



May 14, 2011

ID	Title	Organizer
BTO	Beyond the Obituaries: Success Stories in Ocean Conservation	Knowlton, N

The Second International Marine Conservation Congress is pleased to welcome the return of the one day program entitled “**Beyond the Obituaries: Success Stories in Ocean Conservation**” which will take place on the 14th of May at the Victoria Conference Centre, in the Carson Hall. The event will highlight conservation efforts that are making a difference around the world, allow conservation professionals to learn from the success of others, and demonstrate to the public and policy makers that the situation is not hopeless. The program will consist of invited speakers, a panel discussion, and an open mike session.

May 15, 2011

ID	Title	Organizer
14	Advances in Incorporating Social Dimensions in Marine Conservation Planning	Klain, S

The importance of social considerations in marine conservation planning is increasingly recognized, and hence represents a growing and vital body of research. In order for conservation plans to leverage action that will protect and restore biodiversity and be socially acceptable, people, particularly locals, must be involved and considered in all stages of the planning process. Implementation of conservation plans has had varying degrees of ecological and social success, mostly attributed to insufficient consideration of who will benefit and who will bear the costs of conservation actions. Increased effort is being invested in 1) incorporating social science when planning for conservation and 2) integrating locals who will be affected by changes in marine management throughout the decision-making process. The goal of this symposium is to bring together marine conservation researchers and practitioners to share important lessons not just from successes but also related to the ongoing challenges of incorporating social dimensions in marine conservation. The symposium is directly applicable to marine conservation science, management and practice as it seeks to improve marine conservation efforts through the inclusion of social values, opportunities and constraints in planning. This symposium will include presentations on conservation planning initiatives that have been informed by social science aimed at creating plans that can be effectively translated into conservation action.

41	Science Matters: Research to Implement Land-Based Closed-Containment Systems for Salmonid Food Fish Production	Summerfelt, S
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The Conservation Fund Freshwater Institute has worked for more than 20 years with U.S. Department of Agriculture funding to develop more environmentally friendly methods for salmon, char, and trout farming. New or improved technologies and practices have been developed to prevent escapes and ultimately improve fish health

and welfare without the use of vaccines, pesticides, antibiotics, or harsh organic chemotherapeutics. Today's closed-containment systems provide control of water quality and temperature to optimize fish production and health, provide barriers that prevent escape of fish and entry of pathogens, contain and remediate waste flows to curtail environmental impact, and minimize water use. Closed-containment systems can allow a commercial fish farm to locate where power, feed, or oxygen is relatively inexpensive, where environmental impact can be minimized, and/or adjacent to their primary markets. In addition, strategies are being developed to reduce energy consumption and improving waste disposal, which both are major factors in a fish farm's overall life cycle assessment.

43 Penguins as indicators: understanding the changing marine environment Frost, E

Penguins travel great distances through the ocean as they migrate and forage and are subject to a number of environmental changes. This means that the condition of their populations can serve as an indicator of the coastal and ocean ecosystems on which they depend. According to the International Union for the Conservation of Nature, 11 of the 17 species of penguins are threatened, due mainly to oil pollution, overfishing and climate change. For example, commercial fishing has reduced the carrying capacity of the Benguela ecosystem for penguins to only 10 to 20 percent of what it was in the 1920s, and African penguins have declined by 90 percent. Receding sea ice due to climate change is affecting chick-rearing habitat for Emperor penguins. As highly charismatic species, penguins have the ability to capture the attention of the public and decision-makers, therefore serving as an impetus for conservation action to address these and other threats to penguins and the oceans. By examining the status of four penguin species facing different threats across diverse geographic areas (Africa, Antarctica, New Zealand and South America), this symposium will examine how best to conserve penguins and the ecosystems they inhabit.

44 Modelers and Planners Unite: a case study of ecosystem service modeling and marine spatial planning on the West Coast of Vancouver Island, Canada Toft, J

While ecosystem services have become an important concept in science, there have been few examples where they have been applied in a marine management setting. This symposium will highlight the partnership between West Coast Aquatic (WCA) and Natural Capital Project's Marine Team (NatCap). WCA is a government and non-government aquatic co-management body on the West Coast of Vancouver Island (WCVI), Canada and NatCap is a group of modellers developing the Marine InVEST (Integrated Valuation of Ecosystem Services and Trade-offs) tool. The teams are engaged in a joint effort to advance the modelling and mapping of tradeoffs between marine ecosystem services to inform creation of a marine spatial plan for Barkley and Clayoquot Sounds on the WCVI. Team members from WCA and NatCap will tell the story of the partnership by introducing each team's objectives, discussing the scenario generation process, describing how Marine InVEST is used to assess changes in the delivery of services under alternative management scenarios, and reflecting on lessons learned and paths forward. The resulting symposium will be a presentation of insights into creating robust policy-science partnerships, of cutting-edge tools for synthesis across sectors and disciplines from an ecosystem services context, and of translation of principles from the disciplinary silos of oceanography, ecology, engineering, fisheries

and economics into real-world decisions that directly affect our marine and coastal systems.

45 Size Matters: The Case for Large Ocean Reserves Nelson, J

The world's marine ecosystems continue to be seriously degraded, and less than 0.4 percent of the planet's oceans are fully protected as no-take parks. In contrast, 12 percent of terrestrial habitats have some form of protection. Efforts are underway to increase marine protection through specific international targets for large marine reserves, including the 2003 World Parks Congress recommendation that 20-30 percent of each marine habitat be protected by 2012, and the Convention on Biological Diversity's 2006 recommendation that 10 percent of the world's marine eco-regions under national jurisdiction be conserved by 2010. Large, no-take marine reserves have the potential to benefit a broad array of species and habitat. Recognition of this has led to the recent designation of such sites as the Chagos Protected Area in the Indian Ocean as the largest no-take marine reserve in the world. More large sites are under consideration, which, if designated, will significantly increase protection of marine ecosystems. The panel at this session will explore the scientific case for large, no-take marine reserves and provide an overview of initiatives to establish them. Speakers will discuss some of the benefits and costs of establishing large no-take reserves, chronicle key elements of successes to date as well as on-going progress, and highlight opportunities for major new sites, including no-take reserves in the high seas.

6 Oceans without borders, conservation science Ardron, J
without borders: the Global Ocean Biodiversity Initiative (GOBI)

Almost half of the planet's surface is without borders, beyond national jurisdiction, a vast expanse commonly called the "high seas" Here management is accomplished through multilateral agreements. Reflecting the international character of these waters, the Global Ocean Biodiversity Initiative (GOBI) is a multinational, collaborative, and multi-disciplinary collective of marine conservation scientists. Its Advisory Board has representatives from nine international bodies, such as the UN Convention on Biological Diversity, International Maritime Organization, International Seabed Authority, and FAO. GOBI provides analytical information and support to countries, as well as regional and global organizations, to use existing data, tools, and methodologies to identify ecologically significant marine areas. Our work feeds into efforts to meet the 2012 goals adopted under the Convention on Biological Diversity (CBD) and at the 2002 World Summit on Sustainable Development, to reduce the rate of biodiversity loss and establish representative marine protected area networks. Additionally, its work is relevant to identifying "vulnerable marine ecosystems" as required by UN General Assembly resolutions passed in 2006 and 2009, which require that these VMEs be identified before bottom fishing can proceed, or continue, on the high seas. This symposium will provide an overview of progress to date including examples of innovative analyses, proposed protected areas, and upcoming efforts.

74 What's happening now? Doing and communicating Samhuri, J
the science of ecosystem-based management along
the west coast of North America

Human actions have altered the structure and function of coastal ecosystems worldwide. In many locations, the overall portfolio of goods, cultural amenities, and supporting services provided by the marine environment has deteriorated. Ecosystem-based

large marine fauna for human consumption, and the gaps in current regulatory policies that present concerns for their long-term conservation.

81 What marine conservationists need to know about economics LaFranchi, C

Many coastal and marine ecosystems, like mangrove forests and coral reefs, are situated in places where local people are often too busy making a living to fully embrace conservation. And when conservation is achieved, the cost is borne almost entirely by locals, even though we all enjoy the benefits. Thus, we will focus on emerging and innovative application of economics and economic thinking, starting where more traditional valuation leads off. We begin with an overview of economic concepts relevant to marine conservation and illustrate with field examples. We will then foster an interactive discussion, drawing from talks by economists and conservation field practitioners on a range of conservation initiatives and economic studies. We will make the case for why selected topics are of great relevance to the ultimate success of conservation investments. Issues we will discuss and inform include reconciling the opportunity cost of conservation, rethinking the linking of supply and demand in conservation, payments for blue carbon, and creation of capital streams linked to marine spatial planning and long-term conservation agreements. We will also include examples of how economics is applied at the frontier of conservation practice, using game theory for example, and a report on findings from a study of blue carbon. Time permitting; we will discuss how the burgeoning field of behavioural economics can inform conservation practice.

92 Environmental Concerns related to Salmon Aquaculture and Collaborative Solutions by Environmental Non-Government Organizations and Industry Proboszcz, S

Open net-cage salmon farming was established in British Columbia (BC) in the 1970s. As the industry expanded and increased production, environmental concerns surfaced and contention started to build. Debate around salmon farming has continued in BC for over a decade. Concerns regarding the spread of sea lice and disease to wild fish populations and waste production continue to be at the forefront of the public debate. In 2001 a group of organizations joined together to form the Coastal Alliance for Aquaculture Reform (CAAR) in an effort to find solutions to environmental issues stemming from the salmon farming industry. In 2006 Marine Harvest Canada (MHC), the largest company in BC completed a foundational agreement with CAAR that outlined a collaborative path towards developing solutions through farm management and research. Both CAAR and MHC have worked closely to monitor sea lice on farms and wild juvenile salmon in the Broughton Archipelago. Marking the success of the partnership, the federal government joined the collaborative research in 2010. CAAR and MHC have also developed plans for the development of alternative technologies, such as closed containment farming, to mitigate some of the environmental issues. This long-standing level of cooperative work between environmental organizations and industry is unique worldwide and strives to come to research-based solutions that are beneficial to the marine environment.

98 Pathway toward sustainable seafood consumption? Telecki, K.

There is growing recognition amongst scientists, seafood chefs and retailers that diet matters, not only for the sustainability of fish stocks, but also for food security of many low-income countries, the health of our seas and for the well-being of people. Because the ocean supports such a wide array of use-aquaculture, fisheries, renewable energy

and more the way in which business is done in marine environments has a substantial impact on the health and sustainability of the ocean. As responsible consumers, we no longer have the luxury of selecting our seafood based solely on sustainability. Seafood sustainability has gained momentum in recent years and is now fuelled by the energy of many leaders across fishing and fish-farming industries, seafood businesses, media and conservation groups. This panel will explore the expanded concept of “responsible seafood” and how will this achieve a pathway to sustainable seafood consumption, because even before the seafood reaches our table, the sustainability movement must encompass many other aspects including health, industry (suppliers and producers) and science. The panel will present their perspectives on how they and their sector are approaching seafood sustainability. This is with a view to understanding what effect our collective activities may have, and how we can regain a balance of eating seafood that is good for our health and good for the ocean.

May 16, 2011

ID	Title	Organizer
11	Open Ocean Marine Protected Areas (MPAs): Advances, Challenges, Identification, Management and Governance (Part 1)	Lombard, M.

During IMCC 2009, we presented a symposium on Open Ocean MPAs. Owing to the interest generated there, we propose this follow up symposium in two parts. Open ocean conservation is accelerating within nations’ EEZs and on the high seas. The UK recently established the world’s largest MPA around the Chagos Archipelago. UNESCO recently conferred World Heritage status on Papahānaumokuākea Marine National Monument (USA) and Phoenix Islands Protected Area (Kiribati). There is progress towards a RFMO in the South Pacific. The Global Ocean Biodiversity Initiative (GOBI) was recently founded to help identify significant areas, and has a working group on pelagic MPAs. But we are still far from meeting the 2012 World Summit on Sustainable Development targets in the open oceans, and large gaps remain in identification, governance, surveillance and enforcement. In part 1 of our symposium, we plan to address each of these gaps. Elliott Norse will summarise recent developments in the field. Eddie Game will then discuss challenges in open ocean MPAs. Alistair Hobday and Natalie Ban will pose and answer questions regarding ocean processes and climate change in MPA design in dynamic habitats. Three case studies will follow, looking at scale issues in MPA design in South Africa (Erwann Lagabriele), an offshore MPA network for South Africa’s entire EEZ (Mandy Lombard), and developments in the Sargasso Sea (Sheila McKenna).

12	Open Ocean Marine Protected Areas (MPAs): Advances, Challenges, Identification, Management and Governance (Part 2)	Lombard, M.
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Part two will focus on management and governance. Ben Halpern will explain measures of marine ecosystem status (also with many recent publications to draw from). Daniel Dunn will discuss how the Convention on Biological Diversity’s ecologically or biologically significant areas can inform spatial planning and Patrick Halpin will discuss the Case Study Working Group for GOBI. Hedley Grantham will describe a framework to mainstream conservation management in marine spatial planning for pelagic biodiversity, and Jeff Ardron will discuss how to begin to incorporate uncertainty, learning and adaptation into effective marine spatial planning. Finally, Sandra Brooke

will guide us through SERMA technology (Surveillance and Enforcement of Remote Maritime Areas) and Kristina Gjerde will update us on international legislation and efforts to promote open ocean conservation through cooperation.

22 **A Decade Under California's Marine Life Protection Act: Real-Life Experience with Implementing an Ecosystem-Based MPA Network** Gaffney, K.R

California's Marine Life Protection Act (MLPA) has been recognized as landmark marine conservation legislation and an important model for implementing ocean ecosystem protection. Requiring completion of a statewide marine protected areas (MPA) network, the MLPA is being implemented through innovative science-based and stakeholder-driven processes. The planning and design of the statewide network have been led by a public-private partnership, the MLPA Initiative, which has developed cutting edge decision-support technology (MarineMap), practical science input (including MPA size and spacing guidance, innovative policy mechanisms (regional stakeholder groups to design MPAs and a Blue Ribbon Task Force to review and recommend MPA proposals to decision-makers) and leveraged funding mechanisms. The MPA network is now nearly complete, and additional innovations are underway to meet on-going management needs, such as monitoring that supports adaptive management and reflects public interests. More than ten years of implementation of the MLPA have revealed significant and unanticipated challenges. California's coastal resources are subject to many pressures beyond the scope of MPAs. Escalating human demands are increasingly beyond the reach of existing policy and management frameworks. As MLPA efforts shift from the design to the management phase, there is an opportunity to look back and assess progress, identify lessons learned, and consider the future of marine ecosystem planning in California and beyond.

50 **Recent Advances in Reef Resilience Science and Application to Reef Management** Wear, S

This symposium is consistent with three SCB-IMCC themes: Innovative Techniques and Technology for Marine Conservation, Climate Change and the Oceans, and Marine Protected Area Effectiveness and Marine Spatial Planning. Since early 2005, The Nature Conservancy, in partnership with the World Wildlife Fund, Wildlife Conservation Society, IUCN, Great Barrier Reef Marine Park Authority, CORDIO and NOAA, has led an effort to train coral reef managers on methods of building resilience into the design and management of MPA networks in the face of global climate change. As part of this effort, the Reef Resilience Program works closely with premier scientists who are working on Reef Resilience around the world. We work to translate the latest Resilience science into practical management tools and also provide various platforms for scientists to communicate directly with managers and the conservation community. This symposium will feature some of the latest science and management applications from around the world. A panel of global scientific experts including Peter Mumby, Tim McClanahan, Alison Green, Stuart Campbell, and Elizabeth McLeod will share their most recent work focused on Reef Resilience. The symposium will conclude with a 30 minute panel discussion focused on how the latest scientific information can be used to improve coral reef management and increase the likelihood that corals will persist long term.

54 **Saving the shallow seas: hold your breath for conservation success** Molloy, P.P.

Most people living by the coast can easily see or experience marine environments to

depths of 10 m, should they choose to make the effort. Our proposed symposium and focus group will be important steps towards mobilising such efforts and generating vital support for this sandwich zone, trapped between pressures on land and sea. By bringing marine conservation into people's personal orbits, we can engage a new coterie of collaborators in a suite of marine-conservation issues. The shallow fringe of sea (<10 m deep) that laps the world's coastlines contains the most diverse marine ecosystems and provides numerous resources and ecosystem services. However, these waters are among the most sensitive systems to human and natural perturbation, including urbanisation, pollution, sea filling, and fishing as well as projected changes in sea level, storm intensity, and oceanic acidity. Yet despite the clamours of concern for many marine conservation problems, the threats to the fragile ecosystems in coastal shallows are grossly under-appreciated. During the symposium we will integrate the experiences of leading conservation practitioners and academics working in a variety of shallow coastal ecosystems around the world. Speaker will be asked to explicitly address an agenda that would create broad engagement with waters of <10m depth. After briefly addressing the problems faced, each speaker will discuss best practices and progress in resolving both biophysical and socioeconomic issues.

59 **Tracking Our Progress: A Framework for the Effective Use of Satellite Telemetry for Marine Conservation** Maxwell, SM

Satellite telemetry has emerged as one of the most prominent technologies in marine science, resulting in an unprecedented understanding of marine species movements and habitats in both space and time. As a result, telemetry is a powerful conservation tool given the spatial nature of many management strategies, however, researchers have failed to put telemetry results in a solid management context. We aim to detail an empirically based framework that will (1) emphasize how resource managers can use telemetry as a powerful management tool, and (2) guide researchers who employ telemetry in conducting studies in a cost-effective way that maximizes aid to management decisions. We will review telemetry literature on a global scale across disciplines, highlighting general successes and gaps, as well as focus on specific examples of how telemetry has been used across a suite of marine threats and management options in both developed and developing countries. We will give examples of how telemetry is: combating bycatch and determining management strategies on the High Seas; integrating into the marine spatial planning process in the US; being used as a cost-effective means to determine MPA designation and enforcement in developing African nations; and determining management strategies in the face of climate change. We will additionally show how telemetry can be used as a driving force in community-based conservation planning in Mexico and as a compelling global educational tool.

69 **Using science to influence management decision making: the who, what and how of linking two disparate worlds based on experiences worldwide** Karrer, L

Science-based decision-making is often a core principal of marine conservation efforts; however, in reality decisions are based on a multitude of factors, including politics, economics and cultural issues. What steps, then, can scientists and decision makers take to ensure that scientific insights further conservation efforts? This session is intended to address this question by drawing on experiences of the Science-to-Action Partnership, a network of over 100 scientists and decision makers engaged in over 50

studies, working in over 20 countries and engaging over 70 partner organizations. In particular the symposium will draw on specific examples from Panama, Belize, Brazil, Galapagos, Fiji and the United States. These examples range from the use of genetic connectivity studies to inspire the establishment of new locally managed marine areas in Fiji to the use of livelihood studies to argue against mangrove clearing in Brazil. Cross-site analyses based on examining these varied experiences will highlight the key conditions critical for influencing decision making, including: developing a partnership between scientists and decision-makers; tailoring research topics to management issues before initiating the research; engaging partners at all levels from community leaders to ministers; tailoring research plans to existing efforts; ensuring a programmatic long-term commitment; and making capacity building a central component of the research and management process.

8 Experiences in Marine Conservation Tourism Orams, MB

Two global observations underwrite this symposium on marine conservation tourism. First, more people are travelling for recreation, education, and business than ever before. This travel is facilitated by an astonishing array of technologies and has generated a diversity of recreation and tourism forms. Second, widespread concern for natural resource conservation and environmental protection has never been greater. While history has shown that are many examples of tourism and conservation conflicts leading to negative ecological and social outcomes, positive outcomes are also possible. This symposium focuses on marine conservation tourism, which is conceived of as a goal that is compatible with the overarching ideal of sustainable use of marine resources. This symposium should be of interest to a wide variety of stakeholders including scientists and managers in the public sector, the private sector, and in civil society.

83 Current research and applications in integrated land-sea planning: bridging marine, freshwater, and terrestrial conservation Alvarez-Romero, J

This symposium explores current research and applications of conservation planning that integrates conservation across the land-sea interface. Ranging from reserve design to marine-use planning, the symposium will include examples of marine, freshwater, and terrestrial planning exercises that aim to integrate priorities and maximize conservation outcomes across all realms. Presentations will include an examination of theoretical, methodological, and practical aspects of fundamental decision-making problems encountered by planners and managers when attempting to incorporate land-sea connections, as well as describing available tools. Particular attention will be paid to managing trade-offs within coastal watersheds resulting from spatial incongruence between areas important for upstream and downstream objectives. The symposium will also cover optimizing investments in land and sea-based management actions to contribute towards the protection of marine ecosystems, incorporating cross-system threats into reserve design, and integrating terrestrial planning with freshwater and marine conservation prioritization.

87 Ecosystem Services Research for Ecosystem-Based Management in British Columbia Mach, ME

The ecosystem services concept promises to foster and leverage ample natural and social science research to improve the social and ecological outcomes of ecosystem-based management. But to date, much ecosystem-services research has been superficial, ad hoc, and separate from on-the-ground management. In this symposium,

we consider ongoing efforts to improve our understanding of ecosystem services and their representation in decision-making to foster better management. These efforts generally focused on the West Coast of Vancouver Island (WVI), a rugged and wild area, rich in natural values and diverse human uses involve place-based research to understand nearshore social-ecological systems and associated services, by the BC Coastal Ecosystem Services (BCCES) project of UBC. BCCES research includes subtidal and intertidal field research, remote sensing, habitat and ecosystem modelling, economic valuation and social values research. This group is contributing to planning by West Coast Aquatic (WCA), a regional ecosystem and resource management board. The attempts of this research group to do applied research that contributes to fundamental insight and also local decision-making reveals much about the opportunities for confluence between research and ecosystem-based management

88 **Advances in Indigenous Practices in Marine Conservation: Pan-Pacific Experiences** Dearden, P

In the Pacific Ocean, 10 million people are tasked with conserving the high diversity marine and coastal resources of 1/3 of the world. The Pacific is simultaneously over-governed and under-governed, with a long history of applied holistic traditional management, overlaid recently with 'Western' sectoral management. There are many international and regional agencies providing high level policy advice to governments, however these governments and especially the local communities lack capacity for effective natural resource management. Many large archipelagic states with low populations and weak economies attempt to manage resource use on small islands that stretch over thousands of kilometres. Bordering the Pacific are larger and more populated countries that also have a mix of centralised, and traditional and regional management practices. This Symposium will focus on traditional Pan-Pacific experiences in marine conservation and include representatives from across Pacific nations. The goal is to seek the lessons learned from successful traditional management concepts, the role of traditional/local knowledge and how these can be melded with more recent approaches such as ecosystem based management and marine spatial planning. Commonalities and differences between approaches to MPA development, natural resource and fisheries management from the community to national levels will be investigated. The Symposium also deals with one of the most pressing issues in marine conservation, incorporation of indigenous perspectives, and one that is particularly relevant to Western Canada; these lessons have international implications.

94 **Innovation Lessons from the Control of Invasive Species on Coral Reef Ecosystems in Hawai'i** Conklin, EJ

For over a decade, a partnership of the State of Hawaii, the University of Hawaii, and The Nature Conservancy (TNC) has been working to test hypotheses relating to the spread and control of invasive marine organisms on coral reef ecosystems in the Main Hawaiian Islands. New and innovative techniques have been conceptualized, tested, employed, and refined through time using a mix of mechanical and manual methods to control invasive marine invertebrates and vertebrates in of coral reef habitat, complemented by increased protection for and active re-stocking of native herbivorous organisms on habitat cleared of invasives. Some of the applied research conducted and innovative, real-world technologies tested and applied have been featured as a "modern marvel" during the past few years within the popular media, including the New York Times, National Public Radio, and the Discovery Channel. Based on the experiences of

this partnership, lessons learned, and replication of these techniques in the Hawaiian Islands, there is practical management guidance that can be offered to conservation professionals and site managers to assist them in thinking through and applying similar removal and control efforts on the marine environments where they work. Some of the techniques discussed also have broad applicability for reef conservation and restoration efforts beyond the control of invasive species.

97 **Land & Marine Spatial Planning in British Columbia's Great Bear Rainforest & Pacific North Coast (or, managing 172,983km² in an ecosystem-based way)** Calcari, M

Born of complex interactions between ocean, mountains, forest and rain, British Columbia's coastal-temperate Great Bear Rainforest and adjacent Pacific North Coast are areas of mist-shrouded valleys, glacier-cut fjords, old-growth forests, rich salmon streams, deep-water corals and glass sponge reefs. These have nourished First Nations culture for millennia and sustain coastal communities and corporations with food, jobs and recreation. From foraging grizzly growls and humpback whale sirens to First Nations ancient songs, the region has many voices. And now, in a place once torn by conflict, people have come together raising new voices of hope. The Great Bear Rainforest land-use planning secured 28,327km² of protected areas, put 56,656km² under ecosystem-based management, and stimulated a conservation economy. It replaces an outdated resource extraction model and offers a sustainable approach to protect the environment and enable communities to prosper. First Nations, Federal, and Provincial governments are now turning attention to the adjacent Pacific North Coast Integrated Management Area, a swath of 88,000 km² of ocean, by leading a collaborative integrated management process (see <http://pncima.org>). Participants in this session will bring government and stakeholder stories on lessons-learned of integrating and implementing land and marine spatial planning with multiple levels of government, ancient wisdom and western science, and traditional and emerging ocean activities.

101 **Ocean Acidification: How Carbon Dioxide is Changing Our Oceans and How Should We Respond** Sakashita, C.M.

The ocean's absorption of carbon dioxide from the atmosphere is causing ocean chemistry to become more acidic. The primary known consequence of ocean acidification is that it can impair the ability of many marine organisms-- including plankton, corals, and shellfish-- to build their protective shells and skeletons. This session will examine current and projected changes in ocean chemistry as atmospheric carbon dioxide levels increase, including the geological context of past changes in ocean carbon dioxide as a basis for understanding current ocean acidification. Experts will discuss the biological and ecological consequences of ocean acidification, including impacts on the Pacific Coast's marine biodiversity. Finally, this session will discuss the legal and policy responses to ocean acidification. Like global warming, ocean acidification should be seen as an important concern driving local, national and international efforts to reduce carbon dioxide emissions. We will outline some of the recent successes in legal and policy efforts to address acidification.

May 17, 2011

ID	Title	Organizer
15	Scaling down and scaling up: bridging the gap	Pressey, B.

between regional-scale design and local-scale actions in marine spatial planning

The transition from regional design to local action has been difficult for marine conservation planners. This transition requires the reconciliation of two spatial scales of analysis and decision-making and even two worldviews. Yet, both regional-scale design and local-scale action are crucial to achieving conservation goals, and both have complementary strengths and limitations. Regional designs allow planners to consider the relationships between individual areas so that systems are more than the sum of their parts. They allow planners to explore spatial and temporal options for conservation and facilitate integration of conservation priorities into larger initiatives such as integrated coastal management. But regional designs have a poor record of translation into local actions. Local actions are motivated, understood and supported by the communities most directly affected by the associated constraints on use of natural resources. They are also informed by detailed information that is impossible to collect consistently across most regions. But local actions tend to form collections rather than systems of complementary, functionally connected areas. Combining the complementary benefits of regional-scale design and local-scale action requires scaling up and scaling down. These terms roll easily enough off the tongue but operationalizing them remains a serious challenge. Until this is done, progress in marine conservation will be limited.

36 Arctic Fisheries, Arctic Solutions: Supporting sound fisheries policy and management in northern waters Porta, L.A.

The North American Arctic is one of the last places on the planet that has not experienced large-scale commercial fishing. Managing a potential fishery poses a major challenge for government agencies, Aboriginal organizations, and scientists: how do we develop and implement an ecosystem-based fisheries management regime for Arctic waters in a time of rapid change, with limited scientific knowledge of the ecosystem in question? A panel of marine science, policy, and conservation experts will place the outcomes from pre-congress Workshop 36 into the wider context of Arctic and global fisheries management, identifying common lessons and evaluating the likely effectiveness of the approaches underway in the two case study regions.

37 Scientific needs for effective protection of marine benthic habitats Brooke, SD

Oceans worldwide are being degraded from overexploitation, loss of biodiversity and habitat destruction. In an effort to curb this loss and preserve marine ecosystems, marine protected areas have been established within national EEZs and on the high seas. MPAs have been selected using a variety of approaches, from application of legal or ecological criteria to stakeholder-driven processes. Data for identifying protected areas is often limited, especially for deep or remote areas where exploration is expensive and logistically challenging. Criteria have been developed by national and international entities to define areas worthy of protection; these all require a substantial amount of ecosystem information. In a funding limited world, we will never have sufficient data to make informed decisions for all threatened benthic habitats. There is an urgent need to establish protection before these habitats are irreparably degraded by destructive human activities, so the challenge lies in making good decisions in a data deficient situation. This symposium will present and discuss methods, tools and technologies to define and locate areas worthy of protection. The primary data needs, data gaps and

some approaches to compensate for those gaps will also be presented and discussed. Good habitat information is critical to effective spatial management, but this topic is especially relevant given the recent release of the US National Ocean Policy; which identifies marine spatial planning as a priority.

48 **How can flagship species do more for marine conservation** Vincent, A.

We will tap business acumen and marketing skills as we explore how “sexy” animals and plants can be used for greatest conservation benefit. Flagship species are charismatic organisms used in a strategic way to engage and inform the public about conservation. These species help promote conservation action and garner financial support by relying on human compassion rather than ecological concepts. However, flagship species may also be vulnerable, endangered and/or commercially important. Debate continues about the role of flagship species in conservation. Critics suggest that the efficacy of flagship species is unproven in practice and may detract from wider ecosystem conservation priorities. Their application in marine conservation has been thought to be of little utility compared to their terrestrial counterparts. However the use of flagship species can result in the protection of large areas of habitat for a wide range of taxa, including the less charismatic. We will explore the selection criteria, application and effectiveness for flagship species in marine conservation with a panel of interdisciplinary conservation biologists and, unusually, business marketing specialists. Each speaker will be asked to focus their talk on how we can more effectively support and advance marine conservation efforts through the use of “icons” or flagships species. This series of case studies will be analysed for general principles that exploit marketing acumen for conservation success.

5 **Little Fish, Big Value: Managing Forage Fish in an Ecosystem Context** Santora, C

Forage fish are small schooling fishes that are critically important for marine food webs, while also accounting for nearly 40% of global wild marine fisheries catch. Generally, these species eat plankton and in turn provide food for predators, such as larger fish, marine mammals, and seabirds. Forage fish are also economically valuable by providing fishmeal and oil for animal feeds and human consumption. As climate change and other environmental shifts pair with increased fishery demands, pressure on these species is expected to intensify. Although forage fish are considered the “foundation prey” of many marine ecosystems, the important ecological functions they provide are not often accounted for in their management. Currently, most forage fish populations are managed to maximize fisheries yields. This session outlines why forage fish should be managed in an ecosystem-based context, and why their ecological role as prey must be maintained. Presenters in this session will discuss the ecology of forage fish, consequences of fishing on several predator groups, and tradeoffs between economic value of forage fish and the ecosystem services they provide. Carefully managing forage fish can benefit other marine species, including commercially valuable fish, and ensure that fisheries are conducted with minimal loss of ecosystem services. Maintaining the foundation of marine ecosystems provides stability to the rest of the food web upon which many species, including humans, depend.

65 **Marine conservation in Canada: Status, challenges and opportunities I** Cote, I.M.

Canada has the longest coastline in the world, giving it a significant stewardship responsibility to be an international leader in addressing anthropogenic stressors that

threaten ocean health and marine biodiversity. Unfortunately, the country that is host to the second IMCC is perhaps better known around the world for its spectacular fisheries collapses than for its history of marine conservation efforts. This symposium will bring together contributors from three key parties in Canadian marine conservation: academia, government and non-governmental organisation, with the goal of taking stock of the status of marine environments and their protection in Canada's three oceans and the Great Lakes, the opportunities afforded for marine conservation by Canadian scientific research and legal frameworks, and the opportunities and challenges we are likely to face in the near-future. The first half of the symposium will provide an overall social, ecological and political picture of the Canadian seascape, with emphasis on specifically Canadian issues, such as the role of First Nations in marine conservation and the challenges of protection in northern latitudes.

67 **Marine conservation in Canada: Status, challenges and opportunities II** Tomascik, T

Canada has the longest coastline in the world, giving it a significant stewardship responsibility to be an international leader in addressing anthropogenic stressors that threaten ocean health and marine biodiversity. Unfortunately, the country that is host to the second IMCC is perhaps better known around the world for its spectacular fisheries collapses than for its history of marine conservation efforts. This symposium will bring together contributors from three key parties in Canadian marine conservation: academia, government and non-governmental organisation, with the goal of taking stock of the status of marine environments and their protection in Canada's three oceans and the Great Lakes, the opportunities afforded for marine conservation by Canadian scientific research and legal frameworks, and the opportunities and challenges we are likely to face in the near-future. The second half will focus on what has been achieved and the lessons that have or could have been learned from case studies from our three oceans and our "inland seas", the Great Lakes.

7 **Marine protected areas: Effects, networks and monitoring – A multidisciplinary approach** Claudet, J

Marine Protected Areas (MPAs), although not the ultimate solution for all marine conservation issues, are a very useful tool to manage human uses of marine resources and conserve biological biodiversity. Effectiveness of MPAs regarding fisheries and ecological goals has been widely studied but those fields remain largely compartmentalized. Moreover, MPA goals are also socio-economical. MPAs can be established for economic development, conflicts resolution, or marine spatial planning. They involve a wide variety of constituencies and spawn complex management processes. A multidisciplinary standpoint is key to design, implement, monitor and adaptively manage MPAs, which is lacking in most MPA studies. The integration of ecological and social processes is at the heart of how people come to support or reject MPAs. Here, we present the diverse reality of MPA sciences, including its human dimension: (1) we show how MPAs can be used for ecosystem-based management and marine spatial planning; (2) we synthesize the ecological and fisheries effects of MPAs inside and outside their boundaries; (3) we present ways to improve MPA assessments; (4) we discuss the interconnections between MPAs and the social dynamics of coastal systems; (5) we show how MPA networks should be implemented, monitored and assessed; (6) we present the advantages of high sea MPAs; and (7) discuss how marine conservation awareness and outreach could be improved through a better communication of MPA sciences.

86 **Oil and fisheries in the Gulf of Mexico: ecological and economic impacts** Strub, AM.

With a lack of consensus regarding the quantity of oil, natural gas and associated methane, and chemical dispersants released into the Gulf of Mexico following the explosion of the Deepwater Horizon oil rig on April 20th, 2010, uncertainty pervades the vision of the future of this otherwise well-studied Large Marine Ecosystem (LME). This vision is further obscured by apprehension regarding the three-dimensional trajectory of these substances from the surface to the seafloor. This uncertainty is particularly troubling for fisheries in the region. This symposium will present the findings of recent studies regarding ecological impacts on habitats and marine organisms in the path of this disaster and resulting economic consequences for lucrative fisheries. Finally, the symposium will conclude with a discussion of the global and regional implications of the oil industry on marine species, ecosystems, and fisheries worldwide. Lessons learned from this and similar oil spills may help in the preparation for and mitigation from potential impacts of future spills.

96 **Marine and Coastal Citizen Science – helping to shape our understanding of the ocean and improving conservation** McKay, B

At a most basic level, citizen science can be defined as a research technique that enlists the public, typically as field assistants, in gathering scientific information. Various environmental research and monitoring studies involving the volunteering public have been remarkably successful in advancing scientific knowledge. Today citizen scientists represent a huge workforce and a free source of skills, local knowledge, and computational power, and their involvement allows scientists to gather data on larger geographic scales and over longer (or shorter) time periods than is possible in more traditional scientific research. Indeed, many research and survey programs would be financially impossible to implement without citizen scientists and, citizen scientist-based projects are thus likely to become crucial to monitoring the world's marine and coastal biodiversity. Given the great potential value of using citizen scientists to advance marine and coastal conservation, we will explore in this symposium: how citizen scientists have been deployed in various marine and coastal contexts; lessons learned and experiences; how citizen science can support conservation and the development of policy; how this can be an effective tool for education and outreach; and what the future holds and how can we be gathering mass amounts of information and data through hand held/mobile technology?

100 **Integrating science and policy: how scientists can help CITES advance marine conservation** Foster, S

The aim of the Convention on International Trade in Endangered Species (CITES) is to prevent species extinctions through regulations and requirements that ensure only species that are harvested sustainably are exported internationally. Because fisheries dominate the marine wildlife trade in both value and volume, CITES stands to play a significant role in advancing the sustainable management of marine species, particularly where existing management regimes have not produced sustainable trade. Indeed, CITES has been playing an increasing role in regulating trade in marine species, but unfortunately, naïveté of the CITES process, in which politics play a large part, has limited the role that marine scientists have played in helping CITES meet its potential for marine conservation. The goal of this joint symposium/focus group is to increase collaboration between marine scientists and CITES. The symposia will use case studies

to illustrate the current role, success, failures, and opportunities of CITES in marine conservation. The focus group will bring the symposia speakers and other experts together to seek commonalities among the case studies that demonstrate how CITES can advance the conservation of traded marine species, and how scientists can collaborate with CITES to ensure it achieves its stated goals. Given the outcomes of the most recent CITES Conference of the Parties, all proposals for marine species were rejected, this symposium/focus group is timely and relevant.

102 Securing the Conservation of Sharks & Rays Dulvy, N

Sharks, rays and chimaeras include some of the most charismatic species that swim in our oceans. This allure is not enough to save them from widespread, intense and largely indiscriminate fisheries that supply the demands of the Chinese shark fin soup industry. Of the 1,100 known chondrichthyan species, over a quarter are threatened, mainly by overfishing, but also by coastal development, habitat loss and pollution, and only a quarter are safe according to the IUCN Red List. Now we have the evidence of the imperilled status of chondrichthyans the challenge is make this new marine science matter. We urgently need to protect and manage shark fisheries and trade in a sustainable manner and the recent failure to list sharks and tunas at CITES shows the scale of this problem. Our challenge is twofold: to identify specific opportunities for conservation, management and protection at national, regional and international scales and to enforcing these measures. Here, we aim to bring together the world's experts in national, regional and international fisheries and marine conservation policy to highlight and share recent experiences of conservation and fisheries management of chondrichthyans and to identify a five-year Plan of Action consisting of a priority list of coherent activities that will transform the protection, conservation and sustainable management of sharks and their relatives and secure their future.

200 Combining genetics and remote sensing for effective marine spatial planning and MPA development Rosenbaum, H.

Globally, cetaceans exhibit a diverse array of population structures. It is important to understand the degree of population genetic structure in order to inform the spatially explicit design of MPAs and MPA networks, both in coastal and offshore waters. These relationships are inherently extremely complex due to the multiple, interacting mechanisms that can shape these populations. Historically, differences in population structure have primarily been attributed to evolutionary relationships, behavioural influences, and strong life history or culturally-influenced traits. However, recent research demonstrates how environmental discontinuities coincide with genetic breaks, thus providing evidence for the influence of physical oceanographic barriers to gene flow particularly evident in coastal species. Highly mobile migratory species pose particular management challenges due to their vast and often transboundary ranges, as well as large degree of spatial and temporal variability. Here, we examine the extent of population structure that exists among migratory cetaceans in pelagic and coastal environments, and review approaches that reveal varying degrees of genetic differences. Advances in integrating empirical population data, dispersal analyses, oceanographic variables, and modelling will be discussed. Finally, a synthesis of how these approaches contribute to more effective marine spatial planning practices, including the formation of effective

MPAs, will be presented.

May 18, 2011

ID	Title	Organizer
17	An Ocean Health Index: Assessing the health of ocean systems and the human communities that depend on them	Halpern, BS

The ocean's ability to deliver goods and services to people depends on its overall health, yet few people (including decision makers) have an accurate or comprehensive understanding of what ocean health is, how it should be measured or how it relates to human well-being. Instead attention has focused on specific issues (fisheries, energy, etc.) or particular conservation goals. Effective management must be comprehensive, and must sustain human needs while maintaining natural resilience. Understanding, describing, and measuring the many facets of ocean health, including its human dimensions, scientifically and rigorously remains a key challenge. Capturing all of this information with concrete, meaningful and easy to understand metrics that can be used to guide policy and management is even more challenging. Past research has synthesized various aspects of either natural systems or human communities, often developing indicators for how these components are changing or performing over time. We are finally at the point where these various pieces can be brought together to comprehensively assess ocean health. The resulting index will allow managers and policy makers to track progress toward management goals and allow comparison of ocean health across the world's oceans, facilitating prioritization of conservation efforts. Our symposium will present the science necessary to develop an ocean health index and illustrate its use in several case studies.

25	The Portfolio Effect in marine fisheries: how the diversity of populations, species, and fisheries promotes reliable yield	Webster, M
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Evidence is growing that the diversity of populations, species, and fisheries promotes greater temporal stability in marine fisheries. These fisheries portfolio effects work much like a diversified financial stock portfolio, whereby fisheries that rely on a mixture of non-synchronous populations or species experience lower variability over time. The existence of portfolio effects implies that management will yield better long-term results if extant diversity is maintained, even if that requires lower short-term harvest of some populations and species. The importance of maintaining portfolio effects may increase in the future as managers and fishers attempt to mitigate for increased uncertainty caused by global climate change. In this symposium, we will undertake the first-ever synthesis of portfolio effects in marine fisheries by focusing on the role of population, species, and economic diversity in promoting long-term fisheries stability.

32	The science and policy of marine conservation in the world's most biologically diverse marine region: The Coral Triangle	Klein, C.J.
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The Coral Triangle (Fiji, Indonesia, Malaysia, Papua New Guinea, Philippines, Solomon Islands, Timor Leste, Vanuatu) is the world's epicentre of coral reef diversity. The region is the focus of significant global conservation attention and is supported by the multi-lateral Coral Triangle Initiative, Asian Development Bank, USAID, and many non-

governmental NGOs. These initiatives have the potential to provide a major contribution toward safeguarding the region's marine resources for current and future generations. Conservation goals for each country and the entire region have been developed. Achieving these goals is being pursued at various scales and through various mechanisms (e.g. community driven protected area management, regional fisheries policies). We will profile scientific and political aspects of a selection of marine conservation projects in the Coral Triangle. These projects were selected as they feature cutting-edge science applied to real-world conservation problems in the Coral Triangle. We will highlight challenges and hallmarks of success associated with marine conservation in a politically and biologically diverse region. This symposium will include work done as part of a 2-year National Centre for Ecological Analysis and Synthesis working group on *Supporting Conservation Decision Making in the Coral Triangle*. This working group aims to provide scientific support for conservation and management decisions relevant to the Initiative or, *Make Marine Science Matter*-the IMCC 2011 theme.

4 **Integrating Marine Historical Ecology into Conservation and Management: Using the Past to Manage for the Future** Kittinger, J

Historical marine ecology has gained international recognition as a growing body of research has demonstrated long-term declines in coastal and pelagic environments around the world. These analyses have assessed long term trends in global trends in fisheries, declines in the populations of endangered species, and decreases in the ecological integrity of marine ecosystems. Results of this work have provided evidence that human impacts on ocean ecosystems have been substantial, and helped to establish a deeper understanding of how society and marine ecosystems have interacted over time. The results of historical ecological analyses are frequently relevant to management and conservation of marine species and ecosystems, but the link between historical ecology and policy is only beginning to be discussed. This symposium will provide a forum for a diverse group of scientists and resource managers to discuss the application of historical data to marine conservation. Panellists will be invited to provide case studies or larger-scale analyses that bridge the science-policy by addressing the potential or actual inclusion of historical data into conservation assessments, ecosystem based policy, or management actions. The goals of this symposium are to: (1) highlight examples of the successful use of historical data in marine management, and (2) provide a forum for a lively interdisciplinary discussion of the potential application of historical data toward future conservation efforts.

55 **Conserving Deep-Sea Sponge Communities** Hourigan, TF

The last decade has seen a rapid expansion of scientific interest in deep-sea corals, resulting in action around the world to conserve these habitats and the biodiversity they support. There is growing recognition, however, that other deepwater biogenic habitats, especially sponge grounds, may play similar ecological roles and face similar threats. Internationally, the importance and vulnerability of these habitats has been highlighted by the Convention on Biological Diversity and in efforts to protect vulnerable marine ecosystems from impacts of fishing in areas beyond national jurisdiction. In North American waters, Canada and the United States have begun to develop strategic approaches to understand and conserve these habitats. Canada was among the first countries to protect deep-sea sponge reefs, and Fisheries and Oceans Canada (DFO) has, or is in the process of, developing conservation strategies or plans in three regions. In

2010, the U.S. National Oceanic and Atmospheric Administration (NOAA) released a Strategic Plan for Deep-Sea Coral and Sponge Ecosystems. Compared to deep-sea corals, our understanding of deep-sea sponges, in terms of distribution, biology, and importance as habitat for other species, is rudimentary. This symposium will review recent work on the science needed for their conservation, highlight recent research in the U.S. and Canada, and identify strategic approaches to enhance the protection of these unique communities.

60 **Sharing the water: Marine spatial planning implementation** Kruse, SA

The imbalance between natural and man-made environments is becoming increasingly visible in marine ecosystems. Climate change, changing land use patterns, population growth, and other stressors have led many entities to consider various approaches. Marine spatial planning (MSP) is gaining momentum as an effective means to protect sensitive marine ecosystems around the world. As exemplified by Nancy Sutley, Chair of the White House Council on Environmental Quality: without an improved, more thoughtful approach, we risk an increase in user conflicts and the potential loss of critical economic, ecosystem, social, and cultural benefits for present and future generations. One of the primary concepts to emerge from the Administration's new national ocean policy and academic literature is the need for planning processes to be transparent and include robust stakeholder participation and integration across management scales and sectors. This panel examines how MSP translates to the local level and includes lessons from efforts in British Columbia (BC), Oregon (OR) and Massachusetts (MA). In BC, many First Nations have mapped their ocean resources and created spatial plans, which will be integrated into a larger planning process for the coast of BC. Panellists also highlight a number of adaptable, spatially explicit, decision-support methods and tools for engaging stakeholders, collecting local knowledge, and assessing trade-offs between multiple objectives in OR and MA state waters.

66 **Marine managed areas effectiveness: Ecological and socioeconomic benefits** Tschirky, J.J.

Marine managed areas (MMAs) continue to be one of our most important tools for conserving marine resources, which are critical to human well-being. This symposium will address four focal areas critical to understanding the linkages between marine resource conservation activities and the benefits and costs it can provide to marine biodiversity and human well-being. (1) There is a diversity of approaches to the conservation of marine resources. Given the variety of ecological and socioeconomic situations in the coastal zone, we will discuss the types of management regimes that are most appropriate for compatible/sustainable resource use in these diverse situations. (2) Marine resource protection and conservation activities are expected to have positive ecological effects on marine species, communities and ecosystems. However questions remain as to whether this is in fact the case and exactly what techniques can be used to discern signals due to protection efforts that are distinct from natural variability. Discussion will address the issues of whether protection and conservation efforts yield needed benefits. (3) Effects of marine conservation on human well-being: There are costs and benefits of marine resource conservation on livelihoods, food security/health, and resource access rights. The economic valuation of marine managed areas in the tropics provides evidence of increased net economic returns, particularly from fishing and tourism and shows the potential income from marine conservation.

78 **Navigating Uncharted Networks: Recent Uses** Jacquet, J

of the Internet for Marine Science and Conservation

Today, information is more abundant and accessible than ever before, instead, it is the human attention span that is scarce. Many marine scientists and conservationists are adapting their communication styles to stay relevant and are increasingly using the Web and social networks to spread science and engage activists. Combining the perspectives of scientists, media experts, and activists, this symposium explores various uses of the Internet and other networks that are succeeding and failing in today's Attention Economy. This panel will explore specific marine conservation campaigns that rely on some sort of network, such as Greenpeace's Traitor Joe's campaign, Vancouver-based Shark Truth's Facebook driven campaign, the creation of the Oil Spill Crisis Map, and Atlantic Ocean smart buoys that communicate the presence of whales to prevent collisions with ships. We will also discuss the future relationship between the Internet, new media, and activism, explore upcoming citizen science campaigns, as well as ask what role video games will play in marine science and conservation.

90 **Evolving MPA Monitoring: Aligning Science & Policy** Whiteman, EA

MPA monitoring has traditionally focused on assessing differences in densities and sizes of organisms inside and outside MPAs, but this is insufficient to assess progress against broader ecosystem protection goals, which increasingly are the foundation of conservation policies worldwide. California is currently implementing a statewide network of MPAs with goals that include protecting ecosystem structure, function and integrity, providing a test-case for reframing MPA monitoring. The MPA Monitoring Enterprise has led development of a novel monitoring framework that includes using practical and informative indicators to track trends in ecosystem condition. Monitoring ecosystem-level change following MPA implementation offers feasible and efficient insight into many different system components and provides a road-map to integrate monitoring data and generate performance assessments that are useful to managers and the public interested in broad ocean health questions. This monitoring approach responds to the ecosystem-based policy framework but pushes the boundaries of our scientific knowledge. This session will explore new research methods being employed to increase our understanding of ecosystem structure and function and new tools being developed to report trends in ecosystem health. Presenters will describe their research and evaluate how their approaches may be applied to advance MPA monitoring and support adaptive management.

95 **Historical Ecology: Relevance for Policy and Restoration** Blight, L

The emerging field of historical ecology has unearthed surprising discoveries about the structure and function of past marine ecosystems and the long-term effect of human impacts. Modern-day conservation biologists try to limit and reverse detrimental anthropogenic effects when we manage complex issues such as fisheries, species and habitat loss, pollution, invasive species, and climate change. However, if these interventions are to bring about ecologically meaningful conservation gains it is necessary to consider them in the context of the natural range of ecosystem states. This symposium brings together a group of researchers who are using historical ecology to push our understanding of past conditions and to develop ideas of how this knowledge can help to define policy targets and restoration goals. Presentations will address historical changes in marine populations and ecosystems that are the current focus of

intense management and conservation interest: seabirds, fisheries, marine mammals, Antarctic seas, and polluted estuaries. Presenters will discuss how historical ecological knowledge can improve species conservation and ecosystem-based management. Presentations will also facilitate discussion on how we can balance or integrate seemingly disparate management and restoration goals of attaining a historical baseline, sustaining ecosystem function, and preserving biodiversity.

99 **Can Innovative Entrepreneurship Save Seafood and the Seas?** Garren, M.

This symposium will bring together innovators who apply unique entrepreneurial approaches to achieve sustainable seafood solutions. We will hear from those who have succeeded in transforming businesses to better align environmental, economic, and community sustainability goals. These individuals represent a broad range of players within the seafood industry: from restaurant owners to fishermen to academic researchers. Each speaker will present their unique approach-based on solid entrepreneurial principles to making fisheries and/or aquaculture more sustainable. They will highlight both the successes and the challenges that arise throughout the process of making change and speak to the incentives and motivations that drive and make possible this change. Audience participation will then take on a novel role as attendees will be given the chance to synthesize information through a series of both written and oral avenues. There will be discussion time with each speaker at the end of his/her presentation, and then the last 45mins of the symposium will be a larger interactive brainstorming session to pull themes from all of the presentations. The audience and panellists will then help identify what disciplinary expertise they would most like to see comprised within a think tank that could make significant forward progress within this field in the near future. In other words, what kinds of thinkers and expertise are needed to bring some of these ideas to scale, and to generate new ones, as quickly as possible?