

Dr Richard McGarvey

Sub-program Leader, Fisheries Modelling

SOUTH
AUSTRALIAN
RESEARCH &
DEVELOPMENT
INSTITUTE
PIRSA

Qualifications

BA	Physics, Evergreen State College, Olympia, Washington, USA
MS	Physics, University of Oregon, Eugene, USA
PhD	Biology, Dalhousie University, Halifax, Nova Scotia, Canada
Post Doc	Fisheries Modelling, University of Maryland, USA

Role

Dr Richard McGarvey is the sub-program Leader in Fisheries Modelling at SARDI Aquatic Sciences. He leads a research team working on projects in fisheries population modelling, harvest strategy evaluation, statistical analysis, survey design, fisheries stock assessment, fish movement, growth, and ecosystem energetics.

Research focus

Dr McGarvey has worked in Belgium, UK, Italy, Canada, USA and Australia. He was trained as a physicist specialising in physical and chemical principals underlying self-organisation in living matter. He applied these mathematical and statistical skills to fisheries modelling in completion of his PhD. He has published 70 scientific papers, 140 technical reports, and given 100 conference and seminar presentations.

Major projects

1. Stock assessment models for rock lobster, King George whiting, garfish, and snapper,
2. Bioeconomic models for optimising fishery harvest strategies of lobster, garfish and snapper,
3. Fishery-dependent survey designs for rock lobster and blue crab,
4. Tag-recovery estimates of mortality that are unbiased by tag non-reporting, short-term tag loss, and short-term tag-induced mortality,
5. Movement estimation models for King George whiting, and rock lobster,
6. Growth models for rock lobster, giant crab, King George whiting, snapper, and garfish,
7. Size-based pelagic ecosystem trophic energetics,
8. Achieving higher precision for conventional organism plot-count survey designs.

New statistical methods developed:

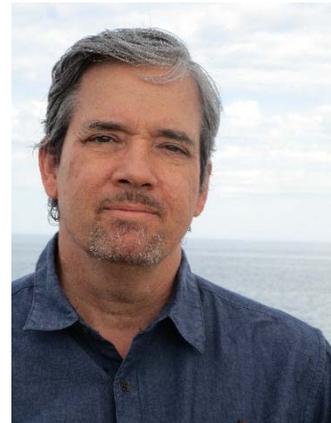
1. A stock assessment model formalism (slice-partition) to dynamically account for fish population numbers broken down by both cohort age and length within age,
2. A 'leaded-line' method of abalone diver survey design to measure density and biomass available for harvest,
3. Accurate yearly estimates of biomass and recruitment using only catch log data of effort, catch in weight, and catch numbers landed, (qR model),
4. Estimation of fish movement rates that are unbiased by incomplete reporting of recaptured tagged fish, requiring fewer prior assumed inputs,
5. Estimating time between moults for crustaceans,
6. For egg survey, estimation using fewer assumptions of daily egg production and total spawning biomass,
7. Estimating flexible growth transition matrices for lobster and other length-based assessments.

Key Publications

- McGarvey R., N. Dowling, J.E. Cohen. Longer food chains in pelagic ecosystems: trophic energetics of animal body size and metabolic efficiency. *American Naturalist* 188: 76-86.
- McGarvey R., Burch, P., Matthews, J.M. 2016. Precision of systematic and random sampling in clustered populations: habitat patches and aggregating organisms. *Ecological Applications*. 26:233-248.
- McGarvey, R., Punt, A.E., Matthews, J.M., Feenstra, J.E., Gardner, C., Burch, P., Hartmann, K., Linnane, A. 2015. Comparing size-limit and quota policies to increase economic yield in a lobster fishery. *Canadian Journal of Fisheries and Aquatic Sciences* 72:1292-1305.
- McGarvey, R., Feenstra, J.E., Ye, Q. 2007. Modeling fish numbers dynamically by age and length: partitioning cohorts into 'slices'. *Canadian Journal of Fisheries and Aquatic Sciences* 64: 1157-1173.

Awards

- 2015 SARDI Achievement Award for Publication of the Year
- Australian national Research and Development Award at the 2010 Biannual 5th Australian Seafood Industry Awards in Melbourne, recognising contributions to fisheries science and management



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