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The First Detailed 2H and 18O Isoscapes of Freshwater in Scotland

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Scotland's freshwater lochs and reservoirs provide a vital resource for sustaining biodiversity, agriculture, food production as well as for human consumption. Regular monitoring of freshwater quality by the Scottish Environmental Protection Agency (SEPA) fulfils the legislative requirements but new scientific methods involving stable isotope analysis present an opportunity for delivering on current and nascent government policies [1] and gaining a greater understanding of Scottish waters and their importance in the context of climate change, environmental sustainability and the aforementioned functions.

In brief, 2H and 18O isoscapes of Scottish freshwater could be used to support fundamental and applied research in:
• Climate change – These first ever isoscapes will provide a baseline against which future environmental impact can be assessed due to changes in the characteristic isotope composition of freshwater lochs and reservoirs.
• Scottish branding – Location specific stable isotope signatures of Scottish freshwater have the potential to be used as a tool for provenancing and thus protecting premium Scottish produce such as Scottish beef, Scottish berries and Scottish Whisky.

During 2011, freshwater samples were collected with the support of SEPA from more than 80 freshwater lochs and reservoirs across Scotland. Here we present the result of the 2H and 18O stable isotope analyses of these water samples together with the first isoscapes generated based on these data.

[1] Adaptation Framework - Adapting Our Ways: Managing Scotland's Climate Risk (2009): Scotland's Biodiversity: It's in Your Hands - A strategy for the conservation and enhancement of biodiversity in Scotland (2005); Recipe For Success - Scotland's National Food and Drink Policy (2009); Scottish Planning Policy Environmental Report (2009); Scottish Planning Policy (SPP) 15 Planning for Rural Development (2005); National Planning Policy Guideline (NPPG) 14: Natural Heritage (1999).