The Arctic cod (*Boreogadus saida*) ecosystem under the double pressure of climate change and industrialization

Summary

Project Leader

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The Arctic cod (*Boreogadus saida*), also known as the polar cod in Europe, is a key component of the Arctic Ocean pelagic ecosystem that effects up to 75% of the energy transfer between the plankton and the vertebrate fauna (fish, seals, whales and marine birds). Being an hyper-specialist adapted to life in ice-covered seas, Arctic cod is likely to be displaced by southern generalists such as the capelin and the sandlance as the ice regime becomes less severe. This project collaborates closely with 'Hotspots', 'Moorings' and 'Sea-ice' to map the distribution and migrations of Arctic cod populations in the Canadian Arctic, and to measure variations in hatching season and early growth in relation to annual changes in ice regime, surface temperature, and zooplankton prey abundance. In partnership with the Department of Fisheries and Oceans, and the Department of Aboriginal Affairs and Northern Development (Beaufort Regional Environmental Assessment program), we assess the general distribution and reproduction of Arctic cod in the Beaufort Sea and its response to climatic and anthropogenic pressures.

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Canadian Scientific Submersible Facility

Publications

Articles Published in Refereed Publications

Benoit, D., Simard, Y. and Fortier, L., 2014, Pre-winter distribution and habitat characteristics of polar cod (Boreogadus saida) in southeastern Beaufort Sea., Polar Biology. 37, 149-163, Published

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Falardeau, M., Robert, D., and Fortier, L., 2014, Could the planktonic stages of polar cod and Pacific sand lance compete for food in the warming Beaufort Sea?, ICES Journal Marine Sciences, DOI: 10.1093/icesjms/fst221, Published

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Other Refereed Contributions

Fortier, L., Darnis, G., Robert, D., Link, H., Geoffroy, M., Forest, A., Wold, A., Archambault, P., Piepenburg, D., Hop, H., Falk-Petersen, S., 2012, Pelagic and Benthic Foodwebs, Circumpolar Flaw Lead Study, chapter 4, , Submitted

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Fortier, L., Ferguson, S.H., Archambault, P., Matley, J., Robert, D., Darnis, G., Geoffroy, M., Suzuki, K., Falardeau, M., Harwood, L.A., Slavik, D., Grant, C., Link, H. and Asselin, N., 2013, Chapter 4. Arctic Change: Impacts on Marine Ecosystems. ArcticNet Integrated Regional Impact Assessment for the Canadian Eastern High Arctic., ArcticNet IRIS - 1, , Accepted

Non-Refereed Contributions

Darnis, G., Fortier, L., 2011, Respiration zooplanctonique et exportation du carbone en profondeur dans le golfe d'Amundsen (Océan Arctique), Annual General Meeting of Québec-Océan, Lac Delage, Québec, 17 November, , Accepted

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Forest, A., Robert, D., Fortier, L., Stemmann, L., Picheral, M., Burdorf, L., Sampei, M., Miquel, J.C., Babin, M., 2011, Zooplankton community structure during the Ajurak-Malina campaign 2009: a multi-methodological approach, Malina Plenary Meeting, Villefranche-sur-Mer, 10 May, , Accepted

Forest, A., Stemmann, L., Picheral, M., Sampei, M., Fortier, L., Raimbault, P., Joux, F., Babin, M., 2011, Malina 2009: oceanographic context, carbon fluxes and first steps toward an integrative study, Malina Plenary Meeting, Villefranche-sur-Mer, 9 May, , Accepted

Fortier L., 2012, Changing Arctic ecosystem services: from knowledge to decision at regional and local scales, Invited plenary lecture. International Polar Year Montreal Conference 2012, Montreal, , Accepted

Geoffroy, M., Rousseau, S. Pyc, C., Fortier, L., 2011, Utilisation d'un sonar halieutique (Simrad SX90) pour l'étude des niveaux trophiques supérieurs de l'écosystème marin arctique, Assemblée générale annuelle de Québec-Océan, Lac Delage, 17-18 November, , Accepted

Geoffroy, M., Rousseau, S., Pyc, C., Fortier, L., 2011, Searching for the missing cod using hydroacoustic technology, Beaufort Regional Environmental Assessment (BREA) Day, Inuvik, 5 December, , Accepted

Miquel, J.C., B. Gasser, I. Tolosa, J. Martin, N. Evensen, S. Fiorini, A. Forest, L. Fortier, M. Babin., 2012, Carbon fluxes and sources of organic matter in late summer in the Southern Beaufort Sea., Proceedings from the International Polar Year (IPY) 2012 Conference, Montreal, Canada, , Accepted

Pyc, C., Geoffroy, M., Rousseau, S., Reier Knudsen, F., Gammelseter, O.B., Levesque, K., Fortier, L., 2011, Canadian Beaufort Sea Active Acoustics Research project, BP external advisory panel meeting, Tampa, 24 November, , Accepted

Robert, D., Falardeau, M., Suzuki, K., Fortier, L., 2011, Investigating trophic interactions between larval Arctic cod (Boreogadus saida) and their zooplankton prey in the rapidly warming Beaufort Sea, 35th Annual Larval Fish Conference, Wilmington, 24 May, , Accepted

Specialized Publications

Benoit, D., 2012, Océanographie, distribution et cycle annual de la more arctique (Boreogadus saida) en mer de Beaufort: une approche hydroacoustique, Ph.D. thesis, Université Laval, Canada, , Accepted

Robert, D., Grant, C., Gagnon, J., 2011, Data from the environment and marine resources assessment of Imperial Oil/BP Exploration License Areas 446, 449, 451 and 453 (Beaufort Sea), in the summers of 2009, 2010 and 2011, Québec, Canada, 74 pp., Published

Thanassekos, S., 2011, Modélisation individu-centrée de la croissance et de la survie larvaire de la morue arctique (Boreogadus saida) dans deux polynies, Ph.D. thesis, Université Laval, Canada, 114 pp., Published