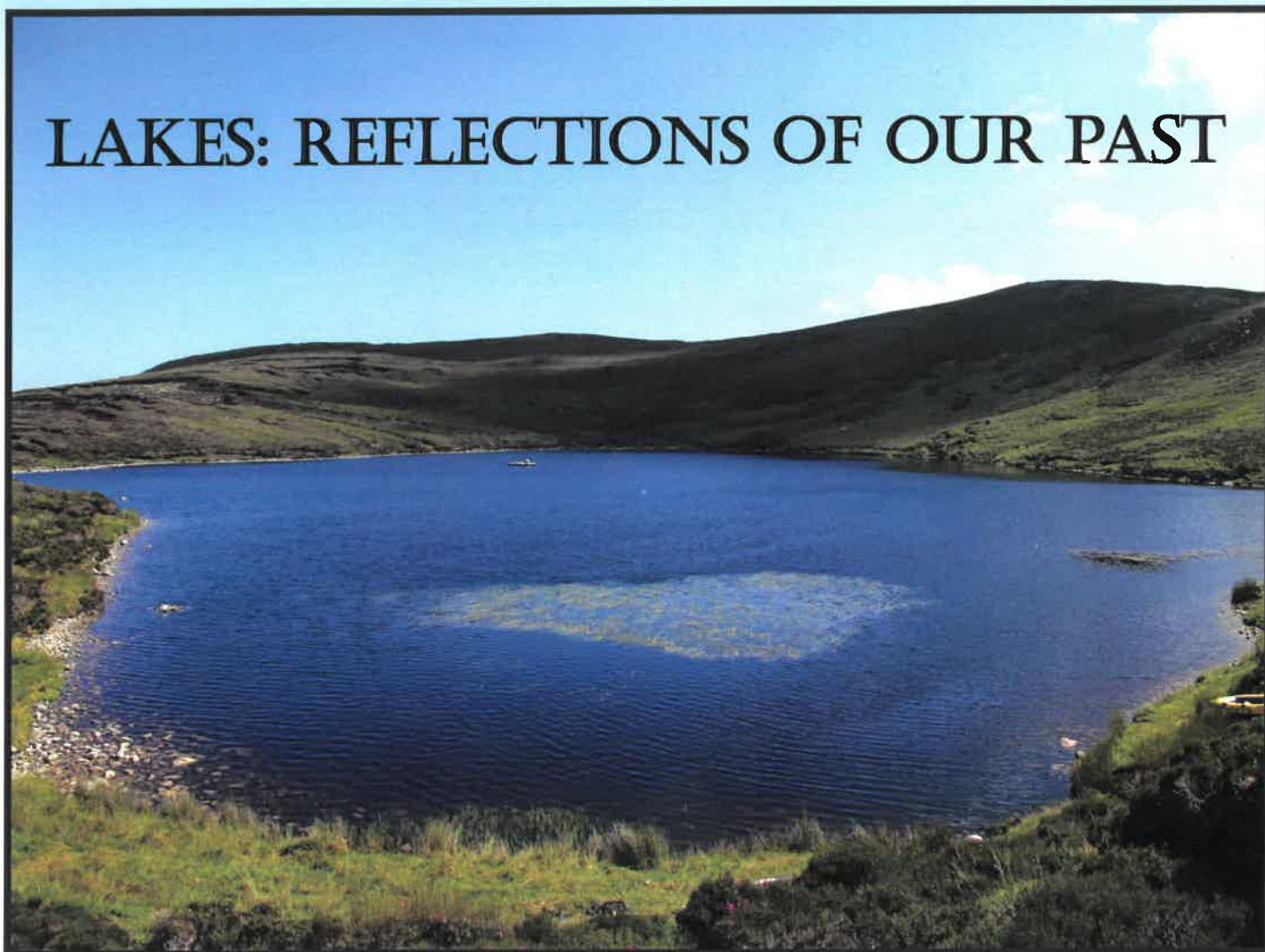




Irish Quaternary Association Annual Symposium

LAKES: REFLECTIONS OF OUR PAST



Friday 28th of November 2014

Geological Survey of Ireland, Beggar's Bush, Dublin 4

PROGRAMME AND ABSTRACTS

IQUA Annual Symposium Schedule

9.30 – 10.00 **Registration**

10.00 – 10.10 **Welcome**

10.10 – 10.55 **Keynote talk: Chris Caseldine** (*University of Exeter*)

From esoteric fringe to Climategate and beyond - the growing importance of Quaternary Science

10.55 – 11.20 **Aidan O'Sullivan** (*University College Dublin*)

Crannógs: Ireland's most rewarding and enigmatic archaeological sites?

11.20 – 11.45 **Tea/coffee break**

11.45 – 12.10 **Aaron Potito** (*National University of Ireland Galway*)

Mixed signals: attempting to resolve human and climatic influences on Irish lakes

12.10 – 12.35 **Michael O'Connell** (*National University of Ireland Galway*)

Lake sediment: the superior archive for palaeoecological investigations?

12.35 – 14.00 **Lunch**

14.00 – 14.45 **Keynote talk: Cathy Delaney** (*Manchester Metropolitan University*)

Glaciolacustrine Varves: Worth the Bother?

14.45 – 15.10 **Michael Simms** (*National Museums Northern Ireland*)

Lacustrine karst as indicators of long-term water chemistry

15.10 – 15.35 **Tea/coffee break**

15.35 – 16.00 **Eleanor Jennings** (*Dundalk Institute of Technology*)

The influence of climate on lakes – the long and the short story!

16.00 – 16.25 **Phil Jordan** (*University of Ulster*)

Using palaeolimnology as a tool to detect lake eutrophication trends and recovery

16.25 – 17.00 **Discussion**

The symposium will be followed by the announcement of this year's award winners and a reception.

KEYNOTE TALK:

From esoteric fringe to Climategate and beyond – the growing importance of Quaternary science

Prof. Chris Caseldine

College of Life and Environmental Sciences, University of Exeter

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Over the last 40 years Quaternary science has moved from being a relatively esoteric and little studied fringe academic subject to one contributing significantly to major global issues, particularly related to climate change and conservation issues. This change is briefly outlined and two questions are formulated that relate to these issues and to which Quaternary scientists are contributing – for climate change the question is posed ‘what climate(s) are we aiming for?’, and for conservation issues ‘how do we decide on what baseline conditions should be i.e. what exactly are we conserving?’

With regard to both these questions emphasis is given to the role of studies of lake sediments as one of a suite of palaeoenvironmental tools that provide evidence of relevance to policy makers. With the growing importance of Quaternary research as an input into national and international policy making, and the potential need for scientists to communicate much more widely and to different audiences, consideration is given to the responsibilities and pitfalls of being a contemporary Quaternary scientist, issues likely to become more important over the next 40 years.

Crannógs: Ireland's most rewarding and enigmatic archaeological sites?

Prof. Aidan O'Sullivan

School of Archaeology, University College Dublin

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Ireland's crannógs - artificially built islands - are probably this island's most important wetland archaeological sites. The paper will also offer some insights from archaeology, environmental archaeology and early Irish historical sources into the social and ideological role of these island lake-dwellings, in early medieval Ireland in particular, revealing that they are far from simply being settlements on lakes, with questions of boundaries, liminality and conspicuous social display all being significant aspects of their origins and use. This paper will briefly review what is known about Ireland's crannógs and lake dwellings, specifically in terms of definition, distribution, chronology and range of functions. It will demonstrate that a legacy of past archaeological excavations, although sometimes problematical, need not be disregarded in their interpretation. The paper will also demonstrate through case studies, including that of Coolure Demesne crannóg on Lough Derravaragh, and the already emerging evidence from recent excavations by Dr Nora Bermingham and the NIEA at Drumclay crannóg, Co. Fermanagh, that while crannógs can be highly rewarding in terms of archaeological and palaeoenvironmental data, there are several features of these distinctive sites that should provide caution before simplistic interpretations of their site histories. The paper will also briefly outline recent and ongoing archaeological research on Ireland's and Scotland's crannógs at UCD School of Archaeology.

Some introductory reading

O'Sullivan, A. 1998 *The Archaeology of Lake Settlement in Ireland*. Royal Irish Academy, Dublin.

O'Sullivan, A. 2004 *The social and ideological role of crannogs in early medieval Ireland*. Unpublished PhD thesis (2 vols), Dept of Modern History, NUI Maynooth (available to download for free on academia.edu or on Maynooth University's eTheses archive at <http://eprints.maynoothuniversity.ie/5079/>)

O'Sullivan, A., Sands, R. and Kelly, E.P. 2007 *Coolure Demesne Crannog, Lough Derravaragh: An introduction to its archaeology and landscapes*. Wordwell, Bray.

Mixed signals: attempting to resolve human and climatic influences on Irish lakes

Dr. Aaron Potito

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Resolving human and climatic influences on lake sedimentary records is an ongoing challenge in Quaternary studies, and becomes especially important in an Irish context, where humans have had a substantial influence on the landscape for at least the last 6000 years. This talk will focus on the use of chironomid (non-biting midge fly) subfossils in lake sediment records in reconstructing both climate and direct human impacts through time. Due to their unique life history traits, chironomids are excellent indicators of past environmental change and are used widely in reconstructing lake histories. In recent years, chironomids have mainly been used as a proxy for reconstructing temperature. However, chironomid communities are affected directly and indirectly by a wide variety of environmental variables including lake water pH, dissolved oxygen content, benthic substrate and lake nutrient status. Disentangling the climate signal from direct human influences can be especially challenging, as climate warming and cultural eutrophication can exhibit similar effects on lake ecology. The climate and cultural eutrophication signals can often be rectified through direct comparisons with instrumental time-series and land-use records, which often require a historical context, or through constrained ordination analysis and variance partitioning within a multi-proxy framework. Strategies for identifying the climate and human impact signals in Irish lakes will be explored using examples from multiple sites throughout Ireland, including a review of a recently published chironomid-based training set for western Ireland. The talk will conclude with several recommendations for Irish chironomid research going forward.

Lake sediment: the superior archive for palaeoecological investigations?

Prof. Michael O'Connell

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National University of Ireland Galway

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Archives that can potentially yield information on major aspects of past environments, e.g. vegetation dynamics, climate change and human impact, are many and varied, particularly in the mid latitudes which is the area of greatest relevance to most people. Typically, these archives include lake sediments and peat, the latter from a variety of sources, including raised bogs and blanket bogs and also fen and reedswamp deposits. Mor humus and organic-rich soils, from forest floors, including small hollows, and archaeological excavations, are further examples of archives with many peat-type qualities.

The choice of deposit to be investigated, often depends on availability and especially availability at/near the area of main interest which is particularly important when investigating human impact and farming history. In Ireland, we are in the fortunate position to be often spoiled for choice as regards deposits suitable for multiproxy and detailed palaeoecological investigations, in that both lakes and bogs are geographically widespread and occur in a wide range of basin size, altitude and, in the case of lakes, different trophic status.

In this presentation, the choices that have been made, up to now, by palaeoecologists with particular reference to Ireland will be considered, and the pros and cons of lake sediments as sources of palaeoecological information will be discussed.

KEYNOTE TALK:

Glaciolacustrine Varves: Worth the Bother?

Dr. Cathy Delaney

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Glaciolacustrine (clastic) varves have been used both to create single site chronological tools to examine temporal environmental change, and to construct multiple-site chronologies to reconstruct rates and timing of ice retreat. However, there is considerable controversy over the identification and use of clastic varves, firstly because rhythmically laminated silt and clay sequences can also be formed by turbidity currents, and secondly because rhythmically laminated silt and clay sequences are difficult to date independently, an approach considered essential for verification of the annual nature of the rhythmites. Nevertheless, when they work, clastic varve can provide very high resolution (seasonal) records of climate and environmental change over long timescales.

This paper will examine the possibility of using clastic varve sequences to reconstruct deglacial events associated with the British and Irish Ice sheets, using sediments from Paleolake Riada in Ireland and Paleolake Rawtenstall in NE England. Various approaches to analysis of rhythmites and identification of clastic varves, including detailed logging, particle size, thin sections, SEM and XRF analyses, will be considered and the possibilities for establishing deglacial varve chronologies in Ireland will be discussed.

Lacustrine karst as indicators of long-term lake water chemistry

Dr. Mike Simms

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Ireland is unusual within western Europe in having numerous lakes that lie partly or wholly on limestone. Typically, analysis of the water in many of these lakes reveals that it is fully saturated yet limestone exposed on their shores supports a distinctive assemblage of dissolutional karst forms. Bizarrely, some karst features can form even under conditions of permanent carbonate saturation, but most indicate that periodically the lake water must become unsaturated to some extent at least locally.

These lake-shore karren potentially can reveal much about long-term trends in water chemistry and lake level through the Holocene, but they have been largely neglected by karst geomorphologists. The talk will provide an overview of the range of karst features observed, the processes that might have formed them, and attempt to explain what the datasets accumulated so far might tell us about the history of some of these lakes.

The influence of climate on lakes – the long and the short story!

Dr. Eleanor Jennings

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Understanding the effects of local weather on lake ecosystems is now even more crucial given current and projected trends in the global climate. These trends include not only long-term increases in temperature, but also increases in the occurrence of extreme conditions such as floods, storms, and heat waves. Lakes are particularly sensitive to climate. Day-to-day changes in temperature, wind speed, and solar radiation influence the degree of water column stratification, and therefore have consequences for the seasonal cycle of phytoplankton species composition and biomass, while flood events can deliver pulses of dissolved and particulate substances to a lake from the surrounding catchment. In the longer term, lakes have been shown to track regional climatic signals such as the North Atlantic Oscillation, and north-south movements of the Gulf Stream. This sensitivity of lakes to changes in the weather means that they can act as sentinels of climate change, integrating the long-term changes in their surrounding catchments over time. Here the effects of climate on Irish and other lakes is reviewed at both longer and shorter time scales, using high frequency data from *in situ* buoys, longer term monitoring data and future climate modelling.

Using palaeolimnology as a tool to detect lake eutrophication trends and recovery

Prof. Phil Jordan

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The recovery of eutrophic freshwaters continues to be high on the environmental policy agenda with phosphorus (P) management central to mitigation efforts. The length of the contemporary monitoring record often limits detecting and understanding the onset and trends of lake eutrophication caused by influent P loads. However, the mass balance Vollenweider P model, developed to understand and manage lake eutrophication, can also be applied to palaeolimnological data. Here, in dated sediments, whole-basin P load is predicted using combinations of lake P sedimentation, historical lake P concentration and estimates of historical hydraulic loading. Applied to a small inter-drumlin lake and catchment, data show that the rate of increased P loading is analogous to the 5,000km² Lough Neagh basin, suggesting a uniform pressure-response. The model is validated by the contemporary Lough Neagh riverine P load record and more precisely by monitoring on the small lake inflow. The onset to increased contemporary P loading pressures is estimated to c.1950s, but suggests a period of prior but stable P loading pressures. More recent palaeolimnological studies show how similar approaches can be used to monitor lake recovery following landuse pressure changes in small catchments; these might ordinarily be missed in routine monitoring. The small scale is proposed, however, to be the most suitable to gauge the immediate impacts of mitigation measures and can be supported with detailed landuse, limnological and stream chemistry data.



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