KEYNOTE ABSTRACTS

Linking the ecology of top marine predators with oceanography. The combination of biologging data with satellite derivated information

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Studying the foraging behaviour of top marine predators by establishing when and where they forage in relation to the oceanographic context is critical to understand how the natural variability of the marine environment and longer term changes induced by human activity could impact the foraging efficiency and consequently the demographic trajectories of these apex predators. To address this question, detailed information was needed on both instant foraging success and oceanographic conditions. Yet, the knowledge of fine scale foraging processes has been limited by a lack of information about feeding success. However in recent years considerable progresses have been achieved through biologging to first assess instant changes in foraging efficiency and second to measure local changes in an increasing number of oceanographic parameters. Several methods relying on the use of hall sensors, accelerometers, cameras…have emerged to quantify prey captures attempt or events and in some case to identify prey species. In the same time an increasing number of oceanographic parameters such as temperature, salinity, fluorescence, dissolved oxygen are recorded from large to fine scale making top marine predators an increasingly important source of data to monitor ocean state. The simultaneous combination of both approaches on the same individuals open a new area to better understand how the marine predators prey field is spatially structured in relation to local oceanographic conditions, while the global oceanographic context is provided by satellite information. New generations of loggers combining accelerometers, magnetometers, swimming speed and pressure allow investigating the 3D fine scale diving behaviour allowing assessing environmental stimulus, such as bioluminescence or acoustic clues that predators might use to locate their preys. However the massive amount of recorded information to be analysed constitutes one of the main challenge that biologging biologists are facing in the decade to come and it is increasingly critical to develop computational skills and to address the question of the needed data resolution to provide pertinent proxies of foraging success and oceanographic context.

From individuals to populations - movements, foraging, fitness and the comparative method

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Biologging data is recorded at the scale of behavioural observations, and yet most management-level decisions require information at the scale of the population. Studies must therefore capture enough variability to accurately describe the population and/or collect ancillary data to provide explanatory models of the variability observed. I discuss the study of animal movements – ranging from manipulative experiments of forest-dwelling rats, to the description of beaked whale and fur seal diving behaviour. Movements can be related to population consequences via life function (foraging success) and vital rates (individual success). Several biologging methods can identify different aspects of foraging, and I have used animal-attached cameras to provide visual-field (prey availability) measurements. These allow the classification of foraging signatures within fur seal diving behaviour, and can then be applied to much larger (potentially historical) TDR datasets. Identification of foraging locations and assessment of the stability of these over time and space is a key component for the identification and designation of pelagic marine protected areas. The relationship between foraging success and individual fitness is less studied but this level of detail is also becoming more important for accurate demographic assessment in conservation planning. Lastly, I suggest that beyond the population level, a comparative understanding of species differences will be key to developing a better understanding of physiological processes underlying diving behaviour.

A quantitative approach to animal movement ecology

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The study of animal movements and their implications for distribution, population dynamics, and biodiversity patterns has benefited tremendously from continued advancements in electronic tracking technologies over the past several decades. Only recently, however, have analytical tools for these behaviourally rich datasets begun to catch up. I will outline a general quantitive approach, based on Bayesian state-space models, for analysis of electronic tracking data. I will show how colleagues and I have applied these models to better understand marine predator movement behaviour and distribution patterns and how this work can inform conservation and management efforts. I will also outline plans for future research as part of the Ocean Tracking Network in Canada.

A particle on the road to ecologically sustainable fisheries

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Common sense dictates that the future of human societies depends on the maintenance of marine (and terrestrial) systems that are healthy and managed sustainability over the long term. The conventional indicators of marine health suggest our track record in achieving this goal leaves a lot to be desired. Advances in fish location technology and fishing gears, and increases in fleet sizes combined with increasing demand for seafood across the globe has resulted in a widespread decline in marine biodiversity. These changes have outstripped our capacity to integrate sustainable stewardship practices into fisheries policy and management. Impacts are not limited to target species - non-target species, such as seabirds, are also affected: 18 of the 22 species of albatrosses are endangered according to IUCN criteria principally due to bycatch in fisheries. Scientists have an important role to play in developing and implementing solutions to critical problems associated with fisheries. The presentation will a) allude to some of the issues that undermine sustainability, b) outline some of the lessons learnt during the course of working collaboratively with the fishing industry, c) provide case studies of the links between research and management and, d) summarise progress on a new technology to reduce (or eliminate) seabird mortality in tuna and swordfish longline fisheries. The talk is mainly aimed at scientists interested in working at the interface between wildlife conservation and the fishing industry.