

2008-2009 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 2008 and 2009 have been exciting in a number of ways. First, we hired, jointly with the Department of Zoology, Dr. David Close to the position of Assistant Professor and Distinguished Science Professor of Aboriginal Fisheries. This appointment provided faculty-level leadership to our Aboriginal Fisheries Research Unit and increased the number of faculty at our Centre to 10, a critical mass that would allow us to do even more! Second, Dr. Daniel Pauly finished his term as director and I was appointed. Third, our Centre underwent the usual 5-year review of academic units at UBC, which came just in time to give the new director some great ideas on how to keep up and improve the good work of the Centre.

The Review Committee acknowledged our outstanding scholarly productivity while at the same time highlighting some of the areas that we, as a Centre, need to improve upon. The Review Committee report states "The scholarly productivity of the Fisheries Centre (FC) is exceptional and internationally recognized. However, the FC does not function as a unit with a common mission. All the indicators of scholarly productivity for FC faculty, scientific staff and students are very strong".

We recognize that we could work more as a unit with a common mission and we have, since the review, put in place initiatives that will help us address this and other concerns of the Review Committee. The strategy has been to create avenues, both social and academic, where members of the centre can interact, with the hope that this will lead to more collaboration. We have also created various committees, with membership drawn from students, staff and faculty, that allow as many of our members as possible to be involved in the running of the Centre.

We continue to make strong scholarly contributions to work on fish and fisheries both nationally and internationally through our prolific publication records, extensive teaching and training programs, and our wide-ranging outreach activities, as documented in the rest of this Report.

I wish to use this opportunity on behalf of the former director Dr. Daniel Pauly and myself to thank all our members for the outstanding performance of the last two years.

I look forward to many more promising years for the Fisheries Centre and all its members.

Dr. Rashid Sumaila
Director and Associate Professor
UBC Fisheries Centre



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 2008 and 2009, numerous research and outreach activities, both in-house and linked with outside organizations (see list of publications, p. 28-39). 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. 18-25 or www.fisheries.ubc.ca/students).

To document these activities, in 2008-2009, the Fisheries Centre published 14 *Fisheries Centre Research Reports* (www.fisheries.ubc.ca/publications/reports/fcrr.php) and 19 items in our *Working Paper Series* (www.fisheries.ubc.ca/publications/working), both often serving as basis for subsequent submission to peer-reviewed literature. Also, we continued to publish *FishBytes* (www.fisheries.ubc.ca/publications/fishbytes), the Centre's bimonthly newsletter, which has been produced and distributed internationally since 1995.

The Centre continued to host a weekly seminar from September to April, funded in part by the Province of British Columbia Ministry of Environment. 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 also hosted dozens of short and long-term Canadian and international visitors, who shared their expertise with the members (see p. 41). The Fisheries Centre also hosts a prestigious lecture series, the Larkin Lectures (www.fisheries.ubc.ca/events/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 2008-2009 period was by Dr Ana Parma (2009; Sustainability in small-scale fisheries: no recipe but one - play with the full deck).

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

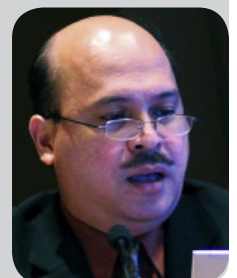
The Fisheries Centre Friday seminars: Stimulating minds, stomachs and community

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 2008-2009 academic year began with David Close's discussion of Pacific Lamprey and associated tribal restoration initiatives. The second term opened with Tom Reimchen's talk: "Partitioning sources of fish mortality in an intact lake ecosystem."

In the fall of 2009, Tony Farrell discussed sea lice on juvenile pink salmon, and in the second term, Gordon Munro presented "Limits to the privatization of fishery resources."

Fisheries Centre seminar coordinators:
Sarika Cullis-Suzuki (2007-2008) and
Brooke Campbell (2009)





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 approach is to assess biological questions that are required to improve aquatic resource management.



David Close

In 2008, the Fisheries Centre welcomed Dr. David Close, who has since led and developed the AFRU. He is a citizen of the Cayuse Nation located on the Confederated Tribes of the Umatilla Indian Reservation in Oregon.

AFRU reaches out to fisheries organizations and prospective students and two aboriginal students joined the unit during 2009 (see below). Outreach to policy makers within aboriginal communities and the public is also pursued through focused lectures and fisheries meetings, i.e.,



Wes Didier

- Presentation entitled "Reintroduction of Pacific lamprey in the upper Umatilla River", Western Division American Fisheries Society, May 4-9, 2008, Portland, Oregon.
- Presentation entitled "What to look for in a mentor", National Conference of the American Indian Science and Engineering Society, Oct. 30-Nov. 1, 2008, Anaheim, California.
- Presentation entitled "Lamprey research update", National Conference of the Native American Fish and Wildlife Society, May 18-21, 2009, Yakima, Washington.
- Presentation entitled "Projected Effects of Climate Change on Aboriginal Fisheries: The Big Picture", National Conference of the Native American Fish and Wildlife Society, 2009, Juneau, Alaska.
- Presentation on "Tamaalwit, the Sacred Law", First Nations Fisheries Council Meeting, 2009, Chehalis Band, Sto:lo Nation.

In addition, 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 meeting on fisheries issues;
- Advice to Columbia River Inter-Tribal Fisheries.

The AFRU brought on two new students during 2009:

Brent Roberts - Campbell River Indian Band - is working on stress physiology in lamprey, and Wes Didier - BC Métis - is working on eulachon food web analysis. Both will be using the AFRU laboratory that Dr. Close, who is also affiliated with the Department of Zoology, established in 2008-2009.

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, thus turning the AFRU into a regional source of knowledge and initiatives on aboriginal fisheries.



Ministry of Environment

The Fisheries Centre houses 12 members of the BC Government, Ministry of Environment Fisheries 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.

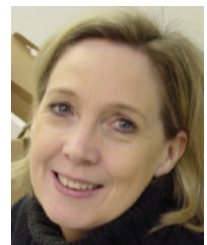
The partnership between the Province of BC and the Fisheries Centre and other units of the University of British Columbia has resulted in support for hundreds of graduate students as well as fostering a collaborative research environment between government scientists and university faculty for more than 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.



Art Tautz



Dan Hogan



Debbie Aird



Eric Parkinson



Jordan
Rosenfeld



Theresa Godin

www.gov.bc.ca/env



Adrian Clarke



Shannon Harris



Tom Johnston



Steve McAdam





Quantitative Modeling Group



Carl Walters
Head

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 focuses on fisheries risk assessment, estimation, decision analysis and management strategy evaluation. Dr. Villy Christensen (see SAUP pages) 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.



Murdoch
McAllister
Associate
Professor

New and continuing projects in 2008-2009

- 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 recently defended his PhD thesis 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 Canadian department of Fisheries and Oceans 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.
- Ongoing studies of the Grand Canyon are aimed at understanding endangered species responses to ecosystem dynamics within regulated systems, improving stock assessments, as well as factors influencing recruitment dynamics, growth, survival, and ontogenetic habitat movement of 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 scale analysis of the status of large pelagic predators and management options for reducing fishing mortality.



Steve Martell
Assistant
Professor



- Recent collaboration with Barbara Block at the Hopkins Institute of Marine Science has resulted in the development of stock assessment methods for Atlantic bluefin tuna incorporating start and endpoint tag recovery data from conventional and PSAT tagging programs. A new project funded by the Lenfest Ocean Program extends this collaboration to develop stock, area, and seasonally-structured stock assessment models that are fitted to PSAT tag track and conventional tagging data records and genetic stock identification of individual tagged fish. Similar stock assessment models that are fitted to similar data for Pacific bluefin tuna are also to be developed.

- 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.



Sylvie Guénette
Honorary Research
Associate



Robert Ahrens
Lecturer



Nathan Taylor
Post-doctoral
Fellow



- Carl Walters is leading 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 funded project on the Global Biodiversity Outlook .

- Ecosystem modeling 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.

- A project on the Gulf of Mexico Reef fishery examining delayed-density dependence in snapper and the multi-species grouper fishery.





Fisheries Economics Research Unit



Rashid Sumaila
Director



Gordon Munro
Professor
Emeritus



Henrik
Österblom



Liesbeth van der
Meer



Andrew Dyck

The Fisheries Economics Research Unit (FERU) has been very busy over the last two years. The total number of students affiliated with FERU has increased to ten - eight of whom are full-time PhD students. As a testament to the quality of FERU graduates, two of our current PhD candidates have secured employment - one with the Department of Oceans and Fisheries Canada, the other with Hokkaido University, Japan - even before defending their theses. The research group has also had welcome increases in its full-time research staff with the addition of researcher Andrew Dyck and post-doctoral researchers Dr. Henrik Österblom and Dr. Ling Huang.

The Fisheries Economics Research Unit has been instrumental in shaping fisheries policy around the globe. Indeed, in the past two years FERU members have been involved in more than 20 journal papers, several book chapters and other publications. Some important contributions by FERU members over the past two years include:



Louise Teh recording fish catches in
Pulau Banggi, Malaysia



Rashid Sumaila, WTO Director General Pascal

- 1.Participated in End of the Line documentary, described by the Economist as the "inconvenient truth of fisheries" – Appearance by Rashid Sumaila
- 2.Omega 3 paper – co-authored by Rashid Sumaila
- 3.NAAFE Special Session on Global Ocean Economics Project – several of our members made presentations
- 4.Participation at a meeting at the British House of Commons on marine ecosystem management and conservation
- 5.Won a Leopold Leadership Fellowship
- 6.Won a Pew Fellowship for Marine Conservation

- 7.Visited the US Congress and made presentation to Congressman from Washington State and several congressional aides
- 8.Appears in a video with several notable celebrities including Leonardo Dicaprio and Prince Charles on the health of the earth's oceans and climate change
- 9.Participated in a YouTube video with the WTO Boss, Pascal Lamy and the Executive Director of United Nations Environment Programme (UNEP), Achim Steinar.
- 10.Former Graduate (Ahmed Khan) co-authors paper on global seafood sustainability in Science magazine's policy forum.

FERU members cover a diverse range of topics, in the past two years, in particular, these diverse interests have begun fleshing out the group's global vision. Global databases of landed value, fishing costs, subsidies, employment and recreational fishing combined with micro-level studies in regions from British Columbia, Canada to Malaysia and Samoa display that the Fisheries Economics Research Unit's collective understanding of the economics of world fisheries are unparalleled. The research interests of current FERU members are outlined on the adjacent page:



Ben: Valuation of direct uses of Fiji's coral reef ecosystems

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

Gaku: Bioeconomic and game theoretic model of Pacific sardine

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

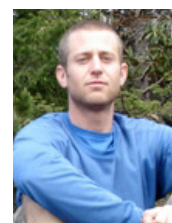
Andrew: Economic impact analysis of world fisheries

Liesbeth: Analysis of the retail trade of fisheries products

Henrik: IUU fishing

Gordon: Subsidies amd access rights to fisheries

Rashid: All of the above and the study of discounting and natural resource sustainability



Ben Starkhouse



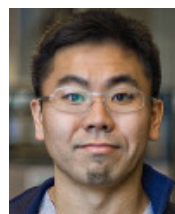
Louise Teh



Nigel Haggan



Dale Marsden



Gakushi
Ishimura



FERU members Gaku Ishimura (bottom right) and Megan Bailey (top) with other students participating in a Game Theory and Fisheries course run by Marko Lindroos at the University of Helsinki



Rashid Sumaila, Ahmed Khan (FERU alumni) and Dale Marsden enjoying time off at the FAME conference in Denmark

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

www.feru.org



Ling Huang



Wilf Swartz



Andres Cisneros



Roseti Imo



Megan Bailey





Marine Mammal Research Unit



Andrew Trites
Director



Pamela
Rosenbaum
Manager



David Rosen
Research
Associate



Dominic Tollit
Research
Associate



Volker Deecke
Research
Associate



Brian Battaile
Post-doctoral
Fellow

The *Marine Mammal Research Unit (MMRU)* is an integral component of the Fisheries Centre and works with other departments and institutions, combining specialties 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. Four Steller sea lions and six northern fur seals housed at the Vancouver Aquarium participated in studies to investigate a number of hypotheses explaining their population declines in the wild. Controlled feeding experiments with the Steller sea lions 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). Studies with the young northern fur seals determined how these animals survive in the cold North Pacific in their first years of life. Five additional sea lions swam and dove freely while accompanying scientists in the field at the Open Water Research Station in Port Moody. The Open Water studies investigated 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. 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 renowned international scientists.



Rod MacVicar
Research
Assistant



Chad Nordstrom
Research
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David Gummeson
Research
Assistant



Mandy Wong
Research
Assistant



Morgan Davies
Research
Assistant



Rebecca Barrick
Research
Assistant





entanglement, harbour porpoise feeding behaviour, and humpback whale abundance and foraging ecology.

Data analysis. Mathematical models are increasingly used to understand the dynamics of Steller sea lions 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. Other models estimated seasonal patterns of sea lion growth and food consumption, the economic cost to fisheries of marine mammal critical habitat designations, and compared trends in pinniped populations in the eastern North Pacific to determine the relative importance of bottom-up versus top-down factors.

Laboratory analysis. Other studies undertaken in 2008 and 2009 included developing a DNA technique to identify prey from sea lion scats, and assessing whether a relationship exists between diet, stress and population trends and distribution of Steller sea lions. We also continued a collaborative study with the Faculty of Engineering to develop an implantable tag to track sea lions.

Publications and Outreach. MMRU researchers published 34 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.

www.marinemammal.org/MMRU2



Field studies. Field work was undertaken in Alaska and British Columbia in 2008 and 2009. Research in Alaska focused on killer whale predation, fur seal foraging behaviour, fur seal growth, and sea lion diets. Field studies in British Columbia focused on sea lion diets, incidence of



Edward Grev
Researcher



Rob Williams
Post-doctoral
Fellow



Rowenna Flinn
Researcher



Ruth Joy
Biostatistician



Renee LaRoi
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Ryan Coatta
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Heather Koldewey
Associate
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Jean Marcus
Postdoctoral
Scientist



Janelle Curtis
Research
Associate



Sara Lourie
Research
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Janna Rist
Program
Manager

Project Seahorse is an interdisciplinary and international organization committed to conservation and sustainable use of the world's coastal marine ecosystems. Our vision is a world in which marine ecosystems are healthy and well-managed. We cooperate with many stakeholders, collaborators and partners, using seahorses as a focus of our work to find marine conservation solutions. We have active projects in seven countries, but particularly in the Philippines, through our in-country colleagues at the Project Seahorse Foundation for Marine Conservation. We also work locally, documenting, for example, the extent of human impact on British Columbia's marine environment.

The diversity and quality of Project Seahorse management and research has resulted in international recognition including, in 2008, an award for 'Best Field Conservation Project' from the British and Irish Association of Zoos and Aquariums (BIAZA).

Part of our success comes from our appreciation of the interdependencies between marine life and human communities. We begin with biological research and work outwards through concentric rings of pressure on marine populations, actively engaged with ecosystems, fishing and other human impacts, trade in marine products, policy development and public outreach.

Seahorses: Project Seahorse is considered the foremost authority in the world on the family of fish that includes about 300 species of seahorse, pipefish, seadragon and pipehorse (Syngathidae). Project Seahorse Director, Amanda Vincent, was the first biologist to study seahorses underwater, the first to discover their huge trade, the first to identify the threatened status of seahorses, and the first to launch seahorse conservation measures. Most recently, we have been investigating the life history, genetic flow, ecology (specifically movement and spatial use) and conservation of European and Philippines seahorses. In particular, a PhD student completed a thesis showing (among other things) that seahorses, which have extensive parental care, still disperse in the plankton. Another team member produced research identifying five new seahorse species from Indonesian waters and the Red Sea. One of these pygmy species is so small, at 11mm, that it is a contender for the smallest fish species in the world.

Ecosystems: Marine Protected Areas (MPAs) are an important conservation tool for protecting marine ecosystems from overfishing and habitat loss. Project Seahorse has been on the cutting edge of MPA research for over a decade in implementing no-take reserves (more than 33 to date) and testing their effectiveness (using long-term data sets). Our research productivity in this domain continues to grow with the completion of four more PhDs relating to MPAs, one in collaboration with First Nation communities in Canada and three representing a suite of anthropological, ecological and resource management studies



Project Seahorse Foundation: First row: Franco Villaruel, Hermes Cosicol, Noel VitorSecond row (standing): Pert Auxilio, Hazel Panes, Mia Apurado, Lourdes Labrada, Angelie Nellas, Virginia Masendo and JR Dongallo
Back row: Reaan Catitig, Alfie Bartolo, Gerry Sucano, Daniel Suarez, Amado Blanco (PSF Director) and Ron Kirby Manit

from the central Philippines. The Philippines' long cultural experience with marine tenure, identified in the anthropological study, may explain that nation's advanced engagement with MPAs. We have, further, completed a set of papers that explore the interface between societal and scientific placement of MPAs, recognizing that the former can produce an ecologically valid array of MPAs.

Fisheries Assessment: Project Seahorse's fisheries management efforts are directed at promoting fishing practices that consider impacts on both ecosystems and human communities. Finding a balance requires biological and socio-economic knowledge and integration of research initiatives with marine management. Among other projects, one of our PhD students just defended a thesis investigating bycatch in tropical shrimp fisheries (Mexico) which retains a large number of small species, including seahorses. Another PhD student is evaluating the social and economic impacts of a small-scale fishery involving a threatened seahorse species (Philippines).

Communities: Engagement of human communities who depend on marine resources is a critical part of marine conservation. Project Seahorse assists people living in coastal villages in the Philippines, from organizing and empowering local stakeholders to generating action for sustainable management. In particular, Project Seahorse initiated and has fostered an alliance of 1000 small-scale fishing families who have developed the capacity to insist on media and political attention for their management concerns.

Trade: Seahorses are valuable globally and are traded around the world for use in traditional Chinese medicine (TCM), aquaria, and for curiosities. Project Seahorse has long been active in Hong Kong – the world's largest entrepôt for TCM products - where we have catalyzed the creation of an advisory council comprising the TCM industry, academia, government, public institutions and non-governmental organizations. We have been supporting national agencies responsible for ensuring that exports do not exceed sustainable levels. To this end, we developed a web resource (www.hippocampusinfo.org) for CITES officials, researchers and resource managers.

Policy: Project Seahorse works with governments and non-governmental organizations to help develop policies with marine conservation benefits. Our technical advice led 172 Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) signatory nations to begin, for the first time, regulating international trade in some marine fishes of commercial importance, and catalyzed development of innovative international management measures that serve multiple species simultaneously.

We are very grateful to all our partner organisations and donors, and particularly to the Zoological Society of London (UK), John G. Shedd Aquarium (USA), and Guylian Chocolates (Belgium) for their extraordinary support.

www.projectseahorse.org



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Sarah
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Marjorie
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Melissa
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Chloe Shen
Administrative
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Lana
Gunnlaugson
Administrative
Assistant



Philip Molloy
Postdoctoral
Scientist



Danika Kleiber
PhD Student





Sea Around Us Project



Daniel Pauly
Principal
Investigator



Zoraida
Alojado
Research
Assistant



Shawn Booth
Research
Assistant



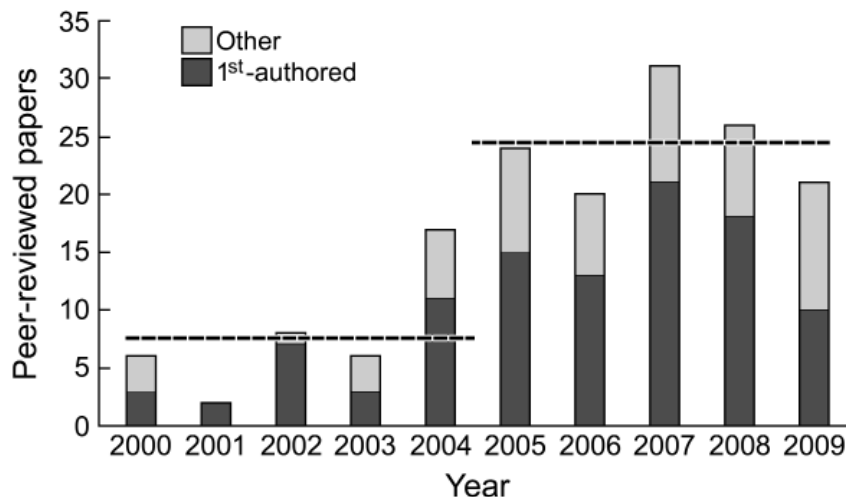
Villy
Christensen
Associate
Professor



Marina
Campbell
Administration

The *Sea Around Us* is a collaboration between the University of British Columbia in Vancouver, Canada, and the Pew Environment Group, Washington, D.C., USA, devoted to assessing the impact of fisheries on the world's marine ecosystems, and proposing policies to mitigate these impacts.

The project started in mid 1999, and thus celebrated its tenth anniversary in July 2009. In early 2005, we issued a five-year retrospective which emphasized the wide scope of our work, and our productivity. We recently issued a similar ten-year retrospective, emphasizing that our scope has become even wider, more focused on fisheries economics and public policy, and that our productivity has increased more than threefold – at least as measured by the number of peer-reviewed contributions authored and co-authored by our members. The reason for this massive increase is obvious: it took us several years to create the complex of global databases (and/or GIS 'layers') that allow inferences on the global ocean. Now that this complex is in place, it has become more straightforward to see global patterns and/or trends that were previously not visible, to assess them, and to develop policies to deal with them.



Number of peer-reviewed articles with *Sea Around Us* members as first (black) or co-authors (grey), 2000-2009. Note the more than threefold increase in the second 5-year period relative to the first.

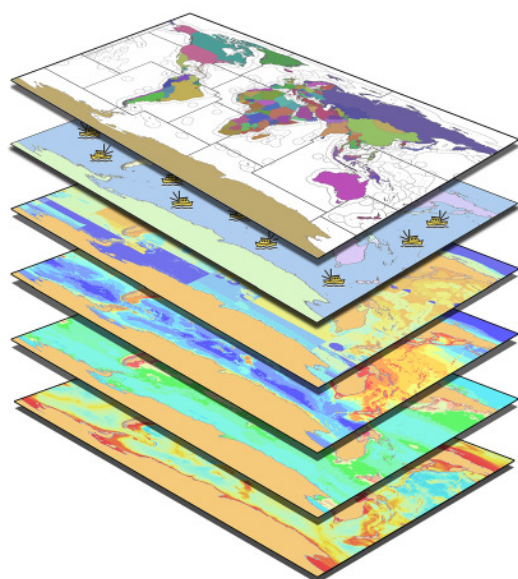
Thus, as a first example, we can now deal with global catches not only in terms of the 'official' global landings assembled and disseminated by the Food and Agriculture Organization of the United Nations, but in terms of their Illegal Unreported and Unregulated (IUU) components, which add to the global catch, and with the fishing effort, the gears and the costs (including subsidies) required to generate that catch, along with its economic value and its disposition through international trade. Also, we can infer long-term trends, because most of our databases start in 1950, and thus span over half a century. Moreover, in some cases where the science allows this, we project these trends into the future.



This applies specially to the studies we performed in 2008-2009 on the potential effects of global warming on biodiversity and fisheries, our second example. The key results we obtained here was that the effects of global warming on marine biodiversity will be major in the Arctic, along the Antarctic Convergence and throughout the intertropical belt, where numerous species will be extirpated in the next half century. For fisheries, we predicted a near constancy of global catches (other things being equal), with increased catches in high northern latitudes, and declining catches in the tropics. However, those results did not yet account for a number of factors, notably reduced oxygen concentrations and acidification, thus providing reasons for more comprehensive analyses in 2010 and beyond.



Sarah Harper
Research
Assistant



- 6) Synthesis, policy and outreach layer
- 5) Fisheries economics layer
- 4) Fisheries catch and fishing effort layer
- 3) Marine biodiversity layer
- 2) Primary production and plankton layer
- 1) Physical/jurisdictional boundaries layer



Jennifer Jacquet
Post Doctoral
Fellow



Sherman Lai
Programmer

Illustrating the scope of the *Sea Around Us* through global 'layers', each representing a type of data used and/or contributed to, and which, when jointly analyzed, represent the entire range of ocean issues.

Overall, the availability of the *Sea Around Us* databases not only allows for more, deeper work by project members, including a host of productive graduate students, but has also generated a flurry of offers of collaboration, resulting in a spectrum ranging from the very fruitful (e.g., with *National Geographic*) to the sensitive, requiring diplomacy ("No, you can't have ALL our data, but we can talk about what you actually need, and which you can use given that you give proper credit"). They establish that the *Sea Around Us* has become an internationally respected player in both the scientific and policy arenas of global fisheries. Not too bad for a ten-year old!



Ashley
McCrea-Strub
Post Doctoral
Fellow

www.seaaroundus.org



Dirk Zeller
Senior
Research
Fellow



Reg Watson
Senior
Research
Fellow



Arash
Tavakolie
Senior .NET
Developer



Maria Lourdes
Palomares
Research
Fellow



Grace Ong
Administration





Policy and Ecosystem Restoration in Fisheries

Policy and Ecosystem Restoration in Fisheries (PERF) is a research group dedicated to restoring aquatic ecosystems and ensuring sustainable fisheries. By developing integrative research tools for historically-based restoration and ecosystem-based management, PERF aims to devise and evaluate sustainable fisheries policies. The group also explores the human dimensions of fisheries by examining social-economic factors, cultural values, institutions, ethics and governance. Tony Pitcher and his team evaluate the trade-offs associated with policy options using ecosystem simulations, ecological economics, biodiversity and cultural indicators, historical and traditional knowledge, cognitive science and participatory workshops. The group pioneers interdisciplinary research in the theory and practice of restoration ecology for marine and freshwater ecosystems from around the globe and close to home.



Dr. Tony J. Pitcher

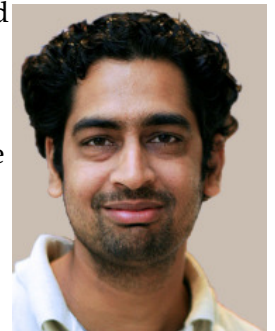
We highlight six accomplishments for PERF in 2008-2009: (1) An Exploratory Workshop grant was awarded by the UBC Peter Wall Institute for Advanced Studies, bringing over 50 international participants to discuss the Strait of Georgia. “The Sea Ahead” comprises a new approach to policy that maximizes sustainable future benefits in the face of risks from climate change, while “The Sea Before Us” incorporates historically-based reconstruction research; (2) Two major papers contributing to the development of historically-based restoration theory (Optimal Restorable Biomass and a cost/benefit analysis of restoration) were published in

Ecological Modeling with former PERF member Dr Cameron Ainsworth. A comparative analysis of resilience in two coastal communities (BC and Indonesia) using the concept of the Maximum Dexterity Fleet was presented at a conference held at FAO in Rome and later published in Marine Policy; (3) Jamie Slogan organized a 5-day international workshop on Primer 6, a Multivariate Statistics tool for Ecologists and Environmental Scientists.



The next three items extend ‘Rapfish’, a rapid appraisal method invented in the PERF group: (4) Four years of research with Dr Daniela Kalikoski and Pramod Ganapathiraju culminated in an evaluation of compliance by 53 countries with the UN Code of Conduct for Responsible Fisheries

published in Nature and detailed in a report published by WWF. In allied work, evaluations of progress in implementing ecosystem-based management were published in Marine Policy; (5) Working with Dr David Agnew and others at the Marine Resources Assessment Group, London, UK, a world-wide estimation of the amount of illegal and unreported fishing was published in PlosOne; (6) The “anchor points/influence factors” semi-Bayesian method, pioneered by PERF, uncovered over 1.5 million tonnes per year of previously unreported catch in the Arafura Sea, Indonesia. Six workshops in the region were led by former member Dr Tonny Wagey, working with an international team of scientists, fishers and FAO.



Robyn Forrest (Australia) successfully completed her PhD thesis on New South Wales shark fisheries and is now a stock assessment scientist with DFO. Megan Moody (Nuxalk Nation and Canada) completed her MSC on eulachon in Pacific coastal marine ecosystems and is now taking up consultancy work on eulachon. Dr Mimi E. Lam joined the PERF group as a Research Associate in 2009. She leads an initiative in the human dimensions of fisheries using theoretical insights from ecology and cognitive science. She organized 3 AAAS symposia and currently chairs the Traditional Ecological Knowledge Section of the Ecological Society of America (ESA) and is profiled in ESA’s Focus on Ecologists series. Dr Lam is Guest Editor of an Ecology and Society Special Feature, “The Privilege to Fish”, and gave two invited presentations at the Ocean



Management Research Network 2009 conference in Ottawa. Her recent grants are from the Gordon and Betty Moore Foundation, UBC, the BC Ministry of Advanced Education and ESA.

Eny Buchary (PhD student: Indonesia) completed her thesis on a traditional sardine fishery in the Bali Strait, Indonesia. The work identified policy options for responsible use of sardine resources by exploring issues in multiple domains: biological, ecological, socio-cultural, economic and institutional. Part of the work was presented at a conference at FAO, Rome. She gained travel awards from GLOBEC and SSHRC.

Dawit Tesfamichael (PhD student: Eritrea) researches the past, present and future of Red Sea fisheries. He uses evaluation and modeling techniques from Rapfish, ecosystem simulation, and the estimation of illegal, unreported and unregulated (IUU) catch, informed by his extensive fieldwork and interview data from coastal communities throughout the region.

Divya Varkey (PhD student: India) works on modeling and ecosystem-based management of coral reef fisheries, sponsored by a Packard EBFM project in Raja Ampat, West Papua, Indonesia. She helped to organize "Oceans Past II", an international conference on the history (and future) of marine animal populations (HMAP); "The Sea Ahead", a workshop using history to plan the future of fisheries in the Strait of Georgia; and "Ecopath 25 years", an international conference. She published an analysis of IUU in Raja Ampat and was awarded a UBC Scholarship and the John R Grace Fellowship.



Carie Hoover (PhD student: USA) researches the ecosystem effects of climate change in the Antarctic Peninsula and Hudson Bay. Global climate forecasts are integrated with ecosystem simulations showing how top predators may be impacted. The Hudson Bay research is in collaboration with DFO, Winnipeg as part of an International Polar Year project: Global Warming and Arctic Marine Mammals. She has also expanded her research to include an economic analysis of whale hunts in Nunavut to show its importance to regional communities.

Pramod Ganapathiraju (PhD student: India) works on illegal fishing and factors contributing to compliance with the UN Code of Conduct for Responsible Fishing. Pramod spent 11 months performing fieldwork in India, sponsored by the 2007 Cosmos International Travel Award, MRAG Ltd. and the UK Government. Interviews and estimates of IUU were made in all of the maritime coastal states of India, including the remote Andaman Islands, where illegal fishing appears to be rife. Final estimates of total catches identify over a million tonnes per annum of unreported catch.

Rajeev Kumar (PhD student: India) built and fitted a detailed ecosystem model for Mille Lacs Lake, Minnesota. During field trips to the site, he liaised with the Department of Natural Resources, the sponsor for this research, on the choice of model parameters and practical research questions to be addressed. Rajeev also presented new software to display the diet matrix in ecosystem modelling at a software conference in Portland, Oregon.

Lydia Teh (PhD student: Canada/Malaysia) continued her fieldwork tracking habitat and fishing grounds use by small-scale fishers in the Semporna Islands and Pulau Banggi, Sabah, Malaysia. She is using the data to develop a fuzzy logic approach to the establishment of MPAs. Lydia's fieldwork is sponsored by the 2008 UBC Cosmos International Travel Award.

Lingbo Li (PhD student: China) works on modeling the lower trophic levels in the Strait of Georgia ecosystem and was awarded an NSERC Postgraduate Scholarship. She attended the 17th Annual BC Marine Mammal Symposium in Vancouver, a GLOBEC meeting in Victoria, the Puget Sound Georgia Basin Ecosystem Conference in Seattle, and the Canadian Conference for Fisheries Research in Halifax.



Jamie Slogan (PhD student: Canada) joined the PERF group to research the long-term community dynamics of intertidal and sub-tidal marine species on fish compensation habitat in Burrard Inlet. Jamie dives and works with EBA Engineering Consultants Ltd, a company responsible for the restoration of the shoreline at the Vancouver Convention Centre. He has been awarded an NSERC Industrial Post-Graduate Scholarship and an Al MacDonald Life-long Learning Award.

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



Graduate Studies

Fisheries Centre students come from all over the world. The 48 PhD and 25 MSc students at the FC during 2008 and 2009 came from at least 25 countries: Australia, Brazil, Canada, Chile, China, Eritrea, France, Germany, Hong Kong, India, Indonesia, Italy, Japan, Kuwait, Malaysia, Mexico, New Zealand, Northern Ireland, Philippines, 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. Over the past two years, RMES and Zoology have provided a second home to 37% and 58% of FC students, respectively, with the rest finding second homes at other departments.

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; and economic valuations.

During 2008 and 2009, 15 doctoral and 10 master's students completed their thesis research.

A list of these graduates and their thesis titles is on pages 24-25. Thesis abstracts can be seen at www.fisheries.ubc.ca/graduated.php. 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, edit FishBytes and the newsletters of various groups, and coordinate fora for discussion.

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



Robert Ahrens (Canada)

PhD Zoology (start 2004*)

Project: Global analysis of apparent trends in abundance and recruitment of tunas and billfish vulnerable to pelagic longline gear.

Supervisors: Dr Carl Walters and Dr Villy Christensen



Brajgeet Bhathal (Canada)

PhD Zoology (start 2005)

Project: Analysis of fishing impacts on India's marine ecosystems and exploration of possible policy scenario

Supervisor: Dr Daniel Pauly



Dalal Al-Abdulrazzak (Kuwait)

MSc Zoology (start 2009)

Project: Historical ecology of Persian Gulf fisheries

Supervisor: Dr Daniel Pauly



Louise Blight (Canada)

PhD Zoology (start 2007)

Project: Using stable isotope analysis to compare ancient and modern change events in marine foodwebs [transferred to Forestry in 2008]

Supervisor: Dr Amanda Vincent



Pamela Allen (Canada)

MSc Zoology (start 2006*)

Project: Quantifying seasonal changes in growth and consumption of Steller sea lions from captive records

Supervisor: Dr Andrew Trites



Ella Bowles (Canada)

MSc Zoology (start 2007*)

Project: Quantifying Steller sea lion diet using real-time PCR

Supervisors: Dr Andrew Trites and Dr Trish Schulte



Jonathan Anticamara (Philippines)

PhD RMES (start 2002*)

Project: Ecology and implications of recovering degraded reef communities within no-take marine reserves

Supervisor: Dr Amanda Vincent

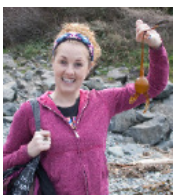


Lucas Brotz (Canada)

MSc Oceanography (start 2007)

Project: Trends in global jellyfish populations

Supervisors: Dr Daniel Pauly and Dr Evgeny Pakhomov



Elizabeth Atwood (USA)

MSc Zoology (start 2008)

Project: Investigating nutritional stress in Northern Fur Seals

Supervisor: Dr Andrew Trites



Eny Buchary (Indonesia)

PhD RMES (start 2001*)

Project: In search of viable policy options for responsible use of marine resources in the Bali Strait, Indonesia

Supervisor: Dr Tony Pitcher

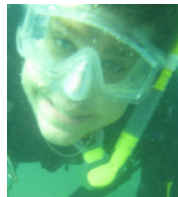


Megan Bailey (Canada)

PhD RMES (start 2008)

Project: Economics of tuna fisheries in the western and central Pacific Ocean

Supervisor: Dr Rashid Sumaila
FishBytes Editor 2009



Iain Caldwell (Canada)

PhD Zoology (start 2006)

Project: Movement of a sedentary fish in response to environmental change

Supervisor: Dr Amanda Vincent



Natalie Ban (Canada)

PhD RMES (start 2003*)

Project: Multiple perspectives for envisioning marine protected areas

Supervisor: Dr Amanda Vincent



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





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



Andres M. Cisneros-Montemayor (Mexico)
 MSc RMES (start 2008)
Project: Economic and ecological implications of ecosystem-based marine recreation
Supervisor: Dr Rashid Sumaila



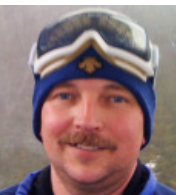
Sarika Cullis-Suzuki (Canada)
 MSc Zoology (start 2006*)
Project: Effectiveness of regional fisheries management organizations
Supervisor: Dr Daniel Pauly



Luciano Dalla Rosa (Brazil)
 PhD Zoology (start 2003*)
Project: Habitat modeling of humpback whales in British Columbia and the Antarctic
Supervisors: Dr John Ford and Dr Andrew Trites



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



Wes Didier (USA)
 PhD Zoology (start 2005)
Project: Testing for stresses that may be affecting fecundity of eulachon
Supervisor: Dr David Close



Robyn Forrest (Australia)
 PhD RMES (start 2002*)
Project: Simulation models for strategic E-B decision-making in the data-limited fisheries of New South Wales, Australia
Supervisor: Dr Tony Pitcher
 Fishbytes Editor 2008



Sarah Foster (Canada/New Zealand)
 PhD RMES (start 2004*)
Project: Assessing the impacts of shrimp trawling on small fish species
Supervisor: Dr Amanda Vincent



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



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



Eli Guieb (Philippines)
 PhD McGill (start 2002*)
Project: Cultural issues behind marine protected areas
Supervisors: Dr Amanda Vincent, Dr Colin Scott and Dr Monica Mulrennan



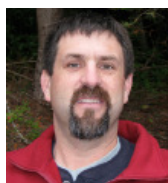
Nigel Haggan (Northern Ireland)
 PhD RMES (start 2006)
Project: Mapping cultural and spiritual values of coastal ecosystems
Supervisor: Dr Rashid Sumaila



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



Mike Hawkshaw (Canada)
 MSc Zoology (start 2005*)
 PhD Zoology (start 2008)
Project: Inter-cohort density dependence and cyclic age zero survival of cyprinids
Supervisor: Dr Carl Walters



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



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

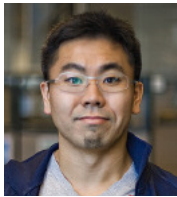




Tabitha Hui (Singapore)
MSc Zoology (start 2007)
Project: Competition between fisheries and Steller sea lions
Supervisor: Dr Andrew Trites



Roseti Imo (Samoa)
PhD RMES (start 2006)
Project: Spatial policy analysis for albacore management in the western central Pacific
Supervisor: Dr Rashid Sumaila and Dr Carl Walters



Gakushi Ishimura (Japan)
PhD RMES (start 2004*)
Project: Economic analysis of Pacific sardine fisheries
Supervisor: Dr Rashid Sumaila



Jennifer Jacquet (USA)
PhD RMES (start 2005*)
Project: Fish as food in an age of globalization
Supervisor: Dr Daniel Pauly



Aaron Keech (USA)
MSc Zoology (start 2005*)
Project: Analyses of corticosterone and triiodothyronine hormones to assess nutritional stress in Steller sea lions
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



Josh Korman (Canada)
PhD Zoology (start 2005*)
Project: Factors in influencing recruitment dynamics, growth, survival, and ontogenetic habitat movement of salmonids in large river systems
Supervisors: Dr Steve Martell and Dr Carl Walters



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



Pamela Lestenkof (USA)
MSc Zoology (2004)
Project: Fine scale diving behaviour of lactating northern fur seals [withdrew in 2009]
Supervisor: Dr Andrew Trites



Lingbo Li (China)
PhD Zoology (start 2008)
Project: Examining climate change impacts on the Strait of Georgia marine ecosystem
Supervisor: Dr Tony Pitcher



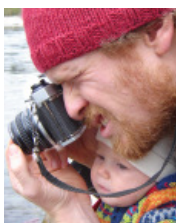
Rachael Louton (USA)
PhD Zoology (start 2007)
Project: Evaluation of alternative management regimes for shrimp fisheries in the Gulf of Mexico
Supervisor: Dr Murdoch McAllister



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



Michael Melnychuk (Canada)
PhD Zoology (start 2004*)
Project: Ecology of juvenile salmon river and early ocean migrations: Assessment of mortality patterns with active and passive acoustic telemetry
Supervisor: Dr Carl Walters and Dr Villy Christensen

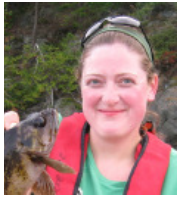


Megan Moody (Canada)
MSc RMES (start 2004*)
Project: Historical analysis of current and past Pacific Coast eulachon status and the possible reasons for its decline
Supervisor: Dr Tony Pitcher





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



Marivic Pajaro (Philippines)
PhD RMES (start 2002*)
Project: Biological, social and economic indicators of effectiveness in community-managed marine protected areas
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



Chiara Piroddi (Italy)
MSc Zoology (start 2005*)
Project: The application of Ecosim with Ecosim to the study of two populations of dolphins in the Eastern Ionian Sea, Greece
Supervisor: Dr Villy Christensen



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



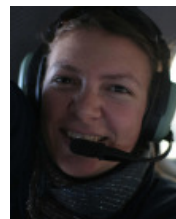
Andrea Rambeau (Canada)
MSc Zoology (start 2006*)
Project: Defining parameters for a migrating, intermixing population of humpback whales in British Columbia
Supervisors: Dr Andrew Trites and Dr John Ford



Erin Rechisky (USA)
PhD Zoology (start 2004*)
Project: Early marine survival and migration of endangered Pacific salmon in the Columbia and Fraser Rivers
Supervisor: Dr Carl Walters



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



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



Ben Starkhouse (USA)
MSc RMES (start 2006*)
Project: Quantifying and valuing extractive resources of Fiji's coral reefs
Supervisor: Dr Rashid Sumaila



Max Thilo Stoeven (Germany)
Visting PhD Student, Christian Albrechts Universität zu Kiel (2008 -2009)
Project : Demand for renewable resource
Supervisor: Dr Rashid Sumaila

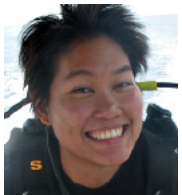


Wilf Swartz (Canada/Japan)
PhD RMES (start 2008)
Project: How does international trade affect marine fisheries
Supervisor: Dr Rashid Sumaila





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



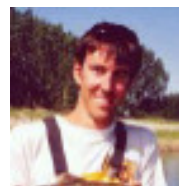
Dawit Tesfamichael (Eritrea)
 PhD RMES (start 2002)
Project: Ecosystem based fisheries management of the Red Sea
Supervisors: Dr Daniel Pauly and Dr Tony Pitcher



Laura Tremblay-Boyer (Canada)
 MSc Zoology (start 2007)
Project : Impacts of global fisheries on the biomass of marine ecosystems since 1950
Supervisor: Dr Daniel Pauly



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



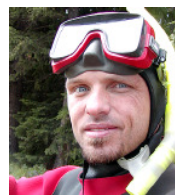
Brett van Poorten (Canada)
 PhD Zoology (start 2005)
Project: Effects of interspecific competition on recruitment processes in rainbow trout and Pygmy Pikeminnow
Supervisor: Dr Carl Walters



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



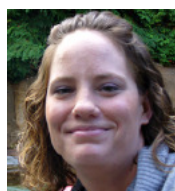
Colette Wabnitz (France/Germany)
 PhD Geography (start 2003*)
Project: The ecological role of green sea turtles and the mapping of their foraging grounds in the wider Caribbean region.
Supervisors: Dr Daniel Pauly and Dr Brian Klinkenberg



Chad Wilkinson (Canada)
 MSc Zoology (start 2005*)
Project: Population study on west-slope cutthroat trout and bull trout in a closed river system of the southern BC Rockies
Supervisor: Dr Steve Martell



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



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



Graduate Theses Completed*

2009

Robert Ahrens (Canada)

PhD Zoology

Title: A global analysis of apparent trends in abundance and recruitment of large tunas and billfishes inferred from Japanese longline catch and effort data

Supervisors: Dr Carl Walters and Dr Villy Christensen

Pamela Allen (Canada)

MSc Zoology

Title: Seasonal oscillations in the mass and food intake of Steller sea lions

Supervisor: Dr Andrew Trites

Jonathan Anticamara (Philippines)

PhD Resource Management and Environmental Studies

Title: Ecology of recovering degraded reef communities within no-take marine reserves

Supervisor: Dr Amanda Vincent

Ella Bowles (Canada)

MSc Zoology

Title: Determining the relative amounts of prey in Steller sea lion (*Eumetopias jubatus*) diet using real-time PCR

Supervisors: Dr Andrew Trites and Dr Trish Schulte

Eny Buchary (Indonesia)

PhD Resource Management and Environmental Studies

Title: In search of viable policy options for responsible use of sardine resources in the Bali Strait, Indonesia

Supervisor: Dr Tony Pitcher

Sarika Cullis-Suzuki (Canada)

MSc Zoology

Title: High seas, high risk: a global evaluation of the effectiveness of regional fisheries management organizations

Supervisor: Dr Daniel Pauly

Luciano Dalla Rosa (Brazil)

PhD Zoology

Title: Modeling the foraging habitat of humpback whales

Supervisor: Dr John Ford and Dr Andrew Trites

Sarah Foster (Canada/New Zealand)

PhD Resource Management and Environmental Studies

Title: Is bycatch a big problem for small fish? Assessing and addressing the impacts of tropical shrimp trawling on small fish species

Supervisor: Dr Amanda Vincent

Eli Guieb (Philippines)

PhD McGill

Title: Community, marine rights, and sea tenure: a political ecology of marine conservation in two Bohol villages in central Philippines

Supervisor: Dr Amanda Vincent and Dr Colin Scott and Dr Monica Mulrennan

Gaku Ishimura (Japan)

PhD Resource Management and Environmental Studies

Title: Transboundary management of a fish stock under climate variability: the case of Pacific sardine in the California current ecosystem

Supervisor: Dr Rashid Sumaila

Jennifer Jacquet (USA)

PhD Resource Management and Environmental Studies

Title: Fish as food in an age of globalization

Supervisor: Dr Daniel Pauly

Josh Korman (Canada)

PhD Zoology

Title: Early life history dynamics of rainbow trout in a large regulated river

Supervisors: Dr Steve Martell and Dr Carl Walters

Mike Melnychuk (Canada)

PhD Zoology

Title: Mortality of migrating Pacific salmon smolts in southern British Columbia, Canada

Supervisors: Dr Carl Walters and Dr Villy Christensen

Marivic Pajaro (Philippines)

PhD Resource Management and Environmental Studies

Title: Indicators of effectiveness in community-based marine protected areas

Supervisor: Dr Amanda Vincent

Chiara Piroddi (Italy)

MSc Zoology

Title: An ecosystem-based approach to study two dolphin populations around the island of Kalamos, Ionian Sea, Greece

Supervisor: Dr Villy Christensen

Erin Rechisky (USA)

PhD Zoology

Title: Migration and survival of juvenile Pacific salmon determined by a large-scale telemetry array and implications for their conservation

Supervisor: Dr Carl Walters

Ben Starkhouse (USA)

MSc Resource Management and Environmental Studies

Title: What's the catch: uncovering the catch volume and value of Fiji's coral reef-based artisanal and subsistence fisheries

Supervisor: Dr Rashid Sumaila

Colette Wabnitz (France/Germany)

PhD Geography

Title: Marine turtle conservation and ecosystem based management with a focus on green turtles (*Chelonia mydas*) and seagrass ecosystems

Supervisor: Dr Daniel Pauly and Dr Brian Klinkenberg

Chad Wilkinson (Canada)

MSc Zoology

Title: Sportfish population dynamics in an intensively managed river system

Supervisor: Dr Steve Martell



2008

Natalie Ban (Canada)

PhD Resource Management and
Environmental Studies

Title: Multiple perspectives for
envisioning marine protected areas

Supervisor: Dr Amanda Vincent

Robyn Forrest (Australia)

PhD Resource Management and
Environmental Studies

Title: Simulation models for estimating
productivity and trade-offs in the
data-limited fisheries of New South
Wales, Australia

Supervisor: Dr Tony Pitcher

Aaron Keech (USA)

MSc Zoology

Title: Fecal triiodothyronine assay
validation using captive Steller sea lions
(*Eumetopias jubatus*) and subsequent
application to free-ranging populations
to examine nutritional stress

Supervisor: Dr Andrew Trites



Mike Hawkshaw (Canada)

MSc Zoology

Title: Methods for estimation of cyclic
recruitment variation in pygmy northern
pikeminnow (*Ptychocheilus*
oregonensis) of south central British
Columbia

Supervisor: Dr Carl Walters

Megan Moody (Canada)

MSc Resource Management and
Environmental Studies

Title: Eulachon past and present

Supervisor: Dr Tony Pitcher



Andrea Rambeau (Canada)

MSc Zoology

Title: Determining abundance and stock
structure for a widespread migratory
animal: The case of humpback whales
(*Megaptera Novaeangliae*) in British
Columbia, Canada

Supervisors: Dr Andrew Trites and Dr
John Ford



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Dr U. Rashid Sumaila, Director
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Resources & Environment
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Planning
Ecological Economics

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Dr Paul LeBlond
Fisheries Oceanography

Dr Don Ludwig
Fisheries Mathematics

Dr Patricia Marchak
Forests & Fisheries

Dr Gordon Munro
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Dr William Neill
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Dr Tom Northcote
Fisheries Biology

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Dr Jackie Alder
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Coastal Zone Management

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Dr Jon Schnute
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FC Office Staff



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Administration
Support



Ann Tautz
Administration
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Publications

ARTICLES IN REFEREED JOURNALS

- Agnew, D., Pearce, J., Pramod, G., Peatman, T., Watson, R., Beddington, J.R. and Pitcher, T.J. (2009) Estimating the worldwide extent of illegal fishing. *Public Library of Science One* 4(2): e4570.
- Alder, J., Cullis-Suzuki, S., Karpouzi, V., Kaschner, K., Mondoux, S., Swartz, W., Trujillo, P., Watson, R. and Pauly, D. (2009) Aggregate performance in managing marine ecosystems in 53 maritime countries. *Marine Policy* 34(3): 468-476.
- Ban, N.C. (2009) Minimum data requirements for designing a set of marine protected areas, using commonly available abiotic and biotic datasets. *Biodiversity and Conservation* 18(7): 1829-1845.
- Ban, N.C. and Vincent, A.C.J. (2009) Beyond marine reserves: Exploring the approach of selecting areas where fishing is permitted, rather than prohibited. *Public Library of Science ONE* 4(7): e6258.
- Ban, N.C., Caldwell, I.R., Green, T.L., Morgan, S.M., O'Donnell, K. and Selgrath, J.C. (2009) Diverse Fisheries Require Diverse Solutions. *Science* 323: 338-339.
- Ban, N.C., Hansen, G.J.A., Jones, M. and Vincent, A.C.J. (2009) Systematic marine conservation planning in data-poor regions: Socioeconomic data is essential. *Marine Policy* 33(5): 794-800.
- Ban, N.C., Picard, C. and Vincent, A.C.J. (2009) Comparing and integrating community-based and science-based conservation approaches to prioritizing marine areas for protection. *Conservation Biology* 23(4): 899-910.
- Carrier, P.C., Rosenfeld, J.S. and Johnson, R. (2009) A simple method to correct for electrofishing capture efficiency bias using mark-recapture. *Ecology of Freshwater Fish* 16: 139-146.
- Cheung, W.L.W., Close, C., Lam, V.W.Y., Sarmiento, J., Kearney, K., Watson, R. and Pauly, D. (2009) Projections of global marine biodiversity impacts under climate change scenarios. *Fish and Fisheries* 10: 235-251.
- Christensen, V., Ferdaña, Z. and Steenbeek, J. (2009) Spatial optimization of protected area placement incorporating ecological, social and economical criteria. *Ecological Modelling* 220: 2583-2593.
- Christensen, V., Walters, C., Ahrens, R., Alder, J., Buszowski, J., Christensen, L., Cheung, W.L., Dunne, J., Froese, R., Karpouzi, V., Kastner, K., Kearney, K., Lai, S., Lam, V., Palomares, D., Peters-Mason, A., Piroddi, C., Sarmiento, J.L., Steenbeek, J., Sumaila, U.R., Watson, R., Zeller, D. and Pauly, D. (2009) Database-driven models of the world's large marine ecosystems. *Ecological Modelling* 220: 1984-1996.
- Clarke, S.C., McAllister, M.K. and Kirkpatrick, R.C. (2009) Estimating legal and illegal catches of Kamchatka salmon from trade and market data. *ICES Journal of Marine Science* 66(3): 532-545.
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- Foster, S.J. and Vincent, A.C.J. (2009) Tropical shrimp trawl fisheries: Fishers' knowledge of and attitudes about a doomed fishery. *Marine Policy* 34: 437-446.
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- Jacquet, J.L. (2009b) Silent water: A brief examination of the marine fisheries crisis. *Environment, Development and Sustainability* 11: 255-263.
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- Jeanniard du Dot, T., Rosen, D.A.S., Richmond, J.P., Kitaysky, A.S., Zinn, S.A. and Trites, A.W. (2009) Changes in glucocorticoids, somatotrophic and thyroid hormones as indicators of nutritional stress and subsequent refeeding in Steller sea lions (*Eumetopias jubatus*). *Comparative Biochemistry and Physiology Part A: Molecular & Integrative Physiology* 152: 524-534.
- Jenkins, D.J.A., Sievenpiper, J.L., Pauly, D., Sumaila, U.R. and Kendall, C.W.C. (2009) Are dietary recommendations for the use of fish oils sustainable? *Canadian Medical Association Journal* 180: 633-637.
- Leung, E.S., Rosenfeld, J.S. and Bernhardt, J.R. (2009) Habitat effects on invertebrate drift in a small trout stream: implications for prey availability to drift-feeding fish. *Hydrobiologia* 623: 113-125.
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- Pauly, D., Graham, W., Libralato, S., Morissette, L. and Palomares, M.L.D. (2009) Jellyfish in ecosystems, online databases and ecosystem models. *Hydrobiologia* 616: 67-85.
- Pine, W.E., III, Walters, C., Kitchell, J.F. and Martell, S.J. (2009) Counterintuitive responses of fish populations to management actions: some common causes and implications for predictions based on ecosystem modeling. *Fisheries* 34(4): 165-180.
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- Rosen, D.A.S. (2009) Steller sea lions *Eumetopias jubatus* and nutritional stress: evidence from captive studies. *Mammal Review* 39: 284-306.
- Rosenfeld, J.S. and Taylor, J. (2009) Prey abundance, channel structure and the allometry of growth rate potential for juvenile trout. *Fisheries Management and Ecology* 16: 202-218.
- Sharp, R. and Sumaila, U.R. (2009) Quantification of U.S. marine fisheries subsidies. *North American Journal of Fisheries Management* 29: 18-32.
- Sharp, R. and Sumaila, U.R. (2009) Quantification of U.S. Marine Fisheries Subsidies. *North American Journal of Fisheries Management* 29: 18-32.



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- Williams, R. and Thomas, L. (2009) Cost-effective abundance estimation of rare animals: Testing performance of small-boat surveys for killer whales in British Columbia. *Biological Conservation* 142: 1542-1547.
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Fisheries Centre Visitors

Listed below are some of the visitors to the UBC Fisheries Centre in 2008-2009. These and many other Canadian and international visitors came to present seminars, attend workshops and collaborate with FC researchers.

Ayaa K. Armah

University of Ghana, West Africa

Host: Rashid Sumaila

Mahamudu Bawumia

Former deputy governor of the Ghana
Central Bank, West Africa

Host: Rashid Sumaila

Amado Blanco

Project Seahorse Foundation for Marine
Conservation, Philippines

Host: Amanda Vincent

Christopher Brown

Ecology Centre, University of Queensland
and CSIRO Marine and Atmospheric
Research, Australia

Host: Villy Christensen

Marta Coll

Institute of Marine Sciences, Barcelona,
Spain

Host: Villy Christensen

Ben Collen

Institute of Zoology, Zoological Society of
London, UK

Host: Amanda Vincent

Marion Cuif

Fisheries and Aquatic Sciences, Rennes
Agrocampus, France

Host: Murdoch McAllister

Tyler Eddy

University of Wellington, New Zealand

Hosts: Tony Pitcher and Villy Christensen

Marie-Pierre Etienne

AgroParisTech College, France

Host: Murdoch McAllister

Lou Frotté

Rennes University, France

Host: Daniel Pauly

Didier Gascuel

Département Halieutique

Agrocampus Rennes - Ensar, France

Host: Daniel Pauly

Carlos Gaspar

Nature, Economy and Environmental
Policy, Argentina

Host: Rashid Sumaila

Neil A. Gribble

Northern Fisheries Centre, Australia

Host: Villy Christensen

Mark Hepburn

CSIRO, Australia

Host: Villy Christensen

Cheng Heqin

State Key Laboratory of Estuarine and
Coastal Research, East China Normal,
University of Zongshan North

Host: FC

Nick Hill

Imperial College of London, UK

Host: Amanda Vincent

Les Kaufman

Boston University, USA

Host: Amanda Vincent

Paul G. Kinas

Laboratorio de Estatística, Departamento
de Matemática, Fund. Univ. Federal do
Rio Grande, Brazil

Host: FC

Hiroyuki Kurota

National Research Institute of Far Seas
Fisheries Shimizu, Japan

Host: Murdoch McAllister

Brian Langseth

Michigan State University, US

Host: Villy Christensen

Anahita Marzin

Fisheries and Aquatic Sciences, Rennes
Agrocampus, France

Host: Murdoch McAllister

Angelie Nellas

Project Seahorse Foundation for Marine
Conservation, Philippines

Host: Amanda Vincent

Henrik Osterblom

Stockholm University, Sweden

Hosts: Villy Christensen and Rashid
Sumaila

Lenin Oviedo

El Valle, Caracas, Venezuela

Host: Villy Christensen

Persson, Lo

Lund University, Sweden

Host: Daniel Pauly

Ruth Pincinato

Universidade de São Paulo

Host: Rashid Sumaila

Massimiliano Rosso

University of Genoa, Savona, Italy

Host: Andrew Trites

Reza Shokri

University of Newcastle, Australia

Host: Amanda Vincent

Stephen Smikle

Department of Fisheries and Commerce,
Jamaica, and University of West Indies

Host: Villy Christensen

Gabriela Rodrigues Vera

Laboratório de Ecologia trófica de Peixes,
Universidade de São Paulo, Instituto
Oceanográfico, Brazil

Host: Tony Pitcher and Villy Christensen

Maria Villanueva

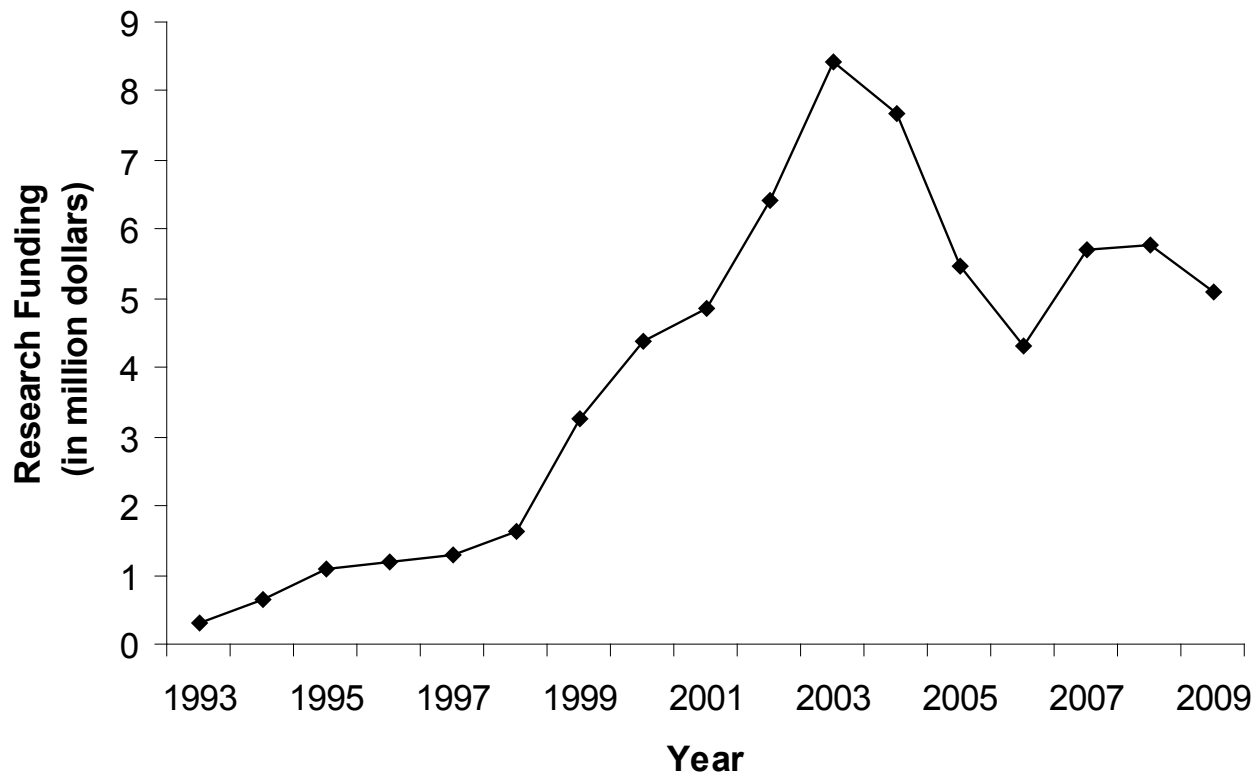
UNICAEN, France

Host: Villy Christensen



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