Review of Jennifer Hubbard, David J. Wildish, and Robert L. Stephenson, eds. *A Century of Maritime Science: The St. Andrews Biological Station*. Toronto: U of Toronto P, 2016.

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Since its founding in 1908, the St. Andrews Biological Station (SABS) has been one of Maritime Canada's most distinguished scientific institutions. At the centenary celebration, station scientists past and present, directors and former directors, and historians of science met to consider the history and scientific contributions of the station and its researchers. This edited volume is a collection of essays first presented at that centenary conference. As a collection by thirteen different authors, the volume suffers from the usual limitations of the genre: inconsistencies of tone and theme, repetition, and insufficiencies of context and perspective. Nevertheless, this is a welcome and important book that makes a significant contribution to the history of Canadian science and to New Brunswick history.

The essays fall into two categories. The first four chapters offer top-down perspectives. Marine scientist Eric Mills opens with an excellent short survey of Canadian scientific institutions in the decades prior to 1908, stressing Canada's reliance on the British institutional model for the organization of science, with its strongly amateur tradition and limited role for government, and the survival in Canada of the tradition of so-called "inventory science." Former station director Robert L. Stephenson follows with a chronology that divides the station's history into three periods. From 1908 to 1937 the station was operated (rather loosely) by the Biological Board of Canada, and was staffed mainly by visiting scientists from regional universities who would come to St. Andrews in the summer to take advantage of its location and research facilities. The SABS did not, he notes, hire a professional employee until 1919, when the redoubtable A.G. Huntsman was appointed. Between 1937 and 1973, the station operated under the Fisheries Research Board of Canada (FRB), but still was controlled largely by scientists, who set research priorities and allocated government funds. The professional staff expanded rapidly from the 1930s on, as the east coast fisheries wrestled with new environmental and regulatory challenges. By 1958 the station was employing 252 people, of whom 29 were research scientists. By the early 1970s, political pressures for the closer bureaucratic management of federal science led to the abolition of the FRB, the integration of the station into the network of institutions operated by the federal Department of Fisheries and Oceans, and more direct bureaucratic control. The SABS, Stephenson suggests, provides a case study of pan-Canadian issues in the management of science, including the tension between research science directed at better exploitation of the resource, management-science pursued for the purpose of regulatory control, and fundamental or basic science.

Two of the first four chapters deal with larger themes in station science. Researcher Mary Needler Arai offers a survey of women scientists who have worked in marine biology, including the significant numbers present at the SABS, and the challenges they faced in building scientific careers in the face of persistent gender discrimination. Dr. Arai belongs to the third generation of women in her family to hold a PhD in biology, all associated in some way with the SABS. Jennifer Hubbard, the sole professional historian contributing to the volume, provides the most electrifying analysis. She examines the political, cultural, and intellectual origins of the idea of "maximum sustainable yield" (MSY), and how it emerged after World War II as the grail of fisheries science and regulatory policy. Hubbard, like others, has been

highly critical of MSY as a management philosophy, claiming that it contributed (and continues to contribute) to over-exploitation and population collapse in key fisheries, in part by ignoring ecological relationships dimly understood or not easily reproducible in mathematical modeling. Her brilliant exercise in intellectual history traces the concept of MSY ultimately back to German scientific forestry practices of the nineteenth century, transported into Canada from the United States Forest Service, and powerfully reinforced along the way by the gospel of efficiency and the tradition of scientific management.

The final nine chapters are by station scientists reviewing the history of research into their specialities. The fields covered include the changing research technology (Timothy J. Foulkes), oceanographic research (Blythe D. Chang and Fred H. Page), experimental flow-studies (David J. Wildish and Shawn M.C. Robinson), research on the scallop fisheries (John F. Caddy), salmon field studies (Richard H. Peterson), work on paralytic shellfish poisoning (Jennifer L. Martin), environmental science and ecotoxicology (Peter G. Wells), and aquaculture research (Robert H. Cook). The chapters sometimes deteriorate into one-thing-after-the-other chronicles of past researchers and their work. But they contain gems, as well. Especially riveting are the accounts of Alfreda Needler and Carl Medcof unravelling the mysteries of paralytic shellfish poisoning, the station's epic research on the effects of DDT and heavy metal pollution on fish populations, its commercially pivotal demonstration in 1981 that overwintering penned salmon was possible and economically viable, and the station's largely negative scientific assessment of the potential effects of tidal power projects in Passamaquoddy Bay (1928, 1956). These chapters have much to offer readers who want to see first-hand accounts of important, "public science" in action.

Are there central themes that emerge from this collection of essays? Much of SABS science during its history was devoted to better commercial use of the fisheries resource. But the dominant theme here is the SABS as watchdog: mobilizing the tools of scientific monitoring to collect information on the effects of pollution, over-exploitation, and inadequate or tardy regulation. This makes for legitimately heroic stories, but overall the volume avoids a heroic institutional account. The SABS seems to have narrowly escaped being closed or moved at several points during its history, and after World War II its scientific importance was eclipsed by other regional institutions such as the Bedford Institute of Oceanography in Dartmouth, Nova Scotia, and the Northwest Atlantic Fisheries Centre in St. John's, Newfoundland. The scientists and station directors contributing to the volume almost universally bemoan the absorption of the station into the line-departments of government during the 1970s. This move, they agree, resulted in managerial confusion, a loss of autonomy for science and scientists to set research agendas, a new and dangerous reliance on commercial and private funding to support public science, and an imbalance of applied over fundamental research. Given very recent political attempts to muzzle Canadian scientists and starve federal scientific institutions, this important collection of essays on the St. Andrews Biological Station provides a timely historical reminder of how crucial to the national interest is the intelligent management and support of public science.

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