

2010-2011 Report

restoring
fisheries

conserving
aquatic life

rebuilding
ecosystems

researching
the options

Fisheries Centre
The University of British Columbia



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Director's Introduction

The years 2010 and 2011 have been very exciting for those of us here at the Fisheries Centre. We welcomed two new faculty members, increasing the number of faculty at our Centre to twelve. First, we hired Dr Sang-Seon Yun, who comes to us from Kunsan National University in Korea, and is working with the Aboriginal Fisheries Research Unit in examining chemical communication systems of fishes. We also welcomed National Geographic Fellow Dr William W.L. Cheung, who obtained his PhD at UBC in 2007 and has returned to work on global change biology and fisheries.

In July 2011, we launched our new website - more attractive, easier to navigate, and a site that all Fisheries Centre members can be proud of. In conceptualizing the site, we recognized that it was important to feature the Centre's publications prominently. So, in addition to creating an extensive Publications section on the site, we allotted space on the homepage and on each Faculty, Staff, and Student profile to highlight our members' exceptional contributions to the research community. It is our hope that the site will act as a common resource, bringing members from our different Research Units together and attracting many outside visitors.

Over the past two years, we were also honoured to receive a number of very distinguished guests, including the Honourable Gail Shea, Federal Minister of Fisheries, who visited shortly after the grand opening of the Blue Whale Project at the Beaty Biodiversity Museum. Ms. Claire Dansereau, Deputy Minister of Fisheries, came to discuss further collaboration between the Fisheries Centre and the Department of Fisheries and Oceans, and the Honourable Keith Ashfield, Canada Minister of Revenue, also toured the FC in 2010.

In 2011, Dr Daniel Pauly, Dr Gordon Munro, and myself were invited to meet with the Prince of Wales to offer feedback on the Prince's Charities' International Sustainability Unit. This honour speaks to the global influence of the Centre and its consequential role in the development of strategies for sustainable fisheries management.

Here at the Fisheries Centre, we will continue to persevere in our scholarly productivity and outreach efforts, with the goal of cultivating local and international fisheries awareness. I would like to offer my thanks to our Faculty, Staff, and Students, for their continued hard work and perseverance.

Dr Rashid Sumaila
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Fisheries Centre

Mission and Activities

We recall the Fisheries Centre's mission statement, which was developed in 1993, slightly modified since, and still relevant today:

Our planet's fisheries have reached their ecological limits. As benefits from traditional resources decrease, pressure grows to exploit other resources, a process not necessarily compatible with ecosystem health.

Policy and planning for ecosystem-based management must then be informed by knowledge of the interplay of human, biotic and environmental factors that affect ecosystem structure and function. Key requirements are sufficient time-depth to capture biodiversity, abundance and trophic structure prior to depletion, identification of the full range of benefits that healthy ecosystems provide to present and future generations and integration of the fine-scale knowledge of the maritime community with large-scale national and international fisheries management.

The Fisheries Centre promotes multidisciplinary study of aquatic ecosystems and broad-based collaboration with maritime communities, government, NGOs and other partners. We believe that the social capital developed through collaboration and the intellectual capital that increased knowledge of ecosystem function and values represents can lead to the re-investment in natural capital necessary to conserve and restore aquatic systems.

As previously, this mission inspired, in 2010 and 2011, numerous research and outreach activities, both in-house and linked with outside organizations (see list of publications, p. 30-42). This research and these outreach activities included convening international and domestic conferences and workshops, drawing researchers and policy-makers from around the world and locally. However, our emphasis remained on the instructional supervision of master's and doctoral students (see p. 22-26 and www.fisheries.ubc.ca/students).

To document these activities, in 2010-2011, the Fisheries Centre published 8 *Fisheries Centre Research Reports* (www.fisheries.ubc.ca/publications/fcrs) and 19 items in our *Working Paper Series* (www.fisheries.ubc.ca/publications/working-papers), both often serving as basis for subsequent submission to peer-reviewed literature. We also continued to publish the Centre's bimonthly newsletter, *FishBytes* (www.fisheries.ubc.ca/newsletter), which has been produced and distributed internationally since 1995, and has been "paperless" since January 2010.

The Centre continued to host a weekly seminar from September to April. The seminar allows the Centre to bring speakers from Canada and abroad, while providing our students with a forum for peer review of their work in progress (see box). The Centre hosted dozens of short and long-term Canadian and international visitors, who shared their expertise with our members (see p. 43). The Fisheries Centre also hosts a prestigious lecture series, the Larkin Lectures (www.fisheries.ubc.ca/about-us/larkin-lectures), held in memory of the late Professor Peter Larkin and funded through an endowment established by his colleagues, family, and friends. The Larkin Lecture for the 2010-2011 period was by Dr Daniel Bromley (2011; Is Fisheries Policy Pertinent? Some doubts from the academy).

We are gratified by the increased recognition of our activities, detailed in the next pages.

The Fisheries Centre Friday seminars:
Stimulating minds, stomachs and community

The Fisheries Centre seminars, held Fridays from 11am-12pm during the winter session, are a weekly opportunity for the members of the Fisheries Centre to share in the latest aspects of fisheries research and to fuel the esprit de corps of the Centre (the donuts beforehand only fuel the corps). The lecture series, organized by a current graduate student, is also offered as a course (FISH 500) for incoming Fisheries Centre students intended to foster critical thinking about the presentations. Each student is also expected to take the stage and reveal his or her own plans for future research.

The diversity of speakers is wide; from quantitative modelers to NGO staff to the students themselves, the Fisheries Centre has benefited from the insights of a number of brilliant speakers. For instance, the 2010-2011 academic year began with Rashid Sumaila's discussion, "The costs of adapting global marine fisheries to climate change." The second term opened with Milo Adkison's talk: "Implications of marine-derived nutrients for salmon management." In the fall of 2011, Wilf Swartz presented "Fisheries subsidies negotiations at the WTO: a witnesses' account," and in the second term, Fred Le Manach discussed the dangers created by international markets on local resources and human populations.

Fisheries Centre seminar coordinators:
Brooke Campbell (2009-2010) and
Andres Cisneros (2010-2011)





Aboriginal Fisheries

The Aboriginal Fisheries Research Unit (AFRU) conducts research to support more effective ecosystem and aquatic resource management, using a multi-disciplinary approach directed toward the maintenance of sustainable aquatic resources that support aboriginal communities. The AFRU focuses research in the areas of aquatic chemical ecology, fish physiology, and the human dimensions of fisheries. The goal is to improve aquatic resource management through the assessment of important biological questions.



David Close
Director

Dr David Close, who leads the AFRU, came to the UBC Fisheries Centre in 2008. He is a member of the Cayuse Nation, located on the Confederated Tribes of the Umatilla Indian Reservation in Oregon.

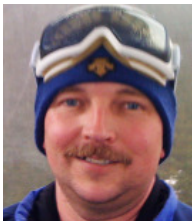


Sang-Seon Yun
Assistant Professor

The AFRU reaches out to fisheries organizations and prospective students. Outreach to policy makers within aboriginal communities and the public is pursued through focused lectures and fisheries meetings. In addition, the AFRU continues to develop collaboration and provide advice for First Nations/Native American Tribes, for example:



- Sto:lo Nation: technical assistance on fisheries;
- Musqueam Nation: meetings on fisheries issues;
- Yakama Nation meetings on fisheries issues;
- Advice to Columbia River Inter-Tribal Fisheries.



Wes Didier
PhD Student

In 2011, the AFRU welcomed PhD candidate Junho (June) Eom. Interested primarily in comparative physiology and ecology, his research is concerned



Junho (June) Eom
PhD Student

with verifying sex pheromones of white sturgeon. He is using the AFRU laboratory that Dr Close, who is also affiliated with the Department of Zoology, established in 2008-2009. Other researchers making use of the lab include Wes Didier - BC Métis - who is investigating endocrine control of sex development in lamprey, a basil vertebrate which appears to have a unique ancestral control system that could be the precursor of higher vertebrate endocrine systems, and Brent Roberts - Campbell River Indian Band - who is working on stress physiology in lamprey. In 2012, the AFRU laboratory will welcome MSc student Satbir Rai.



Brent Roberts
MSc Student

In the coming years, the AFRU will continue to vigorously pursue funding from various sources, such that support will be available for more aboriginal graduate students and for postdoctoral fellows. The goal is for AFRU to function as a regional source of knowledge and initiatives on aboriginal fisheries.

*[www.fisheries.ubc.ca/research-units/
aboriginal-fisheries-research-unit](http://www.fisheries.ubc.ca/research-units/aboriginal-fisheries-research-unit)*



Ministry of Environment

The Fisheries Centre houses 10 members of the BC Government, Ministry of Environment Aquatic Conservation Science Section. The section conducts research on freshwater fisheries management, fish habitat restoration, fish forestry interactions, and fish culture techniques. In addition, an active focus on conservation biology supports British Columbia's goal of maintaining and enhancing the province's fish and wildlife species and their habitats.

British Columbia has over 200,000 small (<1 ha) lakes, hundreds of larger lakes and wetlands, and thousands of kilometres of rivers and streams. This resource is the basis of a sport fishery for more than 400,000 anglers. In addition, abundant freshwater habitats provide spawning and rearing opportunities for British Columbia's salmon, steelhead and several other fish species native to BC. The province's complex geography and glaciation history produced a province rich in natural resources and biodiversity. Managing these resources in a sustainable manner requires the development of ecosystem-based management tools along with data and Geographic Information Systems that support government and industry decision-making systems.

Freshwater habitat restoration is an area of research where British Columbia has been a world leader. Defining the relationships between habitat structure, nutrient dynamics and growth and survival of juvenile fish populations has allowed for the development of realistic restoration options for several 'at risk' lake and stream-dwelling fish populations.

The partnership between the Province of BC and the Fisheries Centre and other units of the University of British Columbia has resulted in support for a large number of graduate students as well as fostering a collaborative research environment between government scientists and university faculty for more than 50 years. This association will be of increasing importance as the stresses on our natural environment continue to increase, and the need for science-based decision-making assumes a greater role in government.

www.gov.bc.ca/env



Art Tautz



Dan Hogan



Debbie Aird



Eric Parkinson



Divya Varkey
The Freshwater
Fisheries
Society of BC



Theresa Godin
The Freshwater
Fisheries
Society of BC



Tom Johnston



Steve McAdam



Shannon Harris



Jordan
Rosenfeld





Quantitative Modeling Group



Carl Walters
Head



Murdoch
McAllister
Associate
Professor



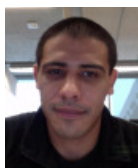
Steve Martell
Associate
Professor



Sylvie Guénette
Honorary
Research
Associate



Tom Carruthers
Research
Associate



Ricardo
Amoroso
PhD Student

The Quantitative Modeling Group develops innovative assessment methodologies and field programs intended to improve single species and ecosystem management. The group focus on Bayesian statistical methods and dynamic population models is aimed at assisting fisheries risk assessment, estimation, decision analysis and management strategy evaluation. Dr Villy Christensen participates in this group working on ecosystem modeling and the further development of Ecopath with Ecosim. Partnerships with colleagues within and outside UBC have generated a continuum of projects ranging from factors affecting species composition in small B.C. lakes to ecosystem management in the Gulf of Mexico.

The group received a major stimulus in 2011 with funding organized by Murdoch McAllister from the NSERC Canadian Capture Fisheries Research Network (CCFRN). The network grant funds graduate students to work on management strategy evaluation for a series of case studies in BC Fisheries, ranging from Pacific salmon to Dungeness crabs.

New and continuing projects in 2010-2011

- In collaboration with the Ecosystems Branch of the British Columbia Ministry of Environment individuals within the group are pursuing a number of field based projects which include investigating recruitment failure and restoration options for white sturgeon, angler effort dynamics in small lake systems as well as meta-population structure and factors affecting species composition within these mixed species small lake systems.
- The project with the Ecosystems Branch of the British Columbia Ministry of Environment continues to develop new mark-recapture models to estimate the abundance of Nechako River white sturgeon over the last decade taking into account also recapture effort data and micro-constituent based covariates for immigration and emigration.
- Members of the group continue to participate in the POST project (<http://www.postcoml.org>) exploring the critical issue of downstream migration and early ocean survival of salmonid smolts. Dr Mike Melnychuk and Dr Erin Rechisky recently defended PhD theses on estimating survival rates in juvenile salmonids.
- Projects in collaboration with the NMFS in Honolulu Hawaii explore assessment and management options for the data limited Hawaiian bottomfish fishery as well as the influence of meta-population structure on the assessment and management of the Hawaiian lobster fishery.
- Members collaborate with the Department of Fisheries and Oceans Canada on the joint statistical committee for Pacific hake assessment and have developed simulations to explore the potential effects on wild populations of introduced genetically modified salmonids.
- An ecosystem management project for the Gulf of Mexico utilizes Ecopath with Ecosim to explore tradeoffs between commercial and recreational fisheries and impacts of shrimp and menhaden fisheries on other fisheries.
- Individuals participate in a PEW and Lenfest funded program investigating the issue of dedicated access in global fisheries.
- NMFS and the PFRP sponsor a global analysis of the status of large pelagics and options for reducing fishing mortality, as documented in the PhD of Robert Ahrens.
- In collaboration with University of Washington, University of Florida, and USGS scientists, improved methods for fitting bioenergetics models to growth data from size-age and tagging studies are being developed; these methods promise to provide better estimation of seasonal changes in metabolic and feeding rates of fish.
- Funding from the UK Game and Wildlife Conservation Trust is directed towards developing Bayesian assessment models to evaluate alternative management strategies for the control of red fox populations in the UK.
- An Environmental Defense funded project aims to develop simulation models to evaluate the potential consequences of alternative harvest management policy options for Gulf of Mexico



shrimp fisheries. The models developed will account for several different shrimp species harvested and the seasonal and spatial aspects of shrimp population dynamics and fishery operations. Feed-back control policies that are based on annual and possibly in-season stock assessments of the main shrimp populations are also to be evaluated.

- Carl Walters is now the Grand Canyon Senior Ecologist, providing stock assessment and ecosystem modeling advice.
- He also leads an advisory panel for the Billfish Foundation to develop approaches for improving fisheries management in the Golfo Dulce, Costa Rica.
- A Netherlands Environmental Assessment Agency project on the Global Biodiversity Outlook.
- Ecosystem models in the Baltic Sea funded by the Environmental Protection Agency, Sweden.
- A Lenfest Ocean Program project on improving ecosystem-based management of the Peruvian anchovy fishery using Management Strategy Evaluation.
- Dr Tom Carruthers is working on the spatial population dynamics modeling of Gulf of Mexico grouper, using a range of operating models that account for offshore ontogeny and protogynous life histories, and intends to evaluate management strategies for this multi-species, multi-component fishery. His other research interests include the optimization of spatial tuna fishing in the Atlantic using multi-species dynamics models, and the simulation testing of data-limited stock assessment methods.

Dr McAllister has a set of collaborative projects including:

- Collaboration in a landscape scale manipulative experiment to evaluate angler effort responses to different management methods for B.C. small lakes fisheries with partners including the Freshwater Fisheries Society of B.C., The B.C. Ministry of the Environment, The Ontario Ministry of the Environment and academic partners from SFU (Dr Wolfgang Haider) and U. Calgary (Dr John Post, PI).
- Collaboration in a Canada-wide NSERC funded strategic network on Canadian Capture Fisheries with collaboration between academics, industry members and government scientists from across the country. Six of the research projects in this network are based at UBC with involvement also of Drs. Trites, Walters, Sumaila, Christensen, and Martell.
- Collaboration with US NOAA scientists at the SE Fisheries Science Centre in a research project on evaluating management approaches for Gulf of Mexico reef fishes (including work with Dr Carruthers on Gulf of Mexico grouper fishery modeling).
- Collaboration with the B.C. Ministry of the Environment in a study to evaluate variations in habitat use at different life history stages of Fraser River white sturgeon from the analysis of fin ray and waterbody microchemistry (co-PI Steve McAdam).
- Collaboration with U. of Stanford (PI Dr Barbara Block) and the Lenfest Ocean Program on developing a mixed stock seasonal time step spatial model for Atlantic bluefin tuna using data from archival tagging studies, otolith microchemistry studies, and conventional tagging and stock assessment data.
- Collaboration with Fisheries and Oceans Canada scientists in developing stock assessments of B.C. Bocaccio, Quillback, and inside waters yelloweye rockfish, B.C. outside waters lingcod, Fraser River eulachon and east coast redfish stocks and evaluating the impacts of seal and sea lion predation on some of these stocks.



Hiroshi
Okamura
Visiting
Scientist



Divya Varkey
Post Doctoral
Fellow



Ben Nelson
PhD Student

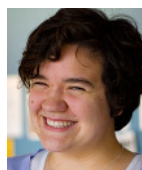


Rachel
Neuenhoff
PhD Student



Meaghan
Darcy
PhD Student

www.fisheries.ubc.ca/research-units/quantitative-modeling-group



Rachel Louton
PhD Student



Brett van Poorten
PhD Student



Shannon Obradovich
PhD Student



Rachel Chudnow
MSc Student



Sarah Hawkshaw
PhD Student



Mike Hawkshaw
PhD Student



Tom Porteus
PhD Student





Fisheries Economics Research Unit



Rashid Sumaila
Director



Gordon Munro
Professor Emeritus



Henrik Österblom
Postdoc



Andrew Dyck
Researcher



Ling Huang
Postdoc



Ngaio Hotte
Researcher



Louise Teh
PhD Student

Through its research, training, and partnerships, FERU aims to advance the management of global aquatic resources and work towards 'healthy' ecosystems for the benefit of both current and future generations. The unit employs an interdisciplinary approach to investigating economics and management of marine and freshwater capture fisheries as well as aquaculture resources. FERU's research is local, regional, national and international in scope, and involves biologists, mathematicians, managers, computer scientists, economists and other social scientists from around the world.

In the past two years, FERU members have been involved in over 45 peer-reviewed journal articles, among other publications, and continue to be instrumental in shaping global fisheries policy. New and continuing contributions in 2010-2011 include:



Rashid Sumaila, Daniel Pauly, and Gordon Munro were among only eight academics invited in March 2011 to provide feedback on Prince Charles's efforts to protect the world's oceans through the Prince's Charities' ISU. Pauly (far right) and Sumaila (middle right) are pictured here with Prince Charles and Rod Fujita.

- FERU Director Dr Ussif Rashid Sumaila had the pleasure of meeting with Prince Charles at a workshop organized at St. James Palace in March 2011. The workshop was a part of the Prince's efforts to protect the world's oceans through the Prince's Charities' International Sustainability Unit. Prince Charles highlighted research by the FERU and the Sea Around Us project on harmful fisheries subsidies during his closing remarks. Dr Sumaila was also among ten people chosen to address the Prince's Charities International Sustainability Unit Marine Programme Launch in February 2012.

- Rashid Sumaila, along with a multi-disciplinary team that included fellow Fisheries Centre members William Cheung, Vicky Lam, and Daniel Pauly, received international attention for the ground-breaking report "Climate change impacts on the biophysics and economics of world fisheries," published in *Nature Climate Change* in 2011. The study garnered attention from national and international media outlets, and earned Rashid Sumaila an invitation to speak at the third Oceans Day, organized as part of the United Nations Framework Convention on Climate Change (UN FCCC) 17th Conference of the Parties (COP 17).

- Rashid Sumaila organized "Climate Change: Altering the Physics, Ecology, and Socioeconomics of Fisheries" at the Washington Convention Centre, which took place February 18, 2011. The emphasis of this meeting was on effective mitigation and adaptation strategies to ensure sustainable marine fisheries well into the future.

- In April 2011, Rashid Sumaila participated in a workshop on the creation of an ocean health index in Santa Barbara, California, gave a presentation entitled "Whose fish are you catching – yours or the future generations?" in San Diego, and participated in a workshop on joint management of the Benguela Current Large Marine Ecosystem in Windhoek, Namibia.

- FERU members participated in the International Symposium on the Ocean, Green Shipping, and Sustainable Energy, April 28-29, 2011, at the Institut Océanographique de Paris.

- Vicky Lam, Rashid Sumaila, Andrew Dyck, Daniel Pauly, and Reg Watson made waves with the release of "Construction and first applications of a global cost of fishing database," published in the *ICES Journal of Marine Science* in 2011. The article highlighted the team's efforts



in developing the database and offered an overview of fishing cost patterns at national, regional, and global scales. The database has vast implications for assessing the economic status of fisheries and the impact of different management policy scenarios at different spatial scales.

- Dr Gordon Munro, Professor Emeritus of Economics, delivered the keynote address at the Danish Environmental Economic Council in September 2011. His presentation highlighted the historical and present challenges of managing international fish stocks.

- Rashid Sumaila appeared in the journal *Science*, co-authoring an article titled “Scenarios for Global Biodiversity in the 21st Century.” It explores changes in future scenarios of biodiversity, using metrics such as species extinctions, species abundance and community structure, habitat loss and degradation, and shifts in the distribution of species. The article suggests that future scenarios of biodiversity focus on integrating predictions of biodiversity changes with feedback to societal responses.

The research interests of current FERU members are diverse and include:

Louise:	Socio-economic factors that effect small-scale fishing activities
Nigel:	Incorporating cultural and spiritual values into decision-making
Dale:	Bioeconomic modeling of Fraser River sockeye salmon
Megan:	Game-theoretic analysis of resource allocation with multiple objectives
Roseti:	Spatial modeling of W. Central Pacific tuna
Andres:	Estimation of global recreational fishing activity
Wilf:	Mapping of international trade and consumption of fisheries products
Ling:	Econometric fisheries applications
Andrew:	Economic impact analysis of world fisheries
Liesbeth:	Analysis of the retail trade of fisheries products
Henrik:	Illegal, unreported, and unregulated fishing
Gordon:	Subsidies and access rights to fisheries
Rashid:	All of the above; also discounting and natural resource sustainability



PhD candidate Megan Bailey samples rockfish in the Strait of Georgia

We wish to thank our collaborators and partners both in research and funding, especially the Pew Charitable Trusts, Conservation International, SSHRC, WWF, the Sea Around Us Project, the United Nations, the World Bank, and the Kingfisher Foundation.



Nigel Haggan
PhD Student



Dale Marsden
PhD Student



Megan Bailey
PhD Student



Roseti Imo
PhD Student



Andrés Cisneros-
Montemayor
PhD Student



Wilf Swartz
PhD Student



Liesbeth van
der Meer
MSc Student



Marine Mammal Research Unit



Andrew Trites
Director



Pamela Rosenbaum
Manager



David Rosen
Research Associate



Brian Battaile
Research Associate



John K. Ford
Adjunct Professor



Jane C. Watson
Adjunct Professor

The Marine Mammal Research Unit (MMRU) is an integral component of the Fisheries Centre and works with other departments and institutions in a coordinated effort to provide independent research and advice on matters related to marine mammals. Members investigate interactions between humans and marine mammals, marine mammals as indicators of ecosystem change, and the natural history, biology and conservation of marine mammals. MMRU research focuses on five areas: population dynamics, energetics and physiology, dietary analyses, behaviour and ecology, and simulation modeling. The multi-disciplinary research program addresses these questions through captive and field studies, data and laboratory analyses, and publications and outreach.

• **Captive Animal Studies.** Studies focused on energetics and nutrition were undertaken at the Vancouver Aquarium on Steller sea lions, northern fur seals, harbour seals and Pacific white-sided dolphins. Some of the research focused on determining whether metabolism changes with season, and whether it in turns affects seasonal food requirements. Other studies investigated a number of hypotheses explaining population declines of sea lions and fur seals in the wild. Controlled feeding experiments examined different diet regimes (through changes in food intake or food quality) on aspects of health, hormone balance and reproduction. Experiments also tested and refined a number of techniques to estimate energy expenditure in wild sea lions (e.g., accelerometers and heart rates), and to detect prey composition (e.g., via DNA analysis and changes in tissue biochemistry). Research was also



Steller sea lion



Steller Shuttle

undertaken at the Open Water Research Laboratory with five sea lions trained to participate in free-swimming research conducted in a fjord near Port Moody. The Open Water studies investigated aspects of diving physiology, energetics, and swimming biomechanics, with the ultimate aim of determining foraging decisions and food requirements of the wild population. The animals also tested and validated a number of technologies that can be used to study the foraging behaviour of sea lions in the wild.



Martin Haulena
Adjunct Professor



Steven Raverty
Adjunct Professor



Michael Grigg
Adjunct Professor



Frances C. Robertson
PhD Candidate



Tiphaine Jeanniard du Dot
PhD Candidate



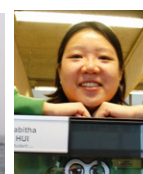
Ben Nelson
PhD Candidate



Rachel Neuenhoff
PhD Candidate



Austen Thomas
PhD Candidate



Tabitha Hui
MSc Candidate



Alex Dalton
MSc Candidate



Collectively, the captive animal studies are resolving questions concerning the nutritional and energetic consequences for marine mammals facing changes in their environment, including changes in prey availability. The animals are a valuable scientific resource, and are being studied in collaboration with the Vancouver Aquarium and renowned international scientists.

• **Field Studies.** Field work was undertaken in Alaska and British Columbia in 2010 and 2011. Research in Alaska focused on northern fur seal foraging behaviour, fur seal growth, and sea lion diets. Field studies in British Columbia focused on feeding behaviour of Pacific white-sided dolphins, harbour seals, and northern resident killer whales.

• **Data Analysis.** Mathematical models are increasingly used to understand the dynamics of marine mammals and their interaction with fisheries. Models were used to identify Steller sea lion critical habitat, as well as the distribution of key fish species consumed by sea lions — with the ultimate goal of estimating the extent of competition between fisheries and sea lions. Models were also used to estimate carrying capacity of South American fur seals, and to compare population trends of Steller sea lions and northern fur seals in Alaska. Swimming paths of fur seals in the Bering Sea were reconstructed to identify foraging areas and the influence of oceanography on foraging decisions. Other analyses estimated the food requirements of North Atlantic right whales and Pacific white-sided dolphins, and assessed the effects of seismic testing on bowhead whale behaviour in the Alaskan Beaufort Sea.

• **Laboratory Analyses.** Other studies undertaken in 2010 and 2011 included developing a DNA technique to identify prey from harbour seal scats, and assessing whether a relationship exists between diet, stress and population trends and distribution of northern fur seals.



New MMRU Students Fall 2010

• **Publications and Outreach.** MMRU researchers published 26 papers during the past two years. Administratively, MMRU continued to oversee the North Pacific Universities Marine Mammal Research Consortium, which unites marine mammal research at the Universities of Alaska, British Columbia, Washington, and Oregon State. MMRU also continued to host an annual Symposium on B.C. Marine Mammals, which provides a forum for local researchers, members of the fishing industry, ecotourism operators, and the public to meet and discuss current issues and research related to marine mammals in British Columbia. MMRU graduate students also participated in the annual symposium of The Society for Marine Mammalogy's Student Chapter, Northwest Region, which includes students from universities in Washington, Oregon, B.C., and Alaska.



Renee LaRoi
Web Designer



Morgan Davies
Research Assistant



Wendi Contois
Research Assistant



Rebecca Barrick
Research Assistant

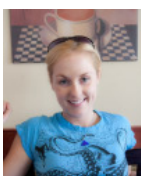


Brianna Wright
MSc Candidate



Mandy Wong
MSc Candidate

www.marinemammal.org/MMRU2



Beth Atwood
MSc Candidate



Susana Cardenas
MSc Candidate



Sarah Fortune
MSc Candidate



Carling Gerlinsky
MSc Candidate



Barbara Koot
MSc Candidate



Chad Nordstrom
MSc Candidate



Erin Rechsteiner
MSc Candidate



Jody Danielson
Research Assistant



Brandon Russell
Research Assistant





Amanda Vincent
Director



Janelle Curtis
Research Associate



Sara Lourie
Research Associate



Janna Rist
Program Manager



Tyler Stiem
Communications
Manager



Tuyu Ochir
Administrative Officer



Christina Czembor
Research Assistant



James Hehre
PhD Candidate



Project Seahorse

Project Seahorse is an interdisciplinary and international marine conservation group dedicated to securing a world where marine ecosystems are healthy and well-managed. By working to protect seahorses, Project Seahorse supports marine conservation more broadly.

We generate cutting-edge research and turn our findings into highly effective conservation interventions — usually in collaboration with other researchers, governments, and local communities. Our innovative and nimble approach has made us very successful, especially in light of our small size and limited resources.

Recognizing the interdependencies between marine life and human communities, we begin with biological research on seahorses and work outwards through concentric rings of pressure on marine populations, actively engaging with ecosystems, fishing and other human impacts, trade, policy development, and public outreach.



The Marine Protected Area (MPA) Workshop took place in Cebu City, Philippines on June 27-29 2011

Seahorses

Project Seahorse uses seahorses as flagship species to generate action for coastal oceans. Our group is considered the world's foremost authority on seahorses and their relatives (Syngnathidae). Amanda Vincent pioneered the study of seahorses in the wild, uncovered the enormous global trade in these animals, and mounted the first conservation response. With 25 years of global expertise, we protect these important animals and increase scientific understanding of their biology, life history, taxonomy, trade, and threats. We serve as the IUCN's Red List Authority on seahorses, pipefishes and sticklebacks, and our assessments are critical in informing conservation action for these fishes.

Recently, we produced a synthesis of global knowledge on the management and conservation of these species and an analysis of the importance of seahorses and pipefish to the diets of marine predators. In 2011, one of our PhD students completed a thesis that used interviews with small-scale fishers in central Philippines, where overfishing is endemic, to reconstruct historical fisheries and thereby understand how seahorse populations have changed over the past four decades. Her analyses have broad applications to the use of data from narrative accounts.

Ecosystems/shallow seas

Building on decades of research on mangrove, seagrass, coral, and estuarine habitats, Project Seahorse explores new ways to manage and conserve these threatened marine ecosystems. Recently, our team has found ways to do conservation more effectively without sacrificing rigour. One recent study demonstrates how to detect trends in marine protected area (MPA) recovery by monitoring only a small subset of all fishes on coral reefs. Another study shows that MPAs established by local communities can protect marine species and habitats as, or nearly as, effectively as those established using rigorous scientific planning tools.

In 2011 we partnered with Selfridges, one of the world's largest department stores, to establish a 53-hectare marine protected area in Danajon Bank, Philippines. This marks the 34th MPA we have catalyzed in the region, all of them locally managed.



Fisheries

Using biological and socio-economic knowledge and integrating research efforts with marine management, Project Seahorse promotes sustainable fishing practices that balance their impact on both ecosystems and human coastal communities. We develop management briefings to help governments to use their marine resources effectively and sustainably, and we work with small-scale fishers to protect fish populations and ecosystems and improve food security.

Our team recently published landmark research on the impact of shrimp trawl fisheries on small marine fishes and other animals that are caught as bycatch. We also investigated the economic, social, and ecological dynamics of Sri Lanka's wild seahorse trade — one of the largest in the world — to ensure it is sustainable. And as part of our collaboration with Selfridges, Project Seahorse provided input into "Project Ocean," a high-profile sustainable seafood campaign launched in the United Kingdom. This included hosting a day-long series of multimedia presentations to educate the public about seahorses and marine conservation.

Trade and policy

In 2002, Project Seahorse was instrumental in generating a landmark global agreement (under the Convention on the International Trade in Endangered Species, or CITES) that forbids countries to export more seahorses than wild populations can bear. This, the first-ever global agreement on exports of marine fishes of commercial importance, created a new international tool for fisheries management. It also effectively acknowledged that marine fish are wildlife as well as economic commodities.

Project Seahorse actively provides critical information to many levels of the trade network, from customs officials, to traditional medicine practitioners, to aquarists. In 2011 we assisted the CITES Animals Committee to assess how effectively the 175 signatory states are meeting sustainable trade requirements. We also published "A global review of seahorse aquaculture" (and its role in seahorse conservation), produced a mammoth Fisheries Centre Research Report (<http://fisheries.ubc.ca/publications/trade-seahorses-and-other-syngnathids-countries-outside-asia-1998-2001>) on seahorse trade outside Asia, and published a paper on the trade of seahorses and their relatives in Malaysia and Thailand.

Outreach

In 2010 Amanda Vincent, Director of Project Seahorse, was one of six finalists for the Indianapolis Prize for Animal Conservation (<http://indianapolisprize.org>), the world's largest award for extraordinary conservation efforts. In 2010-11, our expertise was represented in numerous media, from the Wall Street Journal to Conservation, from National Geographic Television to BBC.

Acknowledgements

We are enormously grateful to our partner organizations and donors, including but not limited to Zoological Society of London (UK), John G. Shedd Aquarium (USA), and Guylian Belgian Chocolate for their vital support.

www.projectseahorse.org



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Iain Caldwell
PhD Candidate



Maï Yasué
Post Doc Scientist



Tarah Brachman
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Research
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Sarah Foster
Research
Associate



Kerrie
O'Donnell
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Candidate



Danika Kleiber
PhD Candidate



Jennifer Selgrath
PhD Candidate





Sea Around Us Project



Daniel Pauly
Principal
Investigator



Rashid Sumaila
Associated
Faculty



Villy
Christensen
Associated
Faculty



William Cheung
Associated
Faculty



Dirk Zeller
Senior
Research
Fellow



Reg Watson
Senior
Research
Fellow



Maria Lourdes
Palomares
Senior Research
Fellow



Ashley
McCrea-Strub
Post Doctoral
Fellow



Kristin Kleisner
Post Doctoral
Fellow



Jennifer Jacquet
Post Doctoral
Fellow



Arash
Tavakolie
Senior .NET
Developer

The Sea Around Us project is devoted to studying and documenting the impact of fisheries on marine ecosystems throughout the world's oceans. With the maturing of the approaches and methods the project has developed since its start, in mid-1999, the project is now able to sustain a high rate of scientific productivity. Thus, the number of publications project members have authored or co-authored in the period covered here is in excess of 65 peer-reviewed journal articles (see list of publications on p. 30) and a very large number of related book chapters and other publications.

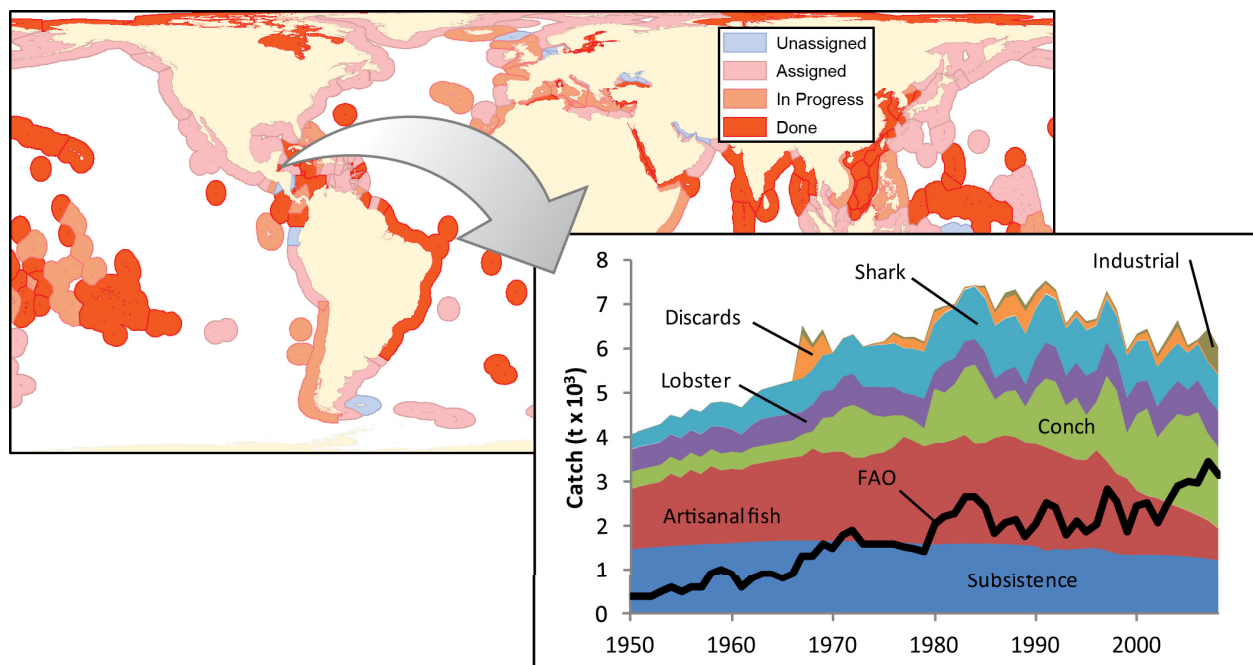
Particularly notable among our journal articles were the contributions by Tremblay-Boyer et al. (2011), which used EcoTroph, a model newly developed by our French colleague Didier Gascuel to infer changes in the biomass of high-level predators in the world ocean since 1950, and the review by Sumaila et al. (2011) of the potential economic effects of global warming on fisheries, which build on earlier work by William Cheung, who has now returned to the Fisheries Centre. A good example of our non-peer reviewed publications is the report entitled "Too Precious to Drill", edited by Deng Palomares and Daniel Pauly (2011), on the marine biodiversity of Belize, which also documents our close linkages with, and commitment to, developing countries. However, the major emphasis of the Sea Around Us project in the 2010-2011 period was undoubtedly the catch reconstruction work that we do, which has brought us, as of December 2011 within striking distance of our goal of reconstructing the catch of all maritime countries and territories of the world in 2012.

Our reconstructions all start in 1950, to provide a strong contrast to the present, and include catches by all fisheries sectors. Thus, besides the traditional focus on commercial fisheries, reconstructions also account for subsistence and recreational fisheries, and discards by industrial trawl fisheries, to cite some examples of catches that are frequently omitted from the statistics that countries submit to the Food and Agriculture Organization of the UN (FAO).

The Sea Around Us has previously shown that much of the data presented by FAO on behalf of its member countries are problematic. Therefore, the project has developed and applied a methodology for 'reconstructing' real catches from coastal countries based on detailed analysis of the peer-reviewed and grey literature and the use of assumption-based interpolations (Zeller et al., 2007). This provides a more comprehensive portrayal of historical fisheries catch data for all sectors than what is otherwise available. Such reconstructions have shown, for example, that Tanzania's official reported fisheries data prior to the year 2000 excluded all catches for Zanzibar, despite this island group having a dedicated fisheries agency collecting data. Due to such underreporting, actual



total catches taken by Tanzanian fishers are around 70% higher than official statistics lead one to believe (Jacquet et al., 2010). However, missing catch data are not only an issue for developing countries. The fisheries of the nine highly developed coastal countries surrounding the Baltic Sea in north-eastern Europe appear to catch over 30% more than is reported by the countries' official statistics (Zeller et al., 2011a), while certain ecosystems, such as the High Arctic, are even more neglected in countries' official records, as illustrated by the near total absence of arctic fisheries catches in the official data provided by the USA, Canada and Russia (Zeller et al., 2011b). Our approach to deriving total catch time series estimates shows that the incorporation of historical 'anecdotes' (i.e., isolated observations) and local studies in catch reconstructions can provide crucial baselines.



Illustrating the Exclusive Economic Zones of the different maritime countries and their overseas territories, covering 40% of the ocean, and 90% of the marine catch. The different colors refer to the status of historic catch reconstructions, of which an example for Belize is provided here (Zeller et al., 2011c; see p. 39).

With the 2012 completion of our coverage of all maritime countries and territories, we will be finally able to promptly quantify the actual contribution of fisheries to food security of the world, examine region-specific trajectories of fisheries catches (likely to strongly differ from those derived from the FAO database), and jointly with our new global database on fishing capacity help settle issues of the impact of fisheries on stocks.

www.seaaroundus.org



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Newsletter
Editor



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Research
Assistant



Stephanie
Lingard
Research
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Robin
Ramdeen
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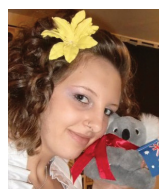
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Shawn Booth
Research
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Zoraida
Alojado
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Grace Publico
Research
Assistant
(Database)





Policy and Ecosystem Restoration in Fisheries



Tony J. Pitcher
Head



David Agnew
Associate member



Daniela Kalikoski
Associate member



Cameron Ainsworth
Associate member



Mimi Lam
Research Associate



Divya Varkey
PhD Candidate

The Policy and Ecosystem Restoration in Fisheries (PERF) group examines fisheries and ecological science at the nexus of policy, with explicit analysis and modelling of the human dimensions. As such, PERF researches issues at the interface of the natural and social sciences, such as historically based restoration, social-ecological systems, ecosystem modelling, environmental values and decision-making, and sustainability policy. Collaborations with other academics (in Canada, USA, Portugal, Norway, Chile), government (Fisheries and Oceans Canada), NGOs (Sustainable Fisheries Partnership), and consultants (MRAG, UK and Greenward Consulting, Australia) attest to the broad reach of the research. Four students completed their PhDs and research has been conducted in the Antarctic, Canada, Eritrea, India, Indonesia, Malaysia, and the USA, variously focusing on the human dimensions of fisheries; coral reef fisheries; seamounts; small-scale fisheries; illegal, unregulated, and unreported fisheries; impacts of harvesting and climate change on polar marine ecosystems; zooplankton dynamics; fish compensation habitats; and ecosystem modelling.

During this period, Dr Tony Pitcher completed a multi-disciplinary review of seamounts, together with colleagues from institutes at Scripps, Woods Hole, Seattle and Oregon: a special Mountains in the Sea issue of the journal *Oceanography* was published in 2010. In a visit to Horta, Azores, Portugal, he continued work with Fisheries Centre alumnus Dr Telmo Morato on a Seamount Ecosystem Evaluation Framework, extending a worldwide analysis of the status, threats and ecology of seamounts. Funded by the Martha Piper Research Fund, Dr Pitcher led an interdisciplinary international project in a workshop that enhanced the way that the human dimensions of fisheries are represented in a rapid appraisal technique, reported on a new website at Rapfish.org. He continued work with MRAG, UK and the Sea Around Us project on estimating total fishery catches for over 60 countries, including discards, small-scale, recreational and unreported catches. With the Sustainable Fisheries Partnership, based in Hawaii, he followed up earlier work on compliance with the UN Code of Conduct for Responsible Fisheries. Dr Pitcher also participated in a workshop at the University of Concepcion, Chile on ecosystem-based management for hake and grenadier fisheries, contributed to an IPSO workshop in Oxford, UK, presented at the Salish Sea Conference in Vancouver, gave research seminars in Norway, Portugal and Chile, and was invited to join the Marine Planning Advisory Council, Haida Gwaii. Notably, Tony Pitcher's journal, *Fish and Fisheries*, continues to lead the field with an impressive impact factor of 6.4.

In 2010-2011, Research Associate Dr Mimi Lam completed no fewer than ten manuscripts now in various stages of publication, while editing a Special Feature on The Privilege to Fish for the journal *Ecology and Society*. Dr Lam has been elected as a Member-at-Large for the Ecological Society of America (ESA) Governing Board, after serving three years as Chair of the Traditional Ecological Knowledge Section and Diversity Representative of the Education and Human Resources Committee. She has been recently appointed as an Adjunct Associate Professor in the Department of Biology, University of New Mexico, and has been invited to join the Global Ecological Integrity Group, the Natural History Network, the NSF Climate, Adaptation, Mitigation, and e-Learning (CAMEL) project and the Institute for Environmental Learning Advisory Councils. At the ESA Annual Meetings, she organized a sense of place symposium, special session, and biocultural event, gave an invited paper in a Natural History symposium, and in 2011 was profiled in a Focus on Ecologists display in Austin, Texas.



In 2010, she presented an invited talk in a Revolutionary Ecology symposium and also organized a special session in Pittsburgh, PA. She gave research seminars in Canada, Chile, the Czech Republic, Norway, Portugal, and the USA, delivered guest lectures on fisheries policy and governance in three courses at UBC and an undergraduate mentoring program in environmental biology at the University of Missouri. Mimi was awarded two long-range planning grants from the ESA and was a co-PI on the UBC Martha Piper Research Fund on valuing the human dimensions of fisheries.



Lydia Teh
PhD Candidate

Dr Divya Varkey successfully defended her PhD thesis on ecosystem modeling, marine protected areas and management of coral reef fisheries in Raja Ampat, Indonesia. She has been awarded an NSERC Industrial Postdoctoral Fellowship to conduct research with the BC government building Bayesian influence models for lake fishery management.



Pramod
Ganapathiraju
PhD Candidate

Dr Lydia Teh presented her research on a fuzzy-logic approach to small-scale fishers and marine protected areas in Malaysia at two conferences: the North American Association of Fisheries Economists in Hawaii and the International Marine Conservation Congress, in Victoria, BC. She successfully defended her PhD thesis in 2011.



Carie Hoover
PhD Candidate

Pramod Ganapathiraju successfully defended his PhD thesis, which showed that, in many countries, penalties are not sufficient to deter illegal fishing and that Monitoring, Control and Surveillance systems are evaluated as poor. As output from his 2008 field trip to India, the thesis also reports that unreported and illegal fishing amounts to 0.9 to 1.5 million tonnes per year, including almost a million tonnes of previously unrecognized discards.



Lingbo Li
PhD Candidate

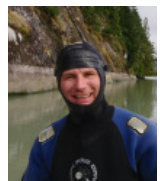
Carie Hoover's PhD thesis, which will be submitted in early 2012, focuses on the joint impacts of fishing, hunting and climate change in Hudson Bay (Arctic: narwhal, beluga, polar bears) and the Antarctic Peninsula (Antarctic: krill, icefish).

Lingbo Li has discovered a regime shift in her multivariate analysis of zooplankton dynamics in the Strait of Georgia, working in collaboration with colleagues in UBC Oceanography and DFO. Her findings were presented at an international conference in Pucon, Chile. Using her marine ecosystem model, she has also continued to investigate the potential impacts of transgenic coho salmon should they be introduced and escape to the Strait of Georgia; results were presented at the Salish Sea Conference, Vancouver.



Rajeev Kumar
PhD Candidate

Rajeev Kumar has continued his modelling work in support of ecosystem-based management of the fisheries of Mille Lacs, Minnesota, US, a large lake popular for its walleye fisheries. He has been using both ecosystem and single-species modelling using EwE and ADMB software to compare MSY estimated using the two methods.



Jamie Slogan
PhD Candidate

Jamie Slogan continued tracking the effectiveness of the fish compensation habitat satisfying a legal requirement at the inception of the Vancouver Convention Centre in Burrard Inlet. The results? It works! He presented his work at the Salish Sea Conference, Vancouver, and was awarded three scholarships by the Association of Professional Biologists, by NSERC (Industrial Partnership), and by the UBC Faculty of Science.

After a period of leave, Dawit Tesfamichael has almost completed his PhD thesis, exploring an ecosystem model of the Red Sea using information from interviews conducted in Eritrea, Sudan, and Yemen in 2008.



Dawit
Tesfamichael
PhD Candidate

<http://sites.google.com/site/ferrfc>





Nereus Program - Predicting the Future Ocean



Villy Christensen
Director

Nereus – Predicting the Future Ocean is a new research program started in cooperation between the Nippon Foundation and UBC in 2010, and fully operational from the autumn of 2011. The Nereus Program is planned with a duration of nine years, 2010-2019, and is focused on developing capacity to predict what the future may bring: will there be seafood and a healthy ocean for our children and grandchildren to enjoy? How will the future look, and what can we do to develop policies that are robust to the combined effects of climate change and overfishing?



Yoshitaka Ota
Co-Director

Nereus builds on a complex data and modeling framework, which integrates much of the information that has been assembled through the Sea Around Us Project and the Fisheries Economic Research Unit over the last decade.

The modeling framework (which is based on the Quantitative Group's work) includes, among others, ocean climate models, food web and fisheries models, biogeographic models, and rules for management and governance, and it will vastly expand our capacity to answer global ocean policy questions. The work is done in close partnership with Princeton, Duke, Cambridge, and Stockholm universities, and the World Conservation Monitoring Centre of the United Nations Environment Programme.



Jeroen Steenbeek
Senior
Programmer

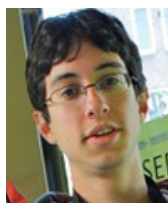


Chairman Yosei Sasakawa, Nippon Foundation, and Prof. Stephen Toope, UBC President, signed the Memorandum of Understanding that formally established the Nereus Program in Tokyo on Dec. 6, 2011.

The program supplements the central work of the Intergovernmental Panel for Climate Change (IPCC), which is focused on how emissions will impact the global environment. We add to this by predicting how climate change may impact life in the ocean (e.g., fish, marine mammals, and birds) and the people that rely on these resources. Our research focus is on mitigating impact – how can we develop governance systems that are resilient to the impact of climate change?



Audrey Valls
Nereus Fellow



Dalai Felinto
Visualization Expert



Mike Pan
Visualization Expert

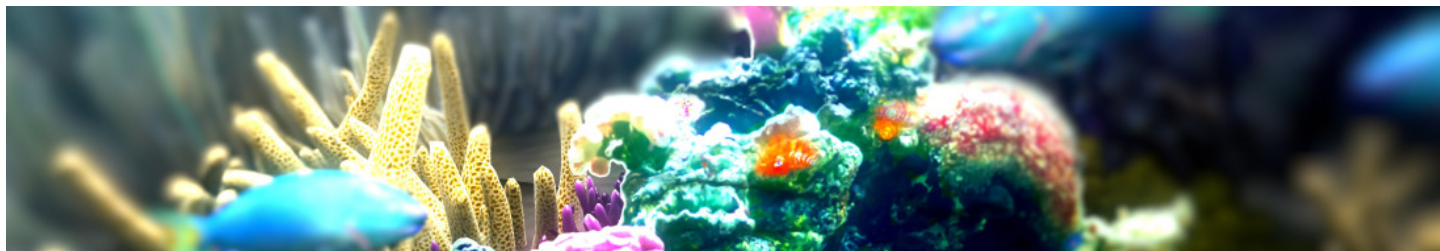


David Le
Administrative Assistant



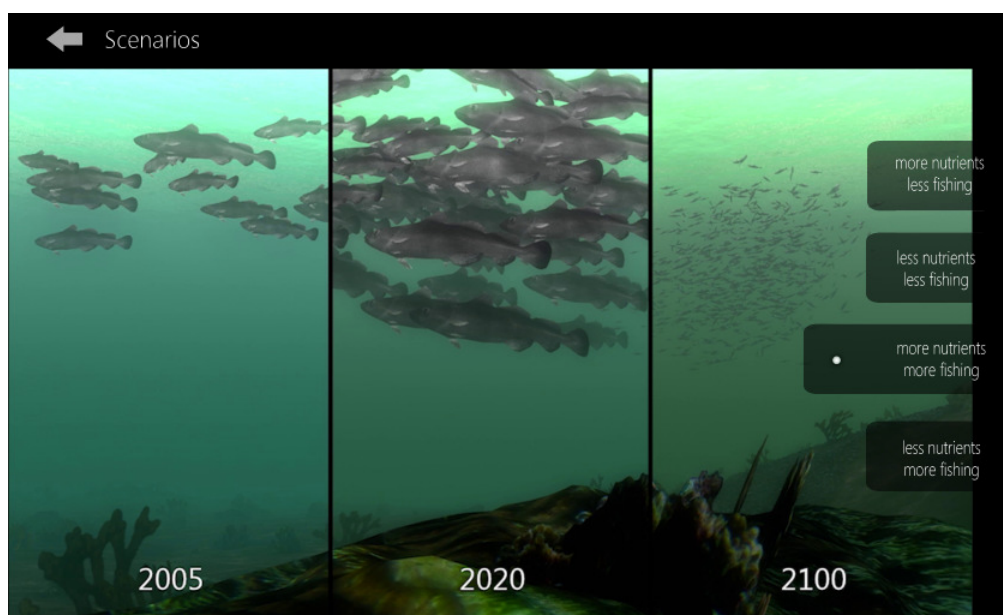
Marta Coll
Postdoctoral Researcher





On the science side, the predictions are heavy. We build on years of modeling and synthesis experience from leading researchers, and we analyze global data at a level that stretches the boundaries of science. Producing the science is, however, just the start – we also need to make the science accessible and relevant for policy makers.

Our traditional means of sharing this information – using spreadsheets, tables, and scientific reports – are OK for communicating between scientists, but not with policy makers. Realizing this, we have teamed up with “gamers” to make the science more accessible through 3-dimensional visualizations, presenting a more stimulating virtual underwater world. We use a 3D gaming engine as an interface for the scientific models in order to present a science-based view of how the oceans once looked, how they look now, and how they may look in the future depending on our actions.



Visualizing change in the Baltic Sea. Contrasts current situation with rebuild by year 2020, and evaluates four different scenarios for years 2100. Developed in cooperation with the Baltic Nest Institute and the Stockholm Resilience Centre.

The Nereus Program was officially launched in December 2010 in Tokyo when the Chairman of the Nippon Foundation, Mr. Yohei Sasakawa, and UBC President Stephen Toope signed the Memorandum of Understanding that formally established the nine-year cooperation.

www.nereusprogram.org



Changing Ocean Research Unit

The Changing Ocean Research Unit (CORU) is a new research unit as of 2011. Led by Dr William Cheung, who joined the Fisheries Centre as an Assistant Professor in September 2011, the unit aims to study the effects of global change on marine ecosystems, biodiversity and fisheries. The unit assesses the biophysical and socio-economic vulnerabilities and impacts of marine climate change, and identifies mitigation and adaptation options. Currently, CORU includes three PhD students: Miranda Jones (University of East Anglia), Tina Kerby (UEA) and Vicky Lam (UBC), and one research associate: Jose Fernandes (UEA). The unit collaborates closely with other research units in the Fisheries Centre.



William Cheung
Head

Dr Cheung's research focuses on assessing impacts of fishing and climate change on marine ecosystems and their goods and services, and studying ways to reconcile trade-offs in their management. Specifically, he develops empirical and numerical simulation models to examine the impacts of climate change on marine biodiversity and fisheries, globally and in various regional seas. Dr Cheung's work is currently funded by the National Geographic Society, UK's Ecosystem Service for Poverty Alleviation (ESPA) Program, and the European Union (FP7). His main projects include developing a new class of the Dynamic Bioclimate Envelope Model that incorporates trophic interactions, assessing the effects of interactions between warming, de-oxygenation, ocean acidification and overfishing on global fisheries, assessing historical and future effects of climate change on fisheries in the U.K. and investigating the trade-offs in ecosystem services for poverty alleviation in managing coastal fisheries in Kenya. These projects involve international collaborations, including Princeton University, NOAA, Plymouth Marine Laboratory, CEFAS, University of East Anglia, Stockholm Resilience Centre, and Wildlife Conservation Society.



Miranda Jones
PhD Student



Tina Kerby
PhD Student



Vicky Lam
PhD Student



Jose Fernandes
Research Associate

In 2011, Dr Cheung contributed his scientific expertise to a number of international assessment reports and to local and international organisations. Notably, Dr Cheung was invited by the Intergovernmental Panel of Climate Change (IPCC) to be a lead author for the IPCC's Fifth Assessment Report (Chapter 6 – Ocean Systems). He is a contributing author of the UNEP's Global Environmental Outlook – 5 report and Global Biodiversity Outlook – 3 report published by the Convention on Biological Diversity (CBD). He also serves as scientific advisor for WWF Canada, SharkTruth and is a member of the IUCN Groupers and Wrasses Species Specialist Group. In 2011, Dr Cheung gave keynotes, talks and seminars in numerous international and regional conferences and meetings, including:

- Invited presentation in the Asia Pacific Economic Cooperation, Blue Economy Forum, "Projecting impacts of climate change on marine living resources in the Asia Pacific region", Xiamen, China, 4 – 10 October 2011.
- Invited lecture in the Ocean Acidification Workshop, "Projecting effects of ocean acidification on fishes and fisheries", Tromsø, Norway, 27 – 29 September 2011.
- Panelist talk and discussion, "Is biodiversity going the way of the Dodo?" – The Royal Society Summer Science Week discussion Forum, 8 July 2011.
- Plenary speech in Advance in Marine Ecosystem Modelling and Research Symposium, University of Plymouth, Plymouth, 26-29 June 2011

In the coming years, CORU will continue its collaboration with other Fisheries Centre research units and international organizations with the goal of shedding light on the impacts of global change on marine ecosystems, proposing solutions, and promoting public awareness.



Fisherman in Wasini Marine Park, coast of Kenya
(Photo credit: Frédéric Le Manach 2011)



Graduate Studies

Fisheries Centre students come from all over the world. The 47 PhD and 22 MSc students at the FC during 2010 and 2011 came from 24 countries: Argentina, Brazil, Canada, Chile, China, Eritrea, France, Germany, Hong Kong, India, Indonesia, Japan, Korea, Kuwait, Malaysia, Mexico, Ireland, Peru, Samoa, Singapore, South Africa, the United Kingdom, and the USA. Since the Fisheries Centre is not an admitting unit at UBC, our students are supervised or co-supervised by a FC faculty member, and admitted to UBC Graduate Studies through other departments, primarily Resource Management and Environmental Studies (RMES) and Zoology, but also Geography and Oceanography.



As of 2012, a fisheries stream will have been created in the RMES program, allowing RMES Masters and PhD students to focus primarily on fisheries management, conservation and governance. This stream will be administered by the Fisheries Centre and students will be supervised by Fisheries Centre faculty members. It will include a new mandatory 6 credit fisheries core course FISH 520, to be taught jointly by Fisheries Centre faculty members.

Students' research covers a wide range of topics related to the FC Mission: *Restoring fisheries, conserving aquatic life, rebuilding ecosystems: Researching the options*. Student research topics usually comprise knowledge from a variety of disciplines. Thesis topics include understanding species life history and population dynamics of key resource species; fisheries, ecosystem and bioeconomic modeling; quantifying the impacts of overfishing, non-selective fisheries and climate change; evaluating possible mitigation tools and policy options; historical reconstructions and future projections of populations and catches; economic valuations, and more.

During 2010 and 2011, 7 doctoral and 6 master's students completed their thesis research. A list of these graduates and their thesis titles is on page 27. Thesis abstracts can be seen at www.fisheries.ubc.ca/students/alumni. Since 2008, all UBC PhD graduates have prepared short lay-language summaries describing their doctoral research. Fisheries Centre summaries are at www.fisheries.ubc.ca/FCdoctoralcitations.

In addition to their research efforts, students play an important role in the day to day life of the Fisheries Centre. A student representative participates in faculty meetings thereby ensuring that students' interests are considered in all decision making. Students organize the weekly FC Seminar Series and coffee breaks, help out with events such as the biennial Larkin Lecture and holiday celebrations, coordinate building-wide composting, and edit *FishBytes* and the newsletters of various groups.

Fisheries Centre students are known to tackle rather ambitious projects that often involve travel to far parts of the globe. In the field, students gain hands-on experience with the fauna, markets, fishery systems, etc., that are the focus of their research. Our students are gaining an increased understanding of the implications of their work for all stakeholders involved. Engaging in diverse projects spanning the globe has allowed our students to make strong connections with their global peers, working alongside NGOs, local communities, fishing industry associations and scientists. Despite the diversity of students' research and field sites, the overarching perspective echoes the Fisheries Centre's goal to reconcile fisheries and conservation.

To achieve its goal, the Fisheries Centre promotes the multidisciplinary study of fisheries, and aims to provide its graduate students with a strong background in quantitative aspects of fishery science and in all aspects of aquatic conservation biology. Analytical tools developed in a broad spectrum of parent subjects, including biology, oceanography, economics, engineering, mathematics, sociology, planning and policy are employed in order to assess, appraise and forecast the impacts of both human and natural processes on fishery resources. Fisheries policy and management problems under study include assessment and management of artisanal and commercial food capture fisheries, recreational fisheries, coastal and watershed management, aquaculture biology and engineering, conflict resolution and the co-management of shared fishery resources, and the conservation of endangered exploited species in both marine and freshwater environments. Faculty members teach a number of graduate credit courses, on such topics as quantitative analysis and modeling, economics, and aquatic policy. These FISH courses are detailed on the graduate program web page www.fisheries.ubc.ca/grad.



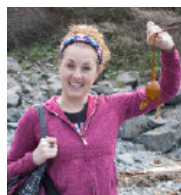
Graduate Students



Dalal Al-Abdulrazzak (Kuwait)
PhD Zoology (start 2009)
Project: Historical ecology of Persian Gulf fisheries
Supervisor: Dr Daniel Pauly



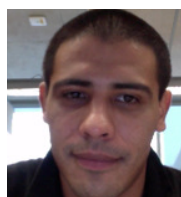
Lisa Boonzaier (South Africa)
MSc Zoology (start 2011)
Project: Effectiveness of marine protected areas for conserving biodiversity
Supervisor: Dr Daniel Pauly



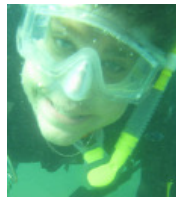
Elizabeth Atwood (USA)
MSc Zoology (start 2008)
Project: Investigating nutritional stress in northern fur seals
Supervisor: Dr Andrew Trites



Lucas Brotz (Canada)
MSc Oceanography (start 2007*)
PhD Zoology (start 2011)
Project: Trends in global jellyfish populations
Supervisors: Dr Evgeny Pakhomov (MSc only) and Dr Daniel Pauly



Ricardo Amoroso (Argentina)
PhD Zoology (start 2011)
Project: Management strategy evaluation for the British Columbia herring fisheries
Supervisor: Dr Steve Martell



Iain Caldwell (Canada)
PhD Zoology (start 2006)
Project: Movement of a sedentary fish in response to environmental change
Supervisor: Dr Amanda Vincent



Megan Bailey (Canada)
PhD RMES (start 2008)
Project: Economics of tuna fisheries in the western and central Pacific Ocean
Supervisor: Dr Rashid Sumaila
FishBytes Editor 2009-2012



Brooke Campbell (Canada)
MSc RMES (start 2007*)
Project: Clarifying historic trends in the marine aquaculture sector: a spatially-refined bottom-up reconstruction of global production
Supervisor: Dr Daniel Pauly



Dyhia Belhabib (Canada)
PhD RMES (start 2011)
Project: Fisheries and food security
Supervisor: Dr Daniel Pauly



Susana Cardenas (Peru)
MSc Zoology (start 2008)
Project: Recovery of South American fur seals in Peru
Supervisor: Dr Andrew Trites



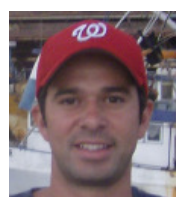
Brajgeet Bhathal (Canada)
PhD Zoology (start 2005)
Project: Analysis of fishing impacts on India's marine ecosystems and exploration of possible policy scenarios
Supervisor: Dr Daniel Pauly



Rachel Chudnow (Canada)
MSc Zoology (start 2010)
Project: The cost of fisheries research: a case study of the BC Area A dungeness crab fishery, and what can be learned from international experience.
Supervisor: Dr Villy Christensen



Leah Biery (USA)
MSc Zoology (start 2010)
Project: Using enhanced shark catch data to estimate the magnitude, global distribution and species composition of the shark fin trade
Supervisor: Dr Daniel Pauly



Andres M. Cisneros-Montemayor (Mexico)
MSc RMES (start 2008*)
PhD RMES (start 2010)
Project: Ecosystem and economic modeling
Supervisor: Dr Rashid Sumaila





Meaghan Darcy (USA)
 PhD Zoology (start 2005)
Project: Management strategy evaluation for a multi-species, multi-sector fishery in the Hawaiian Islands
Supervisor: Dr Steve Martell



Aaron Greenberg (Canada)
 PhD Zoology (start 2010)
Project: Dungeness crab fisheries
Supervisor: Dr Steve Martell



Alex Dalton (Canada)
 MSc Zoology (start 2010)
Project: How much energy does it take to power a northern fur seal and what is the best way to measure that?
Supervisor: Dr Andrew Trites and Dr David Rosen



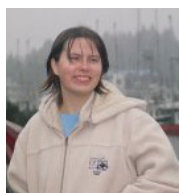
Krista Greer (Canada)
 MSc RMES (start 2011)
Project: Calculating the carbon emissions of the world's fishing fleets since 1950
Supervisor: Dr Daniel Pauly



Wes Didier (USA)
 PhD Zoology (start 2009)
Project: Testing for stresses that may be affecting fecundity of eulachon
Supervisor: Dr David Close



Nigel Haggan (Northern Ireland)
 PhD IIS (start 2006)
Project: Mapping cultural and spiritual values of coastal ecosystems
Supervisor: Dr Rashid Sumaila



Danielle Edwards (Canada)
 PhD RMES (start 2011)
Project: Fishing fleet dynamics and fisheries management policy evaluation for the BC small boat groundfish fleet
Supervisor: Murdoch McAllister



Anna Hall (Canada)
 PhD Zoology (start 2004*)
Project: Effects of tidal mixing on porpoise distribution: Implications for foraging
Supervisor: Dr Andrew Trites



Junho (June) Eom (Korea)
 PhD Zoology (start 2011)
Project: The sex pheromone *Acipenser transmontanus* in White Sturgeon
Supervisor: Dr David Close



Mike Hawkshaw (Canada)
 PhD Zoology (start 2008)
Project: Inter-cohort density dependence and cyclic age zero survival of cyprinids
Supervisor: Dr Carl Walters



Pramod Ganapathiraju (India)
 PhD RMES (start 2005*)
Project: A global study on incentives and disincentives to IUU fishing and compliance with the FAO Code of Conduct
Supervisor: Dr Tony Pitcher



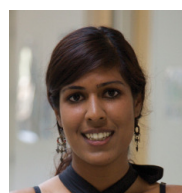
Sarah Hawkshaw (Canada)
 PhD Zoology (start 2011)
Project: Evaluating management strategies for the salmon troll fishery on the West Coast of Vancouver Island
Supervisor: Dr Murdoch McAllister



Carling Gerlinsky (Canada)
 MSc Zoology (start 2010)
Project: How do sea lions manage their oxygen and respond to different prey patches while diving?
Supervisor: Dr Andrew Trites and Dr David Rosen



James Hehre (USA)
 PhD Zoology (start 2009)
Project: Ecological impacts of seaweed farming on coral reefs in the central Philippines
Supervisor: Dr Amanda Vincent



Rhona Govender (South Africa)
 MSc Zoology (start 2009)
Project: A global estimate of the catch of small-scale fisheries
Supervisor: Dr Daniel Pauly



Carie Hoover (USA)
 PhD RMES (start 2006)
Project: Effects of climate change on polar ecosystems
Supervisor: Dr Tony Pitcher

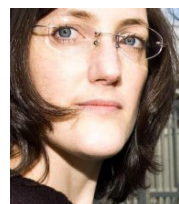


**Tabitha Hui (Singapore)**

MSc Zoology (start 2007*)

Project: The Steller sea lion, its prey and its prey fisheries**Supervisor:** Dr Andrew Trites**Roseti Imo (Samoa)**

PhD RMES (withdrew in 2011)

Project: Spatial policy analysis for albacore management in the western central Pacific**Supervisor:** Dr Rashid Sumaila and Dr Carl Walters**Tiphaine Jeanniard du Dot (France)**

PhD Zoology (start 2009)

Project: Effects of environmental changes on fitness and foraging efficiency of fur seals: an energetic approach**Supervisor:** Dr Andrew Trites**Danika Kleiber (Canada/USA)**

PhD RMES (start 2009)

Project: Gender, marine resource use and community conservation in the Danajon Bank, Central Philippines**Supervisor:** Dr Amanda Vincent**Barbara Koot (Canada)**

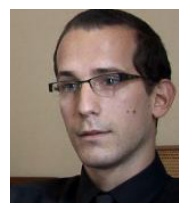
PhD RMES (start 2011)

Project: Seasonal distribution and relative abundance of threatened and endangered whales in British Columbian waters, from passive acoustic data**Supervisor:** Dr Andrew Trites, Dr John Ford, and David Hannay**Rajeev Kumar (India)**

PhD RMES (start 2006)

Project: Simulation modeling of Mille Lacs Lake ecosystems in support of EBM**Supervisor:** Dr Tony Pitcher**Vicky Wing Yee Lam (Hong Kong)**

PhD RMES (start 2008)

Project: Global fisheries economics in the face of change in climate and energy prices**Supervisor:** Dr Rashid Sumaila**Frédéric Le Manach (France)**

PhD RMES, joint with UMR Ifremer - IRD UM2 (start 2011)

Project: Global fisheries, seafood trade, and food security: ethics and human rights in relationships between developed and developing countries**Supervisor:** Dr Daniel Pauly (UBC) and Dr Philippe Cury (UMR)**Lingbo Li (China)**

PhD Zoology (start 2008)

Project: Examining climate change impacts on the Strait of Georgia marine ecosystem**Supervisor:** Dr Tony Pitcher**Rachael Louton (USA)**

PhD Zoology (start 2007)

Project: Evaluation of alternative management regimes for shrimp fisheries in the Gulf of Mexico**Supervisor:** Dr Murdoch McAllister**Dale Marsden (Canada)**

PhD RMES (start 2003)

Project: Bioeconomic analysis of Fraser River sockeye salmon fisheries management**Supervisor:** Dr Rashid Sumaila**Steve McAdam (Canada)**

PhD Zoology (start 2005)

Project: Examination of white sturgeon (*Acipenser transmontanus*) recruitment failure and identification of restoration options**Supervisor:** Dr Carl Walters**Benjamin Nelson (USA)**

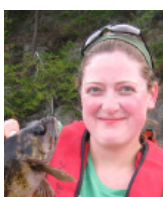
PhD Zoology (start 2010)

Project: Multi-species modeling of predator/prey interactions between pinnipeds and Pacific salmon in the Strait of Georgia**Supervisor:** Dr Andrew Trites and Dr Murdoch McAllister**Rachel Neuenhoff (USA)**

PhD Zoology (start 2011)

Project: Multi-species modeling to determine how gray seal predation impacts Atlantic cod fishery recovery and exploring management options that mitigate predation effects**Supervisor:** Dr Andrew Trites**Chad Nordstrom (Canada)**

MSc Zoology (2008)

Project: Linking foraging northern fur seals with oceanographic features in the eastern Bering Sea**Supervisor:** Dr Andrew Trites**Shannon Obradovich (Canada)**

PhD Zoology (start 2008)

Project: Survey methodologies and management strategy evaluation for BC inshore rockfish**Supervisor:** Dr Murdoch McAllister



Kerrie O'Donnell (USA)
PhD Zoology (start 2005*)
Project: Evaluating recovery options for data-limited seahorse fisheries in the Philippines
Supervisor: Dr Amanda Vincent



Michelle Paleczny (Canada)
MSc Zoology (start 2008)
Project: The effect of commercial fisheries on global seabird populations
Supervisor: Dr Daniel Pauly



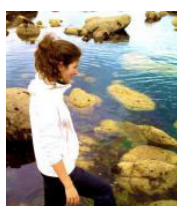
Tom Porteus (UK)
PhD Zoology (start 2006)
Project: Use of Bayesian methods to evaluate strategies for control of terrestrial vertebrate pest species
Supervisor: Dr Murdoch McAllister



Brent Roberts (Canada)
MSc Zoology (start 2009)
Project: The physiological mechanism for response to stress in the sea lamprey, *Petromyzon marinus*
Supervisor: Dr David Close



Frances Robertson (UK/Canada)
PhD Zoology (start 2008)
Project: The effects of behaviour, age, status, environmental parameters and exposure to seismic operations on the observed distribution of bowhead whales in the Alaskan Arctic
Supervisor: Dr Andrew Trites



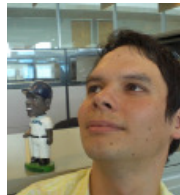
Laureenne Schiller (Canada)
MSc Zoology (start 2011)
Project: A global analysis of tuna and billfish capture fishery landings on the high seas from 1950 to present
Supervisor: Dr Daniel Pauly



Jennifer Selgrath (USA)
PhD Zoology (start 2006)
Project: Ecosystem resilience in coastal fishing grounds
Supervisor: Dr Amanda Vincent



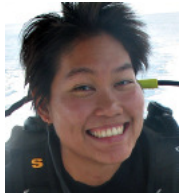
Jamie Slogan (Canada)
PhD Zoology (start 2008)
Project: Long-term community dynamics of marine fish compensation habitat in Burrard Inlet, BC.
Supervisor: Dr Tony Pitcher



Wilf Swartz (Canada/Japan)
PhD RMES (start 2008)
Project: How does international trade affect marine fisheries
Supervisor: Dr Rashid Sumaila



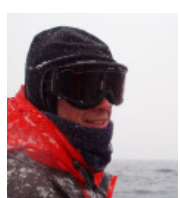
Louise Teh (Malaysia)
PhD RMES (start 2007*)
Project: Investigating the discount rates of small-scale fishers in the Sulu-Sulawesi Marine ecoregion
Supervisor: Dr Rashid Sumaila



Lydia Teh (Malaysia)
PhD RMES (start 2007*)
Project: Zoning MPAs using a fuzzy logic system: case study of small-scale reef fisheries in Sabah, Malaysia
Supervisor: Dr Tony Pitcher



Dawit Tesfamichael (Eritrea)
PhD RMES (start 2002)
Project: Ecosystem based fisheries management of the Red Sea
Supervisors: Dr Daniel Pauly and Dr Tony Pitcher



Austen Thomas (USA)
PhD Zoology (start 2010)
Project: Foraging/spatial ecology of top predators in marine ecosystems
Supervisor: Dr Andrew Trites



Laura Tremblay-Boyer (Canada)
MSc Zoology (start 2007*)
PhD Zoology (start 2010)
PhD Project: Importance of resource availability to apex predators: the White Sturgeon
Supervisor: Dr Daniel Pauly (MSc) and Dr Steve Martell (PhD)



Audrey Valls (France)
PhD Zoology (start 2009)
Project: Using ecosystem models to provide better predictions of global changes in marine biodiversity through the 21st Century
Supervisor: Dr Villy Christensen



Liesbeth van der Meer (Chile)
MSc RMES (start 2009)
Project: Fish retail contribution to the global economy
Supervisor: Dr Rashid Sumaila





Brett van Poorten (Canada)
 PhD Zoology (start 2005)
Project: Effects of interspecific competition on recruitment processes in rainbow trout and Pygmy Pikeminnow
Supervisor: Dr Carl Walters



Brianna Wright (Canada)
 MSc Zoology (start 2010)
Project: How do fish-eating killer whales find their primary prey, Chinook salmon?
Supervisors: Dr Andrew Trites and Dr Dominic Tollit



Divya Varkey (India)
 PhD RMES (start 2005*)
Project: Ecosystem modelling of coral reefs in Raja Ampat
Supervisor: Dr Tony Pitcher



Beth Young (USA)
 MSc Zoology (start 2007*)
Project: The ability of heart rate to predict metabolism in Steller sea lions
Supervisors: Dr Andrew Trites and Dr David Rosen



Mandy Wong (Canada)
 MSc Zoology (start 2007)
Project: Do El Niño-southern oscillation events positively affect the diet of the Hawaiian monk seal
Supervisors: Dr Andrew Trites and Dr Dominic Tollit



FC students and researchers at the North American Association of Fisheries Economists conference in Honolulu, Hawaii (May 2011)



Graduate Theses Completed*

2011

Lucas Brotz (Canada)

MSc Oceanography

Title: Trends in global jellyfish populations

Supervisors: Dr Evgeny Pakhomov and Dr Daniel Pauly

Brooke Campbell (Canada)

MSc RMES

Title: Clarifying historic trends in the marine aquaculture sector: a spatially-refined bottom-up reconstruction of global production

Supervisor: Dr Daniel Pauly

Pramod Ganapathiraju (India)

PhD RMES

A global study on incentives and disincentives to IUU fishing and compliance with the FAO Code of Conduct

Supervisor: Dr Tony Pitcher

Anna Hall (Canada)

PhD Zoology

Title: Effects of tidal mixing on porpoise distribution: Implications for foraging

Supervisor: Dr Andrew Trites

Tabitha Hui (Singapore)

MSc Zoology

Title: The Steller sea lion, its prey and its prey fisheries

Supervisor: Dr Andrew Trites

Louise Teh (Malaysia)

PhD RMES

Title: Investigating the discount rates of small-scale fishers in the Sulu-Sulawesi Marine ecoregion

Supervisor: Dr Rashid Sumaila

Lydia Teh (Malaysia)

PhD RMES

Title: Zoning MPAs using a fuzzy logic system: case study of small-scale reef fisheries in Sabah, Malaysia

Supervisor: Dr Tony Pitcher

Kerrie O'Donnell (USA)

PhD Zoology

Title: Uniting historic perspectives, human behaviour, and habitat use to assess the future for overfished seahorses

Supervisor: Dr Amanda Vincent

2010

Andres Cisneros (Mexico)

MSc RMES

Title: The economic benefits of ecosystem-based marine recreation

Supervisor: Dr Rashid Sumaila

Laura Tremblay-Boyer (Canada)

MSc Zoology

Title: Effects of global fisheries on the biomass of marine ecosystems: a trophic-level-based approach

Supervisor: Dr Daniel Pauly

Divya Alice Varkey (India)

PhD RMES

Title: Ecosystem modelling of coral reefs in Raja Ampat

Supervisor: Dr Tony Pitcher

Beth Young (USA)

MSc Zoology

Title: The ability of heart rate to predict metabolism in Steller sea lions (*Eumatopias jubatus*)

Supervisors: Dr Andrew Trites and Dr David Rosen

*Thesis abstracts are available online at www.fisheries.ubc.ca.



Fisheries Centre Members

Faculty

Dr U. Rashid Sumaila, Director
Professor, Fisheries Centre
Fisheries Economics

Dr William Cheung
Assistant Professor, Fisheries Centre
Global Change Biology & Fisheries

Dr Villy Christensen, Associate Director
Professor, Fisheries Centre
Ecosystem Modeling

Dr David Close
Assistant Professor, Fisheries Centre
& Zoology
Aboriginal Fisheries

Dr Steven Martell
Associate Professor, Fisheries Centre
Quantitative Fisheries Stock
Assessment

Dr Murdoch McAllister
Associate Professor, Fisheries Centre
Bayesian Statistical Methods

Dr Daniel Pauly
Professor, Fisheries Centre & Zoology
Tropical & Global Fisheries Issues

Dr Tony J. Pitcher
Professor, Fisheries Centre & Zoology
Ecosystems, Rapid Appraisal and
Schooling

Dr Andrew Trites
Professor, Fisheries Centre
Marine Mammals and Fisheries

Dr Amanda Vincent
Associate Professor, Fisheries Centre
Canada Research Chair in Marine
Conservation

Dr Carl Walters
Professor, Fisheries Centre & Zoology
Modeling, Assessment and
Ecosystems

Dr Sang-Seon Yun
Assistant Professor, Fisheries Centre
Chemical Communication Systems of
Fishes

Associated UBC Faculty

Dr Kai Chan
Institute for Resources,
Environment & Sustainability
Ecosystem Services & Biodiversity

Dr Douglas Harris
Law
Fisheries Law

Dr Scott Hinch
Forest Sciences and Institute for
Resources & Environment
Forests & Fisheries

Dr Linc Kesler
First Nations House of Learning
Aboriginal Fisheries

Dr David (Ralph) Matthews
Sociology
Fisheries Sociology

Dr Charles Menzies
Anthropology
Fisheries Anthropology

Dr Richard Paisley
Law
Fisheries Law

Dr Royann Petrell
Chemical & Biological Engineering
Fishery Engineering

Dr William Rees
School of Community & Regional
Planning
Ecological Economics

Emeritus Members

Dr Colin Clark
Commercial Fisheries Management

Dr Brian Elliot
Environmental Sociology

Dr Les Lavkulich
Fisheries Education

Dr Paul LeBlond
Fisheries Oceanography

Dr Don Ludwig
Fisheries Mathematics

Dr Gordon Munro
Fisheries Economics

Dr William Neill
Fisheries Limnology

Dr Tom Northcote
Fisheries Biology

Adjunct Professors & Associated Faculty Outside UBC

Dr Cameron Ainsworth
National Oceanic and Atmospheric
Administration
Marine Ecosystem Restoration

Dr Jackie Alder
UNEP, Nairobi
Environmental Policy Implementation

Dr Claire Armstrong
University of Tromsø
Fisheries Economics

Mr Josef Bauer
Commercial Fisherman (retired)

Dr Ratana Chuenpagdee
Dalhousie University
Fisheries Economics

Marie Étienne
AgroParisTech
Hierarchical modeling in fisheries

Dr John K. B. Ford
DFO, Nanaimo
Marine Mammals

Dr Robyn Forrest
DFO, Nanaimo
Management Strategy Evaluation

Dr Michael Grigg
National Institutes of Health (NIH)
Biochemistry

Dr Martin Haulena
Vancouver Aquarium
Veterinarian



Dr Douglas E. Hay
DFO, Nanaimo
Pelagic Fisheries

Dr Glen Jamieson
DFO, Nanaimo
Invertebrate Fisheries

Dr Jacquelynne King
DFO, Nanaimo
Fisheries Climateology

Dr Josh Korman
Ecometric Research Inc.
Adaptive Management

Dr Rosemary Ommer
University of Victoria
Fisheries Sociology

Mr Eric Parkinson
BC Ministry of Environment
Fisheries Management

Dr Ian Perry
DFO, Nanaimo
Fisheries Oceanography

Dr Stephen Raverty
BC Agriculture and Lands
Pathologist - Fish & Mammals

Dr Laura Richards
DFO, Nanaimo
Fisheries Assessment

Dr Jordan Rosenfeld
BC Min. Environment
Stream Ecology

Dr Jon Schnute
DFO (retired)
Fisheries Mathematician

Dr Richard Sims
EBA Engineering Consultant
Environmental Science

Mr Alan Sinclair
DFO (retired)
Management Strategy Evaluation

Dr John Stockner
Eco-Logic Ltd
Limnology & Oceanography

Dr Arthur Tautz
BC Fisheries, Vancouver
GIS, Sports Fisheries

Dr John Volpe
University of Victoria
Sustainable Aquaculture

Dr Jane Watson
Malaspina College,
Nanaimo
Marine Mammals

International Advisory Council

Dr Philippe Cury
CRH/IRD
Sete, France

Dr Douglas DeMaster
National Marine Fisheries Service
Seattle, USA

Dr Cornelia Nauen
European Union
Brussels, Belgium

Dr Ana Parma
Centro Nacional Patagónico
Chubut, Argentina

Dr Yvonne Sadovy
University of Hong Kong
Hong Kong, China

Dr Anthony D. M. Smith
CSIRO Marine & Atmospheric
Research
Hobart, Tasmania

FC Office Staff



Janice Doyle
Administration
Support



Marina Campbell
Administration
Support



Erin Bedard
FC Graduate Program
Assistant



Ann Tautz
Administration
Support

*Thank you, Ann, for 25
great years, and best wishes
for your retirement!*



Publications

ARTICLES IN REFEREED JOURNALS

2011

- Ahrens, R., Walters, C.J., and Christensen, V. (2011) Foraging arena theory. *Fish and Fisheries*, 13(1): 41-59.
- Ainsworth, C.H., Samhuri, J.F., Busch, D.S., Cheung, W.W.L., Dunne, J., and Okey, T.A. (2011) Potential impacts of climate change on Northeast Pacific marine foodwebs and fisheries. *ICES Journal of Marine Science*, 68: 1217-1229.
- Andersen, S.C., Flemming, J.M., Watson, R., and Lotze, H.K. (2011) Global Expansion of Invertebrate Fisheries: Trends, Drivers, and Ecosystem Effects. *Fisheries Research*, 6(3): e14735.
- Anticamara, J.A., Watson, R., Gelchu, A., and Pauly, D. (2011) Global fishing effort (1950-2010): Trends, gaps, and implications. *Fisheries Research*, 107: 131-136.
- Bowles, E., Schulte, P.M., Tollit, D.J., Deagle, B.E., and Trites, A.W. (2011) Proportion of prey consumed can be determined from faecal DNA using real-time PCR. *Molecular Ecology Resources*, 11: 530-540.
- Caldwell, I., Correia, M., Palma, J., and Vincent, A.C.J. (2011) Advances in tagging syngnathids, with the effects of dummy tags on behaviour of *Hippocampus guttulatus*. *Journal of Fish Biology*, DOI: 10.1111/j.1095-8649.2011.02983.x.
- Carruthers, T.R., McAllister, M.K., and Taylor, N.G. (2011) Spatial surplus production modelling of Atlantic tunas and billfish. *Ecological Applications*, 21: 2734-2755.
- Carruthers, T.R., Ahrens, R.N.M., McAllister, M.K., and Walters, C.J. (2011) Integrating imputation and standardization of catch rate data in the calculation of relative abundance indices. *Fisheries Research*, 109(1): 157-167.
- Carruthers, T.R., Walters, C.J. (2011) Evaluating methods that classify fisheries stock status using only fisheries catch data. *Fisheries Research*, DOI: 10.1016/f.fishres.2011.12.011.
- Cheung, W.W.L., Dunne, J., Sarmiento, J.L., and Pauly, D. (2011) Integrating eco-physiology and plankton dynamics into projected changes in maximum fisheries catch potential under climate change in the Northeast Atlantic. *ICES Journal of Marine Science*, 68: 1008-1018.
- Christensen, V., Steenbeek, J., and Failler, P. (2011) A combined ecosystem modeling and value chain approach. *Ecological Modelling*, 222: 857-864.
- Close, D. A., Yun, S.-S., and McCormick, S. D. (2011) Reply to Thornton et al: Lamprey possess a highly specific corticosteroid signaling system. *Proceedings of the National Academy of Sciences*, 108: E6.
- Coll, M., Piroddi, C., Albouy, C., Ben Rais Lasram, F., Cheung, W. W. L., Christensen, V., Karpouzi, V. S., Guilhaumon, F., Mouillot, D., Paleczny, M., Palomares, M.L., Steenbeek, J., Trujillo, P., Watson, R., and Pauly, D. (2011) The Mediterranean Sea under siege: spatial overlap between marine biodiversity, cumulative threats and marine reserves. *Global Ecology and Biogeography*, 21(4): 465-480.
- Collette, B.B., Carpenter, K.E., Polidoro, B.A., Juan-Jordá, M.J., Boustany, A., Die, D.J., Elfes, C., Fox, W., Graves, J., Harrison, L., McManus, R., Minte-Vera, C.V., Nelson, R., Restrepo, V., Schratwieser, J., Sun, C., Amorim, A., Peres, M.B., Canales, C., Cardenas, G., Chang, S., Chiang, W., Leite, N., Harwell, H., Lessa, R., Fredou, F.L., Oxenford, H.A., Serra, R., Shao, K., Sumaila, R., Wang, S., Watson, R., and Yáñez, E. (2011) High value and long-life: double jeopardy for tunas and billfishes. *Science*, 333: 291-292.
- Dowd, M., and Joy, R. (2011) Estimating behavioral parameters in animal movement models using a state-augmented particle filter. *Ecology*, 92: 568-575.
- Espinosa-Romero, M.J., Gegr, E.J., Christensen, V., Walters, C., and Chan, K.M.A. (2011) Representing mediating effects and species reintroductions in Ecopath with Ecosim. *Ecological Modeling*, 222: 1569-1579.
- Fulai, S., Flomenhofs, G., Downs, T.J., Grande-Ortiz, M., Graef, D., Scholtens, B., Mol, A.P.J., Sonnenfeld, D.A., and Spaargaren, G. Editors, Goel, R.K., Hsieh, E.W.T., Scricciu, S., Steurer, R., Polzin, C., Kostka, G., Ancey, T., Pirgmaier, E., Boons, F., Robèrt, K.-H., Bryant, C., Zhou, K., Acharya, S.R., Huberman, D., Sonwa, D.J., Mycoo, M., Guan, D., Hubacek, K., Sumaila, U.R., Lopez-Ruiz, H.G., Jolley, G.J., Dougherty, M.L., Pilon, A.F., Prakash, R.I., Tambunan, T., and Hermann, S. (2011) Is the concept of a green economy a useful way of framing policy discussions and policymaking to promote sustainable development? *Natural Resources Forum*, 35(1): 63-72.
- Gascuel, D., Guénette, S., and Pauly, D. 2011. The trophic-level based ecosystem modeling approach: theoretical overview and practical uses. *ICES Journal of Marine Science*, 68(7): 1403-1416.
- Gleiss, A.C., Jorgensen, S.J., Liebsch, N., Sala, J.E., Norman, B., Hays, G.C., Quintana, F., Grundy, E., Campagna, C., Trites, A.W., Block, B.A., and Wilson, R.P. (2011) Convergent evolution in locomotory patterns of flying and swimming animals. *Nature Communications*, 2: 352.
- Hansen, G.J.A., Ban, N., Jones, M.L., Kaufman, L., Panes, H.M., Yasué, M., and Vincent, A.C.J. (2011) Hindsight in marine protected area selection: A comparison of ecological representation arising from opportunistic and systematic approaches. *Biological Conservation*, 144: 1866-1875.
- Harper, S. Bevacqua, D., Chudnow, R., Giorgi, S., Guillonneau, V., Le Manach, F., Sutor, T. and Sumaila, U.R. (2011) Fuelling the fisheries subsidy debate: agreements, loopholes and implications. *Fisheries Research*, 113(1): 143-146.
- Hastings, K.K., Jemison, L.A., Gelatt, T.S., Laake, J.L., Pendelton, G., King, J.C., Trites, A.W., and Pitcher, K.W. (2011) Cohort effects and spatial variation in age-specific survival of Steller sea lions from southeastern Alaska. *Ecosphere* 2, 111: DOI: 10.1890/ES11-0.
- Heymans, S. J. J., Mackinson, S., Sumaila, R., Dyck, A., and Little, A. (2011) The impact of subsidies on ecological sustainability and future profits from North Sea fisheries. *PLoS ONE*, 6(5): e20239.
- Hill, N.A.O., Rowcliffe, J.M., Koldewey, H.J., and Milner-Gulland, E.J. (2011) The Interaction between Seaweed Farming as an Alternative Occupation and Fisher Numbers in the Central Philippines. *Conservation Biology*, DOI: 10.1111/j.1523-1739.2011.01796.



- Jacquet, J., Boyd, I., Carlton, J.T., Fox, H., Elizabeth Johnson, A., Mee, L., Roman, J., Spalding, M., and Sutherland, W.J. (2011) Scanning the oceans for solutions. *Solutions*, 2(1): 38-55.
- Jacquet, J., Hauert, C., Traulsen, A. and Milinski, M. (2011) Shame and honour drive cooperation. *Biology Letters*, 7: 899-901.
- Jones, T.T., Hastings, M., Bostrom, B., and Pauly, D., Jones, D. (2011) Growth of captive leatherback turtles *Dermochelys coriacea* with inferences on growth in the wild: implications for population decline and recovery. *Journal of Experimental Marine Biology and Ecology*, 399: 84-92.
- Keith, D.A., Martin, T.G., McDonald-Madden, E., and Walters, C. (2011) Uncertainty and adaptive management for biodiversity conservation. *Biological Conservation*, 144: 1175-1178.
- Kleiber, D., Blight, L.K., Caldwell, I., and Vincent, A.C.J. (2011) The importance of seahorses and pipefishes in the diet of marine animals. *Reviews in Fish Biology and Fisheries*, 21(2): 205-223.
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The Federal Minister of Fisheries, the Honourable Gail Shea, visited the Fisheries Centre on August 24, 2010. (Photo Credit: Grace Ong 2010)



Fisheries Centre Visitors

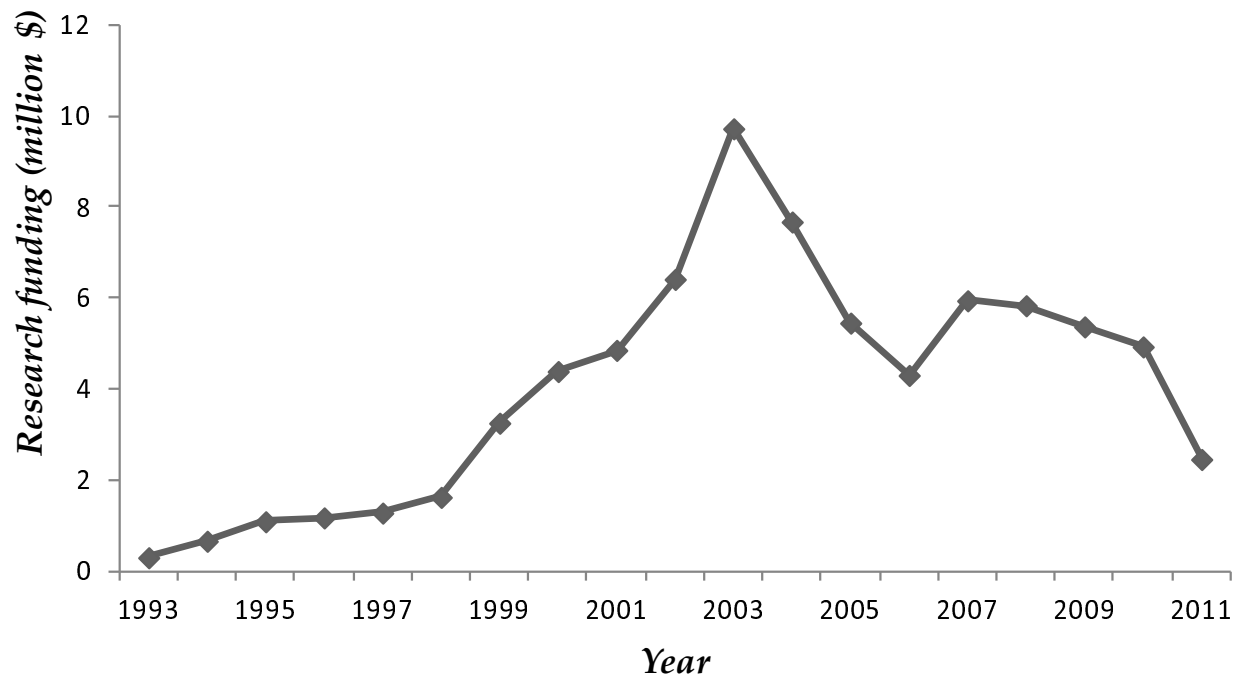
Listed below are some of the visitors to the UBC Fisheries Centre in 2010-2011. These and other Canadian and international visitors came to present seminars, attend workshops, and collaborate with FC researchers.

Milo Adkison University of Alaska Fairbanks Host: FISH 500	Joshua Cinner James Cook University, Australia Host: FISH 500	Victoire Guillonneau University of Paris- Dauphine, France Host: Daniel Pauly	Sharon Melin Alaska Fisheries Science Center Host: FISH 500	Shio Segi University of Alaska Host: FISH 500
Camille Albouy University of Montpellier, France Host: Villy Christensen	Chien-Pang Chin National Taiwan University, Taiwan Host: Murdoch McAllister	Quentin Hanich Australian National Centre for Ocean Resources and Security Host: FISH 500	Kristi Miller Fisheries and Oceans Canada Host: FISH 500	Honourable Gail Shea Fisheries and Oceans Canada Host: Fisheries Centre
Honourable Keith Ashfield National Revenue, ACOA, and the Atlantic Gateway Host: Fisheries Centre	Phil Clapham NOAA Northwest Fisheries Science Centre Host: FISH 500	Doug Hay Fisheries and Oceans Canada Host: FISH 500	Erlend Moksness Norway Institute of Marine Research Host: FISH 500	Alan Sinclair Department of Fisheries and Oceans Host: FISH 500
Sebastian Baust Brandenburg University of Technology, Germany Host: Daniel Pauly (Supervisor: Dirk Zeller)	Marta Coll Institute of Marine Sciences, Spain Host: Villy Christensen	Mark Hemmings Plymouth University, UK Host: Daniel Pauly (Supervisor: Dirk Zeller)	Marcela Nascimento UNICAMP, Brazil Host: Villy Christensen	Weihua Song Zhejiang Ocean University, China Host: Fisheries Centre
Fikret Berkes University of Manitoba Host: FISH 500	Chris Costello UC Santa Barbara Host: FISH 500	John Hocevar Greenpeace Host: FISH 500	John Nightingale Vancouver Aquarium Host: FISH 500	Max Stöven University of Kiel, Germany Host: FISH 500
Daniele Bevacqua Italian Society of Ecology, Italy Host: Murdoch McAllister	Kendyl Crawford Virginia Host: Daniel Pauly	Anders Knudby Simon Fraser University Host: FISH 500	Henrik Osterblom Stockholm University, Sweden Hosts: Villy Christensen and Rashid Sumaila	Samuele Tecchio Institute of Marine Sciences, Spain Host: Villy Christensen
Trude Borch Norwegian Institute of Food, Fisheries and Aquaculture Research Host: FISH 500	Claire Dansereau Fisheries and Oceans Canada Host: FISH 500	Hiroyuki Kurota National Research Institute of Far Seas Fisheries, Japan Host: Murdoch McAllister	Steve Palumbi Stanford University Host: FISH 500	Marian Torres Spanish Institute of Oceanography Host: Villy Christensen
Trevor A. Branch University of Washington Host: FISH 500	Shanggui Deng Zhejiang Ocean University, China Host: Fisheries Centre	Frédéric Le Manach Plymouth University, UK Host: Daniel Pauly (Supervisor: Dirk Zeller)	Ian Perry Fisheries and Oceans Canada Host: FISH 500	Ryan Vachon University of Colorado at Boulder Host: FISH 500
Camilla Brattland University of Tromsø, Norway Host: FISH 500	Delphine Dura La Salle, France Host: Daniel Pauly (Supervisor: Dirk Zeller)	Qiang Li Zhejiang Ocean University, China Host: Fisheries Centre	Randall Peterman Simon Fraser University Host: FISH 500	Marjo Vierros United Nations University, Japan Host: FISH 500
Daniel Bromley University of Wisconsin- Madison Host: FISH 500	Marie-Pierre Etienne AgroParisTech College, France Host: Murdoch McAllister	Huaqing Lu Zhejiang Ocean University, China Host: Fisheries Centre	Evelyn Pinkerton Simon Fraser University Host: FISH 500	Bernard Walrut Barrister, Adelaide, Australia Host: FISH 500
Dennis Brown Fisherman and author Host: FISH 500	Damien Gillis Independent filmmaker Host: FISH 500	Marc Mangel UC Santa Cruz Host: FISH 500	Martin Quaas University of Kiel, Germany Host: FISH 500	Bill Wareham David Suzuki Foundation Host: FISH 500
Brooke Campbell Canadian International Development Agency Host: FISH 500	Sabrina Giorgi University of Paris- Dauphine, France Host: Rashid Sumaila	Loren McClenachan Simon Fraser University Host: FISH 500	Anne Reijbroek Wageningen University, Netherlands Host: Rashid Sumaila	Jack Whalen Aalto University, Finland Host: FISH 500
	Stephanie Green Simon Fraser University Host: FISH 500	Jessica Meeuwig University of Western Australia Host: Daniel Pauly	Jon Schnute Fisheries and Oceans Canada Host: FISH 500	Changwen Wu Zhejiang Ocean University, China Host: Fisheries Centre



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