

FISHBYTES

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Following juvenile salmon into the blue: assessing marine mortality

by Michael Melnychuk and Erin Rechisky

Abundances of many salmon populations have declined on the west coast of North America over the past few decades, having had catastrophic biological and socio-economic impacts. These declines are probably largely due to decreases in natural survival rates of juvenile salmon out in the ocean, before fishing ever takes place. The biggest, blackest hole in determining causes for these declines has been a lack of understanding of the basic early ocean life history of salmon: where they spend their time; when they migrate offshore; what and how much they eat; and where and when they die.



the movements of individual fish can be tracked during their migration through nearshore waters. With careful design of the hydrophone arrays, migration routes can be reconstructed and survival rates of populations can be estimated.

The Pacific Ocean Shelf Tracking project (POST, www.postcoml.org), headed by former D.F.O. scientist David Welch, has just begun to address questions related to juvenile salmon mortality and large-scale migration patterns for many salmon populations from Oregon to Alaska. Currently, the project is centred on studying populations that migrate through the inshore waters of Georgia Strait, Queen Charlotte Strait, Juan de Fuca Strait and Puget Sound on their way offshore or further north along the continental shelf. Besides ourselves, several UBC researchers are working closely with the project as advisors or working group members, including Carl Walters, Bruce Ward, Scott McKinley, Villy Christensen and Scott Hinch. We just completed our second field season, having tagged over 1600 salmon smolts among 18 populations from the Snake River, Idaho, to the northern tip of Vancouver Island.

We recently presented some of our initial results from the 2004 field season at the American Fisheries Society Annual Meeting in Anchorage, AK. We showed that on average, about one-third of tagged smolts died during their downstream migration and another third died during their early ocean migration, although considerable variability existed among populations. Much of this variation in mortality was attributed to simple differences among populations such as fish body length and total migration distance, but some observations were puzzling. While steelhead and sockeye salmon populations tended to

Studying small, migratory fish in a big ocean can be rather difficult. Advances in acoustic telemetry technology, however, have led to tags small enough to be surgically implanted into juvenile salmon during their downstream migration. By deploying a series of hydrophone receivers on the seabed and using unique tag codes,

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migrate quickly out of the Strait of Georgia, most going northwards, coho salmon essentially disappeared once they reached the Strait, either suffering extremely high mortality in the Strait or residing throughout the summer and

early fall, before leaving for offshore waters. Areas of high mortality for some populations included large rivers like the Fraser and Squamish, the constricted waterways of Johnstone Strait and possibly the Strait of Georgia for coho salmon.

See Figures 1 and 2 for examples of migration routes and survival measurements of Cheakamus River steelhead and the endangered Cultus Lake sockeye. Stay tuned for this year's results once we've retrieved our sensors from the seabed!

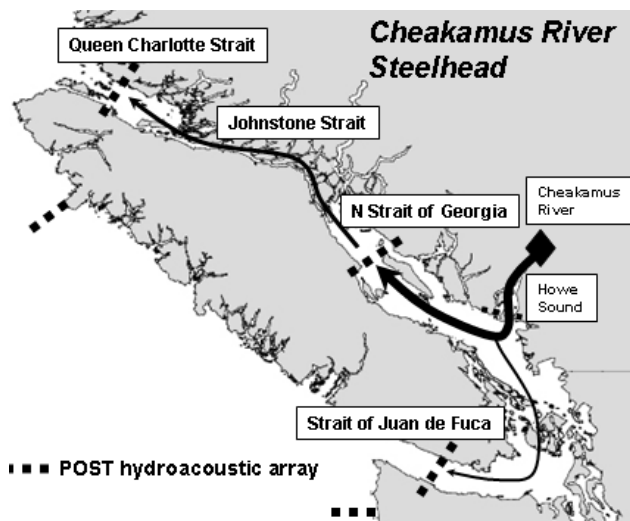


Figure 1. Cheakamus River steelhead. In 2004, 51 Cheakamus River steelhead smolts were surgically implanted with acoustic transmitters. 75% of the fish were detected at the Squamish River mouth, and most of these fish were subsequently detected in Howe Sound. The majority of the fish that survived were detected in the Strait of Georgia and about 20% survived to the Queen Charlotte Strait line. However, a small percentage was also detected leaving via the Juan de Fuca Strait.

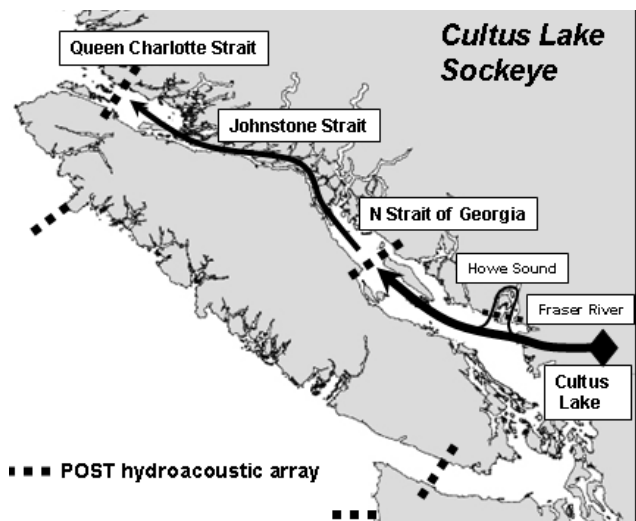


Figure 2. Cultus Lake Sockeye. In 2004, 100 Cultus Lake sockeye smolts were surgically implanted with acoustic transmitters. 61% of the fish were detected at the mouth of the Fraser River; half of these fish were detected on the northern Strait of Georgia acoustic line and 13% of fish survived to leave via the Queen Charlotte Strait line. Several fish were also detected in Howe Sound before continuing their migration through the Strait of Georgia system. The minimum travel time from release in Cultus Lake to detection on the Queen Charlotte Strait line (distance ~500 km) was 30 days.

NGOs and young researchers: a roundtable talk

by Line Bang Christensen

An objective of the recent workshop 'Evaluating Marine and Fisheries Information Needs of NGOs', sponsored by the Sea Around Us project and the Lenfest Ocean Program (see Sea Around Us Issue 31, pp3-4), was to better link NGOs and researchers - including future researchers. To meet this objective, we hosted a student-initiated roundtable discussion at the conclusion of the Sea Around Us program on October 6th, 2005. The roundtable included a panel of five representatives from the NGO sector: Helen Fox from WWF; Hugh Govan from the Foundation of the Peoples of the South Pacific International; Mike Hirshfield from Oceana; Paul Johnston from Greenpeace; and Jeffery Young

from the David Suzuki Foundation.

The event was motivated by the realization that an opportunity to meet with individuals actively engaged in advocating change - in the face of the often-disheartening state of the environment - would be of great value to students in fisheries management, resource management and environmental programs. Many of us are interested in seeing our theses and research efforts put to use and are looking for ways to collaborate with NGOs. The discussion started off with panel-members briefly introducing themselves and describing what they do and the path that took them there. We then moved to a series of questions including: how to foster collaboration

between students and NGOs; competences for young researchers; areas where graduate work is missing; and subtle barriers. Each of the panel members managed to bring complementary perspectives to the issues and engaged the audience in a focused discussion. We wrapped up the evening with cocktails in the atrium, enabling students, faculty and NGO members to network in an informal setting before we bid our guests goodbye.

We would like to thank Margaret Bowman of the Lenfest Ocean Program (www.lenfestocean.org) for supporting this initiative; the NGO representatives; and all the individuals who participated in making this event a success.



Amanda Vincent wins Chevron Conservation Award

We are very pleased to announce that Dr Amanda Vincent, Director of Project Seahorse, has been honoured as one of six Environmental Heroes at the 51st Annual Chevron Conservation Awards.

The winners were selected by an independent panel of six conservationists. Through recognition of award-winning conservation efforts, the Chevron Conservation Award aims to educate and inspire others to preserve natural resources around the world.

Since its founding in 1954 by acclaimed outdoors writer Ed Zern, the Chevron Conservation Awards have

honoured more than 1,000 volunteers, professionals and organizations for their practical and creative solutions to environmental challenges. Besides Dr Vincent, this year's honorees are Liza Gadsby and Peter Jenkins (Pandrillus Organization, west Africa); Programa de Manejo Sostenible de Ecosistemas (Mexico); The Solar Electric Light Fund (USA); Roxanne Kremer (International Society for the Preservation of the Tropical Rainforest/Preservation of the Amazonian River Dolphin, Peru); and Orangutan Foundation International (Indonesia). For more information see www.chevron.com/news/press/2005/2005-10-29.asp.



News and Notes

Welcome

Please join us in welcoming **Fang Gao** to the Fisheries Centre. She is a graduate from UBC Computer Science and will be working on the Lenfest Ocean Futures Project (www.lenfestoceanfutures.org), funded by the Lenfest Ocean Program (www.lenfestocean.org). As part of this project (whose members include Daniel Pauly, Rashid Sumaila, Carl Walters, Steve Martell, Jackie Alder, Sherman Lai, Jeroen Steenbeek and Joe Buszowski) a new generation of the *Ecopath* with *Ecosim* software system will be developed, as well as new facilities for visualization of the results. Fang will primarily be responsible for the new interface for *Ecopath* with *Ecosim*.

Megan Bailey is a Master's student with Rashid Sumaila. Born and raised in London, Ontario, Megan completed her undergraduate degree in zoology at the University of Western Ontario. After graduating, Megan enjoyed field work in South America and on the Gulf Islands. She is now switching her focus, and will be researching the economic value of marine ecosystems in West Papua, Indonesia.

Cedar Chittenden is a graduate student with Scott McKinley, researching tag effects and salmon migration for the POST project (see pp. 1-2). She studied biology and archaeology at SFU and in Fiji and, for the last two years, has been with the Alberta Conservation Association running amphibian programs, assisting with fisheries assessments and acquiring land for the Suncor EF boreal habitat conservation initiative.

Meaghan Darcy is a PhD student with Steve Martell. She will be studying metapopulation dynamics of groundfish in the Northwest Hawaiian Islands. Prior to this she was studying the feasibility of using red snapper as a target species for stock enhancement in the Gulf of Mexico (Florida) at Mote Marine Laboratory. Meaghan has a Master's degree from North Carolina State University and a BA from Smith College.

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New Working Paper Series

We are pleased to announce a new Fisheries Centre Working Paper Series. The Working Series will serve as a 'placeholder' for papers that are destined for publication in the primary literature. Such a series will help to make Fisheries Centre work available to our colleagues in a timely fashion and well before the works appear in the primary literature. It will also help us to obtain timely comments from colleagues. Other advantages of having a Working Paper Series are:

i) Papers in the series can be indexed, e.g., in ASFA, EconLit, and other databases, making them much more accessible. This is done commonly with economics working papers; and

ii) The ability to cite a working paper before it is officially published.

Current titles in the series and instructions for submitting a manuscript can be viewed at www.fisheries.ubc.ca/publications/working/.

Morrow Scholarship 2005

The winner of this year's Cecil and Kathleen Morrow scholarship is Fisheries Centre graduate student and editor of this newsletter, Robyn Forrest.

The scholarship is the result of a generous endowment by Cecil B. Morrow, awarded annually to the student with the best academic travel proposal for research work using techniques developed at the Fisheries Centre. Robyn will use the award to travel to the Commonwealth Scientific and Industrial Research Organisation in Tasmania, Australia, to compare the predictions of two structurally different types of ecosystem model (*Ecopath* with *Ecosim* and *Atlantis*). Emphasis will be placed on modelling the effects of trawling on low-productivity species, particularly dogsharks, which have undergone significant decline on the south-east Australian shelf since the 1970s.

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Pramod Ganapathiraju is a PhD student with Tony Pitcher. He has a Master's degree in Oceanography from India and recently completed an MSc in Marine Management at Dalhousie University. He has worked on molluscan diversity, marine fish biodiversity and participatory fisheries management in coral reef and mangrove ecosystems in the south east Bay of Bengal for four years. His current research interest is the impact of tsunami rehabilitation projects in the fisheries sector in India.

Jennifer Jacquet is a PhD student with Daniel Pauly. She holds an MSc in environmental economics from Cornell University and joins the *Sea Around Us* project to analyse the effects of underestimation of small-scale fisheries to GDP.

Aaron Keech from Detroit, Michigan, is studying under Andrew Trites. He is looking at fecal stress and reproductive hormones in relation to the diet of Stellar sea lions.

Josh Korman is a fisheries biologist and systems ecologist. Since completing his MSc in biological oceanography in 1989 at UBC, he has worked as an environmental consultant and Research Associate at SFU, working mostly with computer modelling, quantitative fisheries stock assessment and design and evaluation of large scale field experiments in support of Adaptive Management. His PhD, under Steve Martell, focuses on how recruitment, growth, survival and movement of juvenile rainbow trout are influenced by flow in the Colorado River in the Grand Canyon.

Steve McAdam is a PhD student with Carl Walters. He is interested in the impacts of hydroelectric dams on riverine fishes and his PhD work will focus on the recruitment failure of white sturgeon in B.C., with emphasis on diagnosis and restoration in the Nechako and Columbia Rivers.

Kerrie O'Donnell joins Project Seahorse as a PhD student with Amanda Vincent. Kerrie will investigate key life history parameters and ecology of seahorses, and combine this information with trends in fishing pressure to assess population viability. She received her BA with Honors in Environmental Studies from Brown University in 2002 and has spent the past three years working in collaboration with

fishermen to study both lobster ecology and Atlantic cod migration patterns.

Chiara Piroddi has an Environmental Science degree from the University "Ca' Foscari" of Venice (Italy) and she is collaborating with an Italian NGO Institute (Tethys Research Institute) for the conservation of the marine mammals in the Mediterranean Sea. She is a Master's student under Villy Christensen and will evaluate the applicability of *Ecopath with Ecosim* on three different areas of the Mediterranean Sea.

Divya Varkey has a Master's degree in fisheries resource management from the Central Institute of Fisheries Education, Mumbai, India. She is now starting a PhD with Tony Pitcher and is interested in studying ecosystem based management of tropical fisheries.

Chad Wilkinson comes from Elk Valley in southeastern B.C. and completed his undergraduate degree at the University of Victoria. His Master's work, under the guidance of Steve Martell, will be to conduct a much needed investigation into the population ecology of bull trout in the Elk River, B.C.

Congratulations



Congratulations to *Sea Around Us* Senior Research Fellow **Dirk Zeller** and his wife **Carole Eros** on the birth of their baby boy **Kai Zeller**, who arrived on October 2, 2005 at 3.59 am, weighing a healthy 8 lbs 1 oz. Kai means "ocean" in Hawaiian and "good" in Chinese. Please join us in wishing the new family every happiness in their life together.

Congratulations to **Dr Katia Freire** who successfully defended her PhD thesis, "Fishing impacts on marine ecosystems off Brazil, with emphasis on the northeastern region", on September 13, 2005. Katia is currently working as a consultant for the Fisheries Department in Brazil.

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Our mailing address is UBC Fisheries Centre, Aquatic Ecosystems Research Laboratory, 2202 Main Mall Vancouver, British Columbia, Canada, V6T 1Z4. Our fax number is +1 (604) 822-8934. All queries, reprint requests, subscription requests and address-changes should be sent to Robyn Forrest, *FishBytes* Editor, at the above address, or by email to

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