



THE KELPIE

Newsletter of
The Marine Alliance for Science and Technology for Scotland

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MASTS stages Museum event



Forum Convenors Elected



MASTS welcomes its first
Associate member

The “Everest” of Public Outreach –

Edinburgh International Science Festival 2013

Picture if you will the Grand Gallery in the National Museum of Scotland thronging with eager Science Festival punters, a tank of live jellyfish – yes they really are alive! And, an ambition to use the phenomenon of increasing jellyfish abundance in our seas as the hook to raise awareness of possible climate change impacts, ocean acidification and the rest.....all beautifully illustrated on easy to understand display banners. A heady cocktail of public outreach opportunities, even for the most reclusive of marine scientists. Well yes, the jellyfish are real and alive, yes some do sting – possible associated anecdote about aunty Flo’s near fatal encounter with a Portuguese Man of War and those bits in the middle are gonads, reproductive organs (things starting to spiral out of control as you try to find simple ways to extract yourself from a full blown lecture on jellyfish sex for the under-five’s).

Explaining this scenario over a cup of much needed coffee – Amy (graphic artist and MASTS PhD student extraordinaire) suggests we might adopt the “Deficit” model approach to awareness raising – in short, let the punters sort it out for themselves and intervene with helpful comments as appropriate. Result! Take big step back from jellyfish tank, observe punters and spring into action if there appears to be suitable opportunity for punter enlightenment! Outcome – lots of sticky finger marks on jellyfish aquarium, occasional attempts by children to hang off aquarium, lots of photos of punters looking at jellyfish through the aquarium – the more inventive realising that if punter has mouth open it can look like they are eating jellyfish! Impact –social media now awash with cool images of children looking like they are eating live jellyfish.

Although a slightly tainted view of public outreach, coloured by having spent several days recently immersed in this activity, it is a description that many of my fellow inmates will recognise. Over the last two weeks MASTS has been staging its “Future Seas” exhibition as part of the Edinburgh International Science Festival. Located in a prime position in the Museum, our various exhibits were probably seen by in excess of 100,000 visitors. A combination of dedicated MASTS Graduate Students and a few other members of the MASTS community invested enormous energy and enthusiasm talking not only about their own research interests, but those of others in MASTS and marine life more generally.

Exhibits ranged from: a simple but very effective jigsaw depicting the lifecycle of salmon; an interactive touch screen explaining cetacean acoustics and seal tagging; information on aquaculture linked to a cartoon illustration of wrasse being used for the control of sealice and of course our now famous jellies!



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A specially constructed cart displaying iconic commercially fished species also formed the base for a binocular microscope used to view fish parasites (also known as “yuck” and “disgusting”). The microscope was used in various modes of operation including lever, battering ram and universal vector of eye infections amongst hundreds of children in the Edinburgh area.

The deep sea lander, associated imagery, and preserved specimens proved to be great hits. The ROV also attracted interest – with two overzealous gentlemen found seeking further enlightenment by attempting to dismantle it to see what was inside. Cold water corals accompanied by the dulcet tones of an Attenborough narrated video tended to attract the more discerning. The periodically functional touch tank was undoubtedly the most popular exhibit for both exhibitors and marauding hordes of junior Sci Fest punters. The need to exchange water in the touch tanks as well as refreshing the over poked, stroked and squeezed invertebrates, could lead to serious crowd control issues. Never get between a mother, her child and a starfish. A number of valiant Graduate Students managed to run the touch tank gauntlet without pause for breath or refreshment for hours on end. Having repeated the same mantra on the basics of sealice and yucky tape worm biology 10,000 times, I eavesdropped with amazement as the touch tank teams dreamt up ever more colourful and inventive ways of saying the same thing over and over again – an immensely useful skill when trying to write scientific papers.

At the end of the first week, with morale flagging, we introduced the 10 minute wonder – a quick trip to the local Eurionics shop to avail ourselves of a portable street performance microphone and speaker and game on! Everything you ever wanted to know in ten minutes about: Hadal exploration – the Linley and Lacey double act; Basking shark biology the Lieber way; Thorburn’s intro to Scotland’s sharks, skates and rays; and Donohue’s - How to make maerl exciting!

Now over, we are into feedback and lessons learned territory. Official figures indicate that 132,515 people visited the Museum during the course of the Science Festival. Given MASTS position in the main Gallery, a good proportion of these visitors will have seen and interacted with the MASTS exhibits. Having spent a few days attending the exhibits I can also attest to engaging with hundreds of individuals and this was the experience of all those that volunteered to act as MASTS facilitators. The quality of this engagement is highly variable, but it was remarkable in its diversity. In the majority of cases, understanding of the marine environment was minimal and it was simply not possible to explain or explore some of the important issues or concepts. This represents a considerable challenge. However, the enthusiasm amongst the public for living exhibits and marine exhibits generally was palpable. Within every group of children there were individuals who were genuinely fascinated by what they experienced and some made quite remarkable observations – the little 5 year old girl who, upon looking at sealice specimens and reading aloud the descriptive text, declared that they resembled the horseshoe crabs that she had seen on TV! The child that thought we were floating bottles of frozen water in the jellyfish tank to illustrate how turtles could mistake plastic for the jellyfish they would normally feed on. The old gentleman who mentioned in passing that he had just written a history of marine science in Scotland. The elderly couple who came to see Art in Iran and ended up being transfixed by deep sea exploration. The teenagers who asked how they might study marine science and what exams they should be taking.

As for lessons learned, there are many – ranging from how not to build a touch tank to wouldn’t antiseptic wipes for microscopes be a really good idea. We will be formalising this process in a few weeks, seeking feedback from our superb team of MASTS helpers and feeding back some of our more robust observations on how not to interact with external exhibitors, to the Museum of Scotland. So was it worth it – with some reservations and pending psychiatric assessment – YES!

By way of post script – those that visited the Museum would have seen the large balloon sculpture created by a group of American artists during the first few days of Science Festival. Nothing to do with MASTS, but damned by association – it’s called Pisces and looks vaguely gastropod-like. Amy’s main psychological crutch throughout the event was the rumoured balloon popping party that would take place at the end as a form of Post Sci Fest Traumatic Disorder therapy. But alas, artists being artists they are being shipped back from the US later this month to produce a time lapse film of the artwork being decommissioned (popped to you and me!).

Observation of the week - small child sees fish, receives fulsome explanation of what the fish is and is then asked what else do you find in the sea – obvious – chips!



MASTS 2nd Graduate School Retreat

Report by Sally Rouse & Joanna Gosling

The 2nd Annual MASTS Graduate School Retreat took place from the 13th – 15th of March at the MacDonald Resort in Aviemore.

The aims of the retreat included developing skills, building community and learning about potential career pathways. These were achieved through a range of talks, workshops and evening activities. All of the students attended STEM ambassador training, giving them the skills and confidence to promote marine science to the general public and in particular to the younger generation. A number of students put this training into practice during the Edinburgh Science Festival.

Challenges for the grey matter included a complex decision making workshop led by Frank Grant (FGDS Ltd.), during which the students discovered the power of using specialist software to consider the conflicting goals and interests of stakeholders when deciding where to direct funding for environmental projects. Dr. Bruce McAdam from the University of Stirling conducted an “Assessing Risk” workshop, which taught the students to think critically about scientific statistics reported in the media, and how the probability of certain events occurring can vastly change when population size is accounted for.

The 1st year students undertook a “Managing your Supervisor” workshop led by Axel, while 2nd and 3rd year students learnt grant proposal writing skills from Prof. Angela Hatton from SAMS. The proposal writing session involved an elevator pitch and poster to “win” a coveted NERC grant to fund students’ projects. This year’s retreat also saw the introduction of the ‘Three-Minute Thesis’ competition for the final year students, where they had to explain a 3yr+ PhD in 3 minutes! Penelope Donohue took the prize for her talk on the effects of ocean acidification on the ‘Maerl-Man superhero’.



Informal careers talks were given each evening in the bar by Dr Phil Newton (NERC), Dr Nick Owen (SAHFOS) and Dr Linda Rosborough (Director of Marine Scotland). Before joining us for dinner, each of the speakers recounted their professional journeys, and the personal sacrifices that they have had to make along the way, emphasising the importance of maintaining the work-life balance.

The most valuable skills of the retreat were, however, learnt during the evening entertainment where we discovered how to eat an After Eight with no hands and how to roll an orange across the floor with a suspended banana. We were also able to finally perfect the MASTS PhD human pyramid, which has so far eluded us at other MASTS events! Similarly to last year, a number of students stayed on in Aviemore for the weekend to enjoy the sunshine and snow whilst skiing and mountain biking. We are already looking forward to next year!

Want to be involved in the 3rd GS Retreat?

For more information about the Graduate School and the Retreat, please contact Prof Axel Miller: 01631 559 263

MASTS Professor: Oscar Gaggiotti

Oscar is a theoretical population geneticist interested in the study of the ecological and evolutionary processes responsible for the spatial patterns of genetic variation observed in natural populations. One of the main objectives of his research is to provide evolutionary insights and tools for the design of management strategies that maximise the genetic variation maintained by populations that are affected by ever increasing human disturbances. One of the main foci of his research as a MASTS professor will be the study of marine connectivity and he is looking forward to establishing collaborations with other MASTS scientists working in this field. Contact Oscar on oeg@st-andrews.ac.uk





Towards Optics-Based Measurements in Ocean Observatories -

report by Prof Alex Cunningham (a.cunningham@strath.ac.uk)

The twenty-first conference in the Ocean Optics conference series was held in Glasgow from October 8th to 12th 2012, co-chaired by Carlos del Castillo (John Hopkins University) and Alex Cunningham (MASTS and the University of Strathclyde). A MASTS sponsored workshop on the afternoon of October 7th was organised by Dr. Steve Ackelson of the Consortium for Ocean Leadership (Washington) with the assistance of Prof. Emanuel Boss of the University of Maine.

The stimulus for the choice of workshop topic was the high degree of innovation in marine monitoring technology that has occurred over the past few years, and the ambitious plans originating in the US for an Integrated Ocean Observing System. It is clear that we are entering a new phase in ocean exploration, in which research cruises will be supplemented and possibly replaced by measurements from autonomous platforms, in situ observatories, and satellite radiometers. The technical feasibility of cabled subsea observatories and long-term instrumented moorings has been well established, satellite ocean colour radiometry has been operational for three decades, and the 3000 free-drifting Argo profiling floats which are currently active are greatly extending our knowledge of the ocean physics. Gliders, which can be actively piloted, have crossed ocean basins and are now capable of missions of several months duration. New arrivals on the scene include remotely piloted aircraft, which seem well suited for coastal surveys, and exciting developments are anticipated in microsatellite technology. The potential gains of using animals as instrument carriers is also recognised, and the workshop noted the pioneering work of the University of St Andrews in this area.

These developments pose considerable challenges for the Ocean Optics community. In principle, the low power requirements and rapid sampling rates achievable by optical measurements could greatly enhance the information obtainable from floats and gliders whose instrumentation is mainly limited to salinity, temperature and depth sensors. Optical measurements made *in situ* also integrate well with the synoptic view of ocean processes obtainable from satellite remote sensing. In practice, however, the miniaturisation of optical sensors has not proved to be straightforward. Moreover, since optical instruments measure proxy variables (fluorescence as an indicator of chlorophyll concentrations, for example, and backscattering as an indicator of suspended particles), techniques for extracting information and resolving ambiguity in optical signals need to be developed alongside work on the sensors themselves. The workshop considered issues of data cleaning and quality control, and stressed the need for rigour in instrument calibration and the standardisation of deployment procedures. Biofouling has not proved to be a serious problem on profiling gliders in the open ocean, but it remains a limiting factor in coastal waters. In spite of a note of caution in the presentations, however, it is clear that the increased use of optical sensors for marine measurements offers the promise of exciting new data sets. The deployment of these sensors on AUVs and gliders, for example, can provide insights into the ecology of regions which are inaccessible to traditional techniques such as shallow reef environments and ice-covered waters.

The workshop attracted 50 registrants and it was generally agreed to have been a great success. Plans are already in place to hold a follow-up meeting on a similar theme at Ocean Optics XXII in 2014.

MASTS welcomes the University of Edinburgh

The MASTS Executive is pleased to welcome The University of Edinburgh as MASTS first Associate Member. Edinburgh University has particular strengths in the understanding of past, present and future changes in the Earth climate through measurements, theory, and modelling. The membership of MASTS will allow scientists from Edinburgh to join new colleagues in working together to address some of the pressing issues arising from global climate change.





AD Model Builder Training Course – Report by Dr Clive Fox

Clive Fox from SAMS recently attended the AD Model Builder training course run at ICES. Clive received a small grant from MASTS which contributed towards the costs of attending the course. So what is AD Model Builder? Essentially it is a powerful piece of software for solving minimisation problems – some of you may be familiar with this approach through using Solver in Excel. The idea is to set up a model of how one thinks a system works and, given a set of observations, to minimise differences between the model prediction and observations in order to estimate the unknown parameters in the model. Whilst Solver can deal with quite complex problems, AD Model Builder can cope with even more difficult non-linear problems where one wants to estimate many parameters. In addition AD produces estimates of uncertainty around the parameters and can implement methods such as MCMC. The downside of this flexibility and power is that there is a steep learning curve in setting up AD models.

My interest in the course was principally from recent applications to fisheries modelling but the software can be used for fitting any statistical model using maximum likelihood estimation. As a consequence of attending the course I have already re-written lectures and practicals to update the stock assessment elements I teach on the SAMS Fisheries Ecology module (albeit using simplified examples in Excel). I now also have a much better understanding of the basis of the new models being used at ICES, for example for the stock assessment of North Sea cod. I am currently working on a project which uses the outputs of the stock assessments to develop indicators of ecosystem health and I believe it is essential to understand enough about the assessment methods used to avoid over-interpreting the outputs. ICES is now providing a wide range of training courses and I would urge MASTS staff and students to take a look at what is on offer (<http://www.ices.dk/news-and-events/Training/Pages/default.aspx>).



“Sustainable Aquaculture” and “Coastal Zone” Forum Convenors now in place



Multidisciplinary research is being commissioned and applied by the aquaculture industry in an attempt to reduce its environmental impact. Much still needs to be done towards reducing the losses related to disease and parasites, diversifying the industry, managing and genetically improving farmed species, replacing and reducing marine ingredients within aquafeeds and in the design of better sited and contained production systems. We can only succeed if we work together in a more collaborative, strategic and integrated way. MASTS will be critical in enhancing communication between the main stakeholders and academics. The focus of this forum will span fin-fish, shellfish, invertebrates and algae.

Prof Brendan McAndrew from Stirling University has been elected as the “Sustainable Aquaculture” Forum Convenor. Contact Brendan McAndrew on b.j.mcandrew@stir.ac.uk

The Coastal Zone Forum will contribute to the MASTS Biodiversity, Function & Services MRT by providing a network for successful multidisciplinary marine and social science to address the issues of the coastal zone and the services it provides. The coastal zone in Scotland is at a critical juncture with the advancement of coastal and marine planning, development of marine renewables, increasing impacts of climate change and implementation of MPAs. The forum aims to produce work of high scientific quality which contributes to the policy debate and the needs of stakeholders.

Prof Nick Hanley from Stirling University has been elected as the “Coastal Zone” Forum Convenor. Prof Hanley is an environmental economist who is increasingly working on coastal and marine issues. Contact Nick Hanley on n.d.hanley@stir.ac.uk



Other News

MASTS Scottish Marine Group Postgraduate Meeting - 9th May

The SMG was formed in 1988 with the aim of providing a straightforward means of communication between people involved with marine science in Scotland. This is achieved by organising one-day meetings twice a year that are open to everyone at no cost other than their own transport and refreshments. Locations of the meeting vary throughout mainland Scotland to allow the greatest number of members to participate without overly long journeys.

The spring meetings give postgraduate research students the opportunity to introduce their projects and practice their formal presentation skills in a supportive atmosphere. The Scottish Marine Group 2013 Postgraduate Meeting will be held on **Thursday 9th May** in the Gannochy Room, Wolfson Medical School, Glasgow University.

Abstract deadline is 24th April and further details are available from <http://www.masts.ac.uk/graduate-school/scottish-marine-group/smg-pg-spring-meeting.aspx>

Any academics who would be willing to attend the day to provide helpful and constructive feedback to the postgraduate students are encouraged to contact Prof Axel Miller (Axel.Miller@sams.ac.uk).

Latest vacancies

Check out the latest vacancies at: <http://www.masts.ac.uk/news/vacancies/fishclimate-change-abdn-phd.aspx>

Current jobs include a MASTS professorship, a PhD studentship, field technician, laboratory technician and more....

Sound of Mull Artificial Reef Trust (SMART)

The Sound of Mull Artificial Reef Trust (SMART) was established by a local business in the Sound of Mull area, bringing together a team of divers, marine specialists and business operators from the UK and abroad in order to deliver the SMART artificial reef project.

SMART proposes to submit an application to the regulator, Marine Scotland (MS), for a marine licence to sink a decommissioned vessel in the Sound of Mull to create an artificial diving reef.

Further details are available from the website: <http://smartdiving.co.uk/> or by contacting Annabel Lawrence on info@smartdiving.co.uk

MASTS Podcasts

Have you listened to the MASTS podcasts? These are available to download from:

<http://www.masts.ac.uk/about/annual-science-meeting/2012-podcasts.aspx> Subjects include cold water corals, saltmarsh, seamounts, seabirds, fishing, marine mammals and more....

Congratulations to Prof Teresa Fernandes...

...who has been appointed as a member of the European Commission Scientific Committee on Health and Environmental risks.

MASTS Webinar series – speakers wanted

We are looking to establish a MASTS webinar series. Topics suggestions so far include marine worms, National Marine Planning, and fishing impacts, but there are no restrictions and topics can be anything related to marine science and technology.

Webinars would take place on Monday lunchtimes (1pm) and I have availability on the following dates: 29 April, 20 May, 10 June, 1 July and 29 July. Each presentation would be 20-30 minutes long with a maximum of 10 minutes for any questions, and should be understandable by a wide audience. Anyone interested in presenting a webinar should contact Emma Defew on ecd2@st-andrews.ac.uk

eAtlas launch

Marine Scotland has launched Scotland's Marine Atlas, Information for the National Marine Plan (first published in March 2011) as an E-PUB (suitable for iPad platforms) and MOBI (for Kindles) formats. They are available to download from:

www.scotland.gov.uk/marineatlas

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