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Counting fish: Performative data, anglers' knowledge-practices and environmental measurement

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ABSTRACT

This paper examines how environmental resources are measured and quantified as objects of environmental science and management and how lay knowledge-producers participate in this process, alongside the state. Using a case study of recreational angling, I show how fish in English rivers and lakes are counted and anglers act as lay or amateur knowledge-producers in the state's metrological knowledge-practices. As embodied measurement instruments, anglers create data about themselves (as 'effort data') and about fish (as 'catch returns'). These data are combined with other forms of data produced by the Environment Agency in England and Wales and used for fisheries management, thus shaping water bodies and fish ecology. I show how, to support environmental measurement, the state manages not only the environment and fish, but also anglers as lay knowledge-producers, using both regulation and economic incentives; in response, anglers also use data reflexively and strategically. I therefore emphasise the heterogeneous co-productions of environmental measurement as amateur–professional, human–animal and organic–technological, and show how measuring and managing water ecologies also involves measuring and managing humans.

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1. Introduction

This paper is about how fish in English rivers and lakes are counted and how anglers perform as embodied instruments of environmental measurement. Measuring environmental resources is rarely easy, but when those resources are invisible to normal human perception by being underwater and highly mobile – as fish are – then measurement becomes even more difficult. To count fish, environmental managers try literally to enrol their human predators – recreational anglers – to submit records of their catches as part of the process of measuring and managing fish stocks. These metrological practices transform fish into numbers, creating new "calculable objects" (Barry and Slater, 2002, p. 181) for environmental management.

The varied performances by leisure anglers of casting a line, catching fish, counting fish, identifying species and recording counts not only render fish as 'environmental resources' that can be measured but also make those resources materially, through enacting different representations of environmental realities (Law, 2008) that then shape management of water environments. Drawing on work in human geography and sociology, I demonstrate how environmental measurement depends upon performative data or what the Environment Agency (EA) of England and Wales calls 'effort data', that is, data about time spent on recreational angling. Such calculative strategies of counting, measuring and categorising, of turning things into numbers (Barnes and Hannah, 2001; Elden, 2007) shape how we understand and manage environmental resources, yet these strategies are often hidden.

My example is also unusual because it relies on literally thousands of members of the public who, as a byproduct of their environmental recreation, produce data about the fish they encounter (or fail to encounter) and about the time spent doing so. They are also themselves monitored and managed as measurement instruments by the state in the shape of the EA. In the process not only environmental data are created, but also relationships between state agencies and environmental recreationists. I therefore focus on three questions:

1. How are amateurs enrolled and managed as recreational knowledge-producers by the state to co-produce environmental measurement?
2. How are measurements from amateur recreationists and professionals combined and what happens when they disagree?
3. How do these co-produced measurements from amateurs shape environmental management and the materialities of water bodies specifically?

These questions emphasise the heterogeneous co-productions of environmental measurement as amateur–professional, human–animal and human–technological, and show how managing water also involves managing humans reciprocally as instruments of environmental measurement.

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2. Measuring environmental resources

My three research questions speak to the importance of counting, calculation and measurement in understanding and rethinking spatial politics generally (Crampton and Elden, 2006). On the one hand, turning environmental resources into numbers that can be managed has been seen as a modernist endeavour that supports capitalist control of the environment. St. Martin (2005) considered how fisheries science and management were used to bring the unruly environmental practices of commercial fish harvesting firmly within capitalism, especially through quantification and privatisation, making fish into abstract 'resources' ready for exploitation. Similarly, Demeritt (2001, p. 455) showed how the statistical measurement of American forests in the early 20th century supported new state agencies and 'professional' forest experts in managing those forests as an environmental resource, by transforming "heterogeneous forest stands into an apparently calculable quantity available to new forms of precise disciplinary control and governmental power". The recent focus on 'ecosystem services' in the UK also shows how practices of environmental measurement are linked with capitalism, as conversion to monetary units is seen as the most influential way to calculate the 'value' of environmental resources and therefore argue for their protection (e.g. UK NEA, 2011).

On the other hand, social scientists have criticised this modernist conceit of control and explored how managing environmental resources is made problematic by proliferating hybrids and the difficulties of counting mobile, diverse and poorly defined populations such as bison (Lulka, 2004) and fish (Bear and Eden, 2008; Mansfield, 2003). Rather than seeing nonhuman entities as resources for capitalism, such analyses are more interested in tracing the processes by which 'environmental resources' are defined and made as objects of science and management, often drawing on actor-network theory and paying attention particularly to hybrid assemblages and knowledge-practices, as well as the embodied performance of knowledge production. Examples include mapping forest-savanna boundaries (Latour, 1999), classifying grassland types (Waterton, 2003), counting bird populations in cities (Hinchliffe, 2008) and defining American catfish or farmed salmon (Mansfield, 2003). In diverse examples, therefore, the knowledge-practices that create and use data are shown to be performative and creative of new realities (Law, 2008).

Such analyses emphasise not merely the uncertainty in categorising living beings, but also the practical problems of counting environmental entities that move differently in time and space from the way that humans do and of making those entities matter for environmental policy (e.g. Hinchliffe, 2008). This is particularly problematic in the 'field sciences', such as ecology, which typically "resist tidy solutions" to measurement problems (Kuklick and Kohler, 1996, pp. 1–2).

This brings us to the first of my research questions: how are amateurs enrolled and managed by the state as recreational knowledge-producers and thus co-producers of environmental measurement? Field sciences have often included amateurs or lay-people in environmental knowledge production, because organisations responsible for measuring and managing environmental resources in the public interest (usually for the state) have insufficient resources to do so themselves. Enrolling enthusiastic amateurs as (paid or unpaid) volunteers can extend the amount and scope of environmental fieldwork that conservation and environmental science can do, such as amateur naturalists collecting biodiversity data for the state (Ellis and Waterton, 2004, 2005; Meyer, 2010).

This is also useful for non-governmental organisations with large memberships but small budgets. For example, the UK's Royal Society for the Protection of Birds runs Garden Birdwatch, with up to 280,000 people participating by reporting bird counts, and the British Trust for Ornithology (BTO) has for decades relied on volunteers to collect data on British bird populations (Greenwood, 2003). In the USA, the Cornell Lab for Ornithology (CLO) and the National Audubon Society run the Great Backyard Bird Count, with over 80,000 counts submitted, as part of their 'citizen science' programme (Bonney et al., 2009).

Such lay participants often need to be managed and nurtured. The BTO aim to give their volunteers "ownership of the work from the start" and "value and cherish them not just as fieldworkers but as a network of well-informed people who help take messages out to the wider community" (Greenwood, 2003, p. 228), including supporting training programmes for ringing birds (http://www.bto.org/volunteer-surveys/ringing/about/faqs). Nurturing may involve professional organisations or state agencies showing volunteers, such as anglers or birdwatchers, that the data they report are valued and useful to scientists and policymakers (Bell et al., 2008, p. 3450). Bonney et al. (2009, p. 981) reported that CLO's 'eBird' website was improved to help people "to track their own observations and to explore how their reports compare with others" and the numbers submitting data "nearly tripled" afterwards, emphasising the usefulness of two-way communication in amateur–professional relationships. However, researchers tend to feel that amateurs should help out for what Ellis and Waterton (2005, p. 685) call "the wider public good, in the form of scientific knowledge" and for their own satisfaction, rather than for monetary recompense (Lawrence, 2006).

Working for their own satisfaction is more problematic for fishers counting fish for the state. Commercial fishers have an economic incentive to provide data to the Canadian 'Sentinel' programme, because this should ensure that fishery management is based on good estimates, unlike the over-estimates of stock pre-1989 that led to over-exploitation and fishing bans (Finlayson, 1994). In England and Wales, the EA has not only a statutory duty to manage fish stocks, but also an economic incentive to increase angler numbers because (unlike many other outdoor recreationists) freshwater anglers must buy a rod licence annually from the EA. This is an important source of revenue for the EA but also makes anglers feel that they are owed a good service in return.

Hence, EA staff (Aprahamian et al., 2010) note that "fisheries management is as much about people and geography as it is about fish stocks and ecosystems", because falling angler numbers do not reflect changing fish numbers (and thus the possibility/satisfaction of catching) but changing social issues (q.v. Eden and Barratt, 2010). "Promotional activity is extremely worthwhile" as a consequence, say the EA authors, because, unlike in France and the USA, "an investment of approximately 2% of licence income is preventing the decline in angling seen elsewhere and is delivering an average 6% increase in sales" (Aprahamian et al., 2010, p. 103). The economic aspect of the angler-state relationship therefore also shapes its knowledge-producing aspect and I return to this point later.

My second research question asks how measurements from amateur recreationists and professionals are combined and what happens when they disagree. The literature shows how environmental scientists combine diverse data sets by translating living beings into counts, maps and graphs and classifying spatial and temporal variability. Latour (1999, p. 46) noted how forest scientists standardised recordings of samples in logbooks, to ensure later comparability; materialities (soil, plants) were transformed into numbers and codes, into writings and mappings, their differences gradually eroding so that they could travel through space and time. Standardisation classifies and transforms heterogeneous individuals from idiographic information into reductionist, aggregated abstractions, such as herds (Lulka, 2004), forests (Demeritt, 2001) or species.

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