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Book Review

A LITTLE LESS ARCTIC: TOP PREDATORS IN THE WORLD'S LARGEST NORTHERN INLAND SEA, HUDSON BAY. Editors: Steven H. Ferguson, Lisa L. Loseto, & Mark L. Mallory. Springer Science+Business Media, 2010. ISBN 978-90-481-9120-8, 308 pp.

With the publishing of *A Little Less Arctic*, Ferguson, Loseto, and Mallory have edited a volume they refer to as a tribute to the scientists, students, and northerners who have worked for decades trying to learn more about the top predators of Hudson Bay (from the "Dedication"). This book is a diverse compendium of work from a multitude of scientists, examining various predatory species in the Arctic versus the effects of climate change and the history and projected future of the Hudson Bay. One of the first issues to be examined by several groups of investigators is the ever-changing issue of climate change and Arctic sea ice, and the impact it has on the Hudson Bay complex, and how some of the climate-sensitive factors affect species ecology. The work of Stewart and Barber examines parameters such as water circulation, mass water characteristics, seawater movement, tides, and other factors that result in significant impacts to plants and wildlife in the Hudson Bay. Hochheim, Barber, and Lukovich examine changing sea ice conditions (such as sea ice extent, changes in freeze-up and break-up dates, and air temperatures) in Hudson Bay, taking a historical perspective starting in 1980 and going through 2005. I really like the fact that this book starts with an assessment of climate conditions (water, sea ice, circulation and tides, to name a few) as I feel that reading these two broad papers gives the reader a chance to orient themselves with the area and the factors that have influenced the various species in Hudson Bay.

Beluga whales play an important role in the ecology of Hudson Bay, and Kelley, Loseto, Stewart, and Yurkowski examine the unique dietary habits of these animals by comparing the fatty acid profile of two species of forage fish—Arctic cod and capelin, while Westdal, Richard, and Orr take up the northern Hudson Bay narwhal's migration route. The latter study involved satellite-linked tracking of nine narwhals between August 2006 and 2007, as well as consulting hunters and elders in the community of Repulse Bay, in order to gather traditional ecological knowledge of the area. As with previous papers included in *A Little Less Arctic*, this paper acknowledges the importance of changing sea ice and the impact thereof.

Polar bears, killer whales, and ringed seals are scrutinized in the next succession of papers. In the study of polar bear ecology, Peacock, Derocher, Lunn, and Obbard state that, although climate change and sea ice issues around the whole of the circumpolar range of the species is important, the Hudson Bay area in particular has been linked empirically to changes in polar bear conditions. The paper concludes that these animals have evolved a highly specialized diet, and have evolved to exploit an energy-rich habitat: the sea ice. The authors state that sea ice is something that the entire food web relies upon and that the continued depletion thereof makes the future of these polar bears uncertain. Ferguson, Higdon, and Chmelnitsky look at the rise of killer whales as major predators of the Hudson Bay region. They state that although killer whales are found in all oceans of the world, warmer oceans and depletion of sea ice have initiated a redistribution of these animals to the colder Arctic waters. They reference Estes et al. in saying that killer whales pose a potential dilemma for the area based upon their presence straining the total resources needed for survival, and they endeavor to provide context in understanding potential ecosystem shifts associated with these animals. They state in their conclusion that combining traditional Inuit knowledge with modern science was valuable in understanding more about a "cryptic predator living at low densities and capable of moving rapidly across vast scales."

After some very interesting discussions of other animals living in the Hudson Bay complex (ringed seals, marine birds, and temporal trends in beluga, narwhal, and walrus mercury levels as linked to climate change), the editors included a paper called "Hudson Bay Ecosystem: Past, Present, and Future" by C. Hoover. This paper interested me for a number of reasons. Ecosystem models were created using software that allows the investigator to simulate environments by adding or eliminating species from them and by measuring the impact this has upon the ecosystem. For example, to simulate the past ecosystem of the Hudson Bay, killer whales were eliminated from the simulation, thereby creating an increased biomass of all other groups (excluding pelagic producers). The future

of the Hudson Bay complex was simulated in three scenarios representing various degrees of reported and predicted ecosystem changes. Comprehensive food webs are generated to better understand the impact over the years that the changing ecosystem has produced in Hudson Bay, and the three future scenarios are examined individually based on the rise and fall of certain predators and the effects thereof. Ultimately, the paper concludes that the potential decreasing of ice algae in Hudson Bay affects nearly every species group in the ecosystem, and it explains these implications. Very interesting.

The remaining papers in *A Little Less Arctic* examine wildlife changes as a result of climate change, and they look at the potential future risks these species face. The last paper is an examination of what the future might hold for the Hudson Bay, and what the next score of research opportunities might be to better understand the ever-changing and complex biome.

Overall, I very much enjoyed the papers presented in this book and appreciated the cohesive chronological order in which the papers appear. The researchers who produced these papers took great care to reference relevant studies, thoughtfully and methodically design and execute their studies, and interpret the results well. Hudson Bay is a remarkable area. I started this book with no more knowledge about the area and its inhabitants than you might have learned in school, but after reading these studies, I feel I have greater insight into a dynamic environment. I'd recommend this book to anyone looking to learn about the current issues facing this unique setting, the flora and fauna contained therein, and the efforts of dedicated scientists to unravel the mysteries of a changing habitat.

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