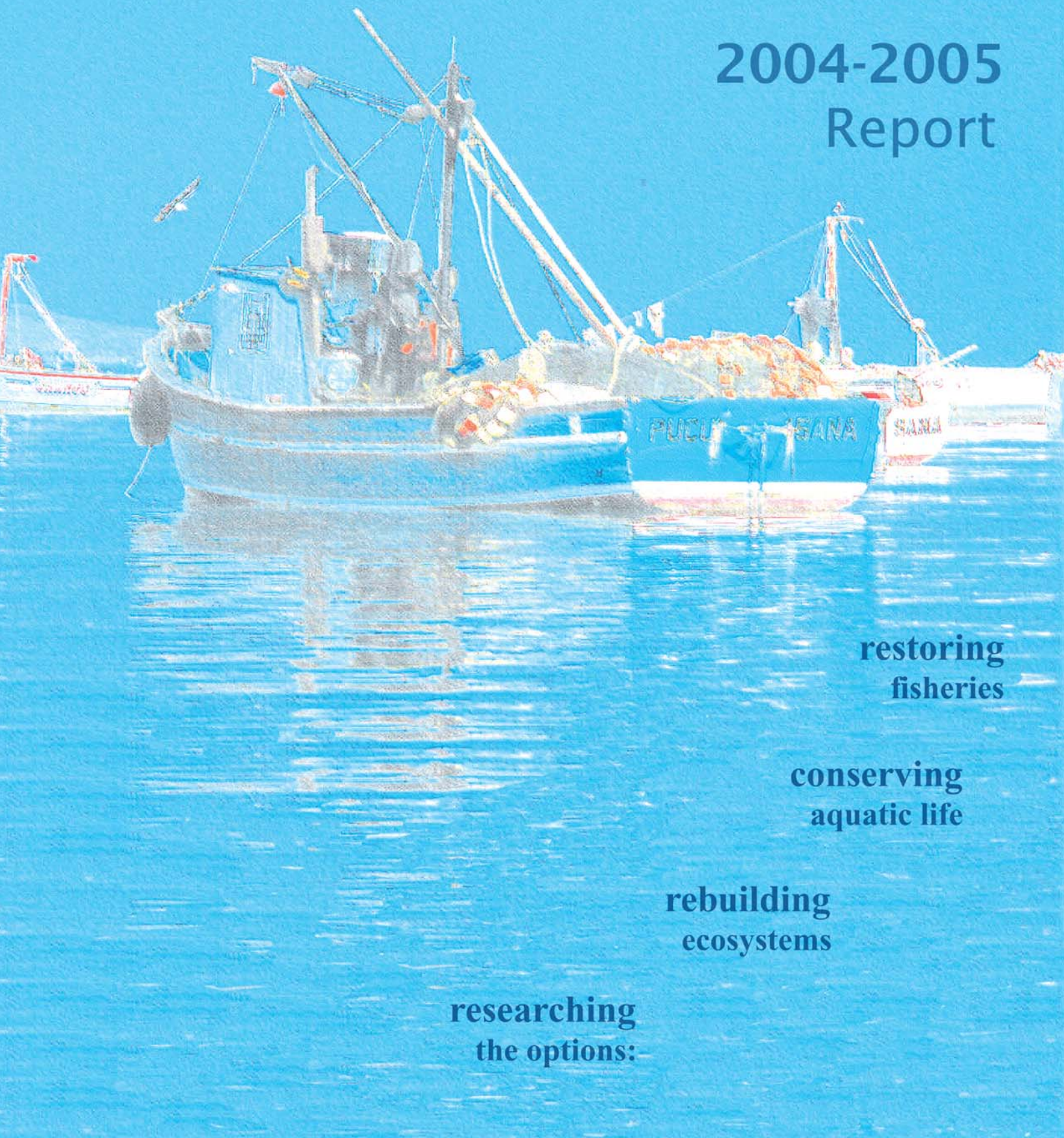


2004-2005 Report



restoring
fisheries

conserving
aquatic life

rebuilding
ecosystems

researching
the options:

Fisheries Centre

The University of British Columbia





Then...



Now!



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Foreword



As Dean of the Faculty of Graduate Studies, it gives me great pleasure to once again have the opportunity to preface the Fisheries Centre Annual Report. For the past 13 years, our Faculty has been the proud home of the Fisheries Centre.

The Centre has established itself as a world leader in aquatic ecosystem management and the development and application of ecosystem modeling techniques for the study of marine populations.

Its members are world-leading scholars and scientists, and we were delighted to see their work recognized once again in this past year.

Dr. Daniel Pauly, the Centre's Director, was awarded the prestigious 2005 International Cosmos Prize by the Expo'90 Foundation of Japan. The prize is awarded annually to an individual or organization for research work contributing to a significant understanding of the relationships among living organisms, the interdependence of life and the global environment; and the common nature integrating these inter-relationships.

Allow me to mention here just a few of the other prizes and awards received by Fisheries Centre members over the past two years. Dr. Amanda Vincent received the 51st annual ChevronTexaco Conservation Award for her research, education, and management programs dedicated to the protection of endangered seahorses around the globe. Tony Pitcher's work as Chair of the Program Committee of the 4th World Fisheries Congress 2004 was recognized with the Distinguished Service Award of the American Fisheries Society. Carl Walters was awarded the 11th Annual Murray A. Newman award for Significant Achievement in Aquatic Research by the Vancouver Aquarium Marine Science Centre.

The opening of the Aquatic Ecosystems Research Laboratory (AERL) marked the long-awaited fulfilment of an extraordinary vision. I would like to thank Tony Pitcher, Ian Robertson and Nigel Haggan for their proposal that opened up fresh and exhilarating possibilities, and express our gratitude for all those who have worked tirelessly to turn this vision into reality, in particular Les Lavkulich, Associate Dean Douw Steyn and his team.

It is difficult to overstate the importance of this accomplishment. AERL now houses three research units – the Fisheries Centre, the Institute for Resources, Environment and Sustainability (IRES), and the Aquatic Ecosystems Research Section of the Ministry of Environment – and brings together natural and social scientists working on scientific, economic, sociological, and environmental aspects of aquatic ecosystems. This new laboratory enables us to do what we have not done before, including dynamic simulation of complex ecological systems; evaluation of the ecological, social, economic, and cultural costs and benefits of different management options; and assessment and prediction of multi-species, multi-fleet, multi-gear, multi-sector fisheries.

It has been a remarkably rich and productive two years for the Fisheries Centre, and I hope you will take the time to read through this Report and join me in celebrating the Centre's numerous outstanding accomplishments, and in thanking all its members for the innumerable and invaluable contributions they have made to our Faculty, the University, and our community.

Dr. Frieda Granot
Dean of Graduate Studies



Director's Introduction

The years 2004 to 2005 cover the period of the Fisheries Centre's exile at the Lower Mall Research Station and our triumphant return to Main Mall. Our new building, the Aquatic Ecosystems Research Laboratory, or AERL, now looms over the brown huts which we left in 2003.

While disrupting our lives and work, our diaspora also forced us to focus on who we are, what we do, and what to keep of our accumulated files, documents and libraries. This shakeup forced us not only to redefine our own niche within the AERL/UBC ecosystem, but to pay more attention to the regional and global influences and externalities from climate change to the effect of oil prices on ecosystem structure. At the local level, where it all begins, we are particularly pleased at the strong relationship being developed with the Institute of Resources, Environment and Sustainability (IRES). All this was not easy at first, but it turned out well and by the end of 2005 we were comfortable in our new building, work stations or offices, and ready to tackle the future.



The last two years have seen a 50% growth in FC faculty, Drs Villy Christensen and Steve Martell (2004), and Murdoch McAllister (2006). This expansion of our faculty, complemented by an increased number of associate and adjunct faculties and more internal and external research partnerships, makes it easier to fulfill our teaching and training mandate, while conducting the leading edge research that this mandate requires. The new facilities provided by the AERL will be crucial to furthering our leadership in fisheries ecosystems research.

Our guiding principle is "Restoring fisheries, conserving aquatic life, and rebuilding ecosystems: researching the options." This report documents the wealth of output that this principle inspired in 2004 and 2005, from articles in first class, peer-reviewed journals to scholarly books and contributions to high-impact popular magazines and newsletters, here fully documented on p. 27-40. We also continued our weekly and well-attended seminar series, and ran or contributed significantly to workshops and conferences, many international, a function best documented by the key roles played by Fisheries Centre members at the 4th World Fisheries Congress, held in Vancouver in the spring of 2004.

I conclude by taking this opportunity to thank my colleagues and the staff and students of the Centre, and all our friends on the UBC campus, who have made it not only a pleasure, but also a matter of pride to be able to speak and write on behalf of the Fisheries Centre.


Daniel Pauly
Director
Fisheries Centre



Fisheries Centre Mission and Activities

The Fisheries Centre's mission statement, developed in 1993 and slightly modified since, is 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.

In 2004 and 2005, Fisheries Centre members conducted numerous collaborative activities to fulfill its mission, with emphasis on instruction and supervision of graduate (Master and PhD) students, and publications of academic research based on grants and contracts (see list of publications, p. 27-40), along with a vast number of related and supportive activities. The latter included convening several international and domestic conferences and workshops, drawing researchers and policy-makers from around the world and locally.

To document these activities, in 2004-2005, the Fisheries Centre published 13 *Fisheries Centre Research Reports* and introduced a new *Working Paper Series* to serve as temporary 'placeholder' for papers that are destined for publication in the primary literature. Also, we continued to publish *FishBytes*, the Centre's bimonthly newsletter, which has been produced and distributed internationally since 1995.

The Centre continued to host a weekly seminar during the fall and winter terms, funded by the B.C. government, which 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. The Centre also hosted dozens of short and long-term Canadian and international visitors, who shared their expertise with the members.

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

The Larkin Lectures



The Larkin Lectures are 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 2004 to 2005 period was:

Dr Jon G. Sutinen, Professor, Department of Environmental and Natural Resource Economics, The University of Rhode Island

"Blue Water Crime and Conservation: Controlling the Pirates in Marine Fisheries" (2005)

The AERL Immersion Laboratory

The 'heart' of the Fisheries Centre's new AERL building is a dark immersion room, in which sophisticated simulation software creates images of underwater and other coastal habitats, and the degradation that results from uncontrolled exploitation. The laboratory will be used to provide high-level decision makers from various countries with a compelling representation of the impact of their choices, and to improve on these through the use of 'gaming' software. The Immersion Laboratory will be also used for other high-level workshops, and for integrating the inputs of sensors tracking electronically tagged marine mammals, and for monitoring BC ecosystems through arrays of sensors.



Aboriginal Fisheries

The cultural and economic wealth of Aboriginal societies and the abundance and diversity of resources at European contact is increasingly linked to pre-contact ecosystem-based management. We are collaborating with Aboriginal people, both locally and globally, to ensure that traditional ecological knowledge (TEK) and values inform and enrich 21st century ecosystem-based management concepts. Our aim is to increase understanding of the productive potential of human aquatic ecosystems as an essential condition for restoration, sustainable fisheries, and preserving biocultural diversity within the Pacific Northwest – for perpetuity.

A 2004 - 2005 highlight was the Aboriginal Fisheries Session chaired by Chief Simon Lucas at the 4th World Fisheries Congress. In a cooperative initiative with the BC Aboriginal Fisheries Commission,

Assembly of First Nations, Pacific Marine Analysis and Research Association, University of Victoria, and DFO, we combined the strengths of TEK, computer modelling, and comprehensive ecosystem valuation to explore the effects of human actions. Partnering with Northwest Indian College (NWIC), we established the Salish Sea Ecosystem Alliance and are committed to design a fisheries course that draws on both Aboriginal and academic traditions. Dr Mimi E. Lam, a chemistry researcher and educational consultant to NWIC and University of New Mexico Biology Adjunct Assistant Professor, has been appointed a FC Adjunct Professor in Aboriginal

Fisheries. To attract more Aboriginal students into fisheries science careers, we are collaborating on projects funded by the BC Ministry of Advanced Education and the Environmental Leadership Program to work with the Homalco and local FNs in place-based education and ecosystem-based governance strategies.



NWIC MOA Signing, May 16, 2005. From L to R: Roberto Gonzalez-Plaza, NWIC President Cheryl Crazy Bull, FC Director Daniel Pauly, and Nigel Haggan



Salish Sea Gathering, November 16 – 18, 2005: Co-chair Tom Sampson, Coast Salish Sea Initiative, and Mimi E. Lam

Meeting presentations at the AAAS, Ecological Society of America, Canadian Aboriginal Science and Technology Society, C-CIARN, Society for Ecological Restoration, and Ocean Management Research Network highlighted Aboriginal ecosystem-based management, the interdependence of Indigenous societies and coastal ecosystems, and integrated place-based education and research. BCAFC Chair Arnie Narcisse, Daniel Pauly, FN Liaison Nigel Haggan, Megan Moody (a Nuxalk Nation FC MSc student studying the historical abundance and fisheries impacts to the eulachon), and other FC members engaged a young Aboriginal audience at the UBC CEDAR Summer Science Camp. Daniel gave the keynote address in the ESA/INTECOL Special Session, *Scaling the History and Future of Pacific Northwest Human Marine Ecosystems*, organized by Mimi and NWIC Faculty, Dr. Roberto Gonzalez-Plaza. At the Salish Sea Gathering, the joint presentation on *Ecosystem-based Governance of the Salish Bioregion*, reflecting an international collaboration of UBC FC, NWIC, Homalco FN, Lummi Indian Nation, and Environment Canada personnel, was firmly endorsed.



Ministry of Environment



Art Tautz

The Fisheries Centre houses 10 members of the Ecosystems Branch of the British Columbia Ministry of Environment. 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.



Dan Hogan

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 values. 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.



Debbie Aird

Freshwater habitat restoration is an area of research area 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.



Eric Parkinson

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.

www.env.gov.bc.ca



Theresa Godin



Bruce Ward



Tom Johnston



Steve McAdam



Jordan
Rosenfeld



Shannon Harris



Quantitative Modeling Group



The Quantitative Modeling Group continues to explore single species and ecosystem management through the development of assessment methodologies and field programs. Its members work in collaboration with colleagues within and outside UBC on a broad spectrum of projects ranging from early ocean life mortality in salmonid smolts to ecosystem management in the Gulf of Mexico. Dr Villy Christensen (see SAUP pages) participates in this group working on ecosystem modeling and the further development of Ecopath with Ecosim, and Robert Ahrens assumes some of the lecturing duties of professor Carl Walters.



Carl Walters
Director

Ongoing and recently completed projects within British Columbia include a large scale assessment for sturgeon in the Fraser River. A continuing field program in collaboration with the Ecosystems Branch of the Ministry of Environment explores the “cultivation-depensation” mechanism potentially responsible for species composition change in aquatic ecosystems. We participate in the POST project (www.coml.org/descrip/post.htm) studying the early ocean mortality and migration of juvenile Pacific salmonids using acoustic telemetry. We collaborate with DFO on the joint statistical committee for Pacific hake assessment. Canada and the US have nearly ratified an agreement for the co-management of Pacific hake stocks of the west coast of North America. We have done an assessment of the status of steelhead trout in the province of British Columbia in collaboration with Ecosystems Branch of the Ministry of Environment.



Steve Martell
Assistant
Professor

Current international projects include stock assessment and metapopulation dynamics for the Northwestern Hawaiian Islands in collaboration with NOAA/NMFS in Honolulu under the Pacific Island Insular Ecosystems Working Group. We have a joint project between the Virginia Institute of Marine Science (VIMS) and UBC to develop a stock assessment framework for sub-stocks of Atlantic menhaden in Chesapeake Bay. Ongoing studies of the Grand Canyon are aimed at understanding endangered species responses to ecosystem dynamics. Collaboration with the University of Maryland Center for Environmental Science and the University of Washington explores assessment and management methodologies. A collaborative study with the University of Washington under Moore Foundation support examines salmon dynamics in relation to ecosystem change. 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. NMFS sponsors a global scale analysis of the status of large pelagic predators and management options for reducing fishing mortality.



Robert Ahrens
Lecturer





Fisheries Economics Research Unit



Rashid Sumaila
Director



Gordon Munro
Professor
Emeritus

The guiding principle of the *Fisheries Economics Research Unit (FERU)* is “fisheries benefits for all generations”. The Unit uses economic tools to address issues relating to the management of aquatic resources for the benefit of current and future generations, while maintaining ecosystem integrity.

Members, who collaborate with colleagues within and outside of UBC, have diverse research interests, ranging from fundamental economic theory to applied empirical studies. Key areas of interest include: (i) the effects of subsidies on fisheries; (ii) valuation of natural resources, in particular, on appropriate methods of considering future benefits from resource use; (iii) economic determinants of illegal, unreported and unregulated (IUU) fishing; (iv) bioeconomic modeling; (v) economics of marine protected areas; (vi) economics of aquaculture; (vii) economics of shared fish stocks; and (viii) globalization, fish trade and marine ecosystems.



FERU graduate student Heather Keith tagging native fish species in the Little Colorado River in the Grand Canyon National Park, USA.



FERU graduate student Louise Teh weighing fish at Maliangin fish landing site in Pulau Banggi, Saba, Malaysia.

The Unit has attracted the attention of the scientific community, policy makers and funding agencies. The Unit attracts funding from a range of national, intergovernmental, and non-governmental organizations. Currently eight graduate students (four PhDs) are associated with FERU, and all are active participants in the Unit’s projects and activities.



Daniel Pauly (LHS), W.H.L. Allsopp, A.K. Armah, F.K.E. Nunoo and Rashid Sumaila at a lunch meeting where they discussed research collaboration between the University of Ghana, Department of Fisheries and Oceanography and UBC Fisheries Centre.



Twelve key FERU contributions and activities:

1. Lecture at the White House Office of Budget and Management on the potential economic benefits of restoring America's overexploited fish stocks, which may have contributed in a small way to the postponement by the Bush Administration of a change to National Standard 1 (that is, the Overfishing Standard in the Magnuson Stevens Act), and a temporal stop, at least, to the weakening of current restoration rules;
2. Successfully hosted the 2005 North American Association of Fisheries Economists Forum at UBC;
3. Completed, together with the *Sea Around Us* Project, Version 1 of the World's first global ex-vessel fish price and landed values database;
4. Gave a keynote address at the 2005 European Association of Fisheries Economists Conference in Thessaloniki, Greece;
5. Made a presentation to a group of Country Representatives to the United Nations on the need for and the role of Regional Fisheries Management Organizations in helping the global community manage its fishery resources sustainably;
6. FERU member, Professor Gordon Munro, received the 2004 IIFET (International Institute of Fisheries Economics and Trade) Distinguished Service Award;
7. Representative Nick J. Rahall, the ranking Democrat on the House Resources Committee, mentioned a FERU study in his own statement about House Bill HR 1431 on October 27, 2005. "According to a recent economic analysis," Rahall's statement said, "the value of this Nation's fishery resources would be nearly three times its current value if Councils dedicated their efforts to rebuilding stocks rather than allowing overfishing to continue."
8. Completed a two-year project on the bio-socio-economics of the Benguela hake. We developed a bioeconomic and a socio-economic impact assessment model that is simple enough for managers and other interested parties to run 'what if' scenario analyses on the economic, social and ecological impacts of different management decisions regarding the exploitation of hake by South Africa and Namibia. As part of the capacity-building component of the project, we organized workshops in South Africa and Namibia, and a training course in Namibia;



Rashid Sumaila (LHS), Dan Huppert, Gordon Munro and Brian Copeland having a chat during coffee at a FERU co-hosted Conference in honor of Gordon Munro, Vancouver, Canada.



Attendees at a FERU-organized training course on Bio-socio-economic analysis, Windhoek, Namibia.

9. Completed a study on the potential economic benefits of sablefish farming in British Columbia, which received a lot of media attention;
10. Completed a study of values from the marine ecosystems of the United States;
11. Completed a study of the Benguela marine ecosystem, which motivated the establishment of a body to promote regional management of the ecosystem;
12. These activities have put FERU on the map, culminating in our invitation to contribute to the United Nation's Secretary General's 2005 Report on marine biodiversity in areas beyond national jurisdiction.

www.feru.org





Marine Mammal Research Unit



Andrew Trites
Director



Rebecca
Barrick
Research
Assistant



Karin Bodtker
Research
Assistant



Volker Deecke
Post-doctoral
Fellow



Edward Greg
Researcher



Sylvie Guénette
Research
Associate



Rod MacVicar
Research
Assistant



Chad Nordstrom
Research
Assistant



David Rosen
Research
Associate



Pamela
Rosenbaum
Manager



Morgan Davies
Research
Assistant



Andrea Coombs
Researcher

The *Marine Mammal Research Unit* (MMRU) is integrated within 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 contains three components: field studies, captive animal studies, and data analysis and laboratory studies.

Captive animal studies primarily focused on the nutritional and energetic consequences for marine mammals faced with changes in the types and quantities of prey available to them. Thirteen Steller sea lions at the Vancouver Aquarium Marine Science Centre participated in studies to investigate a number of hypotheses explaining their decline in the wild. Three of the sea lions were trained to swim and dive freely while accompanying scientists in the field at the Open Water Research Station in Port Moody. The open-water-studies included diving physiology, energetics, and swimming biomechanics, with the ultimate aim of determining food requirements of the wild population.



Feeding experiments at the Vancouver Aquarium were undertaken to better understand how seasonal changes in both the abundance and the composition of prey might impact the health and physiology of sea lions. Another study developed simple, appropriate blood tests to indicate and quantify nutritional stress in wild populations. The cost of thermoregulation was determined by measuring the energy expenditure of Steller sea lions in varying body condition while in water at different temperatures. Other Aquarium-based studies involved estimating the energetic needs of large whales (initially using beluga whales) and validating techniques to estimate diets from fatty acid signatures, as well as prey DNA extraction and prey hard remnant analysis.



Field studies undertaken in Alaska in 2004-05 focused on killer whale predation, sea lion diets, and sea lion behaviour (haulout patterns and timing of weaning). Data from previous field seasons were also analyzed to determine the extent to which predation by other species, such as killer whales, and competition for food are responsible for the decline and lack of





recovery of Steller sea lions. Other studies evaluated the effects of human disturbance on sea lions, the effects of El Niño on South American sea lion survival and breeding behaviour, and the strategies used by sea lions to find food and avoid predators. Field studies in the Antarctic focused on humpback

whales, while those in British Columbia focused on sea lions, harbour porpoise, and humpback whales.

Mathematical models are increasingly being used to understand the past dynamics of Steller sea lions, as well as to project their future population trends. Among the models constructed were ecosystem models of the western Aleutian Islands and Southeast Alaska that showed a combination of factors can explain the observed changes in sea lion numbers, such as killer whale predation and competitive interactions with fish. The models suggest a major driving force was ocean climate (i.e., regime shifts). A population viability analysis was constructed for the western population of Steller sea lions to identify the combination of parameters (birth rates, survival rates and age at first reproduction) that could explain the observed changes in sea lion numbers at each rookery. Finally, mathematical 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 studies undertaken in 2004-05 included constructing a bioenergetic model for killer whales, an analysis of the seasonal variation in nutritional value of walleye pollock, and an empirical analysis to determine how many scats researchers should be collecting to accurately describe sea lion diets.

MMRU continued to administer 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 hosted a meeting 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



Gordon Hastie
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Sheila Heymans
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Mary Royer
Biostatistician



Ruth Joy
Biostatistician



Renee LaRoi
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Lindsay Wilson
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David Gummesson
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Assistant



Arliss Winship
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Amanda
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Project Seahorse



Heather
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Jean Marcus
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Scientist



Bob Hunt
Research
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Jorma
Neuvonen
Operations
Director

Project Seahorse has a vision of a world in which marine ecosystems are healthy and well-managed. In pursuit of this ambition, we weave together many disciplines, nationalities and approaches that might foster sustainable use of the world's coastal marine ecosystems. Our work reaches from biology and social science through fisheries management to international policy change and outreach. Seahorses serve as iconic animals for all our work, requiring us to assess and address a myriad of conservation threats of broad general importance. We are active in many countries, but particularly in the Philippines, through our national team at the Project Seahorse Foundation for Marine Conservation. In recognition of our contributions, we were delighted to receive the 51st Chevron Award for Conservation in 2005.

In 2004, Project Seahorse adopted a new strategic plan that will see us through to the end of 2009, with a transition year in 2005. This gives us an opportunity to present some past successes and introduce some new programmes.

- *Syngnathid biology*: We continued to be the global authority on this family of 300 species of seahorses, pipefishes, pipehorses, and seadragons. Our reputation was bolstered by the publication of 15 refereed seahorse papers during these two years, including a definitive analytical review of their biology and ecology;
- *Marine Protected Areas (MPAs)*: We have been instrumental in developing 19 no-take MPAs in the central Philippines, and are now guiding fishing communities to develop management plans and indicators of success. At the same time, we have analysed our long-term data on fish and benthic changes inside a subset of these MPAs, outside the MPAs, and in distant sites (papers now in review). Other MPA work in the Philippines focuses on socioeconomic perceptions and measures of effectiveness and on the strong cultural basis for marine tenure;
- *Capacity building*: An alliance of 800 fishing families, catalysed and supported by Project Seahorse Foundation, is now energetically engaged in developing new MPAs, enforcing fisheries and marine laws, and marshalling support for management reform. We are also advising and assisting traditional Chinese medicine traders in Hong Kong and Taiwan, and supporting conservation breeding and education programmes in public aquariums around the world;
- *Trade management*: Thanks largely to our efforts, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) began controlling all seahorse exports, as a new tool in global regulation of fisheries. We also saw CITES recommend our management advice to all 169 signatory nations. Our subsequent trade research in Asia and North America is allowing us to modify this advice towards a more precautionary approach, in the best traditions of adaptive management;
- *Outreach*: We answer the voluminous correspondence from children, adults, and journalists, asking intriguing questions. Our exhibits on seahorse conservation reach over 10 million visitors to public aquariums each year. We have extensive interactions with our peers, of course. As one example, Amanda Vincent was one of the keynote speakers at the 4th World Fisheries Congress in Vancouver.



New ventures

- We began working with the Gitga'at First Nation (indigenous people) in Canada to explore the complementarity of societal and scientific approaches to the design of marine reserves;
- We have embarked on a study in Mexico of the impacts of shrimp trawl bycatch on fish smaller than 20 cm;
- We are planning to explore the roles of women in fisheries extraction and management in developing countries, particularly as they relate to marine protected areas;
- We have initiated a study to ensure that all seahorses in the aquarium trade are sustainably sourced (from well-managed extraction or careful aquaculture) within 5 years, as a model for other species.

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

www.projectseahorse.org



Kristin Lunn
Field
Researcher



Rebecca Ng
Field
Researcher



Standing from L to R: Grace Gomez, Hazel Panes, Lourdes Labrada, Mia Apurado, Armi Torrechilla, and Angie Nellas. Front Row from L to R: Alen Mondido, Erwin Brunio, Amado Blanco, Pert Auxilio, Alfie Bartolo, and Brian Cabrera.



Sue Mulligan
Administrative
Assistant



Melissa Grey
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James
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Heidi Shuter
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Sara Lourie
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Candace
Picco
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Assistant



Geoff Gilliard
Communications
Coordinator



Shannon Charney
Operations
Assistant





Sea Around Us Project



Daniel Pauly
Principal
Investigator

The *Sea Around Us* Project (SAUP) assesses large-scale impacts of fishing on marine ecosystems and identifies solutions to the challenges they pose using a variety of tools, including ecosystem modeling, mapping, economic and policy analyses and public outreach. Its work extends our understanding of the impacts of fishing on marine ecosystems globally, and contributes to fisheries management policy.



Villy
Christensen
Senior
Research
Fellow

The SAUP is increasingly involved in research on marine protected areas (MPAs). Our work on improving the current global database of marine protected areas documents, in quantitative terms, the difficulty governments and conservation groups are facing in meeting the various targets set for establishing a global network of MPAs. The recent development of seamount fisheries has highlighted their potential impacts on high seas biodiversity management, and – again – the need for high seas MPAs. This was confirmed by a report to the Convention on Biological Diversity (CBD), which focused attention on the breadth of biodiversity in the high seas.



Reg Watson
Senior
Research
Fellow

Our collaboration with the CBD also involved turning our earlier work on trends in mean trophic level – which demonstrated widespread ‘fishing down marine food webs’ – into a ‘marine trophic index’ (MTI), now endorsed by the member countries of the CBD as one of eight indicators through which biodiversity will be monitored worldwide.



Jackie Alder
Senior
Research
Fellow

The SAUP’s work on the geographic and dietary overlap between fish and marine mammals has helped to dispel the myth that whales and other marine mammals were competing with human food fisheries. Similar work on seabirds also highlighted the limited overlap between fish consumed by seabirds and human food fisheries. On the other hand, an analysis of the deployment of various fishing gears has provided a better picture of the spatial and temporal extents of the impact of gears, such as trawls and long lines on marine ecosystems.

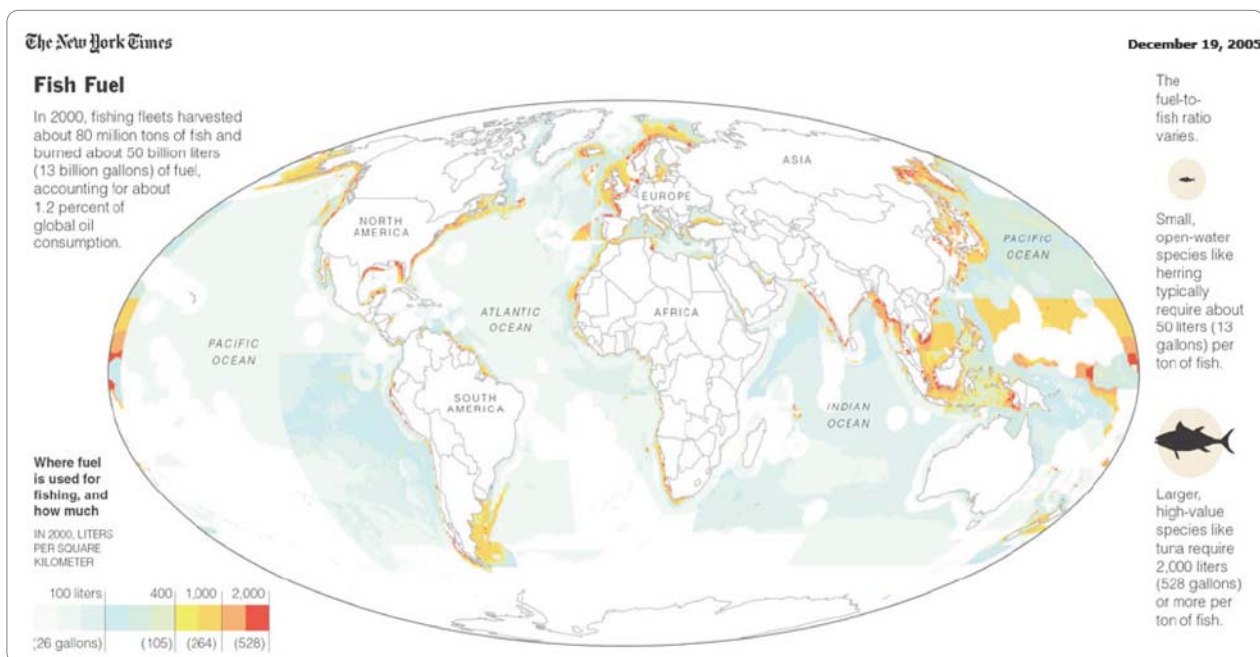


Maria Lourdes
(Deng)
Palomares
Research
Fellow

The SAUP has significantly advanced our understanding of small-scale fisheries in its development of a methodology to estimate small-scale catches based on a variety of information sources. The pilot study of US Flag Island Areas in the Pacific highlighted the large catches of coral reef fish that have gone unreported in the past, and more importantly, their significance to food security and economic development in the community.

A natural extension to the SAUP’s core research has been to explore the economic impacts associated with fisheries. To do this on a global scale, a database of ex-vessel prices has been developed and is accessible at the Project website (www.seaaroundus.org). The SAUP has also investigated various aspects of fishing cost, and completed an analysis of fuel consumption by various fishing fleets. This underlined the contribution of fishing vessels, particularly trawlers, to global greenhouse gas emissions, but also their extreme sensitivity to fuel price increases.





Source: The NYT, based on Peter H. Tyedmers, Reg Watson and Daniel Pauly, in *AMBIO: Journal of the Human Environment* (2005).

Many of the outcomes of SAUP's work contributed to policy at the international and national levels. The SAUP led the writing of the Marine Fisheries Chapter for the Conditions and Trend Volume of the Millennium Ecosystems Assessment, as well as contributing to other chapters and volumes, notably through modeling work, based on Ecopath with Ecosim. Members of the SAUP presented the results of their work to various institutions, including the UN in New York, a British 'Royal Commission', and the fisheries agencies of various countries.

The increasingly successful outreach of the SAUP was highlighted in October 2005, when the Project hosted a two-day workshop with over 20 non-government organizations (NGOs) working on marine conservation around the world. The workshop illustrated the breadth and depth of SAUP research, and its potential toward meeting the science-based information needs of these NGOs. Many NGOs are already using a number of the SAUP products accessible on the web, and based on their experiences a number of improvements will be made to our website. Also, we will focus our research in the coming years to even better identify policy solutions to the global crisis of fisheries. This, ultimately, is the only meaningful measure of success for the *Sea Around Us* Project.

www.seaaroundus.org



Dirk Zeller
Senior
Research
Fellow



Adrian
Kitchingham
GIS/Databases



Fred Valdez
Web
Programmer



Shawn Booth
Research
Assistant



Sherman Lai
Programmer



Vicky Lam
Research
Assistant



Christopher
Close
GIS Analyst



Fang Gao
Programmer



Jordan Beblow
Research
Assistant



Suzanne
Mondoux
Research
Assistant



Brooke
Campbell
Research
Assistant



Grace Ong
Administration





Fisheries Ecosystems Restoration Research

The Fisheries Ecosystems Restoration Research (FERR) group is committed to developing new integrative tools for ecosystem-based management and practical policies for the restoration of aquatic ecosystems. Using fieldwork, community involvement and innovative modelling, Tony Pitcher and his team of graduate students and postdocs continue to advance ecosystem science through the development of ecosystem simulation models, holistic indicators and policy analysis techniques that can help estimate, mitigate and reverse human impacts on the environment. Pivoting on historical and traditional knowledge, ecosystem-based simulations and participatory workshops that foster a sense of ownership and ecological economics, FERR focuses on modelling and evaluation in support of policy goals that reconcile the preservation of biodiversity and services with sustainable and responsible fisheries. The group pioneers new techniques in restoration ecology for a wide range of marine and freshwater ecosystems from around the globe.



The Leader of FERR in Bali.

Techniques include 'Back to the Future', a new approach to policy that maximises sustainable future benefits in the face of risks from climate fluctuations and change; and 'Rapfish', a rapid appraisal method for evaluating sustainability of fisheries and compliance with the UN Code of Conduct for Responsible Fisheries. A new semi-quantitative technique is in use to estimate quantities of illegal, unreported and unregulated catch and also contributes to global studies.

Four visiting researchers contributed to the group's work in 2005, including Prof. Paul Hart (University of Leicester, UK), Georg Skaret (University of Bergen, Norway), Dr Wengui Cai (South China Sea Fisheries Institute, Guangzhou, China) and Dr Jiahua Cheng (East China Sea Fisheries Institute, Shanghai, China). FERR also hosted or participated in workshops and training courses in Athens, Crete, Bilbao, the Azores, Scotland, Bali, Hong Kong, Guangzhou, Florida, and Princeton, and contributed to major symposia in Europe, Asia and North America. Group members were also heavily involved in the 4th World Fisheries Congress held in Vancouver in May 2004. Patricia Rojo-Diaz (Mexico) and Dr Daniela Kalikoski (Brazil) were research collaborators during this period.



Cameron Ainsworth (*Ph.D. Candidate: Canada*) is currently completing his thesis on the development of the Back to the Future policy analysis approach to aid long-term strategic planning of ecosystem-based restoration. Following his Ph.D., Cameron will continue as a Post Doctoral Fellow, studying the EBM of coral reefs in West Papua, Indonesia.

Eny Buchary (*Ph.D. Candidate: Indonesia*) returned from 7 months of IDRC-sponsored fieldwork in two study sites in Indonesia; Bali Strait and Komodo National Park. Eny's research uses local knowledge obtained through interviews to evaluate policy options for marine management. She is collaborating with the Indonesian Ministry of Marine Affairs and Fisheries to organize a 2006 stakeholder workshop in Indonesia.



Eny Buchary and Pak Husin with sardine purse seiners near Negara, Bali.



William Wai Lung Cheung (*Ph.D. Candidate: Hong Kong*) is working on his dissertation evaluating the vulnerability of marine fishes to fishing using a fuzzy logic expert system. His South China Sea case study uses ecosystem simulation modelling to explore trade-offs between socio-economic and conservation fishing objectives. William has taken a teaching position at the University of Hong Kong until mid-2006.



Robyn Forrest (*Ph.D. Candidate: Australia*) is using marine ecosystem models of New South Wales to assist EBM in data-limited conditions. She is interested in the performance of marine protected areas as management tools. Robyn was recently awarded the 2005 Cecil and Kathleen Morrow Scholarship.



William Cheung and Tony Pitcher visiting Guangzhou Fisheries; yes, it's Chairman Mao in the background!

Pramod Ganapathiraju (*Ph.D. student: India*) joins FERR from Dalhousie University in Halifax where he completed his second M.Sc. in marine science studying the migratory patterns of whales and tunas in the Bay of Bengal. His PhD thesis will help us better understand the factors contributing to compliance with the UN Code of Conduct for Responsible Fishing.



Hector Lozano (*Ph.D. Candidate: Mexico*) is completing his dissertation on historic modelling of the Colorado River Delta and the Upper Gulf of California. Hector is exploring the effects of damming and a vital element of his modelling approach is the integration of Local Ecological Knowledge (LEK).



Megan Moody (*M.Sc. student: Nuxalk Nation, Canada*) is studying the past abundance and roles of eulachon in the BC marine ecosystem using the strength of GIS spatial analyses. As a member of Nuxalk Nation, she will attempt to encapsulate the wisdom and traditional ecological knowledge (TEK) of community elders to enrich our understanding of the ecology.

Telmo Morato (*Ph.D. Candidate: Portugal*) is modelling seamount ecosystems in the Azores Islands, Portugal. He collaborated with colleagues at the University of the Azores to host an international Seamount Workshop in Horta in May 2005, which is leading to a book on the topic. His thesis will provide important information for management of seamounts and ocean habitats.



Telmo Morato and dive buddy Norberto, off Pico, Azores.



Dawit Tesfamichael (*Ph.D. Candidate: Eritrea*) is examining the past, present and future of Red Sea fisheries using evaluation and modelling techniques of Rapfish, ecosystem modelling, and the estimation of illegal, unreported and unregulated catch.

Divya Varkey (*Ph.D. student: India*) joins FERR from her Masters on ARIMA modelling at the Central Institute of Fisheries Education, Mumbai, India. She is studying ecosystem-based management of coral reef fisheries and is participating in a Packard-sponsored EBM project in west Papua, Indonesia.



Graduate Studies

Graduate students continue to be an integral part of the UBC Fisheries Centre, which aims to focus and promote the multidisciplinary study of fisheries. Under supervision of faculty and other researchers, Fisheries Centre students employed analytical tools developed in subjects ranging from biology to policy to assess, appraise and forecast the impacts of both human and natural processes on fishery resources. Fisheries policy and management problems under study in 2004 and 2005 included assessment and management of a range of capture fisheries, including recreational, economic valuation studies of marine ecosystems, watershed management, aquaculture, marine protected areas and the conservation of endangered species in marine and freshwater environments.

The Fisheries Centre has strong graduate teaching links to Zoology, Resource Management and Environmental Studies, Oceanography, Land and Food Systems (Aquaculture), Forestry (Watershed Restoration), Anthropology, Sociology, Economics, Education, History and First Nations issues. Students can be enrolled at various departments under the Faculty of Graduate Studies but most choose Zoology or the Resource Management and Environment Program within the Institute for Resources, Environment, and Sustainability. Students interested in graduate studies at the Fisheries Centre should visit the graduate program web page and also contact the Fisheries Centre graduate secretary office@fisheries.ubc.ca.

The Centre's graduate teaching is firmly linked to emerging research over a wide range of topics. Graduate students get the benefits of leading edge science, as lectures often describe new findings accepted but not yet published in journals, let alone textbooks. The recruitment of three additional



In April 2006 UBC Fisheries Centre students will host the third annual Fisheries and Marine Ecosystems (FAME) graduate student conference. FC graduate students began in 2005 to plan the program and logistical details for this collaborative event, which will bring together approximately 70 graduate students from different disciplines in a number of universities across North America, mainly from B.C. and Washington State. Students will share their research and establish relations as current and future scientists, managers, and policy-makers. With a conference theme of "Integrating Science and Policy" presenters will branch out from their own disciplines and try to view current issues in fisheries from diverse points of view.

www.fisheries.ubc.ca/fame

AQUALINK is an international and interdisciplinary network of graduate students and early-career researchers who are dedicated to finding new ways to improve the state of aquatic ecosystems and the quality of life for coastal communities. We work towards this goal by seeking innovation in scientific research and by integrating diverse disciplines and perspectives to facilitate communication and education.

At the 4th World Fisheries Congress in Vancouver in May 2004, AQUALINK members collaborated to analyze global trends in fisheries research, identifying studies that presented innovative and interdisciplinary ways of reconciling fisheries with conservation. Members discussed the results of this project with international fisheries experts at a workshop in Halifax called "Creating a Positive Future for Fisheries and Fishing Communities Worldwide." In 2005, AQUALINK published a Fisheries Centre Research Report, Innovation and Outlook in Fisheries: An assessment of research presented at the 4th World Fisheries Congress (Volume 13, Number 2). Twenty members from ten different countries contributed to this report, which was edited by Ratana Chuenpagdee and Alida Bundy.

<http://www.fisheries.ubc.ca/aqualink/index.htm>



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 large tunas and billfish
Supervisors: Drs V. Christensen & C. Walters



Rik Buckworth (Australia)
PhD Zoology (start 1995*)
Project: Dynamics of tropical line fisheries
Supervisor: Dr Carl Walters



Cameron Ainsworth (Canada)
PhD RMES (start 2002)
Project: Ecosystem restoration in northern British Columbia
Supervisor: Dr Tony Pitcher



Mary Cashman (USA)
Ph.D. RMES (start 2003)
Project: Ecological impacts of small-scale fishers' decisions on the Danajon Bank, Philippines
Supervisor: Dr Amanda Vincent



Jonathan Anticamara (Philippines)
PhD RMES (start 2001)
Project: Recovery of fish assemblages and benthic habitats inside marine protected areas
Supervisor: Dr Amanda Vincent



Olivier Cheneval (Canada)
MSc Zoology (start 1999*)
Project: Steller sea lions and predator-prey relationships
Supervisor: Dr Andrew Trites



Megan Bailey (Canada)
MSc RMES (start 2005)
Project: A total economic valuation of the Raja Ampat Archipelago in Papua Indonesia
Supervisor: Dr Rashid Sumaila



Wai Lung Cheung (Hong Kong, China)
PhD RMES (start 2002)
Project: Vulnerabilities of marine fishes in the N South China Sea & implications to fisheries management
Supervisor: Dr Tony Pitcher



Natalie Ban (Canada & Germany)
PhD RMES (start 2003)
Project: Selecting ecologically viable marine protected areas in British Columbia
Supervisor: Dr Amanda Vincent



Line Bang Christensen (Denmark)
MSc RMES (start 2004)
Project: A stochastic framework for reconstructing historical marine mammal abundance from catch records and sparse abundance information
Supervisor: Dr Steve Martell



Stephen Ban (Canada)
MSc Zoology (start 2002*)
Project: Haulout and rookery selection of Steller sea lions
Supervisor: Dr Andrew Trites



Andrea Coombs (Canada)
MSc RMES (start 2000*)
Project: Impacts on marine mammals and human health in the E. Bering Sea
Supervisors: Drs A. Trites & D. Pauly



Brajeet Bhathal (Canada)
MSc (start 2002*), PhD Zoology (start 2005)
Project: Historical reconstruction of India's marine fisheries effort and ecosystem modeling to explore policy options
Supervisor: Dr Daniel Pauly



Janelle Curtis (Canada)
PhD (Start 2000*)
Project: Using life history and ecology for conservation and management of *Hippocampus guttulatus*
Supervisor: Dr Amanda Vincent



Eny Anggraini Buchary (Indonesia)
PhD RMES (start 2001)
Project: Recharting the cognitive map: In search of viable policy options for responsible use of marine resources
Supervisor: Dr Tony Pitcher



Meaghan Darcy (USA)
PhD Zoology (start 2005)
Project: Examination of metapopulation dynamics of commercially important bottomfish found in the Northwest Hawaiian Islands
Supervisor: Dr Steve Martell





Luciano Della Rosa (Brazil)
 PhD Zoology (start 2003)
Project: The foraging habitat of humpback whales
Supervisors: Drs A. Trites & J. Ford



Ms Robyn Forrest (Australia)
 PhD RMES (start 2002)
Project: Spatial ecosystem modelling of New South Wales fisheries
Supervisor: Dr Tony Pitcher



Sarah Foster (Canada)
 PhD RMES (start 2004)
Project: Impacts of shrimp trawling on small fish species in the Northern Gulf of California
Supervisor: Dr Amanda Vincent



Katia Freire (Brazil)
 PhD RMES (start 2000*)
Project: Analysis of northeastern Brazilian fisheries
Supervisor: Dr Daniel Pauly



Pramod Ganapathiraju (India)
 MSc RMES (start 2005)
Project: Global Analysis of incentives to fisheries management through FAO Code of Conduct
Supervisor: Dr Tony Pitcher



Ahmed Gelchu (Ethiopia)
 PhD RMES (start 2001)
Project: Evolution and distribution of global fishing effort
Supervisor: Dr Daniel Pauly



Eulalio Guieb (Philippines)
 PhD (start 2002)
Project: Cultural and Institutional Correlates of MPA effectiveness
Supervisors: Drs C. Scott (McGill), M. Mulrennan (Concordia) & A. Vincent



Anna Hall (Canada)
 MSc (start 2000*), PhD Zoology (start 2004)
Project: Interspecific habitat selection and predator avoidance of harbour and Dall's porpoise
Supervisor: Dr Andrew Trites



Mike Hawkshaw (Canada)
 MSc Zoology (start 2005)
Project: Juvenile Northern pikeminnow dynamics
Supervisor: Dr Carl Walters



Andrea Hunter (Canada)
 MSc Zoology (start 2000*)
Project: Estimating marine mammal energy requirements
Supervisors: Drs D. Pauly & A. Trites



Kerry Irish (Canada)
 MSc RMES (start 2001)
Project: Killer whales in Alaska
Supervisor: Dr Andrew Trites



Gakushi Ishimura (Japan)
 PhD RMES (start 2004)
Project: Multinational fisheries management under uncertainty: a bioeconomic modeling approach toward optimal management of Pacific hake fisheries in the U.S. and Canada
Supervisor: Dr Rashid Sumaila



Jennifer Jacquet (USA)
 PhD RMES (start 2005)
Project: Estimating the contribution of small-scale fisheries to GDP
Supervisor: Dr Daniel Pauly



Vasiliki Karpouzi (Greece)
 MSc Zoology (start 2001*)
Project: Seabird – Fisheries interactions on a global scale
Supervisor: Dr Daniel Pauly



Kristin Kaschner (Germany)
 PhD Zoology (start 1998*)
Project: Modelling of global marine mammal food consumption
Supervisors: Drs D. Pauly & A. Trites



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



**Heather Keith (Canada)**

MSc RMES (start 2003)

Project: Bioeconomic analysis of the purse seine and longline tuna fisheries**Supervisor:** Dr Rashid Sumaila**Ahmed Khan (Sierra Leone)**

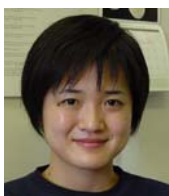
MSc RMES (start 2004)

Project: The nature and magnitude of global fishery subsidies**Supervisor:** Dr Rashid Sumaila**Josh Korman (Canada)**

PhD Zoology (start 2005)

Project: Factors influencing recruitment dynamics, growth, survival, and ontogenetic habitat movement of salmonids in large rivers systems**Supervisor:** Dr Steve Martell**Laura Kucey (Canada)**

MSc Zoology (start 2002*)

Project: Effects of human disturbance on Steller sea lions**Supervisor:** Dr Andrew Trites**Saeko Kumagai (Japan)**

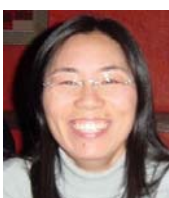
MSc Zoology (start 2001*)

Project: Seasonal differences in energy balance in Steller sea lions**Supervisor:** Dr. Andrew Trites**Bob Lessard (Canada)**

Visiting Student*, University of Alberta

Project: Interactions between wolves and ungulates in boreal ecosystems**Supervisor:** Dr Carl Walters**Pamela Lestenkof (USA)**

MSc Zoology (start 2004)

Project: Fine scale foraging behaviour of female northern fur seals (*Callorhinus ursinus*) in the eastern Bering Sea**Supervisor:** Dr Andrew Trites**Yajie Liu (China)**

PhD RMES 2001

Project: The net benefits from aquaculture**Supervisor:** Dr Rashid Sumaila**Sara Lourie (England)**

PhD Biology (start McGill University, 1998*)

Project: Phylogeography of Southeast Asian seahorses**Supervisor:** Dr Amanda Vincent**Hector Lozano (Mexico)**

PhD Zoology (start 2001)

Project: Historical ecosystem reconstructions in the Gulf of California (Mexico)**Supervisor:** Dr Tony Pitcher**Dale Marsden (Canada)**

PhD RMES (start 2003)

Project: Effects of international trade on fisheries and marine ecosystems**Supervisor:** Dr Rashid Sumaila**Steve McAdam (Canada)**

Ph.D. Zoology (start 2005)

Project : Examination of white sturgeon (*Acipenser transmontanus*) recruitment failure and identification of restoration options**Supervisor:** Dr Carl Walters**Michael Melnychuk (Canada)**

MSc Zoology (start 2002)

Project: Marine mortality and migration patterns of juvenile salmonids**Supervisor:** Dr Carl Walters**Elizabeth Mohammed (Trinidad and Tobago)**

PhD RMES (start 1999)

Project: Reconstructing the southeastern Caribbean ecosystem: applications for assessment & management**Supervisor:** Dr Daniel Pauly**Megan Moody (Canada)**

MSc. RMES (start 2004)

Project: Historical analysis of current and past runs of Pacific Coast eulachon as impacted by traditional fisheries, commercial fisheries and bycatch in the shrimp trawl fishery**Supervisor:** Dr Tony J. Pitcher**Telmo Morato Gomes (Portugal)**

PhD RMES (start 2002)

Project: Ecological modelling of seamounts**Supervisor:** Dr Tony Pitcher



Sian Morgan (Canada)
PhD (start McGill University, 1999)
Project: Movement and dispersal in exploited seahorse populations of the central Philippines
Supervisor: Dr Amanda Vincent



David Preikshot (Canada)
PhD Zoology (start 2000)
Project: Fish biodiversity in large marine ecosystems
Supervisor: Drs D. Pauly & V. Christensen



Lyne Morissette (Canada)
PhD Zoology (start 2001)
Project: Understanding marine ecology through ecosystem modelling
Supervisor: Dr Daniel Pauly



Erin Rechisky (USA)
PhD Zoology (start 2004)
Project: Migration routes and early marine survival of juvenile Pacific salmon
Supervisor: Dr Carl Walters



David O'Brien
Visiting Student, McGill University
Project: Dynamics of rainbow trout and pikeminnow in B.C. lakes
Supervisor: Dr Carl Walters



Yvette Rizzo (Malta)
PhD RMES (start 2000)
Project: The central Mediterranean: functioning of a large marine ecosystem
Supervisor: Dr Daniel Pauly



Kerrie O'Donnell (USA)
PhD Zoology (start 2005)
Project: Assessing viability of seahorse fisheries in the Philippines - links between behavioral ecology and population dynamics
Supervisor: Dr Amanda Vincent



Karim Soto (Peru)
MSc Zoology (start 2002*)
Project: Pup mortality and maternal behaviour of South American sea lions
Supervisor: Dr Andrew Trites



Thomas Okey (USA)
PhD Zoology (start 2001*)
Project: Alternate states in marine communities
Supervisor: Dr Daniel Pauly



Wilf Swartz (Canada)
MSc RMES (start 2002*)
Project: Mapping the fish consumption of Japan
Supervisor: Dr Daniel Pauly



Marivic Pajaro (Philippines)
PhD (start 2002)
Project: Biological, social and economic indicator of success in MPAs
Supervisors: Drs A. Vincent & M. Mulrennan (Concordia)



Nathan Taylor (Canada)
MSc Zoology (start 2001)
Project: Pikeminnows and rainbow trout
Supervisor: Dr Carl Walters



Chiara Piroddi (Italy)
MSc Zoology (start 2005)
Project: The application of Ecopath with Ecosim to study dolphin population dynamics in the central Mediterranean
Supervisor: Dr Villy Christensen



Louise Teh (Malaysia)
MSc RMES (start 2003)
Project: Effectiveness of Tun Mustapha Marine Park (N Sabah) in conserving coral reef and sustaining livelihoods
Supervisor: Dr Rashid Sumaila



Amy Poon (Canada)
MSc RMES (start 1999*)
Project: Impact of ghost fishing: a tentative global estimate
Supervisor: Dr Daniel Pauly



Dawit Tesfamichael (Eritrea)
PhD RMES (start 2002)
Project: Ecosystem based fisheries management of the Red Sea
Supervisor: Drs D. Pauly & T. Pitcher





Pablo Trujillo (Canada)
 PhD RMES (start 2001)
Project: Adding aquaculture to Ecopath models
Supervisor: Dr Tony Pitcher



Chadwick Wilkinson (Canada)
 MSc Zoology (start 2005)
Project: Investigating bull trout in the Elk River in Southeast BC, using quantitative models for effective management
Supervisor: Dr Steve Martell



Brett van Poorten (Canada)
 PhD Fisheries (start 2005)
Project: Effects of interspecific competition on recruitment processes: theory and application
Supervisor: Dr Carl Walters



Louisa Wood (UK)
 PhD RMES (start 2003)
Project: A global analysis of marine protected areas
Supervisor: Dr Daniel Pauly



Divya A. Varkey (India)
 PhD RMES (start 2005)
Project: Ecosystem-based management of coral reef fisheries in West Papua, Indonesia
Supervisor: Dr Tony Pitcher



Harald Yurk (Germany)
 PhD Zoology (start 1996*)
Project: The evolutionary history of resident killer whale clans in the northeastern Pacific, using vocal dialects
Supervisors: Drs A. Trites & J. Ford



Colette Wabnitz (France / Germany)
 PhD RMES (start 2003)
Project: The ecological role of green sea turtles (*Chelonia mydas*) and the distribution of their foraging grounds
Supervisor: Dr Daniel Pauly



Tiphaine Jeanniard du Dot (France)
 MSc Zoology (start 2004)
Project: Nutritional physiology and bioenergetics of Steller sea lions
Supervisors: Drs A. Trites & D. Rosen



Michelle Marcotte (Canada)
 MSc Zoology (start 2004)
Project: Weaning behaviour and haulout patterns of Steller sea lions (*Eumetopias jubatus*) in southeast Alaska
Supervisor: Dr Andrew Trites



* Thesis defended by December 2005.

Graduate Theses Completed*

2005

Stephen Ban (Canada)

MSc Zoology

Title: Modelling and characterization of Steller sea lion haulouts and rookeries using oceanographic and shoreline type data

Supervisor: Dr Andrew Trites

Brajgeet Bhathal (Canada)

MSc Zoology

Title: Historical reconstruction of Indian marine fisheries catches, 1950-2000, as a basis for testing the 'marine trophic index'.

Supervisor: Dr Daniel Pauly

Olivier Cheneval (Canada)

MSc Zoology

Title: Biomechanics of turning manoeuvres in Steller sea lions

Supervisor: Dr Andrew Trites

Kátia de Meirelles Felizola Freire (Brazil)

PhD RMES

Title: Fishing impacts on marine ecosystems off Brazil, with emphasis on the northeastern region

Supervisor: Dr Daniel Pauly

Andrea Hunter (Canada)

MSc Zoology

Title: A multiple regression model for predicting the energy requirements of marine mammals

Supervisors: Drs D. Pauly & A. Trites

Vasiliki Karpouzi (Greece)

MSc Zoology

Title: Modelling and mapping trophic overlap between fisheries and the world's seabirds

Supervisor: Dr Daniel Pauly

Laura Kucey (Canada)

MSc Zoology

Title: Human disturbance and the hauling out behaviour of Steller sea lions

Supervisor: Dr Andrew Trites

Bob Lessard (Canada)

PhD (University of Alberta)

Title: Managing for the conservation of woodland caribou in west-central Alberta: a simulation analysis

Supervisors: Drs F. Schmiegelow & C. Walters

Amy Min-Yee Poon (Canada)

MSc RMES

Title: Haunted waters: an estimate of ghost fishing of crabs and lobsters by traps

Supervisor: Dr Daniel Pauly

Harald Yurk (Canada/Germany)

PhD Zoology

Title: Vocal culture and social stability in resident killer whales (*Orcinus orca*)

Supervisors: Drs J. Ford & A. Trites

2004

Rik Buckworth (Australia)

PhD Zoology

Title: Effects of spatial stock structure and effort dynamics on the performance of alternative assessment procedures for the fisheries of northern Australia

Supervisor: Dr Carl Walters

Andrea Coombs (Canada)

MSc RMES

Title: Marine mammals and human health in the eastern Bering Sea: Using an ecosystem-based food web model to track PCBs

Supervisors: Drs A. Trites & D. Pauly

Janelle Curtis (Canada)

PhD Biology (McGill University)

Title: Life history, ecology and conservation of European seahorses

Supervisor: Dr Amanda Vincent

Anna Hall (Canada)

MSc Zoology

Title: Seasonal abundance, distribution and prey species of Harbour porpoise (*Phocoena phocoena*) in southern Vancouver Island waters

Supervisor: Dr Andrew Trites

Kristin Kaschner (Germany)

PhD Zoology

Title: Modelling and mapping resource overlap between marine mammals and fisheries on a global scale

Supervisor: Drs D. Pauly & A. Trites

Saeko Kumagai (Japan)

MSc Zoology

Title: Seasonal differences in physiology of captives Stellar sea lions (*Eumetopias jubatus*) in response to short-term low energy intake

Supervisors: Drs D. Rosen & A. Trites

Sara Lourie (United Kingdom)

PhD Biology (McGill University)

Title: Phylogeography of Southeast Asian seahorses in a conservation context

Supervisor: Dr Amanda Vincent

Thomas Okey (USA)

PhD Zoology

Title: Shifted community states in four marine ecosystems: some potential mechanisms

Supervisor: Dr Daniel Pauly

Karim Soto (Peru)

MSc Zoology

Title: The effects of prey abundance on the maternal attendance and pup mortality of the South American sea lion (*Otario flavescens*) in Peru

Supervisor: Dr Andrew Trites

Wilf Swartz (Canada)

MSc RMES

Title: Global maps of the growth of Japanese marine fisheries and fish consumption

Supervisor: Dr Daniel Pauly

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



Fisheries Centre Members 2004–2005

Faculty

Dr Daniel Pauly, Director

Professor, Fisheries Centre & Zoology
Tropical and Global Fisheries Issues

Dr Villy Christensen

Associate Professor, Fisheries Centre
Ecosystem Modeling

Dr Steven Martell

Assistant Professor, Fisheries Centre
Quantitative Fisheries Stock Assessment

Dr Tony J. Pitcher

Professor, Fisheries Centre & Zoology
Ecosystems, Rapid Appraisal and Schooling

Dr U. Rashid Sumaila

Assistant Professor, Fisheries Centre
Fisheries Economics

Dr Andrew Trites

Associate Professor, Fisheries Centre & Zoology
Marine Mammals and Fisheries

Dr Amanda Vincent

Associate Professor, Fisheries Centre
Canada Research Chair in Marine Conservation

Dr Carl Walters

Professor, Fisheries Centre & Zoology
Modelling, Assessment and Ecosystems

Associated Faculty

Dr Jo-Ann Archibald

First Nations House of Learning
Aboriginal Issues & Education

Dr Brian Elliot

Sociology
Environmental Sociology

Dr Douglas Harris

Law
Fisheries Law

Dr Scott Hinch

Forest Sciences and
Institute for Resources
and Environment
Forests and Fisheries

Dr George Iwama

Agricultural Sciences
Aquaculture

Dr Les Lavkulich

Institute for Resources
and Environment
Fisheries Education

**Dr David (Ralph)
Mathews**

Sociology
Fisheries Sociology

Dr Charles Menzies

Anthropology
Fisheries Anthropology

Dr Diane Newell

History
History of Fishers
Communities

Dr Richard Paisley

Law
Fisheries Law

Dr Royann Petrell

Chemical and Biological Engineering
Fishery Engineering

Dr William Rees

School of Community and
Regional Planning
Ecological Economics

Dr Jim Thompson

Food, Nutrition and Health
Aquaculture

Dr Richard Vedan

First Nations House of Learning
Aboriginal Fisheries

Emeritus Members

Dr Paul LeBlond

Fisheries Oceanography

Dr Don Ludwig

Fisheries Mathematics

Dr Patricia Marchak

Forests and Fisheries

Dr Gordon Munro

Fisheries Economics

Dr William Neill

Fisheries Limnology

Dr Tom Northcote

Fisheries Biology



Adjunct Professors

Dr Claire Armstrong
University of Tromsø
Fisheries Economics

Dr Martin Castonguay
DFO, Quebec
Fisheries Biology

Dr Ratana Chuenpagdee
Dalhousie University
Fisheries Economics

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

Dr Douglas E. Hay
DFO, Nanaimo
Pelagic Fisheries

Dr Charles Hollingsworth
Consultant
Scientific Writing

Dr Glen Jamieson
DFO, Nanaimo
Invertebrate Fisheries

Dr Mimi Lam
Aboriginal Fisheries

Dr Simon Lucas, Chief
Hesquiat Nuu-Chah-Nulth
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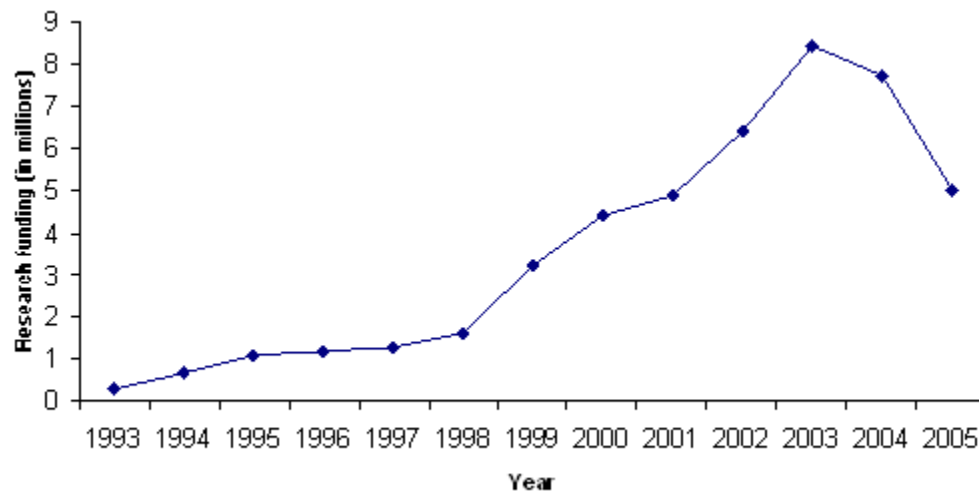
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Research Support Income

		2004	2005
UBC Funding	Salaries	468,516	474,816
	Operating	16,219	16,219
External Research		7,704,038	5,037,894

External research funding trend:



Some of our major funders from 1993 to 2005 are (in thousand dollars): North Pacific Marine Science Foundation (20,743), The Pew Charitable Trusts, Philadelphia (11,910), Natural Sciences and Engineering Research Council of Canada (2,183), BC Ministries of Fisheries, Environment and Advanced Education (1,546), John G. Shedd Aquarium, Chicago (1,009), US Department of Commerce (515), and Exxon Valdez Trustee Council, Anchorage (482), Chocolaterie Guylian N.V., Belgium (437).



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