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An Overview of the Ocean Production Enhancement Network (OPEN)

by

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The Ocean Production Enhancement Network (OPEN) is one of fifteen networks of Centres of Excellence funded in 1990 by Industry Science and Technology Canada. Network participants include scientists from Memorial University of Newfoundland, Laval University, Dalhousie University, McGill University, the University of Quebec at Rimouski, the University of British Columbia, Simon Fraser University, and the Department of Fisheries and Oceans. The network also benefits from the active participation of Canada's three largest seafood companies: National Sea Products, Clearwater Fine Foods, and Fishery Products International.

OPEN is organized around the concept of fisheries as ecological production systems. The goal of the network's research program, as set out in the agreement signed by the partners, is to investigate the processes which control the survival, growth, reproduction, and distribution of fish and shellfish. The research program is primarily focused on two species, the sea scallop (*Placopectin magellanicus*) and Atlantic cod (*Gadus morhua*), which were chosen in consultation with the network's industrial partners. These species represent a large fraction of landed value of the east coast fishery and are also considered good candidates for aquaculture.

The research program is concerned not with how many fish or shellfish are available to be caught today or next year, but with a detailed understanding of the physical and biological processes which govern their production and with the use of this knowledge in the interests of enhancing their production and improving the quality of management decisions related to their exploitation. The scallop projects include a number of investigations with almost immediate applications to scallop culture and production enhancement. The finfish programs will contribute to greater efficiency in the capture fishery through improved forecasting of recruitment, growth, and distribution. The twenty-nine projects which form the research program involve both laboratory and field studies. Most projects incorporate both a laboratory and a field component. The techniques to be used in the field will be calibrated in the laboratory while observations from the field will be confirmed and extended in the laboratory. In much the same way, physical oceanographic modelling will be supported by large scale data collection programs in the field.

OPEN differs from other large scale oceanographic and fisheries research initiatives because it addresses questions of fundamental long-term interest to the fishing industry. Representatives of the Canadian seafood industry have been partners in the network from its initiation. The composition of the network recognizes that no one university of any region has a monopoly on expertise in this area, and that none alone could support the development of such expertise. Unlike most fisheries programs which are carried out primarily by fisheries biologists, OPEN brings together geneticists, physiologists, molecular biologists, marine ecologists, and physical oceanographers working together in partnership in a genuinely integrated program of research.

The following are the projects currently underway in the OPEN Program:

Fish

Recruitment Determination

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| - Birthdate frequency distribution of cod survivors | Fortier (Laval) |
| - Genotype-dependent survival in larval cod | Taggart (Dal) |
| - Lipid content and survival of larval cod | Frank (BIO) |
| - Phenotypic correlates of survivorship | Leggett (McGill) |
| - Behavioral ecology of larval cod | Brown (MUN) |
| - Fish larval recruitment and zooplankton dynamics | McLaren (Dal) |

Fish Distribution and Availability

- Large-scale density distributions of Atlantic cod Rose (DFO, Nfld.)
- Small-scale density distributions of Atlantic cod Schneider (MUN)
- Meso-scale density distributions of Atlantic cod Dickie (BIO)
- Covariation in marine survival, growth and maturation of salmon Peterman (SFU)
- Oceanographic factors, recruitment and distribution of fishes in the Hecate Strait, B. C. Walters (UBC)
- Mitochondrial DNA differentiation of inshore and offshore cod populations Carr (MUN)

Marine Fish Growth and Production

- Heritability and genetic correlations of physiological traits Boutilier (Dal)
- Cold water adaptation in Atlantic cod Fletcher (MUN)

Physical Oceanography: Monitoring and Modelling

- Larval tracking on the Scotian Shelf Thompson (Dal)
- Particle trajectories and ocean diffusion Sanderson (MUN)
- Circulation and density field of the Newfoundland-Labrador Shelf and Slope: observations de Young (MUN)
- Circulation and density field of the Newfoundland-Labrador Shelf and Slope: modelling Greatbatch (MUN)
- Scallop production in Mahone Bay Bowen (Dal)
Hay (MUN)
- Scallop studies in the Baie des Chaleurs Ingram (McGill)
El-Sabh (UQAR)
- Oceanographic hindcasting in Hecate Strait LeBlond (UBC)
- Ocean probe Bowen (Dal)