Bernard Megrey: pioneer of Comparative Marine Ecosystem analyses

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ABSTRACT: The MEPS Theme Section on 'Comparative Analysis of Marine Fisheries Production' is dedicated to Dr. Bernard Megrey. Dr. Megrey was well known for comparative studies of ecosystems, but his contributions to science were far broader. His pioneering of comparative marine ecosystem studies began long before they achieved a high profile in the field. He played a leading role in a number of international projects comparing marine ecosystems in northern hemisphere countries, and championed the use of simple but robust models for this purpose. He was central in organizing a successful trilateral workshop that modeled stock production in the USA, Canada and Norway. This was followed up by the Surplus Production Modelling Workshop in Woods Hole in 2011, which encompassed a broader range of modeling approaches, as well as additional countries and their associated marine ecosystems. The resulting manuscripts are presented in this Theme Section. Dr. Megrey's flair for bringing together scientists with diverse perspectives led to a cohesiveness among such disparate scientists, resulting in the successful completion of this and related workshops and ultimately the works in this Theme Section.

KEY WORDS: Comparative studies · Fisheries production · Modeling · Memorial

The MEPS Theme Section on 'Comparative Analysis of Marine Fisheries Production' is dedicated to the memory of Dr. Bernard Megrey, whose untimely death in October 2010 significantly set back fisheries science in general, and in particular, the art and science of marine ecosystem comparisons. In addition to comparative ecosystem studies, Bern contributed significantly to wide-ranging areas of fisheries science, including ecosystem modeling, population dynamics, and stock assessments. Much of this article is derived from recent tributes from Ecosystem Studies of Subarctic Seas (ESSAS), the North Pacific Marine Science Organization (PICES) and the Alaska Fisheries Science Center (AFSC), but we also emphasize his pivotal role behind much of the work in this Theme Section.

Bern began his career with the NOAA National Marine Fisheries Service at the AFSC in Seattle, where he developed the first stock assessment for the walleye pollock fishery, which was emerging in the Gulf of Alaska at the time. His work enabled timely forecasts of abundance and biomass to be made to the North Pacific Fishery Management Council. It required innovative analyses of the very short time series that were then available. He subsequently took on the task of integrating assessment data from fishery and research vessels into a more complete assessment that could be used to forecast stock size and composition. Bern was then assigned to the Fisheries Oceanography Coordinated Investigations (FOCI) program where he developed recruitment prediction models. His Gulf of Alaska recruitment

prediction model for walleye pollock is one of the few that incorporate both environmental and biological data and that is based on an underlying mechanistic model. Additionally, he helped to implement a series of individual-based models at the AFSC and in other venues, some of which are still in use today.

As a co-chairman of the MODEL Task Team of the PICES/GLOBEC Climate Change and Carrying Capacity (CCCC) Program, Bern was instrumental in the development of the PICES-NEMURO (North Pacific Ecosystem Model for Understanding Regional Oceanography) model. With his leadership, the NEMURO model became an open source public model used by researchers worldwide. His scientific insights were essential for the development of NEMURO, but it was his guidance of the NEMURO 'Mafia', that led to its success in providing a better understanding of marine ecosystems (Kishi et al. 2007). More recently, he was engaged in several national and international efforts to develop integrated end-to-end fisheries ecosystem models.

Bern worked tirelessly for several international organizations, most notably AFS (American Fisheries Society), ICES, GLOBEC (Global Ocean Ecosystem Dynamics) (via ESSAS) and PICES. He served terms as President of the AFS International Fisheries and Computer User sections. The AFS recognized Bern's lifetime achievement in 2009 with the Oscar Elton Sette Award for sustained excellence in marine fishery biology through research, teaching, and/or administration. Posthumously, Bern was given a Wooster Award in 2011 by PICES for his career of sustained excellence in research, teaching, and administration of North Pacific marine science.

Bern was a member of the editorial board of the ICES Journal of Marine Science from 2001 to 2007 and was a member of the ICES Working Group on Data and Information Management. He suggested new Theme Sessions for the Annual Science Conference and regularly presented cutting-edge science there. He was an inaugural member of ESSAS and became the driving force as co-chair of the ESSAS Working Group on Modeling Ecosystem Responses. There, he played a leading role in the development of the End-to-End model based on the NEMURO modeling system. Bern was on the ESSAS Scientific Steering Committee (SSC) and was an enthusiastic supporter of the ESSAS goal of using the comparative approach to gain scientific insights.

Bern also chaired the Technical Committee on Data Exchange (TCODE), led the Marine Ecosystem Model Inter-comparison Project and was a member of the Science Board of PICES. PICES recently recog-nized his achievements with the 2009 PICES Ocean Monitoring Service Award (jointly awarded to S.A. Macklin) for his work in coordinating, organizing and combining the member countries' meta-data-bases for the North Pacific. Bern worked hard to promote cooperation between ESSAS, AFS, PICES and ICES, particularly in bridging the divide between Pacific and Atlantic perspectives of how the oceans and fisheries functioned among those groups. Just prior to his death, Bern served as the lead liaison for fisheries issues in the US Mississippi Canyon 252 Command Center in Washington, DC, in response to the oil well blow-out in the Gulf of Mexico.

Bern pioneered marine fishery ecosystem comparative works before these became high profile (Murawski et al. 2010), often by simply contrasting common datasets and simpler models (e.g. Hunt & Megrey 2005, Megrey et al. 2005). Always a big fan of large, international group projects, he was heavily involved in the studies comparing marine ecosystems of Norway and the United States (MENU, endorsed by ESSAS). He helped to organize a MENU Workshop held in Bergen in 2007, led the push to get ICES to sponsor a theme session on 'Comparative marine ecosystem structure and function: descriptors and characteristics' to help highlight the MENU work, co-chaired this session in 2007 in Helsinki, Finland, and was the lead editor of the resulting special volume in Progress in Oceanography (Megrey et al. 2009a, 2009b). Continuing from this work, he helped to organize a trinational workshop on stock production modeling involving the USA, Canada and Norway in Woods Hole in 2010 (Link et al. 2010). The workshop resulted in over 15 presentations at global meetings as varied as AFS, ICES, PICES, ESSAS or IMBER. In this context, he championed the use of simple but robust models to compare ecosystems (e.g. Richards & Megrey 1994, Megrey et al. 2005, Mueter & Megrey 2006). A follow-up workshop was held in Woods Hole in 2011, the Surplus Production Modelling Workshop, expanded to include additional countries and their associated marine ecosystems, as well as a broader range of modeling approaches. The resultant manuscripts from that workshop are presented in this Theme Section.

Bern's global network of colleagues, which he readily shared with others, was of great benefit to the entire marine fisheries ecology community. Of particular note was Bern's concern for young scientists getting established in the field. Remembering his days as a struggling student, he very much appreciated the value of travel grants for students to test the waters in various international forums. He provided

significant personal donations to support such efforts, and his family established a memorial fund to support the travel and participation of students in joint ICES/PICES activities such as the Early Career Scientists Conferences). He readily encouraged junior scientists; for many he was their first established collaborator, and he always treated them as respected equals, irrespective of his high standing and decades of experience — an attitude that will be much missed and that warrants emulating. Bern had a reputation for 'getting it done', and his scientific productivity — as measured not only in his numerous publications, but in his many other endeavours as well — was exemplary.

Bern had many friends and colleagues in the scientific world, but his first love was his family. He leaves behind his wife, Ronnette, sons Christopher and Nicholas, daughter Sarah, mother Anna Marie Megrey, brothers Joseph Megrey, Robert Megrey and David Megrey, and sister, Catherine Megrey. Friends and family around the world will miss Bernard's gentle spirit, his smile, and his contagious laughter.

Bern was excellent at bringing together people from disparate backgrounds. It is highly unlikely that the degree of cohesiveness among scientists from so many different perspectives would have been as strong as it was, thus facilitating such productive workshops and international collaborations, without people trusting that Bern was doing the right thing and involving the right people. That comfort and ease of interaction facilitated numerous follow up workshops and ongoing collaborations.

Bern had the analytical gravitas to speak authoritatively. Without being authoritative or pedantic, his depth and breadth of knowledge were very reassuring to the many very different people he collaborated with. Our decision to use production models, often subject to much debate in fisheries science (Mohn 1980, Ludwig & Walters 1985, 1989, NRC 1998, Punt 2003, Mangel 2006), was bolstered by the positive aspects that Bern readily noted and so well articulated (cf. Mueter & Megrey 2006, Link et al. 2010). The potential to compare useful, readily available information, across multiple ecosystems, across multiple drivers, and across multiple levels of biological hierarchy, to both help better understand the fundamentals of how marine ecosystems functioned and in ways that could be of practical use for living marine resource management, was decisive for Bern. He will be sorely missed, but the foundations he laid, and upon which we build with these models and comparisons, will ensure that his influence continues.

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