

## Elective Courses Available for Fisheries Students

### REM 613 Methods in Fisheries Assessment

Methods of data analysis; models of fish population dynamics; provision of scientific advice on productivity and status of fish stocks.

### REM 614 Advanced Methods for Fisheries Stock Assessment

Dynamic models of harvested populations and fisheries observations; simulation/estimation approaches to test performance of stock assessment algorithms and procedures.

### REM 612 Simulation Modelling in Natural Resource Management

Construction of computer simulation models; application to environmental and resource systems.

### REM 625 Risk Assessment and Decision Analysis for Management of Natural Resources

Methods for quantifying uncertainties and risks and for evaluating decision options.

### REM 609 Evaluation of Management Strategies for Living Resources

Approaches for designing management systems for living resources; open-loop and closed-loop (feedback) control; passive and adaptive management; evaluation of approaches using control system computer simulations.

### REM 661 Applied Quantitative Ecology

Methods for statistical analysis of ecological processes in a management or decision-making context; abundance and survival estimation; linear and generalized linear models; resource selection models.

### STAT 650 Quantitative Analysis in Resource Management and Field Biology

Use of statistical methods with special emphasis on experimental design, survey techniques, and construction of statistical models.

Other core courses are required for both Masters and Ph.D. students.  
See the REM web site at <http://www.rem.sfu.ca>



## Contact Us

For more information on the Fisheries Science and Management Research Group, visit  
[www.rem.sfu.ca/fishgrp](http://www.rem.sfu.ca/fishgrp)

or contact:

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For information about applying to a graduate program offered by the School of Resource and Environmental Management (REM), visit the School's web site well before the deadline of 1 February:

<http://www.rem.sfu.ca/>



Photo:  
R. Peterman



Photo:  
R. Peterman



Photo: K. Holt



FISHERIES RESEARCH AT  
SIMON FRASER UNIVERSITY

Faculty of Environment

The Graduate School of Resource and Environmental Management at Simon Fraser University (SFU) is located on a hilltop 12 kms from downtown Vancouver, British Columbia, Canada. The overall objective of the **Fisheries Science and Management Research Group** is to improve the understanding and management of fish populations by doing research on scientific topics that are directly applied to fisheries management.

## 10 Reasons to Come to SFU

1. Be part of SFU's applied, interdisciplinary graduate school in resource management.
2. Our fisheries faculty members have experience applying their research internationally.
3. Carry out challenging scientific research in any of a wide variety of fisheries topics.
4. Join a research group that has won international awards and receives substantial funding.
5. SFU has a high-end fisheries research computer lab.
6. We have a 32-foot (9-m) research vessel, remotely operated underwater vehicle, and wet/dry labs.
7. Find excellent job opportunities after graduation.
8. Gain work experience through a graduate-level Co-operative Education Program.
9. SFU has a great academic reputation.
10. British Columbia's outdoor lifestyle is awesome. They don't call us 'Beautiful British Columbia' for nothing!

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## 1. Applied fisheries research in an interdisciplinary graduate school

The School of Resource and Environmental Management (REM) is a graduate school that offers internationally recognized Masters and Ph.D. degrees and post-doctoral positions. The School currently has about 100 graduate students and a core of 13 full-time faculty.

Fisheries students gain in-depth expertise in applied fisheries science and management through graduate courses and a research project. In our interdisciplinary program, students can obtain broad training in topics such as resource economics, simulation modelling and statistics, risk assessment and decision analysis, environmental contaminants, benefit-cost analysis, conflict resolution, co-management, and environmental law. Such an interdisciplinary approach is highly valued by students and employers. Read past students' comments at:

[http://www.rem.sfu.ca/about\\_rem/student\\_comments](http://www.rem.sfu.ca/about_rem/student_comments).

## 2. Faculty with applied international experience

The three main fisheries faculty members in REM, Randall M. Peterman, Sean Cox, and Andy Cooper, have considerable experience working with, and applying their research in, fisheries science and management agencies. These include: United Nations Food and Agriculture Organization, International Council for the Exploration of the Sea, Canada Department of Fisheries and Oceans, U.S. National Marine Fisheries Service, Pacific Salmon Commission, Great Lakes Fisheries Commission, South Atlantic Fishery Management Council, and various provincial and U.S. state fisheries agencies. Researchers from the Salmon Assessment and Freshwater Ecosystem Division of Fisheries and Oceans Canada are located full-time at SFU in the Cooperative Resource Management Institute (<http://www.rem.sfu.ca/crmi>). To promote the sustainable use of aquatic resources, we also do research with industry harvesters' associations and conservation organizations.

## 3. Challenging scientific research

Our long-term research objective is to improve management of aquatic systems. To do so, we pursue applied research directly related to management problems in three broad areas covering marine invertebrates, salmon, amphibians, sablefish, rockfish, other groundfishes, tuna, and marine mammals. We conduct both field and laboratory research, and use computer modelling. Examples of the research carried out in the fisheries group by graduate students, faculty, post-doctoral fellows, and research assistants include:

- (1) Key processes affecting fish populations & aquatic ecosystems
  - Fish population dynamics

- Environmental causes of variation in survival and growth rates in fishes
- Dynamic responses of commercial and recreational fishing fleets
- Ecosystem effects of fishing, both direct and indirect
- Fisheries management from an ecosystem perspective
- Effects of uncertainties on management regulations
- Effects of land use on fish habitat

- (2) Methods for estimating parameters and quantifying uncertainties in conservation and management
  - Stock assessment methods for new and data-poor fisheries
  - Combining multiple sources of information
  - Maximum-likelihood methods for estimating recruitment from survey data
  - Multi-stock Bayesian hierarchical models
  - Kalman filters for tracking time-varying fish productivity arising from changes in climate and the environment
  - Effects of regulations, bycatch, and discarding behaviour on marine biodiversity
  - Pre-season forecasting of abundance
- (3) Approaches to dealing with uncertainties
  - The Precautionary Approach
  - Advanced quantitative methods to evaluate management and conservation options
  - Evaluation of stock assessment and management approaches using simulation models
  - Risk assessment, Bayesian methods, decision analysis, Monte Carlo simulations, and decision support models
  - Development of limit reference points and decision rules for the conservation and management of depleted fish stocks
  - Aquatic conservation and marine protected areas
  - Biological and economic analysis of uncertainties about lake fertilization
  - Rotational harvest strategies and sampling designs for marine invertebrates
  - Management of freshwater recreational fisheries and marine commercial fisheries
  - Design of innovative monitoring programs in the context of climatic change

## 4. Awards and funding

REM fisheries researchers have earned national and international recognition, including:

- The Robert L. Kendall award for the Best Paper published in 2005 in Transactions of the American Fisheries Society
- The W.F. Thompson Award (1994) from the American Institute of Fisheries Research Biologists for a student publication judged to be the "...best contribution to knowledge"
- The 1990 J.C. Stevenson Award for a "...researcher at the cutting edge of an aquatic discipline"
- A citation from the American Fisheries Society for "...the most significant paper in the 1992 North American Journal of Fisheries Management"

Research is supported through scholarships, fellowships, and grants from the Natural Sciences and Engineering Research Council of Canada, the Canada Foundation for Innovation, and SFU, as well as contracts from several natural resource management agencies and conservation organizations, such as the Gordon and Betty Moore Foundation (San Francisco).

## 5. Computer Laboratory for Fisheries Risk Assessment and Management

SFU has a computer Laboratory for Fisheries Risk Assessment and Management to facilitate research in leading-edge quantitative methods in fisheries science and management. This large facility, consisting of high-end computers, helps researchers and policy makers develop and test advanced quantitative models of complex management problems.

## 6. Aquatic Ecosystem and Remote Sensing Research Laboratory

REM has a new \$1,000,000 remote sensing laboratory to support state-of-the-art field research aimed at improving monitoring and management of aquatic ecosystems. The laboratory includes fisheries wet/dry labs, a 32 ft. (9.8 metre) research vessel, a submersible/ROV rated to 2000 ft. (600 m), and hydroacoustics and sonic tracking equipment.

## 7. Excellent job opportunities

The applied, interdisciplinary training of students in the School has enabled fisheries science and management students to secure jobs in private consulting firms, federal and provincial government agencies, international agencies, First Nations tribal councils, and universities. Some REM fisheries students have gone on to Ph.D. degrees, post-doctoral fellowships, and faculty positions.

## 8. Co-operative Education Program

REM's optional graduate Co-operative Education Program provides opportunities for students to gain professional experience in applied problem solving by working in government or private resource management organizations before graduating (e.g. Environment Canada, Fisheries and Oceans Canada, Parks Canada, B.C. Hydro, B.C. Ministry of Forests, and other B.C. government ministries).

## 9. SFU's reputation

SFU consistently ranks as one of the top institutions in annual surveys of Canadian universities.

## 10. British Columbia's outdoor lifestyle

B.C. is world famous for its spectacular landscape and wildlife. Our students enjoy many outdoor activities, including hiking, skiing, kayaking, rock-climbing, surfing, and outdoor adventure.