PRIMER-e
empowering research

Advanced PRIMER 7 / PERMANOVA+ WORKSHOP
at National Marine Science Centre (NMSC)
Southern Cross University, Coffs Harbour, NSW, Australia
Multivariate Analysis in Ecology (& other Sciences)

Presenter: Dr Adam N. H. Smith (Massey University, New Zealand)
Venue: NMSC, Southern Cross University, Coffs Harbour, NSW, Australia
Dates: 17-21 June 2019

This **Advanced PRIMER 7 / PERMANOVA+** workshop is one week long (Monday – Friday, 08:30 to 17:30 each day). Participants will engage in a mixture of informative lectures on key topics and computer lab sessions on literature data sets, with ample opportunity to discuss and analyse their own data sets in consultation with the lecturer (dedicated time for this is provided on the Friday). Participants are expected to **bring their own laptop**. Software may be either purchased (at a discounted price – see below) or a free fully functional but time-limited version will be made available to registered participants for trial use over the period of the workshop. Note that PRIMER is a Windows-only product so Macs need to run in Windows emulation.

Content

- This workshop will provide an overview of statistical methods in non-parametric analysis of multivariate data, encapsulated in the recently released software: **PRIMER version 7**. It will cater primarily to those who have some working experience of PRIMER but are keen to learn about the latest developments in version 7. Important new tools include: **shade plots** with flexible ordering & clustering of axes; **coherence plots** to show species displaying statistically distinguishable response patterns; **unconstrained** binary or divisive **flat clustering** (as in *k*-means) along with **SIMPROF** tests; **metric**, **threshold metric**, **non-metric** or **combined MDS** in any dimensions; **bootstrap averages** to show variation among averages in metric MDS space; **new plot types** (bar, box, means, line, histogram, scatter, surface, shade) in 2-d or 3-d; **animations** of ordinations captured to video files; multi-factor and multi-variable **segmented bubble plots** in 2-d and 3-d; and much more...
- This workshop will also provide an overview of the methods in the **PERMANOVA+ add-on package** for PRIMER. PERMANOVA+ allows more formal models, tests and predictions for multivariate (or univariate) ecological (and other) data in dissimilarity spaces. Participants will explore partitioning multivariate variation in complex experimental/ sampling designs, including interactions, contrasts, fixed or random effects, crossed or nested (hierarchical) multi-factor mixed models (**PERMANOVA**); tests for homogeneity of dispersions and analyses of beta diversity (**PERMDISP**); multivariate regression and model-selection procedures (**DISTLM**); unconstrained (**PCO**) or constrained ordinations using distance-based redundancy analysis (**dbRDA**) or canonical analysis of principal coordinates, as well as predictive canonical models (**CAP**).
- As well as covering advanced methods in **PRIMER v7 and PERMANOVA+**, the core basic multivariate routines (**PCA**, **MDS**, **ANOSIM**, **RELATE**, **BEST**) will also all be touched on briefly, including a review of data pre-treatment tools and definitions of (dis)similarity. Whilst aimed at existing PRIMER users, including those who have been to a previous PRIMER course, the week will be structured so that those who are new to this area will be able to learn much about the core methods. Non-parametric/Semi-parametric statistics and permutation tests make the methods intuitively simple to understand so **no prior background in statistics is assumed**.

Venue

The workshop will be hosted by the National Marine Science Centre**,** Southern Cross University, Coffs Harbour, NSW, Australia. All sessions will be held at the following address: Level 2 Classroom, National Marine Science Centre, 2 Bay Drive, Coffs Harbour, NSW 2450, Australia. For further information, including directions to the venue, parking for participants, nearby accommodation options, etc., please contact the local workshop organiser, *Professor Steve Smith* (Southern Cross University, steve.smith@scu.edu.au). Please note that it is the participant's responsibility to arrange and pay for their own accommodation - this is not included within the course fee.

Costs (in Australian dollars AUD)

	COURSE FEES (per person)	
	Full Registration:	Student Registration:
EARLY BIRD* *Before 31st March 2019*	AUD $1,200	AUD $850
After 31st March 2019	AUD $1,300	AUD $940

All prices are in Australian dollars. The above course registration fee **includes** lunch, coffee/tea and snacks during breaks, all course materials, free wi-fi, and (if needed) a temporary software licence key for the duration of the workshop, **but not** accommodation or the separate (discounted) costs of purchasing software. All prices are in Australian dollars; New Zealand residents will be charged GST for any software purchases brought back to New Zealand[1].

Contact and Registration

To express interest in attending, please send an email directly to the PRIMER-e office: primer@primer-e.com. You will be sent a **registration form**. To register, please complete the **registration form** and return it directly to primer@primer-e.com to secure your place. Places are limited. The **Early Bird** registration deadline is **31st March 2019**. The **Final Deadline** for registration and payment is **1st June 2019**. Late registrants will only be accepted if space permits.

Software – special discount prices for workshop participants

Participants wishing to purchase PRIMER software at the discounted prices shown below[2] should indicate this on the registration form. All prices are in Australian dollars; New Zealand residents must add GST[1].

	New PRIMER 7 (AUD)	Upgrade PRIMER 6 to PRIMER 7 (AUD)	PERMANOVA+ add-on (AUD)
Private sector	$1000	$500	$500
Public sector	$750	$375	$375
Academic	$500	$250	$250
Full-time student	$250	$125	$125

About the lecturer

Dr Adam N. H. Smith (Massey University, Albany, Auckland, New Zealand) is a highly sought-after ecological statistician who specialises in the application of modern statistical methods to ecology and management, including fisheries and marine reserve assessment. Adam obtained his PhD from Massey University and has a wealth of multi-disciplinary experience across a variety of sectors. He lectures across a wide range of areas, including both univariate and multivariate statistics, data mining, quantitative ecology and biostatistics. He has been a key consultant to industry and government, having worked as an in-house statistician for the Department of Conservation (DoC) and the National Institute for Water and Atmospheric Sciences (NIWA) in New Zealand. Adam is an enthusiastic and engaging lecturer with a passion for natural environments and for teaching and learning.

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[1] GST (Goods and services tax) is 15% and is only charged to New Zealand residents.
[2] The workshop discount applies only to purchases of 3 or fewer licences within a given sector, and excludes any additional discounts. Discounts for multiple purchases (i.e., up to 40%, see www.primer-e.com for details) accrue in the usual way for 4 or more licences.