



CARM NEWS *March 2018*

RECENT IMPACT



CARM sponsored the Student Oral Presentation Award at The International Biometric Society Australasian Region Conference, “Biometrics by the Border” Conference, 26-30th November, 2018, Kingscliffe, Australia. **Dr Wen-Hsi Yang** representing CARM presented Kevin Wang from the University of Sydney with the award for his talk, “Fast and approximate exhaustive variable selection for GLMs with APES”. **Wen-Hsi** presented his talk, “Statistical analysis of coastal and oceanographic influences on the Queensland Scallop fishery”, that showed sea surface temperatures have a negative impact on scallops.

Clare McGrory presented, “A Bayesian approach for detecting climate regime shifts” at Bayes on the Beach 2017, Gold Coast, Australia.



Elephant Herd in Addo Elephant National Park. Photo by Rory Biggs

“Breaking the deadlock on ivory”, was published in Science on 15th February, 2017 which includes CARM authors Postdoctoral Fellow **Matthew Holden** and affiliate **Hugh Possingham**. The International team of researchers have “developed a structured process aimed to help stakeholders better understand each other’s perspective, and make informed policy decisions,” Matthew explained when interviewed by UQ media. <http://science.sciencemag.org/content/358/6369/1378>



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Following the publication of a novel application of survival analysis to estimate mortality rates from fish age data for stock assessment purposes, **Marco Kienzle** developed a collaboration with fisheries scientists working for the Government of New South Wales. This collaboration focused on the NSW lampara-net fishery targeting a pelagic species, sea garfish. Their findings have several important implications. First, the outcomes reiterate the utility of survival analysis as one approach for estimating partitioned F and M (Dupont, 1983; Ferrandis, 2007; Kienzle, 2016). Second, it is evident that the selected hazard-function model allowed the effects of management changes to be assessed—which included both an increase in mesh size and an almost 80% reduction in fishing effort to a fairly stable 200 boat-days in 2011. Lastly, it is apparent that the management changes were effective in reducing F to a constant level approaching M and promoting a sustainable, small-scale fishery”.

Software and data used in this study have been shared on <https://github.com/mkienzle/NSW-sea-garfish-stock-assessment> to allow the results of this study to be reproduced and enhanced by researchers. Marco thanked Wen-Hsi Yang for his invaluable contributions to model formulation and Bill Venables, D. Mayer and Martin Peron for their support in performing the research.



Matthew Holden received an ECR Award to attend Science Meets Parliament 2018

Matthew Holden was selected by the Australian Society of Operations Research to attend Science Meets Parliament where he talked to politicians and promoted the use of mathematics in environmental decision making in meetings with Peter Khalil and Pauline Hanson. Matthew was also one of three finalists out of 29 nominations and 349 eligible staff for the UQ, Faculty of Science Rising Star Award.



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Professor Anthony Richardson lecturing to a full-house at the R Workshop 2018

The Introduction to R workshop was held on 5th February 2018 with Professor Anthony Richardson, Associate Professor Chris Brown and Associate Professor Dave Schoeman. Day 1 was ideal for those with little or even no experience with R but want to produce robust analyses and effective graphics. The trio then held the **Intermediate to R Workshop** from the **6th – 7th February 2018**. Days 2 and 3 were for intermediate users or beginners wanting to go beyond the basics. The focus throughout was on ecological applications and particularly marine habitats.

The attendees commented on the presenters being very good, enthusiastic, focused, able to keep the participants interested and providing clear explanations and excellent notes.

Dr Bill Venables conducted the **Advanced R Workshop** from **5th – 7th February 2018**. **Ninety (90) people registered for The Introduction to R Workshop, Seventy-four (74) for the Intermediate and 24 for the Advanced Workshop.**



Professor Jerzy Filar and Maria Kleshnina travelled to the ANZIAM Conference 2018 in Hobart, Tasmania, Australia to individually present their research at the meeting. Maria presented, “Nonlinear learning in games with incompetence” and Jerzy delivered, “Ordered field property in stochastic games”.

Congratulations to Maria who has just had her first manuscript, “Evolutionary games under incompetence” accepted for publication in the Journal of Mathematical Biology.



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NEW PROJECTS

FRDC Project titled, “Stock predictions and spatial population indicators for Australia's east coast saucer scallop fishery” joint with M.F. O'Neill, A.J. Courtney, G. Leigh., M.M.Campbell (DAF) W-H, Yang., J.Filar (CARM).

This project will undertake high spatial resolution analyses of fishing and environmental influences on the scallop population. Improvements to the scallop assessment model will be carried out to produce better predictions for management of the stock.

AFMA funded project led by CSIRO titled, “Harvest strategies for the Torres Strait Finfish fishery”. Joint with T, Hutton (CSIRO) M.F. O'Neill., G. Leigh (DAF) A, Tobin (Tobin Fish Tales) K, Basford., J.Filar., M. Holden (CARM).

The project will contribute to defensible and robust management decisions including the potential mechanisms for fishery expansion. It will assist in a development of a sustainable harvest strategy that is ratified by management agencies and Islanders.

CARM WELCOMES



Welcome **Jacob Rogers**, PhD student who joined CARM in February 2018. After completing an undergraduate degree in applied mathematics at UQ he subsequently completed his honours through CARM. He modelled density-dependent fertilisation in the crown-of-thorns starfish, *Acanthaster planci*. Now starting his PhD he will develop models of intermediate complexity for ecosystem assessment to examine fisheries management through a multistressor framework. This work will have the potential to assist fisheries managers in prioritising potential management actions under climate change.



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VISITORS TO CARM



Dr Ali Eshragh received his Bachelor and Masters degrees in industrial engineering majoring in 'Statistical Modelling and Stochastic Optimisation' at Sharif University of Technology in 2001 and 2004, respectively. Ali is currently a senior lecturer in Statistics and Optimisation at the University of Newcastle. Ali publishes regularly in leading OR journals and has received several awards and prizes. More recently, he has been awarded the Australian Society for Operations Research (ASOR) Rising Star Award 2017. Since 2000, Ali has been involved in several national and international industrial projects. In 2014, he has been invited as a Chief Investigator in the successful ARC Industrial Transformation Training Centre on Food and Beverage Supply Chain Optimisation with the total value of \$2,119,872.

Currently, he is running a demand forecasting project with the Sanitarium Health and Wellbeing Company.

During his visit from the 29th January to Saturday 3rd February, Jerzy and Ali worked on their research project entitled "Hamiltonian cycles and subsets of discounted occupational measures" and drafted a manuscript from their research outcomes for publication.



Dr Vladimir Ejov, Strategic Associate Professor of Mathematics of the School of Computer Science, Engineering and Mathematics, Flinders University re-visits CARM in 2018 from 14 February to 20 February. Vladimir Ejov obtained PhD in Mathematics (Mathematical Analysis, Complex Analysis) in 1986 at Moscow State University. Before taking up a position at the University of Adelaide in 1995 worked at MPI Bonn and at Oklahoma State University. Moved to Uni SA in 2000, where started working with Jerzy Filar in the area of Combinatorial Optimisation. In 2012 moved to Flinders University, where he serves as Acting Director of Flinders Mathematical Sciences Laboratory.



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STATISTICAL META-ANALYSIS SHORT COURSE

Presented by: Professor Bimal Sinha

Date: Wed 11 Apr, 2018 from 9:30 am - 4:00 pm

Venue: Building 14 Room 132, St Lucia Campus, The University of Queensland

Professor Bimal Sinha from the Department of Mathematics & Statistics, University of Maryland, Baltimore County will deliver the SMA short course on Wednesday 11th April, 2018 at UQ St Lucia.

Register at <https://payments.uq.edu.au/OneStopWeb/asp/transform.aspx?TRAN-TYPE=W01SOMP26>

Statistical meta-analysis deals with a variety of sophisticated statistical methods to efficiently combine the results of several studies all with a common target. Examples of such studies abound in the literature. Some common application areas include gender studies in education, EPA studies of effects of second hand smoking on women, and controlled or comparative trials in medicine and epidemiology. In this course, we will describe the basic concepts of effect size for continuous measurements as well as qualitative attributes, combination of tests and estimates of effect size, tests for homogeneity of effect sizes, fixed versus random effects model of meta-analysis, combination of Gallup polls, meta-analysis of binary data, meta-regression, and publication bias. The common data situation in meta-analysis is the availability of only published data like effect size estimate plus standard error or effect size estimate plus confidence interval. Many real data sets of this type will be presented and analysed covering the fields of educational research and health sciences. Some computational aspects of meta-analysis using standard statistical software like R and SAS will also be demonstrated.

R WORKSHOPS

The next R Workshops will be held in February 2019 at Lucia Campus. Please email carm@maths.uq.edu.au to place your name on the notification list for registrations.

Introduction to R:

February 2019 (Professor Anthony J. Richardson, Associate Professor Chris Brown and Associate Professor Dave Schoeman)

Day 1 is ideal if you have had little or even no experience with R and want to produce robust analyses and effective graphics

Intermediate to R:

February 2019 (Professor Anthony J. Richardson, Associate Professor Chris Brown and Associate Professor Dave Schoeman)

Days 2 and 3 are ideal for intermediate users or beginners wanting to go beyond the basics. The focus throughout is on ecological applications, particularly marine habitats.

Advanced R:

February 2019 (Dr. Bill Venables)

If you have used R extensively, then the Advanced R Workshop is for you.



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PUBLICATIONS 2018

Bohner, M., Dannan, F., **Streipert, A.** (2018) A nonautonomous Beverton–Holt equation of higher order. *Journal of Mathematical Analysis and Applications*. 457(1): 114-133

Broadhurst, M., **Kienzle, M.**, Stewart, J. (2018). Natural and fishing mortalities affecting eastern sea garfish, *Hyporhamphus australis* inferred from age-frequency data using hazard functions. *Fisheries Research*. 198: 43-49

Burgess, K.B., Guerrero, M., Marshall, A.D., **Richardson, A.J.**, Bennett, M.B., Couturier, L.I.E. (2018) Novel signature fatty acid profile of the giant manta ray suggests reliance on an uncharacterised mesopelagic food source low in polyunsaturated fatty acids. *PLoS One* 13(1): e0186464

Kleshnina, M., **Filar, J.**, Ejov, V., **McKerral, J.** Evolutionary games under incompetence. *Journal of Mathematical Biology*. Accepted 19/2/2018.

Liu, Q., **McGrory, C.**, Baxter, P. The coresets variational bayes (CVB) algorithm for mixture analysis. *Brazilian Journal of Probability and Statistics*. Accepted 28/7/2018.

Rohner, C.A., **Richardson, A.J.**, Jaine, F.R.A., Bennett, M.B., Weeks, S.J., Cliff, G., Robinson, D., Pierce, S.J. (2018). Satellite tagging highlights the importance of productive Mozambican coastal waters to the ecology and conservation of whale sharks. *PeerJ*. 1-24 doi: 10.7717/peerj.4161

Tulloch, V., Plaganyi, E., Matear, R., Brown, C., **Richardson, A.** (2018). Ecosystem modelling to quantify the impact of historical whaling on Southern hemisphere baleen whales. *Fish and Fisheries*. 19:117-137