Pew Fellows Program in Marine Conservation News and Updates

August—September 2019

Inside this issue:

Outcomes of Pew Marine Fellowship Projects and Program

Evidence of ocean warming in Uruguay's fisheries landings: The mean temperature of the catch approach: Omar Defeo ('10)

Source: Inter-Research

Oceans across the planet are warming, but some areas are heating up much more rapidly than others. The South Atlantic "blob" off Uruguay's coast is changing especially quickly, according to new research, with significant impacts for the country's fisheries. In a paper published 29 August 2019 in *Marine Ecology Press Series,* Omar Defeo, professor at Universidad de la República in Montevideo, and colleagues present the first quantitative evidence that ocean warming has been increasingly affecting Uruguayan industrial fisheries in recent decades. The authors explain, "Managers and decision makers have often left aside the effects of climate change on fisheries to focus on traditional fisheries management and the pressing threat of overfishing. However, the present study suggests that there is a need to consider the effects of environmental changes to properly manage stocks located in a dy-namic warming hotspot, particularly those shared by neighboring countries." Defeo is also quoted in a 11 September article in *The Washington Post* about expanding marine hot zones.

To read the paper, go to: https://www.int-res.com/abstracts/meps/v625/p115-125/

To read the Washington Post article, go to: https://www.washingtonpost.com/graphics/2019/national/climate-environment/climate-change-world/

Genetic diversity increases with depth in red gorgonian populations of the Mediterranean Sea and the Atlantic Ocean: Ester Serrão ('17)

Source: PeerJ

Paramuricea clavata — Photo by Parent Géry / Wikimedia

Found throughout the north-eastern Atlantic Ocean and the north-western Mediterranean Sea, red gorgonians (*Paramuricea clavata*) are long-lived soft corals that occupy rocky habitats between 10—120 meters depth. Shallower habitats within this range offer greater access to re-sources compared to deeper locations, supporting the formation of large, well-connected red gorgonian populations. However, these sites are also subject to greater fluctuations in water temperature, and thermal stress can lead to population bottlenecks and genetic erosion that can subvert assumptions about population dynamics. In a new study, published 24 May 2019 in *PeerJ*, Ester Serrão, associate professor at the University of Algarve, and colleagues examined how genetic diversity varies with depth for red gorgonians in the Atlantic Ocean and the Mediterranean Sea. They found that gorgonians living in shallow waters tended to be less genetically diverse than those at deeper sites, which experience much more stable conditions. The team concludes that the findings may be important for guiding conservation efforts, saying "the identification of deep isolated areas with high conservation val-ue for the red gorgonian represents an important step in the face of ongoing and future climate changes."

To read the paper, go to: https://peerj.com/articles/6794/

Edited by Polita Glynn, Project Director, Pew Marine Fellows Program (pglynn@pewtrusts.org) and Nate Fedrizzi, Senior Associate, nfedrizzi@pewtrusts.org)

Managing recovery resilience in coral reefs against climate-induced bleaching and hurricanes: A 15-year case study from Bonaire, Dutch Caribbean: Robert Steneck ('98) and Peter Mumby ('10)

Source: Frontiers in Marine Science

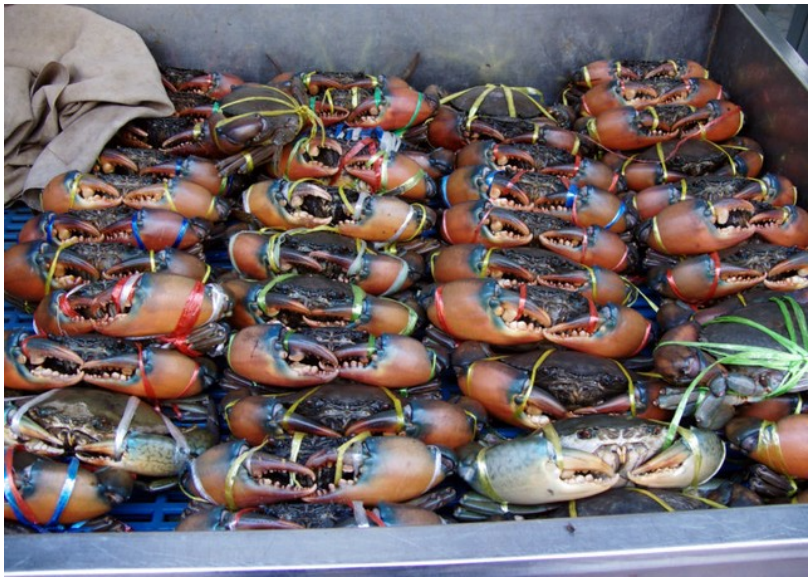
Coral mortality due to climate change is inevitable, but resilient reefs have the potential to recover from bleaching events and damage from intense storms under certain conditions. Reef-wide recoveries have been well documented in the tropical Indo-Pacific, but comparable recoveries had never been recorded in Caribbean—until now. In a new paper, published 7 July 2019 in *Frontiers in Marine Science*, a team of scientists, including Robert Steneck, professor at the University of Maine, Peter Mumby, professor at the University of Queensland, and colleagues present the first documented case of a Caribbean reef ecosystem fully recovering from a severe climate-related mortality event. The researchers monitored the distribution and abundance of reef fish, coral, algae, and juvenile corals on a reef on the island of Bonaire, Dutch Caribbean every other year from 2003 to 2017. At the start of the study, coral was abundant and macroalgae was optimally scarce. By 2010, coral cover had fallen 22 percent and macroalgal cover had tripled due to disturbances from a 2008 hurricane and 2010 bleaching event. However, in 2010, Bonaire banned fishing for parrotfish, herbivorous fishes that can reduce or eliminate harmful macroalgae on reefs. As a result, average parrotfish biomass on the reef quickly increased to more than double that reported for reefs in other parts of the Caribbean. And in the years following the ban, macroalgal cover declined and both juvenile coral density and total adult coral cover returned to pre-hurricane and bleaching levels. This recovery, the authors argue, illustrates that maintaining sufficiently high levels of herbivory to control algal abundance can create conditions that facilitate reef recovery. The research is also an outcome of the Pew Marine Fellows Program, as Steneck explains, "The long-term data [collection] that began in 2003 was supported by the Pew Marine Fellows program after our annual meeting there in 2002. At that meeting the managers of Bonaire's marine park were present. The Pew support jump-started a long-lasting collaboration that exists to this day." He concludes, "Science-informed policy is alive and well on the tiny island of Bonaire."

To read the paper, go to: https://www.frontiersin.org/articles/10.3389/fmars.2019.00265/full

Women fishers in Fiji launch a mud crab management plan for their fishery: Sangeeta Mangubhai ('18)

Source: SPC

In a new issue of the *Pacific Community's Women in Fisheries Information Bulletin* published 15 September 2019, Sangeeta Mangubhai and colleagues present a new fisheries management plan in Fiji that emphasizes the role of women in the design and enforcement of management regulations. The three-year plan focuses on mud crabs (*Scylla serrata*), which are valued for their high meat yield and ability to be sold without the need for refrigeration. The authors explain, "Throughout the Pacific, women in fisheries often suffer from a 'culture of silence', where they are constrained in their participation in management discussions that directly affect their livelihoods. Through [this plan] women fishers are playing a key role in managing their own fisheries." Mangubhai, who directs the Fiji program at the Wildlife Conservation Society, also served as editor of the *Bulletin* issue. As her editorial describes, "This 30th issue includes 18 original articles on a diversity of topics, including gender and development, mud crabs, national gender analyses and mangrove management. [It] also highlights two unique and creative approaches that are being used to highlight the vital role that women play in the coastal fisheries sector."



Mud crabs (*Scylla serrata)* for sale in a market — Photo by Dorami Chan / Flickr

To read the article and bulletin, go to: https://coastfish.spc.int/en/publications/bulletins/women-in-fisheries/504

New Publications and Papers

Challenges to natural and human communities from surprising ocean temperatures: Katherine Mills ('18) and Loren McClenachan ('19)

Source: PNAS

Both human communities and natural ecosystems adapt to local environmental conditions through a process of reactive responses to natural variability. However, climate change may accelerate the rate of environmental change above the capacity of communities to adapt and maintain key functions. In a new paper, published 10 September 2019 in Proceedings of the National Academy of Sciences, Kathy Mills, research scientist at the Gulf of Maine Research Institute, Loren McClenachan, assistant professor at Colby College, and colleagues developed a model of human adaption to explore how people are likely to respond to increasingly frequent environmental 'surprises.' They find that these unexpected stress events will increasingly challenge natural modes of adaptation that rely on historical experience, as these backward-facing strategies perform poorly under conditions with a high likelihood of surprise. They also find that in natural systems, future conditions are likely to encourage shifts toward generalist species, reducing their productivity and diversity. The authors note that these dynamics are already underway in reef ecosystems, saying "warming and associated bleaching events are causing a shift to slower-growing [coral] species with wider thermal tolerances as well as lower structural complexity." They explain that for human communities, shifting to forward-looking strategies will be critical for successful climate adaptation. The team concludes, "our results strongly suggest that betting on the status quo will be an increasingly risky strategy."

To read the paper, go to: https://www.pnas.org/content/116/37/18378.short

Linking the scientific knowledge on marine frontal systems with ecosystem services: Claudio Campagna ('04)

Source: Springer

In the marine environment, areas within which the combination of light, turbulence, temperature, and nutrients makes the proliferation of phytoplankton possible, are considered primary production "hot spots." In these hot spots, plankton blooms can be large enough to be seen from space. Such hotspots typically contain marine fronts, i.e water masses with different temperatures, salinities, or densities moving in different directions. Using the shelfbreak front in the Argentine Sea as a study case, scientists recently demonstrated the importance of marine fronts. According to a new study, published 12 July 2019 in *Ambio*, marine fronts fuel primary production, which supports a wide range of ecosystem services including carbon sequestration and fishery production. The study, co-authored by Claudio Campagna, strategic lead on ocean protection at the Wildlife Conservation Society in Argentina, suggests that monitoring plankton blooms with satellites would allow scientists to locate marine fronts and primary production hot spots.

To read the paper, go to: https://link.springer.com/article/10.1007/s13280-019-01222-w

Pressing needs for penguins: P. Dee Boersma ('97) and Pablo Borboroglu ('09)

Source: SCB

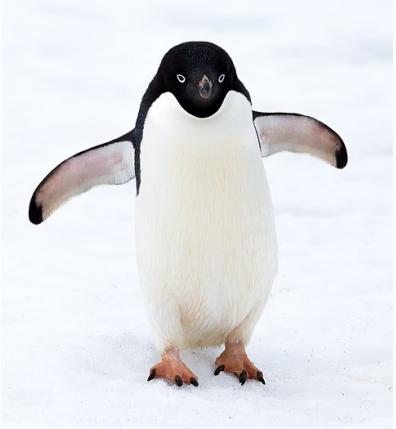
More than half of the world's 18 penguin species are in decline, likely due to impacts from climate change, overfishing, and habitat loss. Recently, the Steering Committee of the International Union for Conservation of Nature Species Survival Commission Penguin Specialist Group convened to develop a consensus on the penguin species in the most immediate need of conservation action. Committee members, including P. Dee Boersma, professor at the University of Washington, and Pablo Borboroglu, founder and President of the Global Penguin Society, used a pairwise-ranking approach to prioritize the conservation of three species: African penguins, Galápagos penguins, and Yellow-eyed penguins. The committee also outlined a plan to prevent the extinction of these species. Their proposal, outlined in an article published 30 June 2019 in *Conservation Biology*, calls for "immediate scientific collaboration and policy intervention." In the article, Boersma, Borboroglu, and colleagues make a strong case that improving marine spatial planning and stakeholder engagement would have a positive impact on the conservation of all penguin populations, not just those most in need of immediate intervention. They also call for the development of species-specific action plans to ensure the conservation community is prepared to respond to an environmental or ecological crisis.

To read the paper, go to: https://onlinelibrary.wiley.com/doi/abs/10.1111/cobi.13378

Scale matters: sea ice and breeding success of Adélie penguins: Yan Ropert-Coudert ('17)

Source: Springer

Adélie penguins (*Pygoscelis adeliae*) are strongly affected by Antarctic sea-ice conditions, to the extent that the species is sometimes used as a proxy for the ecological effects of changes in sea ice. However, until recently, the spatial and temporal scales at which sea-ice affects the reproductive success and survival of these birds were poorly understood. In a new paper, published 5 July 2019 *Polar Biology*, Yan Ropert-Coudert, director of research at France's National Centre for Scientific Research, and colleagues used 23 years of data on penguin breeding success and sea-ice conditions in Pointe Géologie, East Antarctica, to address this knowledge gap. The team found that monthly resolution of sea ice coverage is the most useful temporal scale for explaining variations in reproductive success, rather than the seasonal scale that is typically used. They also found that sea-ice concentrations have the greatest influence on the reproductive success of Adélie penguins during the guard stage—described as the period from a chick's hatching until it reaches 20-30 days old. They conclude, "improving our understanding of the influence of sea ice on breeding outcomes in both space and time scale is a key to better evaluate and anticipate how future sea-ice changes will affect populations and species around Antarctica."



Pygoscelis adeliae — Photo by David Cook / Flickr

To read the paper (available by membership), go to: https://link.springer.com/article/10.1007%2Fs00300-019-02531-2

Social preferences and network structure in a population of reef manta rays: Ricardo Tapilatu ('18)

Source: Springer

Manta rays were once believed to be solitary animals that rarely interacted with their own species outside of mating behaviors. But over the past few decades, researchers have documented mantas engaging in a variety of complex social interactions, suggesting that some elasmobranchs may be more social than previously thought. In a new paper, published 28 June 2019 in *Behavioral Ecology and Sociobiology*, Rick Tapilatu, lecturer at the University of Papua, and colleagues found that manta rays form social relationships and actively select social partners. The researchers analyzed behavioral data from more than 500 groups of reef manta rays (*Mobula alfredi*) in the Raja Ampat Regency of West Papua, collected over a 5-year period. They argue that the findings provide a more complete understanding of the social nature of manta rays, which could aid in future studies of their population responses to anthropogenic pressures, such as disturbances from dive tourism.

To read the paper (available by membership), go to: https://link.springer.com/article/10.1007/s00265-019-2720-x

To read a blog post about the research, go to: https://marinemegafaunafoundation.org/blog/manta-rays-social-bonds-raja-ampat/

Status, trends, and the future of fisheries in the East and South China Seas: Rashid Sumaila ('08)

Source: UBC IOF

Asia's marine waters supply about 50 percent of the global marine fish catch—totaling nearly 110 million tons each year. Effective monitoring of the 13 large marine ecosystems (LMEs) in this region is therefore immensely important to economic security, food security, and livelihoods of countries bordering the East and South China Seas, as well as the health of global marine ecosystems. In a new four-chapter report, Rashid Sumaila, professor at the University of British Columbia, and colleagues review the socio-economic contributions of East and South China Seas fisheries at the LME scale and highlight potential fisheries and ecosystem trade-offs under various management and climate change scenarios. The authors explain that they hope the report will "[help] to inform fisheries policy by highlighting the costs and benefits to society and ecosystems [in the region] if steps are not taken to improve the current state of national and regional fisheries governance. The report was published on 16 July 2019 by the Institute for the Oceans and Fisheries at The University of British Columbia.

To read the report, go to: https://oceans.ubc.ca/2019/07/10/status-trends-and-the-future-of-fisheries-in-the-east-and-

New Publications and Papers

Spawning stock recruitment creates misleading dynamics under predation release in ecosystem and multi-species model: Beth Fulton ('10)

Source: PeerJ

Ecosystem and multi-species models are used to understand the ecosystem-wide effects of fishing, but they aren't always reliable. Many are based on fisheries models that focus on a single, depleted population, and may not always behave as expected in a multi-species context. For example, the spawning stock-recruitment (SSR) relationship, a curve linking the number of juvenile fish to the existing adult biomass, often produces dynamics that are counter-intuitive and change scenario outcomes, according to a new study, published 24 July 2019 in *PeerJ.* The paper, authored by Beth Fulton, research group leader at Australia's Commonwealth Scientific and Industrial Research Organization (CSIRO), presents the problem with the current use of SSR and a solution. The researchers observe that models that rely on the SSR relationship often incorrectly suggest that a depleted population with low resilience will become very productive under persistent predation release. The solution to this problem, they argue, is to limit recruitment to its unfished level. Doing so, they state, would allow for the specification of resilience when a population is depleted, without a sudden and excessive increase when the population expands.

To read the paper, go to: https://peerj.com/articles/7308/

Toward a coordinated global observing system for seagrasses and marine macroalgae: Ester Serrão ('17)

Source: Frontiers in Marine Science

Like terrestrial forests, seagrass meadows and macroalgal forests have immense ecological and cultural value. They provide coastal storm protection, biogeochemical cycling and storage, and habitat for myriad marine species. Unfortunately, these ecosystems, and the socio-economically valuable services they provide, are threatened worldwide by human activities. Substantial areas of seagrass and macroalgal forests have been lost over the last half-century. Now a group of marine forest experts, including Ester Serrão, associate professor at the University of Algarve, are calling on the scientific community to do more to monitor the health of these ecosystems. In a new systematic review, published 4 July 2019 in *Frontiers in Marine Science,* Serrão and colleagues suggest ways in which the monitoring of global marine macrophytes could be vastly improved. The authors recommend establishing a tiered observation system that merges existing collaborative networks to enable contributions from a community of researchers with broad geographic and disciplinary expertise. This system would also improve monitoring efforts by utilizing the latest remote sensing and remote underwater imaging technology. If this system were implemented, the authors argue, scientists would be able to produce a more accurate global picture of change in vegetated coastal systems.

Seagrass meadow in the Florida Keys National Marine Sanctuary — Photo by Heather Dine for NOAA / Flickr

To read the paper, go to: https://www.frontiersin.org/articles/10.3389/fmars.2019.00317/full

New Publications and Papers

Social attributes can drive or deter the sustainability of bottom-up management systems: Stefan Gelcich ('14)

Source: ScienceDirect

Despite the growing popularity of bottom-up, right-based fishery management systems, not all socio-ecological systems are equipped to handle this type of approach. In a recent paper, published 22 June 2019 in *Science of The Total Environment*, Stefan Gelcich, assistant professor at the Pontificia Universidad Católica, and colleagues explore the effect of social attributes on 7, heterogeneous, co-managed, Territorial Use Rights for Fishing (TURFs) areas in the gooseneck barnacle fishery in Asturias, Chile. They find that social factors are key drivers for the sustainability of a bottom-up management system. As the team explains, "The Asturian gooseneck barnacle fishery provides insights on the social attributes that might work as levers for improvement of co-management systems, such as effective enforcement of rules and regulations and the strengthening of cooperation among fishers as a means to escape a small-scale tragedy of the commons."

To read the paper (journal access required,) go to: https://www.sciencedirect.com/science/article/pii/S0048969719328967

Outreach and Commentaries

As planet heats up, scientists race to save reefs: Stephen Palumbi ('96) and Andrew Baker ('08)

Source: WLRN

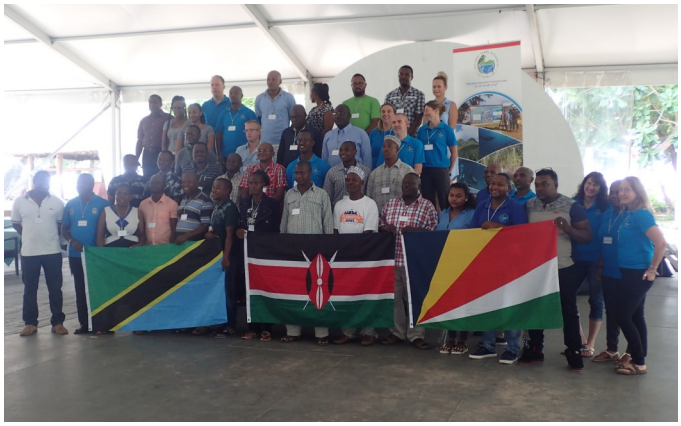
In a new article, published 21 July 2019 on the website of WLRN, South Florida's National Public Radio station, journalist Jenny Staletovich describes the ongoing work to protect Florida's corals from the ravages of disease and climate change. The article interviews Stephen Palumbi, professor at Stanford University, about his work to assess various interventions to increase the resilience of coral reefs as chair of a 12-person committee organized by the National Academies of Sciences, Engineering, and Medicine. The article also interviews Andrew Baker, associate professor at the University of Miami and member of the NAS panel, about his research on a mysterious and virulent disease that is currently wreaking havoc on Florida's corals. The disease first showed up in Florida five years ago, not far from Baker's lab on Virginia Key. It spread quickly and before long was affecting corals along 400 miles of Florida's coast. The disease can infect several different species of corals, but it has had the greatest impact on mounding reef-builders. Baker explains, "It's the most devastating episode of a coral disease on record anywhere in the world."

To read the article, go to: https://www.wlrn.org/post/planet-heats-scientists-race-save-reefs

Linking research and action for effective conservation: Jennifer O'Leary ('16)

Source: Seychelles Nation

From August 12—16 the Seychelles National Parks Authority (SNPA) hosted a training for 31 Marine Protected Area (MPA) professionals from Seychelles, Kenya, and Tanzania at the Seychelles Maritime Academy. A new article published 5 August 2019 on the *Seychelles Nation* website describes the event and profiles Jennifer O'Leary, Africa oceans strategy director at The Nature Conservancy, who developed the training in conjunction with SNPA as part of her Pew fellowship project. O'Leary leads the SMART Seas Network, a professional community of MPA managers and researchers from the Western Indian Ocean who are working to improve MPA management and effectiveness. The event was also covered by the *SBC Seychelles* news station.



Attendees at the training for MPA professionals in the Seychelles

To read the article, go to: http://www.nation.sc/articles/1063/strategic-adaptive-management

To see the SBC news story about the event, go to: https://www.youtube.com/watch?v=NKuxmZTiEDk&feature=share

Mapia Atoll, the next jewel in the BHS MPA network?: Mark Erdmann ('04) and Ricardo Tapilatu ('18)

Source: BHS

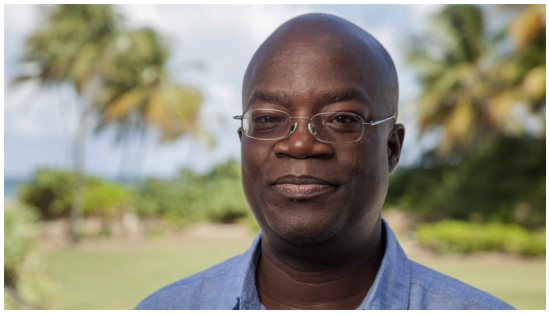
In a new post on the *Bird's Head Seascape Blog*, Mark Erdmann, vice president of Asia-Pacific Marine Programs at Conservation International, and Ricardo Tapilatu, head of the Research Centre for Pacific Marine Resources at the University of Papua, describe a December 2018 research expedition to Mapia Atoll, Indonesia. The survey was supported by the Supiori Regency government, which has authority over Mapia, and aimed to evaluate of the condition of the reefs and reef fish assemblages in the area. The researchers also identified important turtle nesting beaches and conducted interviews with the local community to assess their interest in a potential conservation initiative in Mapia—including the establishment of a marine protected area (MPA). The results of the research were promising, as Tapilatu explains, "We confirmed healthy populations of green, hawksbill turtle populations and potentially olive ridley turtle population at Mapia, and also that at least 2 of the atoll's 5 islands are important turtle nesting beaches." Erdmann adds, "We are delighted to report that when we presented the results of our survey (in early September 2019) to the Supiori government, their response was enthusiastic and promising; they are keen to develop tourism to both Mapia and the rest of Supiori (which has fantastic surf breaks!) and are open to the idea of potentially gazetting Mapia as a new MPA."

To read the blog post, go to: https://birdsheadseascape.com/regional/mapia-atoll-the-next-jewel-in-the-bhs-mpa-network-by-mark-erdmann-ricardo-tapilatu/

Honors and Awards

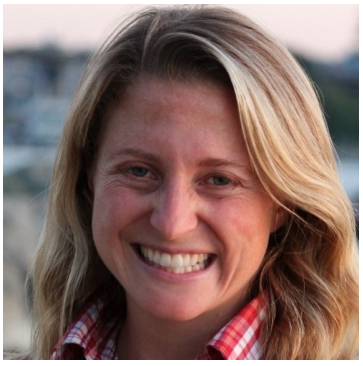
Rashid Sumaila ('08) and Anne Salomon ('13) named fellows of the Royal Society of Canada

Source: RSC



Rashid Sumaila

On 10 September, The Royal Society of Canada (RSC) announced its list of 2019 fellows and members, including two from the Pew Marine Fellows community. Rashid Sumaila, professor at the University of British Columbia, is among the new fellows, who were elected by their peers for their outstanding scholarly, scientific and artistic achievement. As the press release explains, Sumaila's work "has challenged today's approaches to marine governance, generating exciting new ways of thinking about our relationship to the marine biosphere." Anne Salomon, assistant professor at Simon Fraser University, was also recognized as a new member of the College of New Scholars, Artists and Scientists, which recognizes top mid-career leaders in Canada. "Dr. Salomon is internationally recognized for illuminating relationships between humans and the productivity, biodiversity and resilience of marine ecosystems to inform ecologically effective and socially just conservation strategies" explains the press release. The 2019 fellows and members will be inducted into the RSC in November, during the RSC's annual Celebration of Excellence and Engagement event in Ottawa.



Anne Salomon — Photo courtesy of SFU

To read the press release, go to: https://rsc-src.ca/en/press-release-rsc-presents-class-2019

To read coverage on Sumaila's award, go to:

https://research.ubc.ca/nine-ubc-faculty-members-elected-royal-society-canada

To read coverage on Salomon's award, go to:

http://www.sfu.ca/sfunews/stories/2019/09/eight-sfu-innovators-named-to-royal-society-of-canada.html

http://www.sfu.ca/fenv/news/rsc-anne-salomon.html

Honors and Awards

Asha de Vos ('16) wins 21st Century Icon Award

Source: 21st Century Icon Awards

Asha de Vos

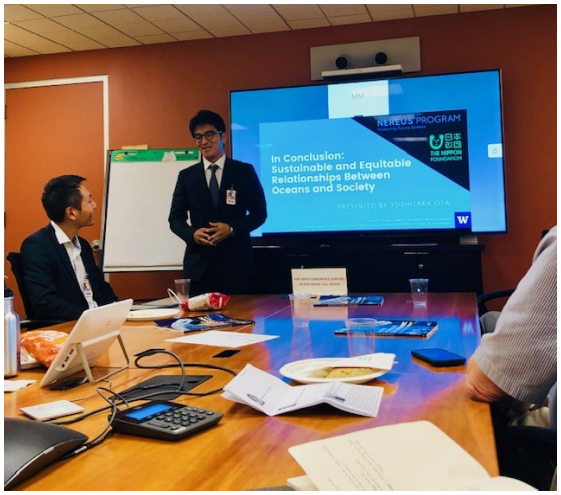
On September 13th, Asha de Vos, founder and executive director of Oceanswell, received an 'Inspirational Icon' award at the 21st Century Icon Awards in London. The event, which supports rising leaders and businesses as role models for future generations, brought together 44 finalists from 16 categories spanning arts, sports, philanthropy and technology. de Vos was recognized as 'someone whose achievements inspire and motivate others" for her research on Sri Lanka's threated pygmy blue whales and her work establishing Oceanswell—Sri Lanka's first ocean conservation-focused organization.

To read more about the awards, go to: https://www.21stcenturyiconawards.com/

Events

Book discussion at The World Bank - Predicting future oceans: Sustainability of ocean and human systems amidst global environmental change: Yoshitaka Ota (SC), Daniel Pauly (SC), Larry Crowder (SC)

Source: Nereus Program



Yoshitaka Ota presents at The World Bank

On 12 September, Yoshitaka Ota, research assistant professor at The University of Washington, and his co-editors held a presentation and panel discussion to launch their new book, *Predicting future oceans: Sustainability of ocean and human systems amidst global environmental change*. The book is a product of the Nippon Foundation Nereus Program and provides an integrated overview of the changes underway in today's oceans. As the book description explains, "The editors undertake the challenge of integrating diverse perspectives—from oceanography to anthropology—to exhibit the changes in ecological conditions and their socioeconomic implications. Each contributing author provides a novel perspective, with the book as a whole collating scholarly understandings of future oceans and coastal communities across the world." Daniel Pauly, principal investigator of the Sea Around Us Project, and Larry Crowder, professor at Stanford University, each contributed chapters to the book. Video summaries of each chapter will eventually be made publicly available via YouTube.

To read more, go to: https://nereusprogram.org/works/predicting-future-oceans-book-is-published/

Opportunities

United Nations Convention on Biodiversity - Information note: Ways and means to contribute to the development of the post-2020 global biodiversity framework

Source: CBD Secretariat

The executive secretary of the Secretariat of the Convention on Biological Diversity (CBD) of the United Nations Environment Programme (UNEP) recently released a summary to provide background on the development of the post-2020 global biodiversity framework and outline various opportunities for relevant organizations and stakeholders to contribute to the process. The document provides information and key dates for regional and thematic consultation workshops and online discussion forums, which will be held throughout 2019-2020, as well as guidance for submitting substantive comments to share scientific expertise related to certain framework documents.

To learn more, go to: https://www.cbd.int/doc/notifications/2019/ntf-2019-049-post2020-en.pdf