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**Back to the Future: Advances in
Methodology for Modelling and Evaluating
Past Ecosystems as Future Policy Goals**

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**BACK TO THE FUTURE:
ADVANCES IN METHODOLOGY
FOR MODELLING AND EVALUATING
PAST ECOSYSTEMS AS FUTURE
POLICY GOALS**

Edited by

Tony J. Pitcher

Sponsored by Coasts Under Stress

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CONTENTS

	Page
Director's Foreword	3
Introduction to the methodological challenges in Back-to-the-Future research Tony J. Pitcher	4
 A. Inputs to Models and Modelling	
Synoptic methods for constructing models of the past Johanna J. Heymans and Tony J. Pitcher	11
What was the structure of past ecosystems that had many top predators? Tony J. Pitcher	18
The problem of extinctions Tony J. Pitcher	21
Challenging ecosystem simulation models with climate change: the 'Perfect Storm' Tony J. Pitcher and Robyn Forrest	29
Tuning ecosystem models to past data Richard Stanford	39
Dealing with migratory species in ecosystem models Steve Martell	41
Estimating the effects of prey-predator vulnerability settings on <i>Ecosim</i> 's dynamic function Cameron Ainsworth	45
Policy search methods for back to the future Cameron Ainsworth, Johanna J. Heymans and Tony J. Pitcher	48
Environmental archaeology: principles and case studies Trevor Orchard and Quentin Mackie	64
How traditional knowledge can contribute to environmental research and resource management Bill Simeone	74
 B. Evaluation and Policy Goals	
Why we have to open the lost valley: criteria and simulations for sustainable fisheries Tony Pitcher	78
Evaluating the ecological effects on exploited ecosystems using information theory Johanna J. Heymans	87
Modifying Kempton's biodiversity index for use with dynamic ecosystem simulation models Cameron Ainsworth and Tony J. Pitcher	91
An index expressing risk of local extinction for use with dynamic ecosystem simulation Models Wai Lung Cheung and Tony J. Pitcher	94

How do we value the restoration of past ecosystems?
 Ussif Sumaila 103

Economic valuation techniques for Back-To-The-Future optimal policy searches
 Cameron Ainsworth and Ussif R. Sumaila 104

An employment diversity index used to evaluate ecosystem restoration strategies
 Cameron Ainsworth and Ussif R. Sumaila 108

Evaluating future ecosystems: a great step backward?
 Nigel Haggan 109

Incorporating First Nations values into fisheries management: a proposal for discussion
 Rashid Sumaila 112

Aboriginal Values
 Simon Lucas 114

C. Community and Workshop Inputs

How we carried out ‘Back-to-the-Future’ community interviews
 Cameron Ainsworth 116

The community workshop: how we did it and what we learned from the results
 Melanie D. Power, Nigel Haggan and Tony J. Pitcher 125

Round-Table discussions from a Back-to-the-Future Symposium at UBC, February 2002: Issues
 in Policy, Visualisation and Presentation
 Melanie D. Power and Tony J. Pitcher 129

Rapporteurs’ report on discussion at the Back-to-the-Future Symposium, UBC, February 2002
 Amy Poon and Yvette Rizzo 135

ANNEX

Back-to-the-Future Symposium Programme, February 2002 155



*A Research Report from
 ‘Back to the Future: the Restoration of Past Ecosystems as Policy Goals for Fisheries’*



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Director's Foreword

Big Catch for Humans

The fishers were not catching much when Jesus, sitting in one of the boats, encouraged Peter to cast the nets again in deeper water. Such a large amount of fish was caught that both boats began to sink. The disciples were astonished, but Jesus said to Peter "Do not fear, from now on you will be catching men."¹ Some might hold that this 'parable of the draught of fishes' is an early example of overfishing. There is a catch, so to speak, in sinking the darn boat, not to say in depleting all those Galilean fishes. But in fact, the parable means that if you fish in the right place with the right gear and information (divine in this case), your catch may surprise you. And indeed, Christianity, a really bright and shiny new idea at the time, ended up with an unexpectedly large catch of humans. (Yes, yes, there was a catch - a lot went very wrong later on!)

Back-to-the-Future (BTF), an integrative approach to restoration ecology of the oceans, is today another bright and shiny new idea, needing more supporters, that attempts to overcome the catch of overfishing. BTF uses past ecosystems as policy goals for the future. It harnesses an understanding of ecosystem processes and whole ecosystem simulation to insight into the human dimension of fisheries management. It includes new methods, reported in substance here, for quantitative descriptions of past ecosystems, for designing fisheries that meet criteria for sustainability and responsibility, and to evaluate the costs and benefits of fisheries in restored ecosystems. Alternative policy choices involve different trade-offs between conservation and economic value. Automated searches maximise values of objective functions, and the methodology includes analyses of model parameter uncertainty. Participatory workshops attempt to maximise compliance by fostering a sense of ownership among all stakeholders. Some challenges that have still be met include improving methods for quantitatively describing the past, reducing uncertainty in ecosystem simulation techniques and making policy choices robust against climate change. Critical issues discussed here include whether past ecosystems make viable policy goals, and whether desirable goals may be reached from today's ecosystem.



The *Draught of Fishes*, painted in 1515 by Raffaello Sanzio (1483-1520). Towards the end of his short life, Raphael moved briefly but spectacularly to Rome, where he initially helped to redecorate apartments vacated by the unsavory and detested Borgia Pope (Alexander 6th). Ten full-size cartoons were commissioned from Raffaello by the urbane Medici Pope, Leo 10th, as designs for tapestries to hang in the Sistine chapel. The subsequent tapestries by Pieter van Aelst in Brussels (1519) were revolutionary in their use of light and shade, and can be seen today in the Vatican Museum. Note that the Vatican is visible on the lake shore, transposed by virtue of our painter's benefactor to the shores of the Sea of Galilee in biblical times. Cranes in the foreground symbolize vigilance, while seagulls allude to the apostasy of the former regime.

Victoria & Albert Museum, London, tempura on canvas, 399 x 440cm.

This report, covering new and adapted methodology devised to support Back-to-the-Future analyses and policy procedures, has been rather a long time in the making. This foreword has been in draft for over a year, and, in the event, turns out to be the last Director's foreword (of 40 since 1993) that I have written for *Fisheries Centre Research Reports*.

The *Fisheries Centre Research Reports* series publishes results of research work carried out, or workshops held, at the UBC Fisheries Centre. The series focusses on multidisciplinary problems in fisheries management, and aims to provide a synoptic overview of the foundations, themes and prospects of current research. *Fisheries Centre Research Reports* are distributed to appropriate workshop participants or project partners, and are recorded in the *Aquatic Sciences and Fisheries Abstracts*. A full list appears on the Fisheries Centre's Web site, www.fisheries.ubc.ca. Copies of the reports are sent to meeting participants, and all papers are available for free download from our web site as PDF files. Paper copies of reports are available on request for a modest cost-recovery charge.

Tony J. Pitcher

Professor of Fisheries

Director 1993-2003, UBC Fisheries Centre

¹ Bible, Luke 5: 1-11.