7th Student Affairs Workshop

12 October 2009

Québec City, Canada

Organization

2009 SMM Student Affairs Committee

Lynne Williams (SMM Student Member-at-Large)

Juan Pablo Torres Florez, Marianne Marcoux, Alexis Rudd, Mandy Wong

AND

Mike Hammill, Kim Schauwecker, and Veronique Lesage

Funding

Society for Marine Mammalogy

AGENDA

I.	**Sign-in and Forage**	**7:00 – 7:40**
II.	**Welcome and Introduction** Lynne Williams, SMM Student Member-at-Large	**7:40 – 7:45**
III.	**Keynote Address** Hal Whitehead *"Dilemmas for marine mammalogists"*	**7:45 – 8:15**
IV.	**Break**	**8:15 – 8:30**
V.	**Group Discussions**	**8:30 – 10:00**

Acoustics
Anatomy and Physiology
Behavioral Ecology
Biological Oceanography and Marine Ecology
Cognition, Communication, and Behavior
Conservation Biology
Distribution, Diving, and Movement
Fisheries Interactions and Human Dimensions
Foraging Ecology
Genetics
Perspectives for a Career in Marine Mammalogy
Population Dynamics and Assessment
Toxicology, Pathology, and Veterinary Medicine

PARTICIPANT BIOGRAPHIES

Keynote Speaker

Hal Whitehead, Ph.D.

Dr. Hal Whitehead is currently a Professor at Dalhousie University in Halifax, Nova Scotia, Canada. His work is principally on the behaviour, social structure, culture, population biology and conservation of sperm and northern bottlenose whales, techniques of studying social structure, and more general questions about social structure in mammals and cultural evolution. Dr. Whitehead received a B.A. (Mathematics), a Diploma in Mathematical Statistics, and a Ph.D. (Zoology) from Cambridge University (UK). Dr. Whitehead advises, "A few of the attributes which have served me well and are characteristic of students who have become successful in marine mammal science: extreme persistence, a strong attachment to the animals and/or their habitat, a well-developed technical skill (such as electronics, GIS, molecular genetics or statistics), and the drive to publish, not becoming derailed by rejections or poor reviews. Broad scientific interests which go beyond the boundaries of marine mammal science are also a huge asset."

Acoustics

Adam Frankel, Ph.D.

Dr. Adam Frankel is currently a Senior Scientist for Marine Acoustics, Inc. (http://www.marineacoustics.com), responsible for bioacoustic research, modeling and marine environmental compliance on a wide variety of private and government funded projects. As a founding member of the Hawai'i Marine Mammal Consortium (http://www.hmmc.org), Dr. Frankel continues his long-term research on humpback whale behavior and bioacoustics off the Big Island, an interest that developed from conducting humpback whale-sound playback experiments at the University of Hawai'i in the mid 1980s. His UH dissertation used both acoustic and visual tracking methods to learn more about humpback whale distribution, behavior and bioacoustics. His post-doctoral work at Cornell University involved more diverse aspects of marine animal behavior and bioacoustics. Over the years, Dr. Frankel has collaborated with others in different parts of the world censusing bowhead whales on the North Slope of Alaska, for example, and studying sperm whale behavior in New Zealand. Dr. Frankel continues his strong commitment to teaching, mentoring and citizen science. During graduate school he worked with Earthwatch volunteers. From 1996 to present, he has taught for the Bioacoustical Oceanography workshops and field courses on the Big Island of Hawai'i and San Juan Island, WA for Cornell University. Dr. Frankel integrates outreach activities into my research whenever possible, including public speaking. He has served on graduate committees for different students at Texas A&M, University of North Carolina at Wilmington, North Carolina State University and Georgetown University.

John Hildebrand, Ph.D.

Dr. John Hildebrand is currently a Professor at Scripps Institution of Oceanography (SIO), UCSD. Dr. Hildebrand's research interests include marine mammal population census using acoustics and impacts of anthropogenic sound on marine mammals. Important educational steps and professional steps in the development of his career include receiving a Ph.D. in Applied Physics – Acoustics, a research / faculty job at SIO on underwater sound and ambient noise, and his developed interest in using sound to study marine mammals. For students pursuing a career in marine mammal acoustics, Dr. Hildebrand advises, "To study marine mammal acoustics it is important to get a good technical background in math, physics and engineering."

Sue Moore, Ph.D.

Dr. Sue Moore is currently a Research Scientist at NOAA/Fisheries in the Office of Science & Technology at the Pacific Marine Environmental Laboratory in Seattle, WA. Dr. Moore's research interests include Arctic marine ecology, marine mammal bioacoustics, and impacts of climate change on polar ecosystems. Important educational steps in the development of her career include receiving a B.A. in Biology from the University of California, San Diego; a M.S. in Biology from San Diego State University; and a Ph.D. in Biological Oceanography from Scripps Institution of Oceanography. Important professional steps in the development of Dr. Moore's career include serving as Director and Cetacean Program Leader at the National Marine Mammal Laboratory (NOAA Alaska Fisheries Science Center), being a Visiting Scholar on

detail to the Applied Physics Laboratory at the University of Washington, and serving as Chair of the Environmental Concerns Subcommittee of the International Whaling Commission Scientific Committee. For students pursuing a career in this field, Dr. Moore says that her advice is, “essentially, to "follow your passion" with regard to science specialization, but only after acquiring a solid foundation in basic biology/ecology/physiology. There are many new sampling tools available now, from passive acoustics to SAT tagging, to DNA and biochemical markers (i.e., isotopes, FA, contaminants). These avenues of research provide unprecedented opportunities to work collaboratively across disciplines to better understand marine mammals and the ecosystems of which they are a part. It is an exciting time to pursue a career in marine mammal science.”

Doug Nowacek, Ph.D.

Dr. Douglas Nowacek is currently an Associate Professor at Duke University based at the Duke Marine Lab with a joint appointment in the Nicholas School of the Environment and the Pratt School of Engineering. His research interests include technology development, marine mammal bioacoustics, and behavioral ecology, with experience in marine mammal and noise issues. Important educational steps in the development of Dr. Nowacek's career include receiving a B.A. in Zoology at Ohio Wesleyan University (1991) and a Ph.D. in Biological Oceanography at Woods Hole Oceanographic Institution and Massachusetts Institute of Technology (1999) as an ONR Graduate Research Fellow with research focused on the sound use and behavior of foraging bottlenose dolphins. Important professional steps in Dr. Nowacek's career development include serving as a National Research Council Postdoctoral Research Associate (2000-2002) working on North Atlantic right whale bioacoustics and behavior specifically focused on the circumstances surrounding collisions between ships and right whales; as a Staff Scientist at the Mote Marine Laboratory (2002-2003) focused on development of multi-sensor tagging technology; 5 years as an Assistant Professor in the Department of Oceanography at Florida State University (2003-2008) continuing bioacoustic and behavioral ecology research of marine mammals with work on right whales, dolphins, and Florida manatees; and finally moving to Duke in 2008. Dr. Nowacek is also one of twelve international scientists on the Western Gray Whale Advisory Panel convened by the World Conservation Union (IUCN), is on the Society for Marine Mammalogy Board of Governors, is an Associate Editor for *Marine Mammal Science,* and is a Guest Editor for *Marine Ecology Progress Series*, specifically co-editing a Theme Section on Acoustics in Marine Ecology with Dr. Brandon Southall.

Anatomy and Physiology

Annalisa Berta, Ph.D.

Dr. Annalisa Berta is a Professor in the Department of Biology at San Diego State University. The research in Dr. Berta’s lab focuses on the evolution, systematics, functional morphology, and biogeography of various marine mammals especially cetaceans. Projects currently being pursued include shape changes in the odontocete lower jaw using CT imagery and geometric morphometrics, the anatomy and evolution of baleen and the comparative anatomy and evolution of the mysticete ear. Dr. Berta’s research is currently funded by NSF (Systematic Biology) and she is accepting M.S. students and Ph.D. students (Joint Ph.D. program

in Evolutionary Biology with UC Riverside to begin Fall, 2010). Important educational and professional steps in the development of Dr. Berta's career have included a diverse, broad background in both comparative and evolutionary biology, which has provided a solid educational framework, as well as a willingness and enthusiasm to explore areas of marine mammal research that have traditionally attracted fewer workers (i.e., anatomy) but where there is much opportunity. Dr. Berta advises, "Be willing to share information with colleagues and collaborate as often as you can-- the research product will be richer with different perspectives and backgrounds provided by colleagues. Make sure you are broadly trained with a knowledge of diverse tools and techniques that you can apply to various research questions. Be flexible and willing to go into different directions if that is where the questions lead you. Hint: Marine mammals may not the best group to answer all research questions."

Ted Cranford, Ph.D.

Dr. Ted W. Cranford is currently an Adjunct Assistant Professor in the Department of Biology at San Diego State University. Dr. Cranford is interested in questions of comparative anatomy and functional morphology and in understanding patterns of morphologic change in evolution. Dr. Cranford states, "Marine mammals offer exemplary comparative models for questions about mammalian anatomy and physiology." His work focuses primarily upon the functional morphology of biosonar, particularly sound generation, sound transmission, and sound reception in toothed whales. He likes to combine modern technological tools with traditional anatomic techniques to develop new or innovative methods to interrogate the structure/function complex as this combination of methods enables him to address questions about the origin and evolution of biosonar in toothed whales. Dr. Cranford says, "The most important step in the development of a career in science is to choose a professor whose work you admire and are interested in, as well as someone you can interact with on an interpersonal level. Interest in a topic is key because it helps motivate dedication to your work. Dedication to your work is the only pathway to distinction. Compatibility on an interpersonal level is essential because choosing a career in science means embarking on a journey of discovery, one that normally takes a great deal of time. Another admonition is, don't be timid about blazing new trails."

William McLellan

William McLellan is currently working as a Research Scientist at the University North Carolina Wilmington. His work has focused on the causes of cetacean mortality from fisheries and vessel strikes. This work has been firmly rooted in understanding normals of morphology and function and how these have been altered with human induced trauma. He says, "Our Lab has worked on basic morphological descriptions but with physiological and functional implications for locomotion, echolocation, thermoregulation and reproduction. Over the years numerous undergraduate and graduate students have contributed to our growing blue prints of form and function in cetaceans." As for important educational and professional steps in the development of his career, William McLellan says, "I went to a small college on the coast of Maine and was introduced to functional morphology and physiology by taking a semester course to the Smithsonian. After the course was done I was offered a job as a technician in the Marine Mammal Stranding Program. Over the next 6 years I had a pickup truck, a gas card and a calling card (before the time of cell phones!) and was told to go collect every marine mammal specimen that I could, that has not ended now 25 years later! I also was interacting with a number of graduate students working on cetacean morphology & physiology topics at the time. The most

important lessens were to maximize the samples and data collected from very rare animals." William McLellan advises, "Build collaborations with multiple researchers that will maximize the data collected. Share data with good colleagues and recognize that much of the work in marine mammals is now results of multiple collaborators in multiple labs. It is rarely a single authored product anymore."

Ann Pabst, Ph.D.

Dr. D. Ann Pabst is currently a Professor in the Department of Biology and Marine Biology at the University of North Carolina Wilmington. Important educational and professional steps in the development of Dr. Pabst's career included volunteering for the Smithsonian Institution's Marine Mammal Program as an undergraduate at the University of Maryland; working with the SI's Marine Mammal Program and meeting students and international scholars; seeking out advice from respected colleagues about graduate work; pursuing her doctoral work at Duke University, with Steve Wainwright, an invertebrate biomechanist who supported her research interests in cetacean axial locomotion; pursuing her post-doctoral work at University of British Columbia with Dr. John Gosline; and establishing an academic career to work with students in the pursuit of understanding cetacean functional morphology. For all students in general, Dr. Pabst advises that one should "establish a reputation for working very hard; be utterly dependable; pursue excellence in everything that you do; seek the advice of respected colleagues; [and] seek out mentors who you respect as scientists and who are good human beings." For those students who are specifically interested in anatomical studies, Dr. Pabst advises students to "get first-hand comparative anatomical knowledge; learn an automated drawing package; take meaningful statistics courses; [and] do everything you can to enhance your 3-D thinking skills."

Behavioral Ecology

Lars Bejder, Ph.D.

Dr. Lars Bejder is currently a Research Leader at Murdoch University Cetacean Research Unit (MUCRU), Centre for Fish and Fisheries Research at Murdoch University, Western Australia. As a Research Leader, he supervises undergraduate and postgraduate students (M.Sc. and Ph.D.). The members of MUCRU work on both applied and empirical conservation-based research projects, including fundamental biology, assessing abundance and habitat use of a variety of dolphin populations, analysing cetacean social structure and mitigating against dolphin by-catch. Other areas of research include foraging ecology, population genetics and assessment of anthropogenic impacts on cetaceans through coastal development (habitat degradation) and tourism. Dr. Bejder's main research interests fall into two categories: analysing and developing quantitative methods to evaluate complex animal social structures; and evaluating impacts of human activity of cetaceans. Dr. Bejder says, "Typically, scientists carry out science – but do not get involved in how their science can help in conservation and management. I am a firm believer in working with wildlife managers to optimise management outcomes of science." Important educational steps in the development of his career include receiving a B.Sc. from the University of Odense, Denmark (1994); a M.Sc. from the University of Otago, New Zealand (1997); and a Ph.D. from Dalhousie University, Canada (2005). In terms of important professional steps in the development of his career, Dr. Bejder says, "I believe a key aspect of

my professional development (during undergraduate- and graduate degree) has been my involvement with a wide range of national and international scientists with differing research interests and strengths. Specifically because at an early stage, I worked with a number of scientists and developed: a) a solid overview of the field of marine mammalogy; b) an interest in a specific area; c) good working relationships with colleagues for future collaborations; and d) good friendships with colleagues. All of these have helped me immensely in my career." Dr. Bejder advises, "(1) Spend time figuring out what REALLY interests you. When you have accomplished this, get some experience from/with scientists/labs that do this kind of research. Importantly, experience does not necessarily have to be gained in the marine system. (2) Get involved in various projects & research labs before starting graduate school. (3) Have a solid background in statistics and modelling. (4) GIS coursework and hands-on experience is also a plus. (5) Make yourself stand out: acquire skills-set that other want-to-be marine mammal students typically do not have (*e.g.*, engineering, oceanography, organic chemistry). (6) Don't kid yourself: you *can not* be an expert at everything. Therefore: build collaborations, networks, friendships – and work together to answer questions. This approach is more fun, productive and insightful."

Richard Connor, Ph.D.

Dr. Richard Connor is currently a Professor of Biology at UMASS-Dartmouth. Dr. Connor's general interests focus on questions about the evolution of social bonds, alliances, cooperation, brain size and the impact of ecological variation on social bonds. Most of his field work involves a joint effort with Michael Krutzen, of the University of Zurich, and their students and colleagues to describe and understand the evolution and ecology of the male dolphin (*Tursiops* sp.) alliances in Shark Bay. To date, they have examined alliance affiliations and relatedness among over 100 adult males in a 600 km^2 area, revealing striking variation in alliance size, stability, and ranging that appears to be related to habitat variation. Future research will focus on male foraging ecology and acoustics. Dr. Connor's students working in South Carolina (Bull Creek) and Florida (Cedar key) are focusing on foraging ecology and behavior of inshore *Tursiops* populations. Otherwise he has a long-standing interest in theoretical issues in the evolution of cooperation and mutualism. Important educational and professional steps in the development of Dr. Connor's career have included: (1) Getting out of Wisconsin to go to school at UCSC; (2) Great undergraduate mentors; (3) Incredible luck in being one of two undergraduates in the room when Elizabeth Gawain came to UCSC to tell everybody about the research potential of Shark Bay; (4) Making that initial visit to Shark Bay a top priority over all else; (5) Ignoring wise council from some and insisting that I was going to do my graduate work in Shark Bay; (6) Getting into a great and dynamic graduate program at U. of Michigan. Dr. Connor advises, "Key qualities for success are 1) perseverance ('stick-to-it-ivness') and 2) an ability to get things done." Specifically for undergraduates, Dr. Connor advises the following: "(1) Get experience on projects where you can learn methods, techniques and the realities of field work logistics; (2) Don't focus only on cetacean literature but develop a broad comparative perspective that includes an understanding of theory and hypothesis testing; [and] (3) Develop an expertise in one or more important areas that require intensive training (e.g. genetics, acoustics) and that are fundable (one rarely sees job ads for simply 'animal behavior' anymore)."

Janet Mann, Ph.D.

Dr. Janet Mann is currently a Professor of Biology and Psychology at Georgetown University. Dr. Mann's research interests include behavioral ecology, reproduction, life-history, and behavioral development. Important educational and professional steps in the development of her career include studying with Jeanne Altmann and Barbara Smuts, both primatologists. The first is known for her methodological rigor and setting the standards for observational research in animal behavior. The latter is known for her sophisticated approach to the study of social bonds. Dr. Mann advises, "Develop at least one skill that has broader application (e.g., molecular techniques, database development, computational or statistical analysis, GIS analysis). This will allow you to explore a range of options. If your focus is too narrow, there will be few jobs available. Also, most of the exciting areas of research are interdisciplinary, so having enough breadth to work at that nexus will be extremely valuable."

Randall Wells, Ph.D.

Dr. Randall Wells is currently affiliated with the Chicago Zoological Society / Sarasota Dolphin Research Program. Dr. Wells' research interests include cetacean research and conservation, including behavior, social ecology, health, human impacts, tagging and tracking. Important educational and professional steps in the development of his career include being a high school volunteer at Mote Marine Laboratory; receiving a B.A. in Zoology from the University of South Florida; receiving a M.Sc. in Zoology from the University of Florida; receiving a Ph.D. in Biology from the University of California, Santa Cruz; and completing a post-doc in Biology at Woods Hole Oceanographic Institution. Dr. Wells advises, "Be prepared to volunteer with established research programs in order to determine if marine mammal science truly is a for you, and to provide opportunities for professionals in the field to get to know you and your abilities, so they can provide guidance or recommendations. Develop good, solid general scientific skills as an undergrad, which can be applied more specifically to marine mammal topics in grad school."

Bernd Würsig, Ph.D.

Dr. Bernd Würsig is Regents Professor of Marine Biology at Texas A&M University, and serves as Chair of the Texas A&M Marine Biology Graduate Program. His research interests include foraging and social strategies of dolphins and whales. This interest is so for the pure learning and teaching aspect of it; but he also believes that all research has an onus to help provide answers on how we humans can do better in interacting with our natural environments. Educational steps in the development of Dr. Würsig's career include receiving a B.S. in Zoology, as well as minors in History and Germanic Literature at Ohio State University in 1971, and a Ph.D. in a multidisciplinary program of Behavior, Neurobiology, Ecology, Evolution, and Marine Sciences at Stony Brook University, New York, 1978. He believes strongly that an academic should have not only focused discipline interests, but also a broad understanding of variable topics and different approaches to science, the humanities, and "life". His dissertation was on aspects of behavior and ecology of bottlenose and dusky dolphins in Patagonia, Argentina, and there he lived with his wife Melany for four years, variably in a tent and a cinderblock house built by Roger and Katy Payne. His field advisor was Roger Payne, and Ph.D. advisor was Charlie Walcott ("both wonderful scientists and human beings!"). Professional steps in the development of Dr. Würsig's career include completing a post-doc with the great Ken

Norris at the University of California, Santa Cruz (1978-1981), studying Hawaiian spinner dophins with Ken, Randy Wells, and Melany. He then went through the ranks of Assistant to Full Professor at the Moss Landing Marine Laboratories, California (1981-1989), and was in 1989 asked to start a Marine Mammal Research Program at Texas A&M, where he is to this day. He has published about 140 peer-reviewed papers and 50 popular ones, but is "most proud" of having mentored over 65 grad students to date. Among his most recent of 6 books, he is co-editor (with Bill Perrin and Hans Thewissen) of the "Encyclopedia of Marine Mammals, ed. 2" (2009), and he and Melany recently published the book "The Dusky Dolphin: Master Acrobat off Different Shores" (although already out, it has a 2010 copyright date). Both are by Academic/Elsevier Press. For students pursuing a career involving marine mammal research and conservation, Dr. Würsig advises, "I look for bright, hard-working, dedicated students who have made sure that they are well-informed. So, read voraciously on the things you care most about, know the names and affiliations and projects of people who do work you admire, and know the research and conservation needs in your discipline. Do not ever be afraid to contact a researcher you admire, but do so only after diligently learning all about her or him. The internet makes this 'easy' these days, so take full advantage of what is available, from search engines such as Google and Google Scholar, Wikipedia, university departmental and professors' listings, your own university library e-journal and e-book resources, and any other sites that strike your fancy."

Biological Oceanography and Marine Ecology

Lisa Balance, Ph.D.

Dr. Lisa Ballance is currently the Director of the Protected Resources Division of the Southwest Fisheries Science Center, U.S. National Marine Fisheries Service, as well as a Professor of Biological Oceanography at the Scripps Institution of Oceanography. Dr. Ballance's research interests include the ecology of seabirds and cetaceans, species diversity patterns and trends in space and time (interannual to regime shift scales), and ecosystem-based approaches to management. Important educational steps in the development of Dr. Ballance's career include receiving a B.A. in Biology from the University of California, San Diego (1981); an M.S. in Marine Science from Moss Landing Marine Laboratories (1987); and a Ph.D. in Biology from the University of California, Los Angeles (1993). Important professional steps in the development of Dr. Ballance's career include serving as a Postdoctoral Fellow for the National Research Council and as a Marine Ecologist for the Southwest Fisheries Science Center, as well as accruing vast field experience studying the ecology of seabirds and cetaceans, particularly during ship-based surveys.

Mark Baumgartner, Ph.D.

Dr. Mark Baumgartner is currently an Associate Scientist in the Biology Department at Woods Hole Oceanographic Institution. Dr. Baumgartner’s research interests focus primarily on top predator ecology and the physical and biological oceanographic processes that allow those predators to survive in the ocean. He is particularly interested in using baleen whales and their zooplankton prey as a tractable system in which questions can be addressed about how prey behavior, life history, and aggregation mechanisms can influence top predator distribution, movements, and behavior. Dr. Baumgartner strives to utilize new technology, novel approaches, and multidisciplinary collaborations to study aspects of both whale and zooplankton ecology in

this system, including autonomous underwater platforms, passive acoustics, archival tags, zooplankton instrumentation, and molecular techniques. As for important educational and professional steps in the development of his career, Dr. Baumgartner says, "I was a mathematics/computer science major in college and I got a very good foundation in the basics: chemistry, physics, and math. My masters coursework concentrated on oceanography (particularly biological and physical oceanography), and my PhD coursework focused on biological oceanography and statistics (I went so far as to get a PhD minor in statistics). My math and computer skills landed me a job at NOAA after college working on marine mammals and oceanography, and I fell in love with the work, which propelled me on to graduate school." For students pursuing a career in biological oceanography and marine ecology, Dr. Baumgartner advises, "Technical skills are of enormous importance in this field right now. Many students coming into this field are very smart and have stellar academic records in biology, conservation, or marine policy programs, but few analytical skills to actually pursue science. I often advise students to learn computer programming and to take statistics classes, because at some point early in their career, someone is going to hand them some data and ask them to make a complicated plot or to do some sort of analysis on those data. This is an enormous opportunity for a young marine mammalogist, and by rising to the occasion, you can demonstrate to your advisor/boss that you are serious about pursuing science and have the means to do it. Right now, students coming to the field from outside of the biological sciences, such as engineering, have a significant advantage over most biology students because they learn these technical skills early in their college careers."

Daniel Palacios, Ph.D.

Dr. Daniel Palacios is currently a Research Oceanographer at the Joint Institute for Marine and Atmospheric Research, University of Hawai'i, and Southwest Fisheries Science Center, NOAA. Dr. Palacios' research interests are in physical ecology. He says that the driving focus of his research is the study of the environmental factors that affect the distribution and community structure of marine top predators (cetaceans, pinnipeds, seabirds, sea turtles) in pelagic ecosystems. He employs a variety of approaches, including survey cruises at sea, telemetry (remote tracking of tagged animals), and integration with oceanographic data derived from in-situ measurements, remote sensing and global digital databases. Important educational and professional steps in the development of his career included undergraduate and pre-graduate research, about which he says, "I spent a lot of time in the field volunteering as an assistant for various projects in the Amazon, the Caribbean and the tropical Pacific. This gave me a lot of exposure to the animals, the tools, the logistics and challenges of fieldwork, and the conservation issues firsthand. It also allowed me to become familiar with the different fields in biology and to eventually choose one that attracted me the most." Graduate school was also important in the development of his career as he said that the formal classwork gave him exposure to the concepts and the tools, while independent thesis research allowed him to learn how to conduct a project from its design phase all the way to presentation and final publication. Dr. Palacios advises, "Learn one or more computer scripting languages (Python, Perl, R, Matlab, GMT) for data analysis and visualization; Get involved in committees, even if they involve extra work; Become familiar with the process of research funding, grant writing and project administration (formally through classes/workshops and informally through your mentors); [and] Become familiar with the climate debate, its impacts, and the science behind it."

Christopher Taggart, Ph.D.

Dr. Christopher Taggart is currently a Professor in the Department of Oceanography at Dalhousie University. He teaches Fisheries Oceanography and Marine Science and Technology. Dr. Taggart's research interests include fisheries oceanography; field and laboratory. His focus is on physical, ecological, biochemical, and genetic influences on early life history, recruitment in fish, and on fish population structure and distribution. His recent research initiatives are related to the plight of the endangered Atlantic right whale. Dr. Taggart received a B.Sc. in Ecology from Carleton University, an M.Sc. in Limnology from York University, and a Ph.D. in Fisheries Oceanography from McGill University. As for important educational and professional steps in the development of his career, Dr. Taggart says, "quanitative, quantitative, and quantitative - if you are keen on research in the ocean then learn your maths, stats and physics - the answers to most biological questions will be found therein." Dr. Taggart advises, "(1) marine mammal studies are seriously data deficient; (2) the literature is odd, but sometimes data-rich; (3) discover the important, relevant and tractable questions and first use the literature to begin your attack on the problem; remember that 3 months in the field is worth a day in the library; (4) you'd be surprised at how some of the most obvious questions/problems really are, and how they have been entirely overlooked; (5) there are more marine mammal researchers than there are species and numbers of some species - thus you have to be good at your research and effective with the use of the results; (6) Remember two things: (a) Most papers in the primary literature are never cited; (b) Prediction is the only word that gives meaning to understanding – all else is rhetoric and fuzzy thinking."

Cognition, Communication, and Behavior

Heidi Harley, Ph.D.

Dr. Heidi Harley is currently a Professor of Psychology at New College of Florida. Dr. Harley is a comparative cognitive psychologist and her research focuses on how the bottlenose dolphin represents its world. She has investigated questions concerning echolocation, dolphin whistles, spatial memory, rhythm processing, and imitation. As for important educational and professional steps in the development of her career, Dr. Harley says, "In college I wrote letters to professors all over the country for advice about studying marine mammals. The most thoughtful response came from Ken Norris who suggested that I begin by getting a job as a trainer. After graduation, my father and I visited the oceanaria in Florida looking for a position, and I ended up training at Miami Seaquarium. That step ended up being helpful in a variety of ways throughout my career. Of course, for students, your graduate school advisor is the most important part of your education, and your fellow graduate students may have a major influence on your life. For me, attending the University of Hawaii made a big difference because I could learn and collect data at Lou Herman's lab, Sea Life Park, and the Navy facility that was there then. Those experiences also helped me make connections with other researchers with whom I had interests in common. That background ultimately helped me gain access to more research opportunities with dolphins." Dr. Harley advises, "As Professor Norris wrote, if you can think of something else you'd like to do as much, do it. Another option will likely provide a more straight-forward path. However, he also noted that every field needs good people, and, if you want to study marine mammals, you should persevere. I think his advice still holds true. If you're an undergraduate, look for internships that will give you experience in areas of interest. These

internships will likely give you access to people who can help you figure out your next step. If you're a graduate student, you've already made some successful decisions – congratulations! Take advantage of the strengths of your program, and gain as many skills as you can. Choose questions in which you have a strong interest and that can be supported by your resources. Learn to frame your work in multiple ways to allow as many options as possible for funding."

Laela Sayigh, Ph.D.

Dr. Laela Sayigh is currently a Research Specialist in the Biology Department at Woods Hole Oceanographic Institution. Before becoming a Research Specialist at WHOI, Dr. Sayigh was a Research Associate Professor in the Department of Biology and Marine Biology at the University of North Carolina Wilmington. Dr. Sayigh's research interests include the acoustic communication and behavior of delphinids. Important educational and professional steps in the development of her career include "[g]etting lots of research experience as an undergraduate, even though it was not related to marine mammals." Dr. Sayigh received a B.A. in Biology and Environmental Studies from the University of Pennsylvania and a Ph.D. in the Department of Biology from the Massachusetts Institute of Technology / Woods Hole Oceanographic Institution Joint Program. Dr. Sayigh advises, "Get a strong foundation in math in physics if you are interested in bioacoustics."

Conservation Biology

Lance Barrett-Lennard, Ph.D.

Dr. Lance Barrett-Lennard is currently the Head of the Cetacean Research Program at the Vancouver Aquarium and an Adjunct Professor in the Zoology Department at the University of British Columbia. Dr. Barrett-Lennard's research interests include the conservation of small populations, inter- and intra-specific variation in animal social systems, mating systems and inbreeding avoidance, mechanisms of sympatric and parapatric speciation, and the impacts of predation on behavior and population dynamics of prey populations. His research focuses on a complex of sympatric and parapatric populations of killer whales off the west coast of British Columbia and Alaska. As for important educational and professional steps in the development of his career, Dr. Barrett-Lennard says, "I did a BSc in biology and math at the University of Guelph, and then worked for seven years on lighthouses in British Columbia. I was a mediocre lighthouse keeper but reasonably good at collecting photo-identification and acoustic data on killer whales. I eventually left the lights to work as a marine mammal research technician for the Ministry of Fisheries and Oceans in Nanaimo, British Columbia. After a short stint there, I began to yearn for a simple life of poverty and contemplation. My application to the local monastery was rejected, so I signed up for graduate studies at the University of British Columbia under the supervision of Drs John Ford and Jamie Smith. I was let out on parole for good behavior each summer and did field research on killer whale acoustic behavior and genetics in B.C. and Alaska. After finishing in 2000, I worked as a research scientist for Fisheries and Oceans for a year, before being appointed to my present position at the Vancouver Aquarium. I continue to do field work in Alaska and B.C. in the summers and divide my time in winter between office and genetics lab." Dr. Barrett-Lennard advises, "Students and researchers who describe themselves as marine mammalogists frighten me. The field is just too broad for the term to be particularly useful, in my opinion. Or perhaps my education has been too limited…in

any case, I have no idea what a marine mammalogist is. Virtually everyone I work with---and certainly everyone I've hired or taken on a student, has a specialization or set of interests that extends well beyond a single order of mammals. Some specialize in molecular biology, others in evolutionary ecology, population dynamics, physiology, spatial analysis, or behavior. Others are just great field hands that enjoy working on boats and collecting data. The most important advice I can offer students wanting to study marine mammals is that they develop a set of academic skills that mesh with their interests and aptitudes and look for opportunities to apply them to marine mammals. My second most important advice is that, if you'd like to do field work, nothing gets your foot in the door faster than good small boat skills…not just from crewing, but from running boats, haywiring engines, navigating, and surviving the sea safely and with minimal drama."

Doug DeMaster, Ph.D.

Dr. Doug DeMaster is currently the Research and Science Director of the Alaska Regional Office, Alaska Fisheries Science Center, U.S. National Marine Fisheries Service. He also serves as the Deputy Commissioner of the U.S. Delegation to the International Whaling Commission. Dr. DeMaster's research interests include the stock assessment, fisheries interactions, and management of marine mammals. He has published over 100 peer-reviewed publications and reports on these topics. Important educational steps in the development of Dr. DeMaster's career include receiving a Ph.D. from the University of Minnesota in 1978. Important professional steps in the development of Dr. DeMaster's career include serving as Head of the Marine Mammal Division at the Southwest Fisheries Science Center, National Marine Fisheries Service; as Leader of the Cetacean Assessment and Ecology Program at the National Marine Mammal Laboratory, Alaska Fisheries Science Center; and as Director of the National Marine Mammal Laboratory. He was previously an Adjunct Professor at the Scripps Institution of Oceanography and is now an Affiliate Professor at the University of Washington and the University of Alaska Fairbanks.

Brad Hanson, Ph.D.

Dr. Brad Hanson is a Wildlife Biologist at NOAA/NMFS/Northwest Fisheries Science Center. Dr. Hanson's research interests include marine mammal ecology, movements and habitat use, prey selection, and health assessment. Important educational and professional steps in the development of his career include volunteering and working in management. Dr. Hanson received a B.A. in Zoology, a M.S. in Fisheries, and a Ph.D. from the University of Washington. Dr. Hanson advises, "develop a specialty area of expertise that can be applied to marine mammals but that is also useful for other species/applications."

Andy Read, Ph.D.

Dr. Andy Read is currently an Associate Professor and the Rachel Carson Chair of Marine Conservation Biology at Duke University in Beaufort, North Carolina. Dr. Read's research interests focus on the conservation and ecology of marine mammals, sea turtles and seabirds. He has conducted field research in North and South America, the Antarctic and Europe. Dr. Read received a B.Sc. in Marine Biology (1983), an M.Sc. in Zoology (1983), and a Ph.D. in Zoology (1990) from the University of Guelph in Ontario, Canada. His dissertation research examined the ecology, life history and conservation of harbour porpoises in the Bay of

Fundy. After receiving his Ph.D. he worked as a Postdoctoral Investigator at the Woods Hole Oceanographic Institution from before moving to Duke University in 1995. He is particularly interested in the development and application of policy approaches to conservation and, as a result, has served on several Take Reduction Teams, the Scientific Committee of the International Whaling Commission, the Committee of Scientific Advisors of the Marine Mammal Commission and the Cetacean Specialist Group of the World Conservation Union (IUCN). He has served on the Editorial Boards of *Marine Mammal Science,* the *Journal of Cetacean Research and Management* and *Endangered Species Research.* He is currently President of the Society for Marine Mammalogy.

Gregory Silber, Ph.D.

Dr. Gregory Silber is currently a Coordinator of Recovery Activities for Endangered Large Whale Species for the Office of Protected Resources, National Marine Fisheries Service/NOAA. Before taking this position, Dr. Silber was the Deputy Scientific Program Director at the U.S. Marine Mammal Commission and the Executive and Scientific Director of the environmental organization Friends of the Sea Otter in Monterey, California. Dr. Silber's research interests include the behavior and ecology of dolphins and large whales; marine mammal acoustics; and reducing the threats of human activities on cetaceans. He received his Master's degree from San Jose State University's Moss Landing Marine Laboratories where his thesis work focused on social and vocal behavior of humpback whales in Hawaii. His Ph.D. is from the University of California at Santa Cruz; his dissertation research was on the highly endangered Gulf of California harbor porpoise. Throughout the 1980s, Dr. Silber conducted or participated in research on whales and dolphins in Hawaii, the high Arctic (Beaufort Sea and eastern Canadian Arctic), the Aleutian Islands, Mexico, California, and the U.S. East Coast. He has published over 30 peer-reviewed and popular articles on whales and dolphin ecology, behavior, and conservation.

Elisabeth Slooten, Ph.D.

Dr. Elisabeth Slooten is currently an Associate Professor in Zoology at Otago University. Dr. Slooten's research interests include distribution and abundance, reproductive biology, ecology and behaviour, and population dynamics. She has experience in survey design; small boat surveys for Hector's dolphins; acoustic surveys for sperm whales; line-transect surveys; ageing using tooth sections; photo-ID surveys; and population viability analyses for Hector's dolphins, NZ sea lions, and yellow-eyed penguins. Dr. Slooten received a B.Sc. and an M.Sc. in Zoology from the University of Auckland and a Ph.D. in Zoology from the University of Canterbury.

Distribution, Diving, and Movement

Michael Fedak

Professor Michael Fedak is currently with the School of Biology and Sea Mammal Research Unit at the University of St. Andrews. Professor Fedak's research interests broadly include ecology, physiology, and life history of marine mammals, and more specifically include interactions between the foraging behaviour and diving physiology – interactions between

foraging ecology and reproductive success; parental investment; interactions between marine mammals and the exploitation of marine resources; and the use of telemetry and remote sensing to study marine mammals at sea. His current research involves developing methodology for using marine mammals as oceanographic sampling platforms – adapting current Satellite Relayed Data Loggers to collect data from standard CTD probes and combine temperature and salinity profiles with location and behavioural information in the returned data stream relayed by the tags.

Bruce Mate, Ph.D.

Dr. Bruce Mate is an endowed professor of Wildlife, adjunct Professor of Biological Oceanography, and Director of the Oregon State University Marine Mammal Institute. He has conducted marine mammal research since 1967 and been at OSU since 1973. His Ph.D. (from U. of Oregon) was on sea lion migrations and he completed a NIH post-doc in biochemistry studying heavy metals and organo-chlorines in pinnipeds. Dr. Mate's research has included population assessment, marine mammal/fishery conflicts, acoustic deterrents, and telemetry. He pioneered the development of satellite-monitored radio tags for manatees and cetaceans. For the last 15 years, his cetacean research has focused on identification of migration routes and seasonal habitats of endangered whales (gray, right, bowhead, humpback, sperm, fin, and blue whales), which he uses to reduce impacts from human activities and promote population recovery.

Fisheries Interactions and Human Dimensions

Mike Hammill, Ph.D.

Dr. Mike Hammill joined the Department of Fisheries and Oceans in 1988, as a Research Scientist working on pinnipeds in the Quebec region and has been Head of the marine mammal section since 1998. He is a life member of the Society for Marine Mammalogy, and the Arctic Institute of North America. Dr. Hammill has been studying marine mammals since 1978. His past research has examined habitat use, reproductive energetics, growth and ecology of ringed, bearded, harbour, harp, hooded and grey seals in the Canadian and Norwegian Arctic and in Atlantic Canada. His current research involves studies on population dynamics, foraging ecology, spatial use and movements of beluga in northern Quebec (Nunavik) and pinnipeds in the Gulf of St. Lawrence and marine mammal-commercial fisheries interactions. Dr. Hammill received a B.Sc. from the University of Guelph and an M.Sc. and Ph.D. from McGill University.

Scott Kraus, Ph.D.

Dr. Scott Kraus is the Vice President for Research at the New England Aquarium in Boston, Massachusetts. He has been a research scientist in the Aquarium's Edgerton Research Laboratory since 1980. Dr. Kraus received his B.A. from College of the Atlantic, his M.S. in biology from the University of Massachusetts, and a Ph.D. from the University of New Hampshire. Dr Kraus has worked on the biology of North Atlantic right whales since 1980, publishing numerous papers on many aspects of right whale biology and conservation. He is co-editor of the Urban Whale, a 2007 Harvard University Press book on right whales in the north Atlantic. He was a member of the original U.S. right whale recovery team, and currently serves on the U.S. harbor porpoise take reduction team and the U.S. large whale take reduction team.

He is adjunct faculty at Univ. of Mass. at Boston and the University of Southern Maine. Dr. Kraus produced both the first North Atlantic humpback whale catalog and the first North Atlantic right whale catalog, research publications that utilize individually distinctive markings on animals to track life history. His early research focused on expanding the application of individual photo-identification studies into population biology. Dr. Kraus' recent studies are looking at methods for reducing bycatch of small cetaceans in fishing gear using acoustic "pingers" and innovative fishing gear. His research is increasingly focused on conservation issues faced by endangered species and habitats, and the difficulties of identifying features that animals need to survive in an increasingly urban ocean.

Andrew Trites, Ph.D.

Dr. Andrew Trites is a Professor at the University of British Columbia where he is Director of the UBC Marine Mammal Research Unit (www.fisheries.ubc.ca) and Research Director of the North Pacific Universities Marine Mammal Research Consortium (www.marinemammal.org). Dr. Trites has been studying marine mammals in the North Pacific for over 25 years. His research involves captive studies, field studies and simulation models that range from single species to ecosystems. His research program is designed to further the conservation and understanding of marine mammals, and resolve conflicts between people and marine mammals. The training of students, and the collaboration between researchers specializing in other disciplines (such as nutrition, ecology, physiology and oceanography) is central to the success of his research program. Dr. Trites received a B.Sc. in Math and Ecology from McGill University and an M.Sc. and Ph.D. in Zoology from the University of British Columbia.

Foraging Ecology

Ari Friedlaender, Ph.D.

Dr. Ari Friedlaender is currently an Assistant Research Scientist in the Marine Geospatial Ecology Laboratory at Duke University Marine Laboratory. Dr. Friedlaender's activities represent the integration of emerging field methods and novel statistical techniques to elucidate ecological relationships between predators and prey in the marine environment, particularly in the Antarctic. He is currently an integral part of the first NSF Polar Programs research grant to study the underwater feeding habits and foraging ecology of whales in the Antarctic. During his Doctoral work, Dr. Friedlaender used spatially explicit analytical tools (e.g. GIS) to quantify ecological relationships between whales, prey, and environmental variables. He is involved in several field programs using the DTAG to study the movement patterns and foraging behavior of baleen whales around the world. Dr. Friedlaender works to advance our understanding of predator-prey relationships in polar regions and how climate change and variability may affect ecosystem dynamics. He has been involved in cetacean field work in both the Antarctic and Arctic since 1997. Dr. Friedlaender received a B.A. in Biology from Bates College, a M.S. in Marine Biology from the University of North Carolina Wilmington, and a Ph.D. in Ecology from Duke University. Dr. Friedlaender advises, "Become an ecologist, or physiologist, or behavioralist, that then studies marine mammals. Become an expert and apply that skill to the animals or ecosystem you are interested in learning more about. The best way to increase our understanding of marine mammals is to bring knowledge from other disciplines and apply it

specifically to marine mammals and to work with other experts in a collaborative and interdisciplinary fashion. Comparative approaches between taxonomic groups and across disciplines are the best way to push forward and gain insights. From my own experience, I tried to become an ecologist, learn a new skill set and apply that to a marine ecosystem. I learned GIS and spatial ecology and applied those theories and quantitative skills to studying the distribution and foraging behavior of baleen whales in particular ecosystems. Likewise, working hand-in-hand with engineers and programmers to develop tools that can directly address the questions of interest is an effective means. In my research we are now specifically interested in understanding how individual whales forage, the behaviors they employ, and how these relate to changes in their prey. We are augmenting both the types of sensors that our tags use, as well as the visualization and quantitative software tools that we use to recreate underwater motion paths. This will allow us to study individual whales, work in an interdisciplinary framework, and be able to apply our knowledge to different ecosystems and species."

Bernie McConnell, Ph.D.

Dr. Bernie McConnell is currently a Senior Research Fellow in the School of Biology at the University of St. Andrews. Dr. McConnell has worked in the NERC Sea Mammal Research Unit (SMRU) for over 25 years during which time I have published on the movement and behaviour of marine mammals – from the Antarctic to the Arctic. He co-manages the Instrumentation Group within the SMRU that has developed a novel set of telemetry systems to study the biology of marine mammals at sea. This group is internationally acknowledged as a world leader in the development of novel telemetry system for marine mammals. Dr. McConnell's research interests include telemetry, foraging ecology, mark-recapture, networks, and the application of wireless sensor networks in ecology and population biology. He has managed the development of a novel telemetry system that can provide unparalleled insight into seal foraging ecology and has recently deployed these tags on harbor seals in Northern Ireland.

Genetics

Scott Baker, Ph.D.

Dr. Scott Baker is currently the Associate Director of the Marine Mammal Institute (http://oregonstate.edu/groups/marinemammal/) and Professor of Fisheries and Wildlife at Oregon State University. Before moving to the Marine Mammal Institute in 2006, Dr. Baker was at the School of Biological Sciences at the University of Auckland, New Zealand, where he was awarded a personal chair in Molecular Ecology and Evolution. Dr. Baker has been involved in the study of whales and dolphins for nearly 30 years, starting as an undergraduate student at New College, in Sarasota, Florida (graduated 1977) and continuing with his Ph.D. at the University of Hawaii (completed 1985). He has acted as a New Zealand and U.S. delegate to the Scientific Committee of the International Whaling Commission, a member of the Cetacean Specialist Group of IUCN – the World Conservation Union, a member of the Society for Marine Mammal Sciences and the American Genetic Association. In August 2008, he was appointed as editor-in-chief of the *Journal of Heredity*. Dr. Baker's research includes both molecular and demographic approaches to the basic and applied investigation of evolutionary pattern and process in whales and dolphins, particularly their abundance, population structure, genetic diversity and systematic relationships. Current research topics include: demographic and genetic

impacts of whaling; molecular taxonomy and applied bioinformatics for species discovery and wildlife forensics; molecular monitoring of meat from protected whales sold in commercial markets of Japan and Korea; and population structure and genetic diversity of whales, dolphins, sea lions and fur seals, including the New Zealand endemic Hector's and Maui's dolphins and New Zealand sea lion.

Phillip Morin, Ph.D.

Dr. Phillip A. Morin is currently a Research Molecular Geneticist at the Southwest Fisheries Science Center, NOAA Fisheries, and Scripps Institution of Oceanography. Dr. Morin's research interests include population genetics and conservation of cetaceans. Important educational and professional steps in the development of his career include a background in molecular genetics, population genetics, and evolutionary biology; experience in different fields that allowed him to establish contacts and knowledge outside of the typical organism-oriented research program; and combined field and lab work that allowed him to understand the limitations and benefits of both. For those students pursuing a career in the field of genetics, Dr. Morin advises, "Genetic methods are rapidly changing and becoming more and more complicated. If you want to focus on genetics of marine mammals, spend most of your student time learning about genetics, genomics, and bioinformatics (including programming and modeling), and then apply these tools to study of marine mammals."

Per Palsboll, Ph.D.

Dr. Per Palsboll is currently a Professor in the Department of Genetics, Microbiology, and Toxicology at Stockholm University, Sweden. Before this, he was an Assistant and Associate Professor in Environmental Science, Policy and Management at UC Berkeley. Dr. Palsboll utilizes empirical and simulated genetic data to study real and theoretical aspects of population, evolutionary and conservation genetics with an emphasis on marine mammals. He collaborates with colleagues at 28 different research institutions and universities. Dr. Palsboll received a Ph.D. in Evolutionary Genetics from the University of Copenhagen. Dr. Palsboll is also currently an Associate Editor for *Conservation Genetics* and a Review Editor for *Marine Ecology Progress Series*.

Howard Rosenbaum, Ph.D.

Dr. Howard C. Rosenbaum is a conservation biologist and the Director of The Wildlife Conservation Society's Ocean Giants Program, which aims to secure the future of significant populations of marine mammals (with a primary focus on large whales and small cetaceans), sea turtles, and sharks (and eventually other fishes) across entire portions of their range. Dr. Rosenbaum received his Ph.D. in biology from Yale University and has been involved in marine mammal research for over 20 years on projects investigating the ecology, behavior, genetics, and conservation of a number of whale and dolphin species, the development of innovative marine mammal research techniques, and the implementation of sustainable ecotourism projects. His main areas of research are conservation of Southern Hemisphere whale populations, applying genetic techniques to promote conservation of endangered species, and most recently, evaluating the impacts of hydrocarbon exploration and development on marine mammals and their critical habitats. Dr. Rosenbaum's work has provided valuable information concerning levels of genetic diversity and systematic relationships among a number of critically endangered species,

including novel insights into some of the most endangered large whales, the North Pacific and North Atlantic right whales. Dr. Rosenbaum also directs an ongoing program, The Cetacean Research and Conservation Program, to determine the distribution, population structure, social organization, and abundance of humpback whales and other marine mammals in critical wintering habitats in Madagascar, the coastal waters of Gabon, and other areas throughout the Indian and South Atlantic oceans. He has also led numerous scientific and educational expeditions throughout the world's oceans. Dr. Rosenbaum is also a Senior Scientist at The Sackler Institute for Comparative Genomics at the American Museum of Natural History and has been an Associate Editor for *Marine Mammal Science*. He is an adjunct faculty member with New York University and Columbia University in New York and is the advisor or co-advisor for post-doctoral fellows and students in graduate undergraduate programs in Madagascar, Brazil, Portugal, Gabon, Chile, and the United States. He currently serves as a member of the United States delegation to Scientific Committee of the International Whaling Commission and is a member of the Cetacean Specialist Group of the World Conservation Union's Species Survival Commission (IUCN / SSC).

Perspectives for a Career in Marine Mammalogy

David Johnston, Ph.D.

Dr. David Johnston is currently a Research Scientist and Resident Faculty in the Division of Marine Science and Conservation in the Nicholas School of the Environment at Duke University. His research focuses on the foraging ecology and habitat needs of marine animals in relation to pressing conservation issues. At present he has active projects in the following areas: population assessments and foraging ecology of marine vertebrates, the design and utility of marine protected areas; the effects of climate variability and global change on marine animals and the sustainability of incidental mortality and directed harvests of marine animals. He is also involved in projects addressing the effects of anthropogenic sound on marine mammals and the suitable application of new technological approaches to marine ecology and conservation. He has experience working in a variety of marine ecosystems - from the highly productive waters of the California Current and Bay of Fundy, to the oligotrophic waters of the central Pacific. Important educational and professional steps in the development of his career include receiving a M.Sc. degree, working for a non-profit organization, receiving a Ph.D., carrying out post-doctoral work, being a Governmental employee with NOAA, and then finally returning to academia as a Research Scientist at Duke University. Dr. Johnston advises, "Do not be afraid to make decisions."

Sarah Mesnick, Ph.D.

Dr. Sarah Mesnick is a Science Liaison of the Director's Office and an Ecologist in the Protected Resources Division at the Southwest Fisheries Science Center, NOAA Fisheries Service. Dr. Mesnick is also a Co-founder of the Center for Marine Conservation at Scripps Institution of Oceanography, University of California San Diego. Dr. Mesnick's research interests include marine biodiversity, behavioral and molecular ecology of marine mammals, sexual selection and sociality (social structure, social networks and social resilience), conservation and management of marine vertebrates, and conservation behavior. She also holds interests in designing avenues for effective communication among scientists, policy makes and

society; creating and strengthening institutional connections to support research and infrastructure initiatives; and designing graduate education programs in marine science. Dr. Mesnick received a B.A. with honors in the Department of Biology from the University of California – Santa Cruz, and an M.S. and Ph.D. in the Department of Ecology & Evolutionary Biology from the University of Arizona.

Population Dynamics and Assessment

Gwénaël Beauplet, Ph.D.

Dr. Gwénaël Beauplet is currently an Assistant Professor in the Department of Biology at the Université Laval. Dr. Beauplet's research interests include ecology, physiology and behaviour of marine mammals, evolution of life-history strategies, evolutionary ecology, and conservation biology of marine mammal populations. Dr. Beauplet is very interested in the functional ecology of marine mammals from an evolutionary perspective and in the conservation of ecosystems, both at the individual and population level. He has been focusing on identifying how individual characteristics (i.e., ecology, physiology, behaviour, morphology, and genetics) may affect habitat use, resource selection, reproductive success and ultimately population dynamics. Dr. Beauplet also aims to estimate the impact of individual quality on population dynamics of marine mammals by investigating their reproductive patterns (i.e., effort, costs, success). Important educational and professional steps in the development of Dr. Beauplet's career include completing Veterinary studies at the National Veterinary School of Nantes (France), receiving a Doctorate in Veterinary Medicine (D.V.M.) from the National Veterinary School of Nantes & University of Nantes, being a Research Fieldworker in Amsterdam Island (French Southern & Antarctic Lands), receiving a Ph.D. in Ecology from the University of La Rochelle (France), and completing a Post-doctorate research position at Texas A&M University at Galveston in the Marine Mammal Research Program.

Barbara Taylor, Ph.D.

Dr. Barbara Taylor is currently working at the Southwest Fisheries Science Center in La Jolla, California, for the U.S. National Marine Fisheries Service and has been researching marine mammals for over 30 years. She leads a group of scientists studying population structure using genetics and heads a project in quantifying risk to develop quantitative risk criteria for the U.S. Endangered Species Act. Dr. Taylor is a member of several endangered species recovery teams and the Cetacean Specialist Group of the World Conservation Union (IUCN). Barbara was one of the researchers that designed the current system in the U.S. (under the Marine Mammal Protection Act) to limit the number of animals that can be accidentally killed in fishing operations. Most of her research has been in the North Pacific ranging from Alaska to the equator. She specializes in estimating risk of extinction and has worked with some of the most endangered species. Last year she participated in the survey that failed to find any baiji, the Chinese river dolphin, portending the first human-caused extinction of a cetacean. As a result, she is actively working with other conservation scientists to prevent the extinction of what now becomes the most critically endangered cetacean: the vaquita or Gulf of California porpoise in Mexico. Dr. Taylor spent 10 years doing field work before returning for her Ph.D., which concentrated on building skills in modeling. The addition of quantitative skills to her field experience toolbox has been very valuable in integrating science and management, i.e. in

conservation science. For students pursuing a career in population dynamics and assessment, Dr. Taylor advises you to include more focus on writing and communication, in addition to quantitative skills (especially modeling).

Alexandre Zerbini, Ph.D.

Dr. Alexandre Zerbini is currently working at the National Marine Mammal Laboratory, AFSC-NOAA and Cascadia Research Collective. Dr. Zerbini's research interests include population ecology, assessment, and conservation. In particular, Dr. Zerbini's work has focused on abundance estimation methods and large whale satellite telemetry. Important educational steps in the development of Dr. Zerbini's career include receiving a B.S. in Biological Oceanography from the Universidade do Rio Grande, Brazil (1992), an M.S. in Zoology from the Universidade de Sao Paulo, Brazil (1998), and a Ph.D. in Aquatic and Fishery Sciences from the University of Washington (2006). Dr. Zerbini was also a National Research Council post-doctoral fellow from 2006 to 2009. Important professional steps in the development of Dr. Zerbini's career include serving as a Marine mammal Researcher at the Oceanographic Museum of the Universidade do Rio Grande, Brazil; as a Professor of Marine Mammalogy at the Universidade do Vale do Itajai, Brazil; as a Member of the IUCN Cetacean Specialist Group; and as a Member of the Scientific Committee of the International Whaling Commission, where he has acted as Chair of the Sanctuary Review Working Group and the Other Southern Hemisphere Whale Stocks Sub-Committee. Dr. Zerbini advises, “1) Be creative, flexible and (as much as possible) independent; think outside of the box; 2) Learn one or more programming languages and GIS software; 3) Some marine mammals are global, so it is important to understand the research questions and conservation problems they face elsewhere and not only your country/ geographic area; 4) If you become interested in working abroad, learn another language; [and] 5) understand not only the scientific but also the political implications of your research. Nowadays, conservation actions are closely linked to politics so your ability to influence species management and conservation depends on understanding the bigger picture.

Toxicology, Pathology, and Veterinary Medicine

Frances Gulland, Vet. M.B., M.R.C.V.S., Ph.D.

Dr. Frances Gulland is currently the Director of Veterinary Services at The Marine Mammal Center in Sausalito, CA. Dr. Gulland is also a Science Adviser on the California Ocean Protection Council, a Member of the Advisory Board for California’s Oiled Wildlife Care Network, Chair of the Southern Sea Otter Recovery Implementation team, a Scientific Advisor to the Marine Mammal Commission, Chair of the Working Group on Unusual Marine Mammal Mortality Events, and a Member of the Hawaiian Monk Seal Recovery Team. Dr. Gulland received a B.A. in Natural Sciences; a Vet. M.B., M.R.C.V.S.; and an M.A. and Ph.D. from the University of Cambridge. Dr. Gulland’s dissertation work was on “The role of parasites in the population dynamics of Soay sheep on St. Kilda.”

Ailsa Hall, Ph.D.

Dr. Ailsa Hall is currently the Deputy Director of the Sea Mammal Research Unit. Regarding her research interests, Dr. Hall states, "All my research interests over the years fall

into the general category of 'factors affecting survival in marine mammals'. An epidemiologist by background, I became involved in marine mammal research following the first outbreak of phocine distemper amongst European harbor seals. Since then, I have carried out research into the influence of infectious and non-infectious disease and contaminants on marine mammal populations. I am particularly interested in the process of disease causation, the effect of contaminants on marine mammal physiology (such as immune and endocrine function), and how we can apply epidemiological and toxicological principles to risk assessment in marine mammals. As for important educational and professional steps in the development of Dr. Hall's career, she recalls, "This really has been a matter of luck to some extent, being in the right place at the right time. Clearly a background in a related discipline that suddenly was required in the field of marine mammal science had a big impact on the direction of my career. I was lucky enough to secure a permanent job in, what was then a UK government funded research institute. These posts are almost non-existent these days, so things are somewhat different for students wishing to pursue a career in marine mammal science." For students pursuing a career in Toxicology, Pathology, and Veterinary Medicine, Dr. Hall advises, "I would suggest that students take a higher degree in a related field so that they become fully conversant in a subject that is central to the questions now being asked within our field. However, from the perspective of pathology and veterinary medicine, these disciplines require students to be qualified as veterinarians in the first instance. However, for toxicology and epidemiology, those likely to succeed in the current climate would need to have broad skills and further experience within these subjects, be it through the human or veterinary medical routes. I would particularly recommend excellent numerical and statistical skills."

Peter Ross, Ph.D.

Dr. Peter S. Ross is a Research Scientist at Fisheries and Oceans Canada, an Associate Professor at the University of Victoria, and an Adjunct Professor at Simon Fraser University. Dr. Ross' conducts research into the fate and effects of environmental contaminants, with a focus on marine mammals. He is interested in both persistent and non-persistent contaminants, and the ways in which they move through the environment, partition into aquatic food webs, accumulate in food webs and marine mammals, and their impact on immune and endocrine systems of marine mammals. With his interest being largely related to the conservation of marine mammals, he works on both abundant (i.e. non-threatened) marine mammals (e.g. harbour seals and beluga whales), as well as endangered species (sea otters, right whales, killer whales, Indo-Pacific humpback dolphins). In addition, he conducts research on the indirect effects of contaminants on marine mammal prey, notably salmonids. Important educational and professional steps in the development of his career include receiving a B.Sc. Honours in Biology from Trent University; receiving an M.Sc. in Biology from Dalhousie University; receiving a Ph.D. in Veterinary Sciences from Utrecht University; receiving a Visiting Fellowship (NSERC; Fisheries and Oceans Canada); and being a Research Scientist at Fisheries and Oceans Canada. For students pursuing a career in this field, Dr. Ross advises, "work and study as much as possible in the area of interest. Get a solid footing in basic sciences, including chemistry, physics, biology and maths, prior to specializing. Do 'hard time' on a solid topic rather than obtaining the most glorious field experience. Listen to your supervisors and mentors. Don't be afraid of criticism or of saying 'I don't know'. Publish. Publish. Publish."