange between managers and practitioners across the globe.

[Restoration in the Age of Disease](#)

As Florida faces an unprecedented disease outbreak involving more than half of its coral species, many restoration practitioners and environmental managers are wondering how best to responsibly continue restoration efforts for both affected and unaffected species in the face of disease. Scientists at Mote Marine Laboratory and Nova Southeastern University discuss their plans for adapting restoration to help answer disease-related questions and prepare for future restoration efforts. This Coral Restoration Consortium webinar featured three presentations followed by a panel Q&A session.

Webinars 2018-2019:

[Community Engagement in Restoration Implementation](#)

Broadcast live from the Reef Futures 2018 Symposium, presentations focused on harnessing communities to engage in restoration activities, and included:

- From California to Palau, youth activists of the Pacific study and talk coral for their generation, April and Charley Peebler (Heirs To Our Oceans)
- Coral restoration in marine protected areas, sustainability for who? A stakeholder analysis of factors of success from the perspective of recipients, Igo Gari (Bond University)
- Participatory and large-scale coral reef restoration: From gardening to managing rehabilitated areas, Mariana Gnecco (Corales de Paz)
- Application of coral gardening concept as a strategy for public participation in reef restoration activities, Nuphar Charuvi (Fundación Calipso)
- Scaling-up coral restoration in Saint Lucia and St. Vincent and the Grenadines: Strategies for community engagement, Owen Day (CLEAR Caribbean Ltd)
- Promoting community engagement to increase the spatial scale and species diversity of coral outplanting through corporate social responsibility (CSR) programs, Andy Bruckner (NOAA FKNMS)

Reef Restoration for Coastal Protection [Part 1](#) & [Part 2](#)

Broadcast live from the Reef Futures 2018 Symposium, presentations focused on building/restoring coral reefs to serve as wave breaks, as well as on modeling and monitoring the expected results, and included:

- Coral restoration for coastal resilience: Incorporating hydrodynamics into restoration planning and implementation, Shay Viehman (NOAA National Centers for Coastal Ocean Science)
- Enhancing and restoring coral reefs for coastal defense: A case example from Grenada, Boze Hancock (The Nature Conservancy)
- Reef management and restoration to improve coastal protection for risk reduction, Calina Zepeda (The Nature Conservancy)
- The role of demographic and wave numerical models as tools to address coral reef rehabilitation success under a climate of change and ecological mediocrity, Edwin Hernandez (Sociedad Ambiente Marino)
- Using wave-tank and field experiments to evaluate the influence of coral reefs on wave dynamics, Jane Carrick (University of Miami)
- Post-disturbance assessment to maximize long-term restoration success: Lessons learned from Puerto Rico in the aftermath of Irma and Maria, Sarah Groves (NOAA/NOS/NCCOS)
- The role of reefs as natural defense: Catalyzing large-scale restoration efforts, Michael Beck (The Nature Conservancy)

[Status and Trends of Coral Reefs of the Pacific](#)

Serge Planes from the French National Center of Scientific Research and France's Laboratory of Excellence (LabEx) CORAIL discusses key findings from the new report Status and Trends of Coral Reefs of the Pacific and what the results mean for improving the management of Pacific reefs. This webinar was co-sponsored by the International Coral Reef Initiative, the Reef Resilience Network and the EBM Tools Network (co-coordinated by OCTO and NatureServe).

[Marine Protected Area Financing Tool](#)

Reef Support is a new tool designed to help MPA managers collect and sell marine park fees to visitors. Developed by Ramón de León, former manager of the Bonaire National Marine Park, Reef Support is a simple, robust, and customized tool that offers not only a safe way to receive money, but also access to a growing database of park visitors, a unique ticketing system, and the possibility to generate customized financial reports. Learn how you can use this tool to achieve (and fund!) your conservation objectives.

[Stony Coral Tissue Loss Disease: Lessons Learned & Resources from Florida](#)

Florida's corals reefs have been experiencing devastating effects of a multi-year outbreak of Stony Coral Tissue Loss Disease (SCTLD). This disease has now been observed and reported in several other Caribbean locations. In response, experts from Florida have been compiling their knowledge, resources, and lessons learned to share with others. Hear from Dana Wusinich-Mendez (National Oceanic and Atmospheric Administration), Maurizio Martinelli (Florida Sea Grant), and Dr. Andrew Bruckner (Florida Keys National Marine Sanctuary) as they discuss our current knowledge of SCTLD, Florida's response to this disease outbreak, the status of SCTLD in the Caribbean, and current resources available on the disease.

[Finance Tools for Coral Reef Conservation: An Overview](#)

The Wildlife Conservation Society, in collaboration with the Conservation Finance Alliance and in support of the 50 Reefs initiative, recently released Finance Tools for Coral Reef Conservation: A Guide as a resource for protected area managers and others charged with managing and financing reef conservation. The report describes 13 types of finance tools which have either been proven successful at or have great potential to support reef conservation and sustainable management. Some of the finance tools covered in this overview webinar include tourism-based fees, biodiversity offsets, bonds, debt swaps, and conservation trust funds. This webinar shares key findings and recommendations from the report and invites discussion from participants. This webinar is sponsored by the International Coral Reef Initiative (ICRI), an informal partnership which strives to preserve coral reefs and related ecosystems around the world, as part of its collaboration with the Conservation Finance Alliance for promoting innovative financing for coral reef conservation.

Presented by: David Meyers of the Conservation Finance Alliance and Venkat Iyer of the Wildlife Conservation Society

Co-sponsored by: OCTO (OpenChannels, The Skimmer, MPA News), the EBM Tools Network (co-coordinated by OCTO and NatureServe), and the Reef Resilience Network

[Financing Coral Reef Conservation and Management with Tourism-Related Tools](#)

Coral reefs provide enormous economic value to humanity, and their value for recreation is one of the easiest to capture financially. This webinar explores the range of existing and emerging tools that protected areas and site managers can use to capture funds from tourism for conservation and management. Specifically the webinar discusses the use of: 1) entry, activity, and special use fees; 2) commercial concessions; 3) departure taxes; 4) partnerships with hotels; and 5) voluntary donations. This webinar is sponsored by the International Coral Reef Initiative (ICRI), an informal partnership which strives to preserve coral reefs and related ecosystems around the world, as part of its collaboration with the Conservation Finance Alliance for promoting innovative financing for coral reef conservation.

Presented by: David Meyers of the Conservation Finance Alliance

Co-sponsored by: OCTO (OpenChannels, The Skimmer, MPA News), the EBM Tools Network (co-coordinated by OCTO and NatureServe), and the Reef Resilience Network

[Photomosaics as a Tool for Monitoring Coral Restoration Success](#)

Measuring the long-term and large-scale changes to a coral reef community achieved through restoration is something the scientific community has been working towards since restoration efforts began. Watch the Coral Restoration Consortium's Monitoring Working Group webinar on the use of photomosaics for monitoring. The webinar covers the motivation and rationale of photomosaics, the steps involved with collecting the data and creating the product, and examples of how the technology has been used by restoration practitioners. Guest speakers include Art Gleason, Stuart Sandin, Nicole Pederson, Alex Neufeld and Lisa Carne.

Webinars 2019-2020:

[Financing Coral Reef Conservation and Management: Conservation Trust Funds and Impact Investing](#)

Coral reefs provide enormous economic value to humanity and are gaining increasing attention from donors, philanthropists, and governments. This webinar explores the use of Conservation Trust Funds and Impact Investing to support coral reef conservation. Conservation Trust Funds (CTFs) are private, legally independent institutions that provide sustainable financing for biodiversity conservation. Impact Investing is investing in companies, organizations, and funds with the intention of generating measurable social and environmental impact alongside a financial return. Specifically, the webinar discusses how protected area, national, and regional CTFs can raise, manage, and invest financing for coral reef conservation and restoration. The webinar also reviews how impact investing can be used to manage coral reef areas through public private partnerships. This webinar is sponsored by the [International Coral Reef Initiative](#) (ICRI), an informal partnership which strives to preserve coral reefs and related ecosystems around the world, as part of its collaboration with the Conservation Finance Alliance for promoting innovative financing for coral reef conservation.

Presented by: Katy Mathias of the Conservation Finance Alliance and WCS and Nicolas Pascal of Blue finance

Co-sponsored by: OCTO (OpenChannels, The Skimmer, MPA News, EBM Tools Network) and the Reef Resilience Network

[Maximizing the Adaptive Potential of Restored Coral Populations](#)

The Coral Restoration Consortium's Genetics Working Group presents a webinar on their recently-published paper titled "Considerations for maximizing the adaptive potential of restored coral populations in the western Atlantic". This paper provides practical advice for restoration practitioners and resource managers when making decisions about what species to work with, how many genotypes to include in nurseries, and how to design outplant plots to increase the chances of successful cross-fertilization. Dr. Iliana Baums, Dr. Mikhail Matz and Dr. Margaret Miller provide a summary of the working group's suggestions and a robust question and answer session.

[Treatment and Intervention Approaches for Stony Coral Tissue Loss Disease](#)

An outbreak of an epizootic coral disease, known as Stony Coral Tissue Loss Disease (SCTLD), is severely impacting coral reef ecosystems in the Atlantic-Caribbean region. While the disease was first identified on Florida's reefs in 2014, it has now spread to nine countries and territories in the Caribbean. Coral reef scientists and practitioners in the affected locations have been working to develop and apply existing and new intervention techniques in an effort to halt the spread of the disease, maintain reef structure and function, and protect rare species. Hear from

leading experts on their experiences with different SCTLD treatment approaches as well as exciting new efforts to develop alternative treatment options using natural ingredients and probiotics. Presenters include Dr. Karen Neely from Nova Southeastern University, Dr. Marilyn Brandt from the University of the Virgin Islands, Mike Favero from Ocean Alchemists LLC, and Dr. Valerie Paul from the Smithsonian Institution. This webinar was co-hosted by the U.S. National Oceanic and Atmospheric Administration (NOAA) on behalf of the Caribbean Cooperation Team of the Florida SCTLD Response Effort and the Reef Resilience Network.

[Seagrass Conservation through Payment for Ecosystem Services](#)

Learn about a new Seagrass Payment for Ecosystem Services (PES) guide that explores how community groups can use PES to fund and facilitate seagrass conservation projects. Seagrass experts, Robyn Shilland and Mark Huxham, provide best-practice guidance on planning, funding, and facilitating a community carbon-based PES project. Anne Wanjiru, Social Impact Officer for Kenya Marine and Fisheries Research Institute, shows what this work looks like on the ground through Mikoko Pamoja, a community-led mangrove and seagrass conservation and restoration project based in southern Kenya.

[Global Fund for Coral Reefs](#)

Learn more about the Global Fund for Coral Reefs (GFCR, or the Fund). This exciting blended finance vehicle will seek to raise and invest USD \$500 million in coral reef conservation over the next 10 years! The GFCR is a multi-party initiative that includes the following public, philanthropic, and private actors: Paul G. Allen Family Foundation, Prince Albert II of Monaco Foundation, BNP Paribas, Althelia Funds, UNDP, UNEP, and UNCDF. The Conservation Finance Alliance (CFA) is providing technical assistance to the GFCR partners by leading the development of the Investment Plan. In this webinar David Meyers, Executive Director of the CFA, alongside GFCR partners, shared information about: • Background on the Fund including its innovative and growing partnerships and how the Fund is planning its implementation • The Fund's blended finance model that supports businesses and finance mechanisms that improve the health and sustainability of coral reefs and associated ecosystems, while empowering local communities and enterprises • The Fund's desired outcomes and criteria for site selection and business models – including how to propose a business, financial instrument or coral reef site to be considered for investment. • How to respond to the Request for Information Global Fund for Coral Reefs: <https://www.conservationfinancealliance.org/gfcr>.

[Addressing the Threat of Ocean Sewage Pollution](#)

Ocean sewage pollution is an enormous environmental problem that few people are talking about. During this series of online activities and events, we will discuss and demystify this massive ocean issue and innovative approaches being used to address it. In this first webinar on this topic, Dr. Stephanie Wear of The Nature Conservancy provides an overview of the issue of ocean sewage pollution – the largest contributor to coastal pollution, how sewage impacts the well-being of the environment, coral reefs, and coastal communities, and why we need to act now to mitigate it. Stephanie debunks some commonly promoted beliefs for how to address sewage and discuss the importance of creating awareness on a larger scale to compel government agencies, funders, and the public to work toward a solution to address the threat of ocean sewage pollution.

[Wastewater 101](#)

Christopher Clapp of The Nature Conservancy provides an introduction to the basics of wastewater, including terminology, how septic systems work (and fail), and how wastewater is managed, treated, and discharged into our oceans directly and indirectly.

Case Studies

The Reef Resilience Toolkit features case studies highlighting successful management strategies from 30 countries and territories around the world. Each case study is tagged by key topic and location to make it easily searchable. These case studies highlight specific issues managers are dealing with and strategies that were used to address the issues with lessons learned and recommendations for other managers. See below for a list of case study titles and reefresilience.org/case_studies/ for the full case studies:

- At the Water's Edge (AWE): Enhancing Coastal Resilience in Grenada
- Reef Rescuers: Coral Gardening as an MPA Management Tool
- Making Use of Acoustic Telemetry to Improve Management of Spawning Aggregation Fishery in the Seychelles
- Reducing Local and Direct Environmental Impacts Associated with Diving and Snorkeling Tourism Activities to Increase Reef Resilience
- Guardians Protect the Sea in Papua New Guinea
- Eco-tourism Supports Marine Conservation Area in Malaysia
- Coral Reef Resilience to Climate Change in the Florida Reef Tract
- How We Pushed 400 Tons of Coral Back into the Ocean after a Cyclone
- Assessment of 2017 Hurricane Impacts to Coral Reefs in Puerto Rico
- From Awareness to Action: Building Social and Ecological Resilience Towards Climate Change
- Climate-Smart Coral Reef and Watershed Management Using the Adaptation Design Tool in Guánica Bay Watershed, Puerto Rico
- Farmers of the Sea – Sea Cucumber Farming as an Alternative to Fishing (updated)

Online Courses

The [Reef Resilience Online Courses](#) provide coral reef managers access to the latest science and strategies for managing coral reefs in a changing climate. To help coral reef managers better utilize information housed in the Reef Resilience Toolkit and meet the growing demand for our in-person training, we offer free online courses. We continued to administer and manage the self-paced versions of the online courses and promote and support opportunities to share the courses with partners, managers, and students globally. The Advanced Studies in Coral Reef Resilience Online Course, incorporates new climate, coral reef, and reef fisheries science, case studies, and management strategies. It is available in English, Spanish, and French and is comprised of 6 modules and 19 lessons.

In addition to the Reef Resilience courses, we added new courses including:

- [Adaptation Design Tool Online Course](#)
- [Strategic Communication Online Course](#)
- [Coral Reef Restoration Online Course](#)

Adaptation Design Tool Online Mentored Course

The Adaptation Design Tool Online Mentored Course was held October 16 - November 17, 2017. Managers learned how to adapt their management activities to incorporate climate-smart design. This month-long mentored training (a 8-10 hour time commitment) featured interactive lessons, hands-on exercises, webinars, and interaction with experts and other managers. Using real-world examples, participants were guided through the process of incorporating climate change adaptation into a management plan, first using existing planned actions as a starting point, and then through the development of additional climate-smart strategies as needed. A total of 43 people participated from government agencies, NGOs, and the private sector, working in 20 countries and territories. The four course lessons were developed as a collaborative project of the Climate Change Working Group of the interagency U.S. Coral Reef Task Force and The Nature Conservancy. See appendices at the end of this document for the final report.

Strategic Communication Online Mentored Course

The Strategic Communication Online Mentored Course was held January 16 - February 8, 2018, with participation from 71 people in 22 countries and territories. Participants were guided through the communication planning process to influence behavior or raise awareness about an issue to advance marine conservation efforts. Participants learned key components of strategic communication and applied these concepts to develop communication plans for a project specific to their work. The mentored course combined self-paced lessons, quizzes, and worksheets, interactive webinars, and discussions using the Reef Resilience Network Forum. See appendices at the end of this document for the final report.

AIC Strategic Communication Mentored Courses

Four Strategic Communication Mentored Courses were completed for the U.S. All Islands Coral Reef Committee (AIC) jurisdictions of American Samoa, Florida, Guam and the Commonwealth of the Northern Mariana Islands (CNMI). These courses were offered in response to the needs assessment we conducted for the AIC and executed in place of in person trainings to offer more tailored support for each jurisdiction. The courses were run independently and were built off the communication planning course we piloted in January 2018 where participants learned key components of strategic communication and applied these concepts to develop communication plans for a project specific to their work. See appendices at the end of this document for the final report.

The online courses combined self-paced lessons, quizzes, and worksheets, interactive webinars, discussions using the Network Forum, and one-on-one feedback on participants' drafts for each step of the planning process. At course completion, site teams had a draft strategic communication plan to promote coral conservation, a project timeline, and clear actionable next steps to execute the plan. RRN brought on a communication contractor to help manage the courses and provide additional expertise.

AIC Visual Design Mentored Courses

RRN provided tailored visual design mentorship to the jurisdictions after they completed their communication plans. We brought on a graphic design contractor to lead the month-long Visual Design Mentored Online Courses as a complementary component of the Strategic Communication Mentored Online Courses. The designer provided tailored support based on the participants' requests to either design a product themselves or have the designer execute design work for them. Participating jurisdictions and projects included:

- American Samoa: Promoting fisheries rules and best practices to address overfishing

- Florida: Motivating coastal visitors to take pro-reef actions
- Guam: Building support for the Guam Reef Resilience Strategy
- Commonwealth of the North Marianas Islands: Reducing storm drain pollution through the Ocean Friendly Partners Program

Coral Reef Restoration Online Course

The Coral Reef Restoration Online was completed and launched with a mentored course in April 2019. This course is designed to provide coral reef managers and practitioners with best practice guidance for common coral reef restoration techniques. This course includes 6 lessons that discuss strategic planning and decision-making for coral restoration, enhancing coral populations through gardening and larval propagation, restoring reef structure for coastal protection services, rapid restoration response after acute disturbances, and monitoring for restoration success. Lessons incorporate new science, case studies, and management practices described in the Reef Resilience Toolkit.

The Restoration Mentored Online Course ran April 15 – May 24, 2019 with participation from 86 people from 29 countries and territories. This mentored training was designed as a 20-hour time commitment, and featured interactive lessons with quizzes, hands-on exercises, webinars, and interaction with experts and other managers. Through each of the lessons, managers were guided through current best practices for restoring coral reef ecosystems, beginning with a robust planning and decision-making program, followed by descriptions of common methodologies and techniques, and ending with monitoring guidelines and approaches. See appendices at the end of this document for the final report.

Finfish Aquaculture 101 for Coral Reef Managers Mentored Online Course

To support coral reef managers and practitioners that are working in a reef system that contains nearshore fish aquaculture cages or are considering management decisions on whether or how to permit finfish aquaculture cages in the nearshore environment, a mentored course on the new [Aquaculture toolkit](#) was held April 13-20, 2021 with participation from 58 people from 24 countries and territories. Along with the new Aquaculture toolkit and case study: [Developing Sustainable Aquaculture in Palau](#), a webinar and panel discussion with five aquaculture experts was held to discuss the development of sustainable finfish aquaculture in coral reef areas. The webinar provided an introduction to aquaculture and its importance for food security and livelihoods; impacts, mitigation, and proper management; site selection; legal and regulatory frameworks to support sustainable aquaculture; and community-based aquaculture. It was co-hosted with The Nature Conservancy's Global Aquaculture and Micronesia programs.

Coral Reef Restoration Planning & Design Training

As part of TNC's work to assist managers in the area of coral reef restoration, the Reef Resilience Network (RRN) Team worked with NOAA CRCP, the US EPA, James Cook University, and contractors from Tetra Tech, Inc. and SymbioSeas to complete *A Manager's Guide to Coral Reef Restoration Planning and Design*. This guide, with accompanying workbook and implementation plan template appendices and two excel sheet tools and tutorials is posted on [NOAA CORIS](#).

With funding from NOAA's Restoration Center, RRN lead the Coral Reef Restoration Planning & Design Training with the Pacific jurisdictions (American Samoa, CNMI, Guam, and Hawaii) using the *Manager's Guide* as the basis for this training. Funds from CRCP were used in addition to funds from the Restoration Center to support adaptation of the Managers Guide to a

virtual training format as we were not able to meet for an in-person workshop due to the global coronavirus pandemic. We transitioned to providing virtual support for each jurisdiction independently from February 2020 – July 2021. All sites have a draft Restoration Action Plan and are using it to seek funding for implementation support. RRN will continue to provide capacity building support for the plans with the Pacific jurisdictions.

Trainings & Mentorship

To help managers incorporate resilience concepts into their management strategies and policies, the Reef Resilience Network provides training, networking opportunities, and mentorship. In-person trainings emphasize knowledge sharing within and across regions and are designed to prepare managers to apply cutting edge science and management strategies. Based on the needs of managers, in-person trainings range in design, topic, and duration.

To best meet the needs of AIC jurisdictions, we prepared and administered a training needs survey to the jurisdictions through the AIC Secretariat. This survey, along with additional communication with the AIC, provided the plan for developing the training and mentorship topics during the four years. Trainings and mentorship included:

Strategic Communication Planning

At a workshop in Hawaii, 15 Department of Aquatic Resource staff learned the basic components of strategic communication planning, and participated in hands-on activities to brainstorm messages and tactics to reach target audiences specific to the Marine 30x30 Initiative. In the U.S. Virgin Islands, planning calls and in-person meetings were held with Coastal Zone Management and St. Croix East End Marine Park staff (EEMP) to provide content and design feedback on the EEMP Visitor Center and guide them to develop a draft strategic communication plan for the visitor center.

Reef Futures Communication Workshop

The Network partnered with the Pew Charitable Trusts & The Ocean Agency to host an interactive workshop to build participants' understanding of strategic communication and develop and practice messaging skills to motivate action for reef conservation. More than 75 participants from government, NGOs, and academia attended this workshop as part of Reef Futures 2018: A Coral Restoration and Intervention-Science Symposium. Participants engaged in group activities where they discussed components of an effective message and tools to create compelling messages. Then they worked on developing key messages specific to a target audience and practiced sharing messages with other group members and received feedback.

Reef Futures Planning Guidance for Restoration Workshop

As part of our work to assist managers in the area of coral reef restoration, the Network continued working with NOAA CRCP, the US EPA, and contractors from Tetra Tech to develop a Manager's Guide to Coral Reef Restoration Planning and Design. This guidance manual with accompanying workbook was first drafted in October 2018 and then reviewed by over 30 reef managers from Florida, USVI, Hawaii, American Samoa, CNMI, Guam, Australia, Mexico, and Cuba in December 2018 at the Reef Futures 2018 Conference. During the 3-hour workshop, a draft of *A Manager's Guide to Coral Reef Restoration Planning & Design* was presented, after which managers piloted the guide in small groups and then provided feedback through facilitator-led discussions. Overall, managers provided us with over 15 pages of suggestions. Comments were also received from managers from the Great Barrier Reef Marine Park

Authority and the Coral Restoration Consortium. A fillable PDF version of the workbook was created that is downloadable from the Coral Reef Restoration Online Course.

Train-the-Trainers Workshop on Strategic Adaptive Management for Western Indian Ocean MPA Managers

The Network collaborated with SMART Seas Africa Network to host a week-long train-the-trainers workshop for 31 Marine Protected Area (MPA) professionals from Seychelles, Kenya, and Tanzania in August 2019 at the Seychelles Maritime Academy. The purpose of the training was to develop peer trainers who can help other MPA managers in the region identify their MPA management objectives and use science to guide decision-making to reach those objectives. Areas of skill-building during the workshop focused on marine monitoring, data management and graphing, and strategic decision making and management. The Network led strategic management sessions, including facilitation and communication instruction. This workshop was funded by ICRI and amplifies the reach of RRN domestic activities supported by CRCP.

Support Provided to Reef Managers at UNESCO World Heritage Reef Sites through the Resilient Reefs Initiative

The Network supported the Resilient Reefs Initiative (RRI) as part of its five-year partnership with The Great Barrier Reef Foundation (GBRF) and UNESCO to pilot a model for resilience-based management at five World Heritage-listed coral reef sites. Participating World Heritage Sites include: Great Barrier Reef, Australia; Ningaloo Coast, Australia; Lagoons of New Caledonia: Reef Diversity and Associated Ecosystems, France; Belize Barrier Reef Reserve System, Belize; and Rock Islands Southern Lagoon, Palau. The Network conducted five one-on-one consultations with RRI sites to better understand their needs and discuss how to tailor Network resources. After online consultations, Network staff shared resources of interest and access to Network experts to sites. This engagement is funded by the Great Barrier Reef Foundation and amplifies the reach of RRN domestic activities supported by CRCP.

Communication Capacity-Building for Coastal Managers in Cuba

With separate funding from TNC Caribbean region, the Network provided strategic communication support to the Fundación Antonio Núñez Jiménez de la Naturaleza y el Hombre over seven months. In 2019, the Network worked with Fundación and TNC staff in the Dominican Republic to develop a draft project vision, goal, and objectives and lead a three-day workshop to build strategic communication skills of the organization and apply these concepts to develop a communication plan to support selected coastal communities to build resilience through conservation of reefs, mangroves, and seagrass. This workshop was funded by the Nature Conservancy's Caribbean region and co-hosted by the Reef Resilience Network.

Network Forum

The Reef Resilience Network promotes collaboration between coral reef practitioners around the world through peer-to-peer learning and discussion, shared resources, training opportunities, and access to coral reef experts. One of our main vehicles for carrying out this work is through the Reef Resilience Network Forum – an online member-only discussion forum where managers and practitioners can share ideas and resources and connect directly with experts.

We continue to use the Forum to foster communication and resource sharing between Network members before, during, and after Reef Resilience trainings and learning exchanges. These discussion forums, not only provide managers opportunities for exchange and networking, but

create an efficient avenue for Reef Resilience staff to stay in touch with workshop participants and share additional resources and provide continued support.

Membership in the Network Forum continues to grow to more than 1,000 members. Forum members can participate in discussions with experts following a webinar or during and post trainings and start or join a conversation with peers. These conversations can take place on the main discussion forum, within groups created for specific regions or topics, or by sending a private message. Other Forum features include the ability to: translate all content, share media files, and search managers based on interest or region.

Appendices

Adaptation Design Tool Online Mentored Course Final Report
Strategic Communication Online Mentored Course Final Report
AIC Strategic Communication & Design Mentored Courses
Restoration Online Course

Appendix A: Adaptation Design Tool Online Mentored Course Final Report

Executive Summary

With the support of the Department of the Interior, 43 participants from 20 countries and territories took the month-long mentored online course Corals & Climate Adaptation Planning: Adaptation Design Tool. The mentored course combined self-paced lessons, assignments for participants to apply their knowledge, interactive webinars with global experts and discussions using the Reef Resilience Network Forum. Using real-world examples, participants were guided through the process of incorporating climate change adaptation into a management plan, first using existing planned actions as a starting point, and then through the development of additional climate-smart strategies as needed.

Introduction

Managers have expressed a need to “climate proof” their existing coral reef projects and programs. In response, a new tool was developed called the CCAP Design tool – a product of the Corals & Climate Adaptation Planning project, a joint collaboration under the Climate Change Working Group of the U.S. Coral Reef Task Force. The CCAP Design Tool was developed to increase the ability of managers to take action to integrate climate change into existing management plans and projects. It helps managers to consider how the design or implementation of their management actions could be modified for greatest effectiveness in the face of climate change.

Through this project we developed an online training as part of the Reef Resilience Network, for coral reef managers and practitioners to use the CCAP Design Tool and support the incorporation of climate-smart design considerations into their coral reef management plans and projects. Specifically, the lessons support a process of how to consider the effects of climate change on ecosystem stressors and implications for effective management. A mentored session of the online course was also offered to managers around the globe through the established virtual training program of the Reef Resilience Network.

Background and Training Objectives

The Reef Resilience Network is a partnership led by The Nature Conservancy that builds the capacity of coral reef managers and practitioners around the world to address impacts on coral reefs from climate change and other stressors. Network in person and online training activities have reached 75% of all countries and territories with reefs.

Network accomplishments include:

- A state-of-the-art website providing a comprehensive suite of training and knowledge-sharing resources benefiting coral reef managers; In 2015, the site had over 50,000 visitors
- A searchable database of 45+ case studies and 115+ summaries of cutting-edge resilience science articles
- In-person training for 1000+ managers
- An online course, designed to provide easy access to the latest science and strategies for managing coral reefs.

- Self-paced and mentored courses are offered in English, Spanish and French.
- Since its launch in 2010, over 1600+ participants have taken the online course

Addressing Priority Regional Conservation Needs

The CCAP tool and course were developed because practitioners lack simple tools to integrate climate change into current management efforts and plans. Practitioners expressed frustration with the proliferation of new planning processes instead of tools that can be used with existing plans. The CCAP tool and associated online course empowers participants to undertake efforts independently and in partnership with other stakeholders to integrate climate change into existing efforts and better understand and access data from scientists conducting research in the area.

We developed 4 new online lessons that help managers learn how to use the CCAP Adaptation Design Tool to support climate-smart planning and management. The online course development and mentored course build on five years of successful online trainings through the Reef Resilience Network.

The training objectives for the development of the online course were to:

- Help make existing plans and on the ground projects in coral reef areas climate-smart; potentially expand management/adaptation actions; help identify existing actions that may not be effective in the face of climate change (and thus may need to be replaced)
- Provide access to experts to step through each activity with guidance on how to develop design considerations using information from vulnerability assessments (e.g., see Glick et al. 2011; U.S. Coral Triangle Initiative Support Program 2013) and the CCAP Compendium.
- Provide managers a list of possible climate-smart actions that can be considered when creating or updating a management plan. Supplementary outputs include data and information gaps and research needs, and key interactions among management actions and timing issues relevant to implementation.
- Connect experts and managers and share key training materials with managers throughout the globe, through the Reef Resilience Toolkit (reefresilience.org) and online Forum.

The development of the online lessons and mentored course directly build on the work of Climate Change Working Group of the U.S. Coral Reef Task Force and was completed in partnership with the lead working group members Jordan West (EPA) and Britt Parker (formerly NOAA CRCP).

Online Course Lessons

Four online lessons were created with the CCAP Working Group of experts and The Nature Conservancy's Reef Resilience Program and the Technology Learning Center. The course consists of four lessons, each of which takes from 20 to 45 minutes to complete. These lessons are based on the user guide, [Adaptation Design Tool: Corals & Climate Adaptation Planning](#), developed as a collaborative project of the Climate Change Working Group of the interagency U.S. Coral Reef Task Force and The Nature Conservancy.

Scripting and review of the online course content was provided by the CCAP Working Group which consisted of:

- Jordan West (Co-lead), U.S. Environmental Protection Agency
- Britt Parker (Co-lead), The Baldwin Group at the National Oceanic and Atmospheric Administration
- Kitty Courtney, Tetra Tech
- Anna Hamilton, Tetra Tech
- Susan Julius, U.S. Environmental Protection Agency
- David Gibbs, ORISE Fellow, U.S. Environmental Protection Agency
- Pat Bradley, Tetra Tech
- Petra MacGowan, The Nature Conservancy
- Cherie Wagner, The Nature Conservancy
- Karen Koltas, U.S. Department of the Interior

The course focuses on coral reef management planning but is also fully transferable to natural resource management in other systems and applications, such as wetland and watershed management planning. The lessons were designed to be as interactive and user friendly as possible for managers with a variety of learning styles and technological abilities. An overview of the lessons is below:

Lesson 1: Principles of Climate-Smart Planning (20 minutes)

This lesson introduces key concepts of Climate-Smart Conservation, including why and how to brainstorm and design management actions to account for the effects of climate change.

Lesson 2: Introduction to the Adaptation Design Tool (20 minutes)

This lesson provides an overview of the Adaptation Design Tool, how it works, and best practices for using it effectively.

Lesson 3: Applying Climate-Smart Design Considerations to Existing Conservation & Management Actions (45 minutes)

This lesson demonstrates Activity 1 of the Adaptation Design Tool, which applies climate-smart design considerations to (1) identify climate change impacts on the effectiveness of your management actions and (2) consider what changes should be made to the actions based on those impacts.

Lesson 4: Expanding the List of Adaptation Options & Course Conclusion (30 minutes)

This lesson demonstrates Activity 2 of the Adaptation Design Tool, which identifies gaps in your existing plan, helps you brainstorm new actions to fill those gaps, and concludes with next steps on how the tool results can be used to inform other steps of the Climate-Smart Conservation Cycle.

Mentored Online Course

Overview

The Adaptation Design Tool Mentored Online Course ran from October 16 - November 17, 2017. This month-long mentored training was designed as a 8-10 hour time commitment, and featured interactive lessons, hands-on exercises, webinars, and interaction with experts and other managers. Using real-world examples, managers were guided through the process of incorporating climate change adaptation into management activities, first using existing planned actions as a starting point, and then through the development of additional climate-smart strategies as needed. The course schedule is below:

- **September 21 - October 16:** Course registration
- **October 16:** Course Orientation and Introductory Webinar: Introduction to the Adaptation Design Tool (1 hour)
- **October 17 - November 16:** Complete four self-paced lessons and learning exercises (approximately 6 hours)
- **November 6:** Webinar 2 – Developing Climate-Smart Design Considerations for Existing Conservation and Management Actions (1.5 hours)
- **November 17:** Webinar 3 – Expanding the List of Adaptation Options & Course Conclusion (1 hour)

Course Mentors

- Cherie Wagner, Program Coordinator, Reef Resilience Network, The Nature Conservancy
- Jordan West, Senior Ecologist, Office of Research & Development, U.S. Environmental Protection Agency
- Britt Parker, Senior Climate and International Specialist, NOAA Coral Reef Conservation Program (with The Baldwin Group Inc.)
- David Gibbs, ORISE Fellow, Office of Research & Development, U.S. Environmental Protection Agency
- Eric Conklin, Director of Marine Science, Hawai'i Program, The Nature Conservancy
- Tova Callender, Watershed Coordinator, West Maui Ridge to Reef Initiative
- Chris Bergh, Florida Reef Resilience Program, The Nature Conservancy
- Kim McGuire, American Samoa Department of Marine and Wildlife Resources

Course Components

Webinars

The course began with an Orientation and Introductory Webinar and had 42 participants. Information was given on the course schedule and components and how to register. Jordan West, Senior Ecologist in the U.S. EPA's Office of Research and Development gave an introduction to the Adaptation Design Tool, what it can be used for, and introduced the concept of Climate-Smart Conservation. Then a discussion session was held for participants to ask questions about the course. Britt Parker, Climate Coordinator for NOAA's Coral Reef Conservation Program and David Gibbs, ORISE fellow in the U.S. EPA's Office of Research and Development were also available during the webinar to answer questions.

The second webinar had 11 participants and went into more depth on Lesson 3 which demonstrates Activity 1 of the Adaptation Design Tool – applying climate-smart design considerations to (1) identify climate change impacts on the effectiveness of management actions and (2) consider what changes should be made to the actions based on those impacts. After a review of the previous lessons and the tool by Jordan West, the webinar focused on walking participants through an example for Florida Reefs. Chris Bergh, TNC Director for Conservation in South Florida, Florida Reef Resilience Program used the action – outplant aquarium-grown corals on reefs surrounding the bay mouth to enhance coastal protection and reduce coastline erosion – to show how to identify climate impacts on this action and changes to the action that would enhance effectiveness based on those impacts. Discussion sessions during the presentation and at the end allowed participants to ask clarifying questions. Britt Parker and David Gibbs were also available during the webinar to answer questions.

The third webinar had 6 participants and went into more depth on Lesson 4 which demonstrates Activity 2 of the Adaptation Design Tool – expanding the list of adaptation options by identifying gaps in an existing plan and showing how to brainstorm new actions to fill those gaps. Jordan West started with a quick review of the flow chart of activities of the Adaptation Design Tool and showed where the course participants were in the process. Then Kim McGuire, Climate Change Coordinator for the American Samoa Department of Marine and Wildlife Resources showed an example for American Samoa. She discussed how she used the CCAP Compendium to identify additional actions that address climate-related vulnerabilities not sufficiently addressed in their current activities in American Samoa. Discussion sessions during the presentation and at the end allowed participants to ask clarifying questions. Britt Parker and David Gibbs were also available during the webinar to answer questions.

Assignments

Assignments were provided in each section of the course to reinforce the concepts learned and to provide an opportunity for participants to apply the tool to their site. Assignment 1 asked participants to read through the CCAP Compendium and an example Summary Vulnerability Assessment for Guánica Bay, Puerto Rico, in preparation for using them as key inputs in the next lessons.

The CCAP Compendium is a compilation of ideas from peer-reviewed articles, guides, and case studies on adaptation options for coral reefs, along with corresponding examples of climate-smart design considerations. While the Compendium is focused on coral reefs, the general strategies and many of the adaptation ideas are transferable to other systems, or can help inspire similar ideas for other systems.

Information on vulnerability and resilience is a key input needed to use the Adaptation Design Tool. While creating vulnerability assessments is outside the scope of the tool, the tool user guide provides some information on methods for summarizing available information for an area.

Assignment 2 asked participants to fill in worksheets that are part of the tool using an example from Guánica Bay, Puerto Rico coral reefs. And as an optional activity, to fill in the worksheet for with an action specific to their own system and location.

For Assignment 3 participants used the Matrix Worksheet from the user guide to assess how well the growing list of management actions covers different general adaptation strategies. Example actions for Puerto Rico were provided for use in conjunction with the Summary Vulnerability Assessment for Guánica Bay, Puerto Rico. In addition, participants were encouraged to use other management actions

specific to their own system and location, along with vulnerability information for their local area and fill in Worksheet 2.

Reef Resilience Network Forum

Participants were encouraged to interact with course mentors and other managers on the Reef Resilience Network Forum. The Adaptation Design Tool Mentored Course Group was created for the group conversation and questions. Mentors checked for postings and provided responses by the end of each lesson period.

Measuring Progress

We assessed the progress of the project through the following measures and methods:

1. Completion of the development of the online course and launch on website
2. Coordination of a mentored online course for the new CCAP lessons
3. Number of participants who complete the new online course both self-paced and mentored versions
4. At least 90% of the participants will come away with new knowledge and skills they believe will be helpful to them in their jobs as practitioners. Participants were asked to complete post-webinar evaluations and an end of training evaluation.
5. Continued access to the online course through the Reef Resilience Toolkit

Course Completion

Self-paced Course & Mentored Course

To date, 59 people have registered for the Self-paced course. Twenty-five people from 15 countries and territories have completed some of the course lessons. For the Mentored Course, an additional 25 people from 15 countries and territories completed some of the course lessons.

For the Mentored Course, three live webinars were held to give participants an opportunity for interaction with subject matter experts and provide more information. Webinar recordings were also posted on the Reef Resilience YouTube channel and linked to the course page so they could be watched by participants who were not able to make the live webinar or for review by attendees. See the chart below for webinars statistics:

Webinar Title	Attendees	# Views Online
Orientation Webinar	42	91
Lesson 3 Webinar	11	22
Lesson 4 Webinar	6	15

Feedback from Participants

Participants were asked to complete a survey at the end of the training to measure our progress towards our specific training objectives and gain feedback on how to improve the course. Responses were received from 8 participants. About 50% of respondents said that the concepts taught in the course will help them improve their work outcomes. The other 50% said that they took the course for information purposes only and it is not specifically relevant to their current work. Overall, participants felt that after taking the course their understanding of the following concepts had increased:

- Key principles of climate-smart conservation
- The Adaptation Design Tool and its component activities
- Impacts of climate change on the non-climate stressors and implications for management actions
- Integrating climate-smart design considerations into management actions using the Adaptation Design Tool
- Crafting additional actions to address vulnerabilities and fill gaps in your management plan
- How outputs from the Adaptation Design Tool support adaptive management through time

Lessons Learned and Next Steps

The online courses empower participants to undertake efforts independently and in partnership with their stakeholders to integrate climate change into their existing management efforts and to fill gaps in their current plans. Since the self-paced course was launched in August 2017 and this is the first mentored course we have run, we will be reviewing the participant evaluations to see how we can improve the future mentored courses. Overall the mentored course ran smoothly with three mentors helping to organize and the addition of three mentors added field-based knowledge to the webinars. We will be adding the assignments and other relevant resources from the mentored course to the self-paced course to improve the learning experience for participants. We will also continue to manage and encourage participation in the self-paced course and look for opportunities to run another mentored course in the future. The mentored course group on the Reef Resilience Network Forum is still in place to further support managers to connect with mentors as they work on implementing what they learned in the course.

Appendix B: Strategic Communication Online Mentored Course Final Report

Executive Summary

With the support of the NOAA's Coral Reef Conservation Program, 71 people from 22 countries and territories participated in a month-long mentored online course on strategic communication. Participants were guided through the communication planning process to influence behavior or raise awareness about an issue to advance marine conservation efforts. Participants learned key components of strategic communication and applied these concepts to develop communication plans for a project specific to their work. The mentored course combined self-paced lessons, quizzes, and worksheets, interactive webinars, and discussions using the [Reef Resilience Network Forum](#).

Background and Training Objectives

The Reef Resilience Network (RR Network) connects marine resource managers with information, experts, resources, and skill-building opportunities to accelerate and leverage solutions for improved conservation and restoration of coral reefs and reef fisheries around the world. The Network is a partnership led by The Nature Conservancy comprised of more than 1,350 members, and is supported by dozens of partners and more than 100 global experts.

Network in-person and online training activities have reached 75% of all countries and territories with reefs. Through the RR Network trainings, we help coral reef managers:

- Access and understand current ecological, social, and socioeconomic scientific information to support strategy implementation;
- Develop the skills necessary to implement management strategies and use new science effectively at their sites;
- Make progress on the implementation of strategies to address reef decline by providing support and inspiration.

Overview

The Strategic Communication Mentored Online Course ran from January 16 - February 8, 2018. This three-week mentored training was designed as a 6-8 hour time commitment, and featured interactive lessons and quizzes, hands-on exercises, webinars, and guidance from mentors and other managers. Participants were guided through the communication planning process to influence behavior or raise awareness about an issue to advance marine conservation efforts. Participants learned key components of strategic communication, and applied these concepts to develop communication plans for coral reef conservation-related projects. The course schedule is below:

- **December 18 - January 16:** Course registration
- **January 16:** Course orientation webinar - introduction to communication planning process, goal & objectives, context, and audience, and Q&A session (1 hour)
- **January 17 – January 24:** Complete three self-paced lessons and worksheets on the communication planning process: establish your goal & objectives, assess the context for your efforts, and identify your target audience(s) (~2.5 hours)
- **January 25:** Webinar 2 – Review concepts, introduction to messaging, tactics, measures, and creating a plan summary, and Q&A session (1 hour)

- **January 26 – February 7:** Complete four self-paced lessons and worksheets on the communication planning process: make your message matter, identify messengers and tactics, measure your impact, and create a summary of your plan (~3.5 hours)
- **February 8:** Webinar 3 – Review concepts, deep dive into creating a summary plan with examples and tips, and course conclusion (1 hour)

The Strategic Communication Mentored Online Course was taught using the [Communication Planning Process](#) in the new Strategic Communication [module on reefresilience.org](#). The Reef Resilience Network developed this content based on lessons learned from four in-person trainings using Spitfire Strategies’ Smart Chart® strategic communication planning tool. The lessons follow these seven steps of the communication planning process:

- Establish your [goal & objectives](#)
- Assess the [context](#) for your efforts
- Identify your target [audience\(s\)](#)
- Make your [message](#) matter,
- Identify [messengers & tactics](#) for communicating your messages
- [Measure](#) your impact
- Create a [summary](#) of your plan

Course mentors and presenters included:

- Kristen Maize, Strategic Communication Manager, The Nature Conservancy
- Cherie Wagner, Program Coordinator, The Nature Conservancy
- Mallory Morgan & Whitney Hoot, Guam Bureau of Statistics and Plans

Participants

Two hundred and twenty (220) people registered for the mentored course, with 71 people from 22 countries and territories actively participating [by taking lessons and quizzes or attending webinars] in the course. See the table below for details on participant organizations and countries. Thirteen people completed all the lessons.

List of Participant Organizations & Countries:

Organization	Country/Territory
AMI Corp	Trinidad and Tobago
Auburn University	United States
Bureau of Environmental & Coastal Quality	CNMI
Bureau of Statistics and Plans, Guam Coastal Management Program	Guam
Centre for Marinelife Conservation and Community Development	Vietnam
City and County of Honolulu	Hawaii
CNMI Bureau of Environmental and Coastal Quality	CNMI
Coral Reef Advisory Group, Department of Marine and Wildlife Resources	American Samoa
Coral Reef Alliance	United States
Dalhousie University	Canada
Department of Commerce	American Samoa

Organization	Country/Territory
Department of Planning and Natural Resources, Coastal Zone Management	USVI
Department of Land and Natural Resources, Division of Aquatic Resources	Hawaii
Earth Conservation Foundation	United States
East Maui Watershed Partnership	Hawaii
Fisheries Division, Government of Saint Lucia	Saint Lucia
Florida Fish and Wildlife Conservation Commission	Florida
GIZ	Kyrgyzstan
Gulf Research Program	United States
Hawai'i Conservation Alliance & Foundation	Hawaii
Hawai'i Coral Reef Initiative, University of Hawaii Manoa	Hawaii
Mālama Pūpūkea-Waimea	Hawaii
Marine Plan Partnership (MaPP)	Canada
National Park Service / University of United States - Guam	Guam
NOAA	Hawaii
NOAA Fisheries/ Guam Community Coral Reef Monitoring Program	Guam
NOAA Office for Coastal Management	USVI
Ola'pi Creative	United States
Oxford University	Croatia
Palau Conservation Society	Palau
Ramboll	Gibraltar
Recent graduate	Eritrea
Reef Check Indonesia	Indonesia
Reefdivers.io	United States
Regional Secretariat of CTI-CFF	Indonesia
Scottish Association for Marine Science (SAMS)	United Kingdom
Seaflower Research and Conservation Foundation	Colombia
SEAPEN Marine Environmental Services	Australia
STINAPA Bonaire (National Parks Foundation)	Bonaire
The Nature Conservancy	United States
The University of Hawaii at Hilo	Hawaii
UF/IFAS - Florida Sea Grant College Program and NOAA/AOML	United States
UN Environment	Jamaica
UNDP	Mexico
University of Exeter	United States
University of Rhode Island	United States
University of Texas at Austin	United States
University of Guam Sea Grant	Guam
Wageningen University	Netherlands
West Coast Aquatic	Canada
World Federation Coral Reef Conservation - Mission Blue	United States

Course Components

Webinars

Webinars were held at a time that was favorable for participants in the Pacific Ocean (9:00 AM Indonesia) and recorded for other time zones. Participants who were not able to join the live webinars viewed the recordings (see webinar viewing statistics below).

The course began with an orientation webinar which had 73 participants. During this webinar, RR Network staff gave an overview of the course content and schedule, followed by an introduction to the planning process, setting your goal & objectives, assessing the context for your efforts, and identifying your target audience. The webinar ended with a Q&A session.

The second webinar had 36 participants and went introduced the next four steps of the communication planning process: making your messages matter, identifying messengers and tactics for communicating your messages, measuring your impact, and creating a summary of your plan. Time for questions was provided at the start of the webinar to address questions about previous content and at the end for newly covered content. Polls were used throughout the webinar as a way to engage the participants, learn about their progress, and elicit them to share about their work.

The third webinar had 16 participants and went into greater detail on how to create a summary plan, i.e. how to put all the strategic communication planning steps together into a cohesive summary. This webinar included tips for creating a plan and provided two examples – one hypothetical and one from fellow classmates. Mallory Morgan and Whitney Hoot from the Guam Bureau of Statistics and Plans presented their summary plan for a communication project in Guam. Like we did during the previous webinar, time was provided early in the webinar for questions about the previous content, poll questions were used to engage participants throughout the webinar, and the webinar ended with a Q&A session.

Feedback was collected after each webinar to make adjustments to upcoming webinar content or logistics for the course.

Webinars viewing statistics:

Webinar Title	Attendees	# Views Online
Orientation Webinar (Intro, Goal & Objective, Context, Audience)	73	126
Webinar 2 (Messages, Messengers & Tactics, Measures, Summary)	36	55
Webinar 3 (Summary Plan with 2 examples)	16	25

Assignments

Downloadable worksheets corresponding to each of the planning process steps were provided with the lessons, along with quizzes to test knowledge and track progress. Participants were instructed to complete the worksheets for a project specific to their work. Worksheets included:

- [Goal and Objectives Worksheet](#) provides the template and guiding questions to help participants write a SMART goal and objectives.

- [Context Worksheet](#) is used to conduct an internal and external scan of your organization/agency/group's assets and challenges.
- [Audience Worksheet](#) is used to write down specific target audiences necessary to reach in order to achieve a goal, including their values, concerns, and connections to them.
- [Message Box Worksheet](#) is used to develop core messaging about the work or project.
- [Tactics Worksheet](#) is used to brainstorm and list tactics that will best reach the target audience(s) and the kinds of measures that will be used to assess the tactics.
- [Summary Template](#) is used to compile all the previous steps into a high-level document that provides a snapshot of the project.

Reef Resilience Network Forum

Participants were encouraged to interact with each other on the Network Forum, an online discussion platform for marine managers. The Strategic Communication Online Course Forum group was created specifically for participant conversation and to respond to questions about the course and material. RR Network staff checked daily for postings and provided timely responses. Seventy-five course participants joined the group.

A partner system was developed for participants to learn about each other and to give and get feedback on each other's goal and objective. Participants who elected to work with a partner were asked to post their overarching goal and one objective they planned to address for the rest of their communication strategy on the Network Forum. They were also given directions on how to provide feedback. For example, participants were prompted to consider if their partner's goal and objectives were SMART (i.e. specific, measurable, attainable, realistic, and time-bound), and if they effectively communicated:

- An issue or problem they are trying to solve
- A change they are trying to achieve over the long-term and the short-term
- What will be different in their place (community, organization, etc.) after they have achieved their goal

Participant Feedback

Participants were asked to complete a survey at the end of the training to measure RR Network progress towards specific training objectives and gain feedback on how to improve the course. Twenty-three participants responded to the survey. Approximately **77% of respondents said that the concepts taught in the course will help them improve their work outcomes and 56% said they feel able to move forward with implementing the plan they worked on during this course.** All respondents said that they would recommend the course to a colleague. Specific comments include:

- *I have already recommended the material to several people. We are building the templates into both our internal work as well as groups that help coordinate. I appreciate this course being made available, and the fact that the material is available on the website outside of the course format.*
- *Even though I had time constraints that affected my ability to complete the course on time, I appreciate the resources that are available to me as my time opens up and as relevant projects arise. I also liked the networking and partnership aspect of the course because I met a few new people that are now contacts. Thank you!*

- *The course was very helpful. The visuals in the webinar and other peoples' examples in the forum really helped me understand the course. The schedule of the webinars was convenient as it was during lunch time at my end so it didn't disrupt my work. Thank you TNC & Reef Resilience Network for offering this course.*
- *I really appreciated this course not only for its content and teachings, but for the network of multiple disciplines. I feel my knowledge and confidence for developing a conservational and/or restoration project, as well as the ability to communicate effectively with others, has significantly increased. I feel motivated to continue appropriate project development in conservational practices. Thank you very much Kristen and Cherie for your attention in this course and all the positive info. you shared! I will look out for more webinars and courses to take with the Reef Resilience Network.*

Lessons Learned and Recommendations

Based on participant feedback and staff lessons learned, if this course were taught again in the future, changes to consider include:

Course Length

- Add one week to the course to make it just over 4 weeks

Course Webinars

- Make webinars more interactive for participants
- Include more examples in the webinars
- Alternate the webinar times for different time zones

Course Forum

- Explore different ways to use the Forum for course communication

Appendix C: AIC Strategic Communication & Design Mentored Courses

Executive Summary

With the support of the NOAA Coral Conservation Program, 15 coral reef managers from American Samoa, Florida, Guam, and Commonwealth of the North Marianas Islands (CNMI) received individual communication planning support tailored to their needs. They learned key components of strategic communication and applied these concepts to develop communication plans for a project specific to their work. Participants completed self-paced lessons, quizzes, worksheets, support and feedback calls, and discussions using the Network Forum. At course completion, participants had a draft strategic communication plan to promote coral conservation, a project timeline, and clear actionable next steps to execute the plan.

In addition, tailored visual design mentorship was provided as they completed their communication plans. A graphic designer led individual month-long Visual Design Mentored Online Courses. The designer provided tailored support based on the participants' requests to either design a product themselves or have the designer execute design work for them.

Projects included:

- American Samoa (June – August 2018): Addressing overfishing by promoting fisheries rules and best practices
- Florida (July – October 2018): Raising reef awareness and motivating pro-reef actions of coastal visitors
- Guam (October 2018 – January 2019): Promoting awareness and the use of the Guam Reef Resilience Strategy
- Commonwealth of the North Marianas Islands (October 2018 – March 2019): Reducing storm drain pollution through the Ocean Friendly Partners Program

Reef Resilience Network Background and Training Objectives

The Reef Resilience Network (RRN) is a partnership led by The Nature Conservancy that builds the capacity of coral reef managers and practitioners around the world to address impacts on coral reefs from climate change and other stressors. Network in-person and online training activities have reached 75% of all countries and territories with reefs. Current Reef Resilience Network accomplishments include:

- A state-of-the-art website providing a comprehensive suite of training and knowledge-sharing resources benefiting coral reef managers, with over 180,000 visitors annually
- A searchable database of 60+ case studies and 130+ summaries of cutting-edge coral reef and resilience-related scientific articles
- In-person training for 1,500+ managers

- [Online courses](#) designed to provide easy access to the latest science and strategies for managing coral reefs, offered in:
 - Coral Reef Resilience, in introductory and advanced options, offered in English, Spanish and French
 - Climate Change Adaptation Design, including a course and management tool
 - Strategic Communication and Visual Design, with activities and tools for managers
 - Coral Reef Restoration, offered as mentored and self-paced online courses, offered in English and Spanish

Addressing Priority Regional Conservation Needs

The Strategic Communication and Visual Design courses were held for the All Islands Coral Reef Committee (AIC) jurisdictions of American Samoa, Florida, Guam, and CNMI. These courses were offered in response to the needs assessment conducted with the AIC and executed in place of in person trainings to offer more tailored support for each jurisdiction. The courses were run independently and were built off the communication planning course we piloted in January 2018 where participants learned key components of strategic communication and applied these concepts to develop communication plans for a project specific to their work.

Strategic Communication Course Content

The Strategic Communication Mentored Online Courses were taught using the [Communication Planning Process](#) in the [Strategic Communications section](#) of the RRN Toolkit. The RRN developed this content based on lessons learned from four in-person trainings using Spitfire Strategies' Smart Chart® strategic communication planning tool. The lessons follow these seven steps of the communication planning process:

- Establish your [goal & objectives](#)
- Assess the [context](#) for your efforts
- Identify your target [audience\(s\)](#)
- Make your [message](#) matter,
- Identify [messengers & tactics](#) for communicating your messages
- [Measure](#) your impact
- Create a [summary of your](#) plan

Course mentors included:

- Kristen Maize, Strategic Communication Manager, The Nature Conservancy
- Cherie Wagner, Program Coordinator, The Nature Conservancy
- Jennifer Barrett, Island Connect Consulting

Strategic Communication Course Components

Each mentored course was comprised of the following elements:

Online course content

Participants were encouraged to work their way through the [online course content](#) *independently* according to deadlines established in the course syllabus.

The online course is broken into several modules which each include a variety of resources including: a narrative summary; video overview (5-15 minutes each); quizzes; real-life examples illustrating the concepts presented; downloadable worksheets, and additional resources.

Private group in Network Forum

A private group was created in the Network Forum for each of the participating jurisdictions. The private group served as a repository for all materials related to the course (e.g., syllabus, links to worksheets, etc.). Participants were encouraged to use the group space for any questions and correspondence related to the course.

Worksheets

For each section of the online course, participants completed a worksheet and then uploaded it to their private group in the Network Forum.

Written feedback

Course instructors provided written feedback on each worksheet. Since all worksheets were distributed as Microsoft Word files, feedback was shared using the comment and 'track changes' features in MS Word and then uploaded to the private group in the Network Forum.

Live calls

A series of 4-5 calls were conducted with each jurisdiction. The purpose of the calls was to: review the completed course modules, discuss the written feedback and any questions related to the worksheets, share any helpful prep for the upcoming section, and check-in on the overall course timeline, and adjust if needed.

At course completion, all jurisdictions had a draft strategic communication plan to promote coral conservation, a project timeline, and clear actionable next steps to execute the plan. RRN brought on a communication contractor to help manage the courses.

Visual Design Course Content

RRN also provided tailored visual design mentorship to the jurisdictions as they completed their communication plans. We brought on a graphic design contractor to lead the month-long Visual Design Mentored Online Courses as complementary components to the Strategic Communication Mentored Online Courses. The designer provided tailored support based on the participants' requests to either design a product themselves or have the designer execute design work for them.

Course mentors included:

- Kristen Maize, Strategic Communication Manager, The Nature Conservancy
- Cherie Wagner, Program Coordinator, The Nature Conservancy
- Stephanie Chang, Stephanie Chang Design Ink

Visual Design Course Components

The purpose of the course was to familiarize the jurisdictional teams with the elements of a visual piece, and the best practices for creating an effective visual piece. A webinar, Visual Design Best Practices for Conservation, was created to share this key content and provide guidance for the team to work successfully with a professional designer in the future or if designing a visual piece in house.

A summary sheet of the webinar, titled Visual Design Best Practices Handout, was also created and provided to the teams. The second purpose of the course is to produce a visual piece that could be put into use immediately by the conclusion of the course. The pieces were produced to support each jurisdiction's ability to make progress on their communication plan and objective. American Samoa chose to design their own piece in house. Florida, Guam and CNMI chose to have the designer design the piece. Some of the resources from the course can be viewed on the RRN Toolkit [here](#).

Each mentored course was comprised of the following elements:

- Teams watched the 1.25 hour long webinar in advance of the first call. The webinar offered visual design best practices by breaking down the components of a visual piece and conveyed the best practices for creating an effective visual piece. Teams were provided a summary sheet of the webinar in advance of the call.
- On the first call, teams arrived already having watched the webinar. The purpose of the call was to recap fundamentals of visual design best practices and reach an agreement on the type of piece that would meet their needs. The purpose, concepts, components — messaging and/or content, and photos and/or visuals needed — and approach of the piece was also discussed. The call included:
 - Introductions (5 mins)

- Recap of key points using handout (10 mins)
 - Q&A about visual design best practices (30 mins)
 - Jurisdiction presents communication plan (5-10 mins)
 - Discuss design project (30 mins)
- Before the second phone call teams gathered all items needed for design by an agreed upon date — copy for content, photos of their place or anything necessary to complete the visual piece — and uploaded content to the forum. Completed draft designs were uploaded to the Forum by a designated date in advance of the second phone call.
 - The purpose of second call was to review the draft of the design. The designer walked the group through decisions that were made and why. The group had a chance to ask questions, voice opinions, and request changes or edits.
 - Design pieces were edited and follow up was made with the teams with the completed design. In some instances, a third call was scheduled to go over the second draft of the visual piece. All visual pieces were finalized and shared with the jurisdictions for their use.

Visual Design Projects

American Samoa (September 2018)

A two-sided brochure to address overfishing was created for the target audience – untitled fisherman within Marine Protected Areas (MPA) villages. In addition to educating about fishing best practices in the area, and reminding about the existing regulations, a key goal was to express the importance to village communities.

Florida (October 2018)

A rack card that would be placed in Florida Welcome Centers to reach fisherman who come to Florida to fish and encourage fishermen to play a role in responsible fishing practices that care for the reef was created.

Guam (February 2019)

A two-sided 8.5 x 11 one-sheet was created to use with legislators and other high level decision makers to bring the Guam Reef Resilience Strategy to their attention, and encourage them to take action on and provide funding for the recommendations in the strategy.

CNMI (April 2019)

An infographic was created to convey how the recommended actions prevent contaminated oceans for their clean water campaign. The infographic will enhance the existing campaign materials including a flyer, property pledge, and magnet.

Participant Feedback

Strategic Communications

Participants were asked to complete a survey at the end of the training so the Network can measure progress towards specific training objectives and gain feedback on how to improve the courses. The feedback below represents the collective responses from 5 respondents from American Samoa and Florida. Overall, respondents strongly agreed or agreed (100%) that the online content, worksheets, and calls were useful for understanding the course content.

Overall, respondents replied that the pace of the course was ‘just right’ and that the course met their expectations. Topics or skills respondents would have liked more information on include: writing up a strategic communication plan for an organization that targets multiple audiences, more examples of communication plans, more information on improving development of SMART goals and objectives, and further information on ways to learn about your target audiences.

Visual Design

A survey was also conducted at the conclusion of the Visual Design Course. Comments from respondents included:

- “The visual aid is effective in highlighting the main topics of discussion that we would like our audience to take away from our outreach or presentations. It is also a good guide during face to face interactions with our audience to ensure that we hit the main point of discussions.”
- “It would be really helpful if the course was conducted in a classroom setting, so that feedback is given and changes can be made immediately.”
- “Really happy with the product. Way better than anything I could have done. Process was so useful! Great experience to learn how to work with a designer.”

Appendix D: Restoration Online Course

Executive Summary

With the support of the National Oceanic and Atmospheric Administration's Coral Reef Conservation Program, 86 participants from 29 countries and territories obtained instruction through a 6-week long mentored online course in Coral Reef Restoration. The mentored course combined six self-paced lessons, workbook activities and assessments, interactive webinars with global experts, and discussions with other course participants and mentors on the Reef Resilience Network Forum. Participants of this course were guided through content developed by the Reef Resilience Network and many partners to obtain a broad and diverse background understanding of key concepts, approaches, best practices, and the application of restoration in the context of coral reef ecosystems.

Introduction

Coral reef restoration is a rapidly growing field within coral reef conservation and management agencies. However, to date many advances in reef restoration have been driven by technical practitioners and local community groups, and many marine resource managers are in need of resources and guidance to identify how restoration can best fit within and meet broader management priorities specific to their local needs. Additionally, there are numerous approaches and techniques being applied under the umbrella of coral reef restoration, including methods to promote recovery of coral populations, repair damaged reef structure, and enhance processes for healthy reef functioning. Numerous and ever-increasing approaches being used across the globe creates confusion and a need for managers to obtain guidance on a suite of options and best practices for each.

As managers increasingly seek to use restoration as a tool to enhance coral reef recovery and mitigate degradation, the Reef Resilience Network has partnered with several leading organizations and communities of practice to provide an overview of best practices and planning guidance for reef managers on coral reef restoration. Through six topic-specific lessons, the Restoration Online Course presents a broad suite of commonly-used methods and approaches for reef-specific restoration that is situated within knowledge of ecological restoration learned from decades in other habitats.

Reef Resilience Background and Training Objectives

The Reef Resilience Network is a partnership led by The Nature Conservancy that builds the capacity of coral reef managers and practitioners around the world to address impacts on coral reefs from climate change and other stressors. Network in-person and online training activities have reached 75% of all countries and territories with reefs.

Current Reef Resilience Network accomplishments include:

- A state-of-the-art website providing a comprehensive suite of training and knowledge-sharing resources benefiting coral reef managers, with over 180,000 visitors annually
- A searchable database of 60+ case studies and 130+ summaries of cutting-edge coral reef and resilience-related scientific articles
- In-person training for 1,850+ managers

- [Reef Resilience Network online courses](#) designed to provide easy access to the latest science and strategies for managing coral reefs, offered in:
 - Coral Reef Resilience, in introductory and advanced options, offered in English, Spanish and French
 - Climate Change Adaptation Design, including a course and management tool
 - Strategic Communication and Visual Design, with activities and tools for managers
 - Coral Reef Restoration, offered as mentored and self-paced online courses

Addressing Priority Regional Conservation Needs

In 2016, after identifying restoration as an increasing topic of interest from reef managers, the Reef Resilience Network conducted a survey of reef managers in their network on their interests and resource needs on this topic. Responses from over 140 managers in nearly 50 countries and territories (representing all major reef regions globally) provided evidence of great excitement for resources on this topic. From this survey, the first iteration of the Reef Resilience Network Toolkit Restoration Section was developed. In addition, a 2017 needs assessment conducted by the Reef Resilience Network of reef managers from the U.S. coral reef jurisdictions (i.e., the United States All Islands Coral Reef Committee) (AIC) identified coral reef restoration as a shared top priority need for reef managers across all of the jurisdictions.

To address the needs of managers from the U.S. jurisdictions and globally, we developed the Restoration Online Course from updated online Toolkit content and new guidance manuals recently published by various partners. We worked closely with numerous content experts, partner programs within TNC (e.g., Mexico/Central America and Florida Programs) and organizations (e.g., NOAA, U.S. EPA, AIC), and communities of practice (e.g., the Coral Restoration Consortium, Reef Restoration and Adaptation Program in Australia), to create 6 topic-specific lessons that incorporate a broad and diverse range of knowledge and approaches.

The online course development and mentored course built on more than a decade of successful online trainings developed and provided through the Reef Resilience Network. Training objectives for the Restoration Online Course were to:

- Help reef managers understand the broader content and appropriate use of restoration with or in place of other management strategies, as restoration is a new, riskier, and more costly endeavor than other more conventional management actions
- Guide managers through a strategic planning and decision-making process to ensure higher success of their restoration programs, including setting objectives and identifying restoration actions and stakeholders specific to those objectives
- Provide an overview of both conventional and emerging techniques used for restoring different aspects of coral reef ecosystems, including coral populations and the physical reef structure

- Provide guidance on rapid response plans for various kinds of reef disturbances, as well as on monitoring coral colonies and reef habitats to identify reef recovery over time
- Connect managers to their peers, expert mentors, and communities of practice (e.g., the Coral Restoration Consortium) to provide opportunities for continued learning and support after the course
- Share key training materials with managers throughout the globe, through the Reef Resilience Toolkit (reefresilience.org) and online Forum

Online Course Lessons

The Restoration Online Course lessons were created by the Reef Resilience Network with assistance from numerous expert reviewers from the Coral Restoration Consortium, Reef Restoration and Adaptation Program in Australia, and staff from several of The Nature Conservancy field offices. The course consists of six lessons that are topically-specific and take approximately 2 hours to complete. These lessons are based on content on the [Reef Resilience Network Toolkit Restoration section](#), that summarizes numerous guides spanning different topics in coral reef restoration.

The Reef Resilience Toolkit restoration content was initially developed in partnership with leading members of the [Coral Restoration Consortium](#) and has expanded with additional resources and partnerships. Scripting and review of the online course lessons were led by Reef Resilience Network staff, Elizabeth Shaver (Science Lead) and Cherie Wagner (Program Coordinator), with numerous experts either contributing or reviewing the lesson content (described below).

This course is designed to provide coral reef managers and practitioners with best practice guidance for common coral reef restoration techniques, including strategic planning and decision-making for coral restoration, enhancing coral populations through gardening and larval propagation, restoring reef structure for coastal protection services, rapid restoration response after acute disturbances, and monitoring for restoration success. Lessons incorporate new science, case studies, and management practices. An overview of the lessons is below:

Lesson 1: Introduction to Restoration and Project Planning

This lesson introduces the general theory and practice of ecological restoration and its use in coral reef ecosystems and provides a guided process for planning a coral reef restoration project, from setting objectives through determining on-the-ground restoration actions. This lesson was based on the *Manager's Guide for Coral Reef Restoration Planning and Design*, developed by Elizabeth Shaver (TNC), Kitty Courtney (TetraTech), Cherie Wagner (TNC), Petra MacGowan (TNC), Jordan West (U.S. Environmental Protection Agency), Kristine Bucchianeri (U.S. All Islands Coral Reef Committee), Jason Philibotte (NOAA Coral Reef Conservation Program), Jennifer Koss (NOAA Coral Reef Conservation Program), Ian McLeod (James Cook University), and Lisa Bostrom-Einarsson (James Cook University).

Lesson 2: Restoring Coral Populations with Coral Gardening

This lesson describes the steps involved with restoring populations of hard corals through coral gardening practices. This lesson covers topics such as collecting coral fragments from reefs, types of coral nurseries, propagating new coral fragments in nurseries, and transplanting corals onto reefs. This lesson was reviewed by several restoration practitioner experts from the Coral Restoration Consortium, including Elizabeth Goergen (NOAA and Qatar University) and Jessica Levy (Coral Restoration Foundation).

Lesson 3: Restoring Coral Populations with Larval Propagation

This lesson describes the steps involved with the emerging coral population enhancement techniques of larval propagation. This lesson includes information on coral's natural sexual reproduction process, collecting and fertilizing coral gametes, rearing new coral larvae and promoting settlement onto the reef or artificial structures, and outplanting. The content in this lesson was written in close partnership with [SECORE International](#) and other experts, including Aric Bickel and Margaret Miller (SECORE International), and Anastasia Banaszak (Universidad Nacional Autónoma de México).

Lesson 4: Restoring Reef Structure for Coastal Resilience

This lesson describes restoring the physical structure of coral reef ecosystems, an important intervention for habitats that have been damaged, degraded, or become unsuitable for coral larval settlement. This lesson is based on the [Guidance Document for Reef Management and Restoration to Improve Coastal Protection: Recommendations for Global Applications Based on Lessons Learned in Mexico](#) (Zepeda-Centeno et al. 2018) from The Nature Conservancy's Mexico and Central American Program, with significant contributions from Calina Zepeda (TNC). Reviewers also included Lizzie McLeod (TNC), Boze Hancock (TNC), and Rosa Rodríguez Martínez (Universidad Nacional Autónoma de México).

Lesson 5: Rapid Response and Emergency Restoration

This lesson describes how to prepare for, respond to, and then repair coral reef ecosystems after events that cause acute physical damage on reefs. Recommendations in this lesson focus on responding to three types of events: tropical storms, vessel groundings, and disease outbreaks. Much of this lesson was developed from the [Early Warning and Immediate Response Protocol for Tropical Cyclone Reef Impact in Puerto Morelos Reef National Park](#) (Spanish version; Zepeda-Centeno et al. 2018) from The Nature Conservancy's Mexico and Central American Program, with significant contributions from Calina Zepeda (TNC). Reviewers also included Ian McLeod (James Cook University) and Adam Smith (Reef Ecologic).

Lesson 6: Monitoring for Restoration

This lesson describes monitoring approaches to help evaluate the success and development of a coral reef restoration project. This lesson discusses current practices in restoration monitoring, including methods and metrics for assessing individual coral colonies and the broader ecological effects of

restoration on reef habitats. This lesson also provides recommendations for standard monitoring metrics that can be used to help compare across projects. Contributions and reviews to this content were provided by Ian McLeod (James Cook University), Margaux Hein (James Cook University), Lisa Bostrom-Einarsson (James Cook University), and Liz Georgen (NOAA and Qatar University).

Mentored Online Course

Overview

The Restoration Mentored Online Course ran for six weeks from April 15 - May 24, 2019. This mentored training was designed as a 20-hour time commitment, and featured interactive lessons with quizzes, hands-on exercises, webinars, and interaction with experts and other managers. Through each of the lessons, managers were guided through current best practices for restoring coral reef ecosystems, beginning with a robust planning and decision-making program, followed by descriptions of common methodologies and techniques, and ending with monitoring guidelines and approaches. The course schedule was as follows:

- March 15 - April 16: Course registration
- April 15: **Webinar 1** – Course Orientation and Introductory Webinar (1 hour)
- April 16 - May 6: Complete Lessons 1-3 (1 week per lesson) and participate in discussion with course mentors and other participants on the Network Forum (6.5 hours)
- May 7: **Webinar 2** – Lesson 1-3 Review and Expert Mentor Q&A (1.5 hours)
- May 8 - 24: Complete Lessons 4-6 (1 week per lesson) and participate in discussion with course mentors and other participants on the Network Forum (6.5 hours)
- May 23: **Webinar 3** – Lesson 4-6 Review and Expert Mentor Q&A (1.5 hours)

Course Mentors

- Dr. Elizabeth Shaver, Science Lead, Reef Resilience Network, The Nature Conservancy (all lessons)
- Cherie Wagner, Program Coordinator, Reef Resilience Network, The Nature Conservancy (all lessons)
- Dr. Jordan West, Senior Ecologist, Office of Research & Development, U.S. Environmental Protection Agency (Lesson 1)
- Dr. Phanor Montoya-Maya, Co-founder, Corales de Paz (Lesson 2)
- Jessica Levy, Science and Education Director, Coral Restoration Foundation (Lesson 2)
- Dr. Anastasia Banaszak, Research Professor, Universidad Nacional Autonoma de México (Lesson 3)
- Calina Zepeda, Restoration Specialist, Mexico and Central America Program, The Nature Conservancy (Lesson 4 and Lesson 5)
- Dr. Liz Georgen, Postdoctoral Researcher, NOAA and Qatar University (Lesson 6)
- Dr. Ian McLeod, Marine Biologist and Principle Research Scientist, Reef Restoration and Adaptation Program, James Cook University (Lesson 6)

Course Participants

The mentored course had 335 enrolled users, with 86 people from 29 countries and territories completing all six lessons. See the table below for details on participant organizations and countries.

Participant Organizations & Countries

Organization	Country/Territory
Coral Reef Advisory Group	American Samoa
Department of Environment	Antigua and Barbuda
ScubbleBubbles	Aruba
Adrenalin Snorkel & Dive	Australia
Reef Ecologic	Australia
Coastal Zone Management Unit	Barbados
STENAPA	Bonaire
Eco Divers Reef Foundation	Cayman Islands
Bureau of Environmental and Coastal Quality	Commonwealth of the Northern Mariana Islands
Equilibrio Azul	Ecuador
DEAL de Mayotte	France
Community Centered Conservation (C3)	Great Britain
Grenada Fisheries Division, MPA Unit	Grenada
Guam Department of Agriculture, Division of Aquatic and Wildlife Resources	Guam
Guam Environmental Protection Agency	Guam
National Park Service	Guam
Utopia Village Resort	Honduras
Haifa University	Israel
Centre for Marine Sciences	Jamaica
Discovery Bay Marine Lab & Field Station	Jamaica
Ministry of Industry, Commerce, Agriculture & Fisheries	Jamaica
Oracabessa and Boscobel Bay Fish Sanctuaries	Jamaica
Oseuri Limited	Kenya
Pwani University	Kenya
REEFolution	Kenya
Seacology Foundation	Kenya
Mangily Scuba	Madagascar
James Cook University	Mauritius
Reef Conservation	Mauritius

Organization	Country/Territory
Shoals Rodrigues	Mauritius
Sundivers ltd	Mauritius
WiseOceans	Mauritius
Autonomous University of Yucatan	Mexico
Global Vision International	Mexico
Herencia Social Natural y cultural	Mexico
Takata Research Center	Mexico
Universidade Lurio	Mexico
Université de La Réunion	Réunion
Global Vision International	Seychelles
Seychelles National Parks Authority	Seychelles
Nature Foundation St Maarten	Sint Maarten
Nuarro Eco Dive Center	South Africa
Tropical Research and Conservation Centre	Switzerland
Kitu Kiblu: Responsible Marine Encounters	Tanzania
University of Dar es Salaam, Institute of Marine Sciences	Tanzania
New Heaven Reef Conservation Program	Thailand
Environmental Protection Agency	United States of America
Florida Fish and Wildlife Research Institute	United States of America
Hawaii Division of Aquatic Resources	United States of America
Heirs To Our Oceans	United States of America
Hilo High School	United States of America
National Oceanic and Atmospheric Administration	United States of America
National Park Service	United States of America
Naval Facilities Engineering Command Pacific	United States of America
New York Aquarium	United States of America
Oak Ridge Institute of Science and Education	United States of America
PADI	United States of America
Tetra Tech	United States of America
The Nature Conservancy	United States of America
University of California Santa Barbara	United States of America
University of Delaware	United States of America
Velaa Private Island	United States of America
Zavora Marine Lab	United States of America
National Oceanic and Atmospheric Administration, Fisheries	U.S. Virgin Islands

Course Components

Webinars

The Restoration Mentored Course included three webinars spaced throughout the six-week course that occurred at varied times to allow for participation across different regions and time zones. Each webinar included multiple presenters and course mentors as well as interactive poll questions to understand participant's regions and type of work and gauge their thoughts on course content. Additionally, webinars were recorded and posted online for later access.

The first webinar was an Orientation and Introductory Webinar that kicked off the course on the first day. This webinar took place on April 15 at 3:00 PM EDT to reach the Caribbean and eastern Pacific regions (e.g., Hawaii). During this webinar, an overview was provided on the Reef Resilience Network (given by Elizabeth Shaver, Science Lead, RRN), the NOAA Coral Reef Conservation Program (given by Jason Philibotte, International Lead, NOAA CRCP), and the Coral Restoration Consortium (Tom Moore, Coral Reef Restoration Program Manager, NOAA Restoration Center). Elizabeth Shaver then provided information on the course schedule, requirements for course completion, and the course mentors involved in each lesson, and introduction to the first 3 lessons of the online course, followed by an orientation on how to register and access the online course lessons and the Network Forum (given by Cherie Wagner, Program Coordinator, RRN). A Question & Answer session at the end of the webinar allowed participants to ask general questions about the course, mentors, and requirements. This webinar was widely attended by 133 participants.

The second webinar occurred halfway through the course on May 7 at 9:00 AM EDT to reach the Western Indian Ocean and Caribbean regions. This webinar focused on reviewing concepts presented in the first three lessons of the course (Lessons 1-3). This session provided a more in-depth overview of the content in each lesson, as well as participant feedback and additional resources on concepts that many people appeared to struggle with in their Network Forum postings (given by Elizabeth Shaver, RRN). These reviews were then followed by 20 minutes of open Question & Answer for each lesson with expert mentors (Jordan West for Lesson 1, Jessica Levy for Lesson 2, and Anastazia Banaszak for Lesson 3). The webinar concluded with a quick introduction to the next 3 lessons of the course (Lessons 4-6) and a review of the course schedule. This webinar was attended by 77 participants.

The third and final webinar occurred at the end of the last week of the course on May 23 at 7:00 PM EDT to reach Australia and the Pacific. This webinar focused on reviewing concepts presented in the last three lessons of the course (Lessons 4-6). More in-depth overviews of each lesson, and feedback and additional resources on identified Network Forum concepts was provided by Elizabeth Shaver. Reviews were followed by 20 minutes of open Question & Answer for each lesson with expert mentors (Calina Zepeda, TNC, for Lesson 4 and 5, and Ian McLeod, James Cook University, for Lesson 6). The webinar concluded with information on how participants can continue their education in coral reef restoration and remain involved in a broader restoration community through the Coral Restoration Consortium, provided by the Consortium's Coordinator, Michelle Loewe (NOAA). This webinar was attended by 34 participants.

Surveys were given at the end of each webinar to collect feedback from course participants and inform changes to upcoming webinar content or logistics for the course.

Webinars viewing statistics:

Webinar Title	Attendees	# Views Online
Orientation Webinar	133	310
Webinar 2 (Lesson 1-3 Review and Question & Answer with Course Mentors)	77	156
Webinar 3 (Lesson 4-6 Review and Question & Answer with Course Mentors)	34	60

Assignments

In order to obtain a course completion certificate, participants were required to complete all six lessons and score a 75% or higher on their lesson assessments for Lessons 2-6 (Lesson 1 did not include a lesson assessment as this lesson was based on the Manager’s Guide workbook activities). In addition, participants had to complete a 10-question survey at the conclusion of the course that asked for their input on course content, use of the Network Forum and webinars, and course length.

In addition to these requirements, course participants also had optional discussion questions to post in the Reef Resilient Network Forum. Although these questions were optional and not required for the certificate, participation in this aspect of the course was very high. Below are the number of people who participated in discussion postings for each lesson:

Lesson	Question	# People
Lesson 1: Introduction to Restoration and Project Planning	Thinking about your location, what would the major objectives of a restoration program be and what restoration actions and stakeholder partners would be most critical for achieving these objectives?	68
Lesson 2: Restoring Coral Populations with Coral Gardening	If you have conducted coral gardening, what has worked or not worked well and why? If you have not conducted coral gardening, describe the location and structures you would consider for a restoration program in your area and why.	60
Lesson 3: Restoring Coral Populations with Larval Propagation	If you have conducted larval propagation, what has worked or not worked well and why? If you have not conducted larval propagation, describe how you think these techniques could be used in your location to promote reef recovery.	54

Lesson	Question	# People
Lesson 4: Restoring Reef Structure for Coastal Resilience	Identify and describe a location where you work (a coastline, reef, or reef system) that could be a good candidate for physical reef restoration or reef mimicry. What techniques would you choose for this location and why?	45
Lesson 5: Rapid Response and Emergency Restoration	Tell others about an event in which immediate response was needed to mitigate damage to a coral reef(s) in your location. Do you have a response plan in place and how could a response plan with local partners be used for an event in the future?	46
Lesson 6: Monitoring for Restoration	Describe a proposed monitoring plan for your location. Include the metrics you would choose to measure, how they relate to your objectives, and how long you would track these components.	34

Reef Resilience Network Forum

Course participants were additionally encouraged to introduce themselves to other students and interact with expert mentors through the Network Forum. Overall, 41 participants provided information about themselves, their location, and focus of their work for others to read. For each lesson, a discussion topic was started by the mentor specifically for content-related questions.

Course Feedback

Participants were asked to complete a survey at the end of the training to measure RRN progress towards specific training objectives and gain feedback on how to improve the restoration online course. Seventy-one participants responded to the survey.

Overall Course

The majority of respondents found the course to be useful for building their skills in coral reef restoration (65% “completely agreed”, 28% “mostly agreed”; 93% total). The majority (92%) of respondents also felt that the course length of six weeks was “just right” (the remainder of respondents felt it was too short). Aside from a few additional comments of technical difficulties experienced by respondents, the majority of comments can be summarized by the statements below:

- *This was a very useful course! I liked the combination of webinars, self-guided work, and forums. You assembled a great panel of experts to contribute and it was useful to hear real-world examples.*
- *This course was incredible. It was of great help to improve my knowledge about restoration techniques and I also learned new things that I can put into practice in the future. The support of the mentors was also spectacular, always supporting and answering questions. I am very satisfied with this course, excellent work. Many thanks.*

- *I enjoyed reading through the materials and the resources made available during the course. The content appeared to be presented in a way that was easy enough for persons who may not be experienced with the topics to understand, but comprehensive enough to keep more experienced participants engaged. Facilitators and mentors were extremely knowledgeable and gracious in their interactions.*
- *I think building skills in coral reef restoration will be exponentially enhanced through practical application and involvement. There is only so much you can understand about practical elements from a theoretical training program.*

When asked how much respondents believed the concepts taught in the course would improve their work outcomes, the majority (52%) of respondents believed the concepts would “help me significantly”, followed by would “help me a moderate amount” (32%). Overall, 97% of respondents agreed that further training would help them with implementing coral reef restoration, with 70% suggesting both more online and in-person trainings followed by 14% suggesting more online training and 13% suggesting in-person training.

In terms of overall satisfaction with the course, 96% of respondents rated the course very highly, either as 5 stars (exceeded expectations, 41%) or 4 stars (met my expectations, 55%). Additionally, 100% of respondents would recommend this course to a colleague.

Lesson Content

The majority of respondents agreed that the lessons were clear and comprehensible (82% “completely agreed”, 15% “mostly agreed”; 97% total) and were easy to navigate (75% “completely agreed”, 21% “mostly agreed”; 96% total).

In terms of specific lesson content, the majority of respondents felt that they obtained a level of “comprehensive knowledge” (answer 2 of 5) for all topics (general ecological restoration = 49%; planning restoration programs = 44%; coral gardening = 54%; structural restoration = 48%; rapid response = 41%; and monitoring = 48%). One exception to this trend was “larval (sexual) propagation techniques” where most respondents felt they obtained “solid knowledge” of the topic (answer 3 of 5). For all topics, the second most answered level of knowledge was “solid knowledge”. Thus, most respondents felt they received comprehensive or solid knowledge for all the topics covered in this online course.

Webinars

Most respondents “mostly agreed” that the webinars were useful for reviewing the content (49%) with an additional 30% “completely agreeing” with this statement (79% total). Respondents were asked to provide more explanation if they answered in the bottom 3 answers (“agree”, “somewhat agree”, or “do not agree”).

Forum

The majority of respondents “completely agreed” that the discussion forum was useful for asking questions of the mentors (38%), although responses to this question were more equally spread amongst those who “mostly agreed” (32%) and “agreed” (20%) with this statement. Respondents were asked to provide more explanation if they answered in the bottom 3 answers (“agree”, “somewhat agree”, or “do not agree”).

Lessons Learned and Recommendations

Structure of Course

This course was considerably longer than other course provided, because of the nature of restoration being a large field within the broader context of conservation that spans many disparate topics. Thus, each lesson is large and specific to a certain topic that may or may not be related to all of the other lesson topics. Because of this, there was a lot of material to cover over six weeks, and a need to have different expert mentors for each lesson. Some participants felt that there was not enough time to write in the Network Forum and only have access to mentors for the allotted week of that lesson; however, it would be too much to ask for mentors to be available for the duration of this six week-long course. Thus, a different structure could be smaller, more topic-oriented courses that include 1-3 of the online course lessons that are related to each other. For example, mini-courses could include:

- Restoration Planning and Design (Lesson 1)
- Coral Population Recovery (Lesson 2, 3, 6)
- Physical Reef Restoration, Repair, and Rapid Response (Lesson 4 and 5)
- Or, individual short courses on individual lessons

Conducting short courses in this way would allow for more time to be given for participants to finish lessons, less expert mentors who could spend more time with fewer Forum postings or number of participating students, and less traffic on the Network Forum allowing for increased exchange amongst participants with mentors and each other. In addition, these courses could be paired with in-person trainings and offered as “advanced” courses, as many people noted that they require additional hands-on support to be able to implement restoration.

Course Content

- Lesson content could include more real-world examples or case studies throughout and more interactive features such as additional worksheets to complete - one suggestion included having participants write a draft rapid response plan
- Additional topics were suggested by survey respondents - which could be further developed in the online course lessons or developed as separate resources through partners. These topics and requests for additional resources and information included:
 - Photomosaic technology
 - “Blueprints” for designing and building nurseries
 - Stabilizing reef structure and coral rubble

- Site and coral species selection
- Ex-situ or land-based coral nurseries, especially for larval propagation
- Enhancing reef processes like coral recruitment
- Practical “hands-on” videos of people doing different restoration techniques
- Involving local community members in restoration
- Costs of restoration projects

Course Webinars

- In future mentored course, we could have more participation from expert mentors in course webinars, including short presentations from mentors

Course Forum

- Some of the forum discussion questions were difficult for people to answer who are not currently working on any coral reef restoration projects. It may be useful to increase the participation of these people in the forum in the future if some “case study” examples were provided, and participants were asked to apply knowledge from the lesson to answer the forum discussion question