Open House 2012 Agenda
Tuesday, May 1st, 2012, 3:00 - 5:30 pm
Halpern Centre, Room 126, Simon Fraser University - Burnaby

Community-Engaged Research:
Interconnected Problems Need Interconnected Solutions
Moderator: Jonathan Moore, Liber Ero Chair in Coastal Science and Management, SFU

3:00 – 3:05 pm Welcome: John Pierce, Dean, Faculty of Environment, SFU

3:05 – 4:15 pm Brief Overviews of Current Research

The Wicked Problem of Climate Change
Jonathan Moore, Liber Ero Chair in Coastal Science and Management, SFU

Weighing the Energy Options for British Columbia
Wendy Palen, Canada Research Chair in Aquatic Conservation, Biological Sciences, SFU
Craig Orr, Executive Director, Watershed Watch Salmon Society
Trish Panz, Councillor, District of West Vancouver

Aquaculture and the Protection of Wild Salmon
Rick Routledge, Professor, Statistics and Actuarial Science, SFU
Andy Wright, Member, Solutions Advisory Committee, Save Our Salmon Conservation Foundation

Freshwater Ecosystems
Jonathan Moore, Liber Ero Chair in Coastal Science and Management, Biological Sciences, SFU
Chris Darimont, Assistant Professor, Environmental Studies, University of Victoria

Marine Conservation
Francis Juanes, LiberEro Chair, University of Victoria
Nicholas Dulvy, Canada Research Chair in Marine Biodiversity & Conservation, Biological Sciences, SFU

Ecological Restoration
Leah Bendell, Director, Environmental Sciences, SFU
Michael Jackson, President, Acroloxus Wetlands Consultancy Ltd. and Chair, Board of Directors, Ruby Lake Lagoon Nature Reserve Society and Iris Griffith Field Studies and Interpretive Centre

Future Directions
Jonathan Moore, LiberEro Chair in Coastal Science and Management, SFU
Potential effects of the varnish clam, *Nuttallia obscurata*, on biogeochemical cycling in the intertidal

Kayi Chan, M.Sc. Candidate, Biological Sciences, SFU

The transport of marine organisms has been occurring since the advent of nautical travel. However, it is only in recent decades that the consequences of these introductions have begun to be understood. The varnish clam *Nuttallia obscurata*, an invasive bivalve, was first reported in the Pacific Northwest in the early 1990s. It is believed to have been introduced from its native habitat in Asia via ballast waters into Vancouver harbour, British Columbia. It has since spread rapidly at high densities (up to 800 individuals/m²) with a distribution spanning from Smith Sound, BC to Coos Bay, Oregon. A three-tiered approach consisting of a field survey (Tier I), a density manipulation experiment (Tier II) and a microcosm experiment (Tier III), was applied to determine the potential effects of the invasion of varnish clams on biogeochemical cycling in the intertidal. Field survey results showed that physical factors related to tidal height was the greatest predictor of bivalve densities (Tier I). While organic matter (OM) concentration was not significantly different in relation to density manipulations, there was a slight trend of high OM concentration in high density (800 individuals/m²) treatments when compared to controls (Tier II). Higher concentrations of OM could over-enrich sediments, which could lead to anoxia that would result in changes of redox-potentials in sediments. Significantly higher concentrations of ammonium, the result of excretory processes by the varnish clam (Tier III), were found in high density treatments when compared to the controls (Tier II). Nitrogen is a limiting nutrient in the marine environment and its inorganic form, ammonium, is preferentially used by phytoplankton and microphytobenthos, which form the basis of all marine food webs. The accumulation of OM and the resulting increase in ammonium could result in changes to the ecosystem functioning of the intertidal. As the varnish clam is often closely associated with the economically important Manila clam, *Tapes philippinarum*, the results of this research may have consequences for the aquaculture industry on the BC coast.

What is driving Fraser River sockeye dynamics?

Brendan Connors, Post Doctoral Fellow, Resource and Environmental Management, SFU

The enigmatic dynamics of Fraser River sockeye salmon populations have led to much uncertainty and debate about the relative influence of natural and anthropogenic factors in driving sockeye salmon population dynamics as well as a $25-million Judicial Inquiry by the Government of Canada. This poster highlights the findings of analyses that quantify the support for four key hypotheses for the drivers of sockeye dynamics: (i) delayed density-dependent processes in fresh water arising from high spawner abundance, (ii) coastal oceanographic conditions, (iii) pathogens (including transmission from farmed salmon) and (iv) interspecific competition with pink salmon in the open ocean.

How threatened are the world’s sharks?

Lucy Harrison, M.Sc. Candidate, Biological Sciences, SFU

Sharks and their relatives (skates, rays and chimaeras) have thrived on this planet for over 400 million years. However, in the past 100 years many species have experienced dramatic declines through the impacts of bycatch and targeted fisheries; these fisheries are driven by the high value of shark fins used for shark fin soup. The IUCN Shark Specialist Group works with 170 volunteer ecologists, conservation biologists and fisheries managers around the world to determine the threat status of all 1083 species of sharks as well as create Global Conservation Strategies for those species most at risk.

Authors: Heather Pettigrew, Lucy Harrison, Nicholas Dulvy, Biological Sciences, SFU
Comparison of the Growth Histories of Pre- and Post-Decline Brood Years of Sockeye Salmon (*Oncorhynchus nerka*) from Rivers Inlet Based on Otolith Analysis, and in Relation to Environmental Conditions

Claire Li Loong, M.Sc. Candidate, Statistics and Actuarial Science, SFU

The widths of growth zones recorded on otoliths of sockeye salmon (*Oncorhynchus nerka*) from Rivers Inlet were measured to assess the impacts of environmental conditions on growth at different life history stages. Otoliths from the pre-decline (1984–1987) and post-decline brood years (1997-2005) were compared. Post-decline juveniles were significantly larger than pre-decline individuals during the migration to sea, but grew less in the first marine year. Final size was not significantly different between time periods. Functional regression analyses were performed to investigate the relationship between otolith growth and sea surface salinity at McInnes Island. Otolith growth was positively correlated with salinity during September and October. Decreased salinity under a 30 ppt threshold appears to have contributed to recent unfavourable oceanic conditions.

Dam evolution: Rapid evolution of salmon migration in response to novel river barriers

Corey Phillis, Ph.D. Candidate, Biological Sciences, SFU

Dams are threats to migratory salmonids across their range; where dams bisect partially migratory populations, their persistence upstream requires adoption of the completely resident form. Whether fish in these populations undergo migrations is dependent on the genetic and or environmental conditions. Here we examine the evolutionary response and demographic consequences of selection against migration in partially migratory populations. In a common garden experiment we find evidence for genetic control of the migratory phenotype. Using these results, we parameterize a model to simulate demographic and evolutionary consequences of dam creation and removal. Our results inform our understanding of how migratory salmonids may respond to changes in landscape connectivity.

Authors: Corey Phillis, Biological Sciences, SFU; Devon Pearse, Fisheries Ecology Division, Southwest Fisheries Science Center, NOAA National Marine Fisheries Service and Jonathan Moore, Biological Sciences, SFU

Developing a decision-support tool for cumulative impacts of small hydropower (Run-of-River) projects

Viorel Popescu, Post Doctoral Fellow, Biological Sciences, Simon Fraser University

Renewable energy sources are being promoted at the global level to mitigate the effects of climate change and to meet increasing human demand for energy and food. In the past decade, small hydropower (Run-of-River) emerged as a renewable energy source with presumably low environmental impact. However, the poor understanding of the potential ecological consequences for aquatic and terrestrial biota and ecosystem services continues to fuel debates between the promoters and opponents of Run-of-River technology. By building a partnership between academia, industry, natural resource managers, and environmental groups, we aim to develop a spatial decision-support tool for prioritizing energy – environment land allocation in British Columbia. We are adopting a cumulative assessment framework, which integrates the potential effects of multiple Run-of-River projects, and synergies with other economic activities from both economic and ecologic standpoints. This transparent decision-support tool will articulate the tradeoffs that may exist between biodiversity conservation and renewable energy production under different development scenarios. The key result will be a scenario-based prioritization of watersheds that achieve both biodiversity conservation and power production goals based on economic potential, ecological integrity, or both.

Authors: Viorel Popescu, Wendy Palen, Janie Dubman, and Isabell Eischeid, Biological Sciences, SFU, Craig Orr, Watershed Watch Salmon Society; Pat Gallaugher, Centre for Coastal Science and Management, SFU and Mary Ruckelshaus, The Natural Capital Project
The biological basis of WCVI herring and salmon production variability
Ron Tanasichuk (DFO, retirement pending)
An euphausiid (krill)/zooplankton sampling programme has been monitoring fish prey variability for WCVI herring and salmon populations for over 21 years. That information, as well as information on the populations themselves (eg. salmon spawner abundance, herring egg deposition, salmon smolt production), and on predator and competitor abundances, have been used to learn the biological basis of herring and chinook, coho, chum, and sockeye salmon production variability. We are endeavouring to advance this work in two ways. First, there is an unprecedented opportunity to learn the biological basis of euphausiid/zooplankton production variability, to address one of the fundamental questions in oceanography, that is “How do the sun and the ocean ultimately affect marine animal production?” Second, we would use this new information, and the relationships that describe herring and salmon production variability, to evaluate the impact of changes in ocean climate on fish production, and to develop ecosystem-based management strategies with communities that will enable them to decide how the herring and salmon resources should be harvested.
Authors: Ron Tanasichuk (DFO, retirement pending), Richard Pawlowicz*, Evgeny Pakhomov*, and Maite Maldonado*. * - Earth and Ocean Sciences, University of British Columbia, Vancouver, B. C.

A Planet Under Pressure Film and Lecture Series 2011-2012
This series addresses the unprecedented global change we are facing. Its goal is to empower citizens by connecting them with scientists to mobilize positive change. Social Scientists and Scientists – using clear and accessible language – explored phenomena that are threatening the future of life on Earth as we know it and explored solutions for reversing these negative trends. This series will continue in 2012-13 with a focus on increasing world population in collaboration with faculty from Biological Sciences and Archeology at SFU. Continuing Studies in Science and Environment and Centre for Coastal Science and Management, SFU

Speaking for the Salmon Series
Since its inception in 1998, this series has examined issues impacting the survival of wild salmon in British Columbia. Programs include workshops, think tanks, community forums, proceedings and video presentations. Centre for Coastal Science and Management and Continuing Studies in Science and Environment, SFU

Functional and structural responses to metal-enriched leaf packs in small streams in British Columbia
Hazel Walling, M.Sc. Candidate, Biological Sciences, SFU
Metal pollution is a persistent global issue. Depositions of metals from vehicle exhaust and industrial activities are of significant concern in urban watersheds, and their impacts on stream community ecology are only beginning to be understood. How does metal-enrichment of basal food resources, such as plant leaves, impact the structure and function of stream invertebrate communities? We grew red alder (Alnus rubra) saplings under two metal-enriched treatments, corresponding to British Columbia’s interim sediment quality guidelines (ISQG) and probable effect level (PEL) for Cadmium, Zinc and Copper and used these leaves to construct leaf packs. We measured mass loss, invertebrate communities and nutrient ratios following immersion. Our results could have implications to organic matter cycling in contaminated freshwater ecosystems and highly impacted urban watersheds.
Authors: Hazel Walling and Leah Bendell, Biological Sciences, SFU