

‘Science Matters’ and the public interest: the role of minority engagement

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Much has been written about how the public are imagined and constituted in recent science–society developments. In this chapter we explore the relatively neglected but related question of how the relationship between science and the public interest is constituted. The question is timely in the wake of Britain’s exit from the European Union and the election of Donald Trump as US president. Both have raised significant concerns about the future of public support for science, and of policymaking supported by scientific facts (see Introduction). These have spurred public mobilisation and reflection by scientists concerned about the implications for their profession (*Economist*, 2016), as well as for the public interest as a whole (*Guardian*, 2017). But when members of the public mobilise around scientific research or policy decisions involving science, how should we understand their relationship to the public interest? This is our focus in this chapter.

At the height of concerns over science–society relations, the then UK Prime Minister Tony Blair delivered a widely cited ‘Science Matters’ speech (Blair, 2002). This speech echoed wider criticism, which still continues in Britain and elsewhere, of public protest against topics such as genetically modified (GM) crop trials or animal experiments. In mobilising to articulate what are minority positions vis-à-vis ‘public opinion’ as a whole, such publics seem, at first, to represent a monstrous departure from the social order and, in turn, the public interest. Following the twin meanings of the figure of the monster (Haraway, 1992, and see Introduction), we will critically interrogate this assumption and illustrate how minority groups are capable of engaging with

science in ways that allow alternative visions of the public interest to become temporarily visible and potentially compelling.

The 'Science Matters' speech provides an opening for our argument, which we develop in the context of two different cases of minority engagement with science. We first consider the case of activists campaigning against the use of animals in scientific research, who are effectively characterised in Blair's speech as opposed to the public interest (as well as to science). Blair also contrasted the UK situation with support for science elsewhere in the world, implying that how science and publics relate to each other in other countries is relevant for how the UK imagines these issues. We therefore also consider a case in Canada, where a minority indigenous group engaged with both science and a part of the state (the law) to overturn a policy decision in fisheries management. This second case shows that science and public engagements can sometimes constitute challenges to dominant *policies* held to be against the public interest, as well as constituting opposition to established ways of doing scientific research, as in the animal activists' case. Whether or not they succeed in overturning the status quo, the engagements of minority groups should be seen as central to periodic renegotiation of the social contract with science, innovation and wider public policies (Guston, 2000) through which the public interest is constituted.

Tony Blair issued a clarion call for ensuring that 'Government, scientists and the public are fully engaged together in establishing the central role of science in building the world we want' (Blair, 2002). With this statement Blair essentially invoked the principle that matters of importance to science and scientists are also matters of the wider public interest, which he was authorised to pursue as head of government. Yet, by signalling that the world 'we' want will not simply follow from the work of either science or government, his speech identified a key role for the public in this respect. Blair seemed to suggest that only when all parties worked together would it be possible to achieve the common goal of co-producing science and the public interest.

In effect, Blair's 'Science Matters' speech opened up a space for conceptualising engagement as a way of embedding the public interest in science. But how should we conceive of the public interest in scientific research in the first place? And what are the grounds on which the public might be expected to engage with scientists and the state in

pursuit of such a shared interest? Blair's account reflected more broadly shared assumptions: first, the public already has an interest in science in advance of its engagement in it, and second, members of the public will engage mainly to support and secure this pre-given interest. The first represents the substantive aspect of science/public engagement (what is in the public interest), while the second captures the procedural or processual aspect (how the public interest is to be determined). The 'Science Matters' speech characterised the substance of the public interest in science mainly in terms of the ability of research to offer technological solutions to economic, health and environmental challenges. For Blair and like-minded others, a shared interest in these solutions called for a process of engagement by a majority public to limit the influence of minority critics. The potential of minority publics to stimulate periodic renegotiation of what is taken to be the public interest through their engagements with science is, however, missing from this picture. To explore this potential, we situate our analysis in the context of recent research in science–society relations.

Public engagement is a major theme in this research (e.g. Felt and Fochler, 2010; Marris, 2015; Mohr and Raman, 2012; Welsh and Wynne, 2013), where it has been explored in relation to the inclusion and exclusion of particular publics and perspectives, and imagined representations of the public and public opinion. How engagement relates to the pursuit of a shared public interest is often implicit in these discussions, but only rarely is it explored in its own right (but see Hess, 2011; Jasanoff, 2011; Wilsdon et al., 2005). In this chapter, we seek to fill this gap.

Callon (1994) was one of the first to draw attention to the question of how we might think about the relation between science and the public good, though this was in a discussion framed by economics rather than public engagement. Interest in a wider set of questions is emerging, however, with Helga Nowotny, following Yaron Ezrahi, recently calling for more sustained analysis of the relationship between science and the public interest (Nowotny, 2014). For reasons of space we bracket the different lineages of relevant overlapping terms; namely, public value, the public good or the common good. We use 'the public interest' to denote the dual meaning that, first, some matters involving scientific research are, in principle, *of interest* to members of the public

and, second, that these matters affect what is in the best interests of the collective ('society'). The first meaning is captured in the Royal Society's (2006) report on science and the public interest, which emphasises a need to communicate research results to the public to help them understand how these impact on their lives and enable them to participate in debates of the day. This is interrelated with the second meaning, invoked by Nowotny (2014), of public or collective interest, which is commonly defined as distinct from private interest alone. This public interest may or may not extend to *all* aspects of research, but we cannot know what it covers in advance of concrete efforts *to engage with* publics or *by* publics already engaging with science matters. Likewise, the nature of this interest is varied, but we focus specifically on *political* interests in and about science. In addition to government, scientists and a general public, as spotlighted by Blair in his speech, we include other social actors and institutions in governance (Lam and Pitcher, 2012). These include organised civil-society groups and communities as well as other parts of the state; notably, the law. Following Mark Brown, the conception of politics we have in mind for this inquiry is of 'purposeful activities that aim for collectively binding decisions in a context of power and conflict' (Brown, 2015: 19). Importantly, this conception takes various modes of participation, including civil-society engagements in governance, as *part of* the pursuit of collective decisions that underlie institutions of representative democracy (see also Brown, 2009).

We begin by first developing a framework of five key principles distilled from science–society debates, where the public interest question has periodically emerged but lacked detailed scrutiny. We then illustrate the strengths and gaps of this framework through the two case studies of science and minority public engagement, one on animal research in the UK and the second on fisheries policy in Canada. In science and public engagement research these have been described in process-based language; so, 'unruly' publics are said to be disinvited or otherwise excluded from the collective (e.g. de Saille, 2015; Welsh and Wynne, 2013). While this might be true in particular contexts, such a framing in terms of inclusion/exclusion unwittingly detracts from full consideration of wider public-interest arguments that we raise here in our examination of minority publics engaging with science.

Conceptions of science, the public interest and conditions of engagement

How should we conceive of the public interest in science? In this section we first examine reasons why a common response to this question – namely, that science is intrinsically in the public interest – is inadequate, and why more socially embedded notions of accountability and the usability of science might offer a more nuanced response. We then examine limitations of the way accountability and usability are commonly framed, which in turn underline the need to consider how publics may engage with science. Finally, we ask: on what grounds might public engagement be expected to happen? Our response explains why engagement is a process not merely for opening up but also potentially for renegotiating the substantive question of what is in the public interest (see also chapter 1). For instance, renegotiating a social contract for ethical fisheries has been promoted as a way of managing and protecting fishery resources and other public goods (Lam and Pauly, 2010). In practice, both engagement and renegotiation may happen only rarely and cannot substitute for socially attuned forms of expertise, as Jasanoff (2003) has argued. But the *potential* to renegotiate remains crucial for times when established understandings of the public interest are called into question (Barnett, 2007).

The idea that science is intrinsically in the public interest has resonated in the different registers of economics, culture and politics. In economic terms, this is underpinned by the classic definition of a public good as non-rivalrous and non-excludable, and thus deliverable only by a public body, not the market. Scientific knowledge, it is argued, meets these requirements (Stiglitz, 1999). However, this abstract notion of a good that can be used by people other than the producers has been critiqued and qualified to clarify the actual conditions that make it more or less possible to fulfil these requirements in practice. For example, recognising the rise of partnerships with commerce, Callon (1994) argued that science can still contribute to a public good but only through the pursuit of diverse questions and approaches, alliances with different networks, and the ability to share knowledge and support new collectives. Judging by this criterion, Stengel et al. (2009) conclude that UK plant science lacks the qualities of a public good.

The cultural case for an intrinsic public interest in science is also widely resonant, though the definition of scientific culture is more elusive, resting typically on the capacity of individuals and society to appropriate science (Godin and Gingras, 2000). This could encompass both the appreciation of science as a cultural good and a more instrumentalist economic understanding, though both may be linked in practice. For example, the local authority in Nottingham aims to develop the city as a place of scientific culture through its STEMCity initiative, which links education, community engagement and local economic development, and which has become a springboard for an ambitious responsible research and innovation project (Nucleus Nottingham, 2016). But whether made in isolation or in conjunction, both cultural and economic arguments for science in the public interest ultimately rest on expectations of the wider engagement in and use of science.

The limitations of taking the public interest to reside intrinsically within science become especially evident in the context of political arguments for supporting research. Whether the state should support specific lines of research or research in general is obviously a political question with public implications and implicit value choices. Political arguments for the intrinsic value of science are often mixed up with economic, cultural and societal rationales, as in Blair's 'Science Matters' speech. But such arguments should be seen as 'the *commencement* rather than the *completion* of public policy' (Guston, 2000: 48; emphasis added) and, more generally, an invitation to public discussion on what kinds of research are worth supporting and why (Brown and Guston, 2009). Precisely because they involve matters of public interest, claims on behalf of, say, state-funded, private or do-it-yourself research in synthetic biology should all be open to wider debate in the public sphere.

Public support for scientific research in turn entails that a public voice be heard. This has been recognised and promoted in policy through codes such as the Universal Ethical Code developed in 2007 by the British Government Office for Science, and through initiatives in public dialogue in emerging research and technological fields. The ethical code refers to science's need for a social licence to operate, based on a continually renewed relationship of trust, resonating with the language of good governance, such as openness and transparency,

briefly alluded to in ‘Science Matters’. While these terms signify a concern with *accountability* in the sense of requiring research systems to give an account and take note of public responses, research councils have also emphasised a need to demonstrate the impact or *use* of research in practice. ‘Science Matters’ was primarily a plea to the public to engage with and support science rather than a plea for scientific accountability, but it emphasised the use-value of research in the form of technological benefits. Paralleling similar developments in the USA (Guston, 2000), notions of the intrinsic public interest in research have disappeared from the British social contract with science, which is now firmly centred on demonstrating accountability and usability through wider engagement with the public. But, in practice, the terms of this engagement have been too narrowly circumscribed. We thus set forward five key principles that we believe underpin science–society engagement in the public interest.

First, engagement is not the same as endorsement. Public engagement can indeed offer the possibility of enhanced public support for research, as Blair envisioned and as political theorists Brown and Guston (2009) argue. But this does not mean people will support a *specific* study or technological configuration as a result of public discussion, as ‘Science Matters’ implied. Informed scrutiny has the potential to open up substantive issues that may not have been anticipated in research systems. Engagement can lead to many alternative outcomes for the proposed research: enhanced public support, criticisms leading to modifications, or outright rejection (which might still be accompanied by the endorsement of *other* forms of research). All these outcomes represent collective efforts to construct what is in the public interest.

Second, engagement can generate learning by different parties. Public engagement can expand the scope of issues deemed relevant for discussion beyond those originally imagined. This could cover matters of governance on specific areas of research, but also ideological disagreements about the nature, structure and value of these investments. For example, de Saille (2015) found that the social-movement activists she interviewed were more sceptical about how research is regulated than about the research per se. Likewise, Marris (2015) argues that governance issues, such as the lack of transparency about commercial links, was a real concern for publics critical of synthetic biology research, not commercialisation per se or fundamental ideological

objections (e.g. 'tampering with nature'). Others highlight the gap between research funded for commercial purposes versus its public value (Moriarty, 2008; Wilsdon et al., 2005).

Third, engagement can open up alternative pathways for research and innovation. In determining what should be supported in state-funded research, one must consider the specific area of research (such as its risks, benefits and value to specific parties) and opportunity costs – that is, what other possibilities are foregone (Brown and Guston, 2009). If diversity is a criterion of science as a public good (Callon, 1994), then the market fails as a mechanism for achieving this good, as it prioritises only what elites say we ought to want (Jones, 2013). Public engagement, properly understood and devised, might stimulate discussion not just of the merits of one research area, but the wider question of what kinds of research and innovation are needed to fulfil the public interest (Jones, 2013). For example, Hartley et al. (2016) argue that to properly assess the merits of an emerging technology, such as GM insects, due consideration must be given to alternative research pathways to address societal challenges.

Fourth, engagement may involve the use of science to open up alternative policy pathways. Public engagement with science can take different forms, ranging from the appreciation of scientific insights to employing (say) climate science to make a case for radical political, economic and social change, to opposing experiments using animals in research. This means engagement does not only refer to efforts initiated by research systems and policymakers – it can also emerge from below. Nor does it signify just technological goods as a marker of public interest. Publics may engage with what Jasanoff (2006: 24) calls 'public science', i.e. 'science that underwrites specific regulatory decisions, science offered as legal evidence, science that clarifies the causes and impacts of phenomena that are salient to society, and science that self-consciously advances broad social goals, such as environmental sustainability'. Public science may be used by governments or the law in support of specific decisions but it may also be used by publics appealing against or seeking to overturn such decisions to advance their interpretation of the public interest.

Fifth, as a summary principle, engagement can help revivify what is understood to be in the public interest. Public engagement is a process for opening up and potentially renegotiating what is in the public

interest. In addition to efforts by policymakers to engage the public, engagement might also include mobilisation from below by publics seeking to engage on their own terms (de Saille, 2015), often providing 'the basis for publicity for an *alternative* view of the public benefit' (Hess, 2011: 630; emphasis added). Knowledge from some areas of public science may be used to scrutinise or call to account other research areas – for example, those on environmental sustainability. Such engagements may emerge from 'scientific counterpublics' (Hess, 2011), who form alliances across different organisations and sectors (including science, non-governmental organisations (NGOs), professional groups and sympathetic parts of the state) and claim to offer a better account of the public interest than that assumed by dominant actors. The example we consider below of the Haida Nation represents one such diverse alliance. But engagement with science might also come from smaller, less-networked groups who have yet to persuade and mobilise a larger alliance of actors, but nonetheless have substantive issues to raise, as we will explore in the animal experiments case.

Both our cases highlight the limitations of conceiving public engagement solely as a procedural exercise for capturing the majority position, as often painted by policy sponsors of dialogue activities (Mohr and Raman, 2012). Studies of public-engagement exercises sometimes unwittingly reproduce the process-oriented languages of inclusion of public perspectives or the exclusion of uninvited or unruly publics, making it harder to focus on engagement as a mechanism for negotiating and potentially renegotiating substantive issues around science and the public interest. We explore these issues in our cases of animal-research activism and indigenous communities, which, in opposing different aspects of the dominant order, can be viewed as 'monstrous' in Blair's 'Science Matters' terms, or as warnings of the limits of this dominant order (Haraway, 1992).

Challenging animal research ... and the 'monstrous' public

Animal research is a particularly illuminating case through which to consider the limitations of the 'Science Matters' representation of public engagement as a process for endorsing current research systems. Animal research is a high-stakes issue, particularly in the UK (Hobson-West, 2010). Some argue that using animals is not just *a* method of

science, it is *the* method of modern scientific inquiry (Rupke, 1987), creating an animal–industrial complex (Twine, 2013). Social scientists have framed animal research as dependent on a tacit social contract between scientists, citizens and the state (Davies et al., 2016). We show in this section that public engagement with animal research has the potential to open up alternative understandings of what kinds of research are in the public interest. Such alternatives have not yet been successfully established. However, the capacity for research systems and embedded notions of the public interest to change in the future cannot be ruled out.

In the UK opinion polls are commissioned regularly by the Government and receive significant media coverage (e.g. Department for Business Innovation and Skills, 2014). Results of these polls have had notable impacts on policy – for example, with funders supporting initiatives to open up animal research (McLeod and Hobson-West, 2016), partly on the assumption that this is what polls show the public want. Empirical research has also shown how different actors in the debate – including researchers using animals and animal-rights charities – claim to be aware of, and actually responsive to, public-opinion polling (Hobson-West, 2010). For those conducting animal research, claims that their actions are in line with public opinion represents a kind of legitimisation strategy (Hobson-West, 2012), so that the polls themselves become a route to a ‘social licence to research’ (Raman and Mohr, 2014). But beyond national opinion polling, or critiques thereof, how should we conceptualise different forms of publics in the animal-research debate?

One way is to focus attention on how minority groups are sidelined, silenced or undervalued in the sphere of animal-research policymaking. One key minority perspective is that animal research should not continue, either for ethical (cruelty to animals) or for scientific reasons (the unreliability of knowledge and technologies generated through animal research). This abolitionist view is sidelined in several ways, including via the use of opinion-poll results. For example, in the press release accompanying the 2014 Mori Poll (Department for Business Innovation and Skills, 2014, no pagination), the Government stresses that ‘a majority of the British public accept the use of animals in scientific (medical) research “where there is no alternative”’. It then mentions the ‘myths’ that still exist, thereby implying that those who

are not in the majority are misled. The minority view is also more implicitly sidelined in policy statements, for example, via the claim from the UK Home Office (2015, no pagination) that ‘We respect the fact that people have strong ethical objections to the use of animals in scientific procedures. [But] we have legislated so experimentation on animals is only permitted when there is no alternative research technique and the expected benefits outweigh any possible adverse effects.’

In these examples, opponents of animal research can be understood as unruly publics (de Saille, 2015) who challenge the status quo. In the UK the peculiar history of active (and sometimes violent) protest against animal researchers means that labels of extremism abound, including in law, where legislation to control animal-rights activities was bound up with a government response to terrorism. This fits well with Welsh and Wynne’s (2013) category of the ‘threatening public’, where the threat is both literal, in the sense of violence, and metaphorical, in that animal research and the life sciences are tied to economic growth (Home Office et al., 2014). If animal research is constructed as a key to medical progress, then an abolitionist agenda is enormously radical. To return to this book’s metaphor, being seen as not on the side of health or progress is monstrous – that is, almost inconceivable – as an aberration of logic or civility.

However, one limitation with the focus on inclusion and exclusion of publics is that it can unwittingly reproduce a fragmented, individualised version of the public. An alternative analytical approach, following Hess (2011), is to look for dominant and subordinate *networks* and, crucially, to explore how those networks construct the concept of the *public interest*. Applying this lens to animal research, we can identify a dominant, currently stable network consisting of government departments such as the Home Office, the pharmaceutical and research industry, and, arguably, some powerful research charities, such as those campaigning for more research into diseases like cancer. The subordinate network comprises animal-rights groups, some religious groups opposed to using animals, and scientists and funders involved in using or searching for alternatives to animal research. In other words, opposition to the use of animals in scientific research is no longer seen simply as the vision of an aberrant public (as suggested by Blair) but as a position embedded within a set of alliances.

Given the link made between animal research and medical and health progress, one of the key discourses of the subordinate network is that animal research is *not* in the public interest. This is achieved in several ways, including by questioning the dominant narrative that animal research is equal to medical progress. Critics point to examples where results seen in animals have not transferred to success in human trials, the fact that many diseases remain without cures and the relative lack of research into unexplored areas of science, such as into alternatives to use of animals (Hadwen Trust, n.d.). Others question what it means socially, culturally and ethically to live in a society that tolerates deliberately killing or harming some species. In short, as predicted by Hess (2011), this scientific counter-culture is offering an alternative vision of the public interest. This is very different to an analysis focusing only on public consultation, where animal-rights groups might be seen as representing or giving voice to certain groups of individuals, or, as is implied by some of the names of campaign groups, such as SPEAK (<http://speakcampaigns.org/>), giving voice to animals themselves.

If counter-movements such as animal-research critics are indeed articulating alternative visions of the public interest, then, rather than being monstrous in the negative sense described by Blair, we could perhaps see them in more positive terms, as calling attention to limits of established ways of doing research. Following Haraway (1992), what these counterpublics potentially demonstrate is that alternative visions of medicine and science are possible, and that the established order may one day be overturned through the formation of new alliances that come to represent new scientific and social norms.

Challenging fisheries policy through a coalition of an indigenous community, public science and the law

We now turn to the case of an indigenous community, the Haida Nation, which is asserting and renegotiating the terms of its government-to-government relationship, as established in numerous agreements with the Canadian Federal Government, in the management of marine resources in its traditional territories. Disputes over fishing rights between British Columbia, First Nations, and the Department of Fisheries and Oceans Canada (DFO) reflect a history of legalised

colonial dispossession and loss of access by aboriginals to fish (Harris, 2009). We examine the ongoing herring fishery dispute between the Haida Nation and the DFO to illustrate how public science can be used and combined with alternative forms of knowledge, such as traditional ecological knowledge (Berkes, 2012), in policy disputes. As in the animal-research case, this example highlights the limits of equating engagement with endorsing the object of engagement. But unlike that case, it also shows that subordinate networks (Hess, 2011) are capable of expanding their base – in this case, through a coalition of the indigenous community, stakeholders, indigenous and ecosystem-based science, and the law – to renegotiate what is understood to be in the public interest.

Haida Gwaii (formerly known as the Queen Charlotte Islands) is an archipelago on British Columbia's northwest coast with a population of approximately 5,000 residents, both Haida and non-Haida. The islands are the ancestral and contemporary home of the Haida Nation, which claims aboriginal rights and title to the archipelago. The Supreme Court of Canada has recognised that the Haida Nation has a strong *prima facie* case for the aboriginal title to Haida Gwaii, so the Federal Government has a duty to consult the Haida people and accommodate their interests (*Haida Nation v British Columbia*, [2004] SCC 73). Herring has significant cultural value for the Haida and other British Columbia Coastal First Nations, particularly as spawn on kelp, which is a traditional source of food and trade for indigenous peoples along British Columbia's coast. As a forage fish, herring plays an important provisioning role in the ecosystem, feeding predatory fish, birds and marine mammals, as well as supporting commercial roe herring, spawn-on-kelp, and food and bait fisheries in British Columbia. Herring stocks in the Haida Gwaii major stock area declined to chronically low levels in the 1990s and have yet to recover, resulting in closures of the commercial roe herring fishery since 2003 and spawn-on-kelp fishery since 2005 (Jones et al., 2017). However, in recent years, there have been a number of disputes over the proposed reopening of the commercial herring fisheries.

The inclusion and public consultation of First Nations' communities is prominent in fisheries management, but it is typically presented as a right of these groups to present their *own* special interests (von der Porten et al., 2016). This narrow characterisation of voice is part of an

equally limited understanding of public engagement as a process for merely consulting different groups and acknowledging their distinct perspectives. Again, drawing on Hess (2011), and as implied in Welsh and Wynne (2013), we instead consider the possibility that minority voices are capable also of articulating a *wider* public interest. Minority communities often build specific claims for change, intervention or the protection of nature based on a collective vision of shared values and purpose. The Council of the Haida Nation (CHN) has articulated traditional Haida values (CHN, 2007) that it believes are important for planning marine use and managing fisheries (Jones et al., 2010). Haida values of respect, balance, interconnectedness, reciprocity, seeking wise counsel and responsibility have been compared to scientific principles of ecosystem-based management (Jones et al., 2010). These community values, if meaningfully taken into account in the engagement process, may widen what constitutes the public interest (Lam, 2015). This possibility was initially subverted by the DFO's use of public science to support its case for reopening the commercial herring fishery in Haida Gwaii. However, transient alliances between the CHN and the fishing industry in 2014 and the law in 2015 successfully challenged the DFO's construction of what was in the public interest.

In 2015, the DFO consulted the CHN and conducted preseason stock assessments that provided the option for closing down the commercial herring fishery around Haida Gwaii (Jones et al., 2017). Despite this, the then Minister of Fisheries reopened the commercial roe herring fishery, which led to a legal challenge from the CHN. Public engagement had occurred and procedural requirements had been fulfilled, yet the substantive arguments and claim presented in the consultation with the Haida that their values had been infringed was overridden in the final ministerial decision. The CHN filed an interlocutory injunction to prevent the reopening of the herring fishery based on four key points: (1) the herring stocks had not sufficiently recovered to support the commercial fishery opening, disagreeing with the DFO's scientific assessment; (2) given the infringement of Haida rights and title, the DFO had not adequately consulted and accommodated with the Haida Nation; (3) the DFO had failed to develop an integrated herring management framework with appropriate rebuilding strategies; and (4) reopening the fishery contravenes existing negotiated management agreements between the Crown and the Haida Nation.

The Federal Court ruled in favour of the Haida Nation (*Haida Nation v Canada (Fisheries and Oceans)*, [2015] FC 290). Judge Manson challenged the Minister's weighing of the scientific evidence and the lack of meaningful consultation and accommodation with the Haida Nation, given the significance of herring to the community's culture and traditions. While the Herring Industry Advisory Board supported opening the fishery, the judge noted:

The [United Fishermen and Allied Workers Union] UFAWU, who are an integral part of the commercial fishery, supports the Haida Nation's position, for the very reasons why this injunction is being granted:

- i) the need for a better and independent science review of the herring stocks;
- ii) lack of inclusive decision-making;
- iii) their own assessment of the state of the roe herring stocks;
- iv) respect for local First Nations' insights;
- v) a willingness to build a collaborative understanding of the state of the herring in the shared ecosystem. (*Haida Nation v Canada (Fisheries and Oceans)*, [2015] FC 290 at [59])

Judge Manson cited the potential for irreparable harm to the herring and to the Haida Nation, as well as the balance of convenience, which weighs the potential prejudice to all parties, including the Haida Nation, the DFO, commercial fishers and the public interest. He concluded that granting the injunction was 'very much in the public interest'.

Thus, an alliance of indigenous-community, scientific, stakeholder and legal actors effectively challenged the Canadian Government's approach, both to engagement and to the use of science in informing policy decisions. Alternative sources of public science, different framings of knowledge, the significance of uncertainty and the role of values in informing a precautionary approach to resource management all became visible and, at least temporarily, powerful.

Conclusion

The fisheries case illuminates how a minority community successfully co-produced, with the law and scientific knowledge, an alternative vision of policy in the public interest. By contrast, in the animal-research

case, activists opposed to the use of animals in scientific research have not yet been successful in institutionalising an alternative vision of the public interest, but this is not to say that such an alternative is precluded in the future. Both cases call attention to thinking more deeply about the grounds on which public engagement with science contributes to the public interest.

Science–society scholars suggest that the potential to diversify scientific practice and engage with diverse stakeholders is crucial for science to achieve the public interest (Stengel et al., 2009). They distinguish public value from commercial value, raise the importance of diversifying forms of innovation and bring in matters of the governance of cutting-edge science. These are all important but they focus mainly on processes for including publics, omitting the substantive matter of what is understood to be in the public interest at any one time. We have argued that insofar as public engagement is not simply a process for endorsing current research and policy practices, we need to pay more attention to its capacity to further the periodic scrutiny and renegotiation of what kinds of research and wider public policies receive support. In conclusion, we reflect on the potential of science–public engagements to transform what is taken to be in the public interest.

In his 'Science Matters' speech, Blair suggested that science is vital to Britain's continued future prosperity and that different parties need to collaborate to oppose the small band of obstructionists who were acting against the general public interest. Blair's speech invoked the legacy of Newton and Darwin and described science as 'just knowledge', thus attempting to side-step the relationship between science and commerce. Littered with references to nano-scale robots, biomedical science, hydrogen power and what he called e-science ('big data' in today's parlance), his speech overwhelmingly focused on technological outcomes from research producing new knowledge of how things work and the capacity to transform these operations, all ultimately linked to economic and financial benefits alone. He did not discuss, for example, the scientific knowledge that was making visible previously unforeseen hazards of industrial activity or drawing attention to the limits of technological fixes to environmental challenges. Nonetheless, Blair was appealing to a commonsensical view of scientific research

for the greater good recurrently invoked in public discourse – most recently, by journalists urging an extension of the fourteen-day limit on embryo research to ensure benefits from medical science (e.g. Harris, 2016). In this equation of science and the public interest, the public are represented primarily as beneficiaries.

Yet, in principle, Blair's intervention opened up the possibility of renegotiating how the public interest in science is imagined, articulated and constructed through interaction among various different actors. Rather than taking the public interest as already given, the reference to engagement suggests that the interface between science and the public interest can on occasion be opened up and politicised in the sense of being '*made into a part of politics*' (Brown, 2015: 18), at least until a new settlement is achieved. The case of the Haida Nation's role in overturning a ministerial decision in Canadian fisheries policy by an alliance with public science and the law suggests that such renegotiations may be possible, but are likely to remain fragile unless they are supported by wider coalitions. So far, action on animal rights does not appear to have been able to similarly overturn dominant understandings of research in the public interest. However, our analysis suggests that we cannot foreclose future changes to received understandings, which are entirely possible through new and unexpected configurations of activism, public science, the law and publics. Until then, it is important to cultivate attention to apparently monstrous voices that seem to be discordant with the dominant order but may transform it in the future.

In conclusion, our two examples obviously do not negate the larger challenge of limits to public expertise and capacity to engage and scrutinise either science or policy, let alone articulate diverse perspectives. This capacity is necessarily limited in complex societies (Jasanoff, 2003), where facts are the aggregation of multiple, often proprietary, sources and complex institutional arrangements (Turner, 2015). In this context, state resources must be devoted to building independent and distributed systems of public expertise to engage and scrutinise, especially, large-scale research and innovation systems of the kind highlighted in Blair's speech. Until these systems are developed and their ability to elicit diverse perspectives is valued as much as research and innovation itself, efforts to connect science and the public interest are incomplete at best.

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References

- Barnett, C. (2007). Convening publics: The parasitical spaces of public action. In K. R. Cox, M. Low and J. Robinson (eds), *The SAGE Handbook of Political Geography* (pp. 403–417). London: Sage.
- Berkes, F. (2012). *Sacred Ecology*. New York: Routledge.
- Blair, T. (2002). Science matters. Speech to the Royal Society on 23 May 2002. Retrieved 1 December 2016 from: www.ukpol.co.uk/2015/09/12/tony-blair-2002-science-matters-speech/.
- Brown, M. B. (2009). *Science in Democracy: Expertise, Institutions, and Representation*. Boston, MA: MIT Press.
- Brown, M. B. (2015). Politicizing science: Conceptions of politics in science and technology studies. *Social Studies of Science*, 45(1), 3–30.
- Brown, M. B., and Guston, D. H. (2009). Science, democracy, and the right to research. *Science and Engineering Ethics*, 15(3), 351–366.
- Callon, M. (1994). Is science a public good? *Science, Technology and Human Values*, 19(4), 395–424.
- CHN (2007). Towards a marine use plan for Haida Gwaii. N.p.: CHN. Retrieved 1 December 2016 from: www.haidanation.ca/Pages/Splash/Documents/Towards_a_MUP.pdf. [Now available at: www.haidanation.ca/wp-content/uploads/2017/03/Towards_a_MUP.pdf.]
- Davies, G. F., Greenhough, B. J., Hobson-West, P., Kirk, R. G. W., Applebee, K., Bellingan, L. C., Berdoy, M., et al. (2016). Developing a collaborative agenda for humanities and social scientific research on laboratory animal science and welfare. *PLoS ONE*, 11(7), e0158791, doi: 10.1371/journal.pone.0158791.
- de Saille, S. (2015). Dis-inviting the unruly public. *Science as Culture*, 24(1), 99–107.
- Department for Business Innovation and Skills (2014). Public attitudes to animal testing. *Gov.uk*, press release, 4 September. Retrieved 1 December 2016 from: www.gov.uk/government/news/public-attitudes-to-animal-testing.
- The Economist*. (2016). The European experiment: Most scientists want to stay in the EU. *The Economist*, 28 May. Retrieved 7 April 2017 from: www.economist.com/news/britain/21699504-most-scientists-want-stay-eu-european-experiment.
- Felt, U., and Fochler, M. (2010). Machineries for making publics: Inscribing and de-scribing publics in public engagement. *Mimerva*, 48(3), 219–238.

- Godin, B., and Gingras, Y. (2000). What is scientific and technological culture and how is it measured? A multidimensional model. *Public Understanding of Science*, 9(1), 43–58.
- Guardian (2017). ‘Science for the people’: researchers challenge Trump outside US conference. *Guardian*, 19 February. Retrieved 4 April 2017 from: www.theguardian.com/us-news/2017/feb/19/epa-trump-boston-science-protest.
- Guston, D. H. (2000). *Between Politics and Science: Assuring the Productivity and Integrity of Research*. Cambridge: Cambridge University Press.
- Hadwen Trust (n.d.). *Dr Hadwen Trust*. Retrieved 1 December 2016 from: www.drhadwentrust.org/about-us/whats-the-problem. [No longer available, but see www.animalfreeresearchuk.org/mission-vision-values.]
- Haida Nation v British Columbia (Minister of Forests)*, [2004] 3 SCR 511, [2004] SCC 73. *CanLII*. Retrieved 27 April 2016 from: <https://scc-csc.lexum.com/scc-csc/scc-csc/en/item/2189/index.do>.
- Haida Nation v Canada (Fisheries and Oceans)*, [2015] FC 290. *CanLII*. Retrieved 27 April 2016 from: www.canlii.org/en/ca/fct/doc/2015/2015fc290/2015fc290.html.
- Haraway, D. (1992). The promises of monsters: A regenerative politics for inappropriate/d others. In L. Grossberg, C. Nelson and P. A. Treichler (eds), *Cultural Studies* (pp. 295–337). New York: Routledge.
- Harris, D. C. (2009). *Landing Native Fisheries: Indian Reserves and Fishing Rights in British Columbia, 1849–1925*. Vancouver: University of British Columbia Press.
- Harris, J. (2016). It’s time to extend the 14-day limit for embryo research. *Guardian*, 6 May. Retrieved 1 December 2016 from: www.theguardian.com/commentisfree/2016/may/06/extend-14-day-limit-embryo-research.
- Hartley, S., Gillund, F., van Hove, L., and Wickson, F. (2016). Essential features of responsible governance of agricultural biotechnology. *PLoS Biol*, 14(5), e1002453, doi: 10.1371/journal.pbio.1002453.
- Hess, D. J. (2011). To tell the truth: On scientific counterpublics. *Public Understanding of Science*, 20(5), 627–641.
- Hobson-West, P. (2010). The role of public opinion in the animal research debate. *Journal of Medical Ethics*, 36, 46–49.
- Hobson-West P. (2012). Ethical boundary-work in the animal research laboratory. *Sociology*, 46(4), 649–663.
- Home Office, Department for Business Innovation and Skills, and Department of Health (2014). *Working to Reduce the Use of Animals in Scientific Research*. N.p.: Home Office, Department for Business Innovation and Skills, and Department of Health. Retrieved 4 December 2015 from: www.gov.uk/government/uploads/system/uploads/attachment_data/

- file/277942/bis-14-589-working-to-reduce-the-use-of_animals-in-research.pdf.
- Home Office (2015). 2010 to 2015 government policy: Animal research and testing. *Gov.uk*, Home Office, policy paper, 8 May: Retrieved 1 December 2016 from: www.gov.uk/government/publications/2010-to-2015-government-policy-animal-research-and-testing/2010-to-2015-government-policy-animal-research-and-testing.
- Jasanoff, S. (2003). Technologies of humility: Citizen participation in governing science. *Minerva*, 41(3), 223–244.
- Jasanoff, S. (2006). Transparency in public science: Purposes, reasons, limits. *Law and Contemporary Problems*, 69(3), 21–45.
- Jasanoff, S. (2011). Constitutional moments in governing science and technology. *Science and Engineering Ethics*, 17(4), 621–638.
- Jones, R. (2013). *The UK's Innovation Deficit and How to Repair It*. Sheffield Political Economy Research Institute paper no. 6. Retrieved 1 December 2016 from: <http://speri.dept.shef.ac.uk/wp-content/uploads/2013/10/SPERI-Paper-No.6-The-UKs-Innovation-Deficit-and-How-to-Repair-it-PDF-1131KB.pdf>.
- Jones, R., Rigg, C., and Lee, L. (2010). Haida marine planning: First Nations as a partner in marine conservation. *Ecology and Society*, 15(1), 12.
- Jones, R., Rigg, C., and Pinkerton, E. (2017). Strategies for assertion of conservation and local management rights: A Haida Gwaii herring story. *Marine Policy*, 80, 154–167, doi: 10.1016/j.marpol.2016.09.031.
- Lam, M. E. (2015). Opinion: Herring fishery needs integrated management plan. *Vancouver Sun*, 9 November. Retrieved 23 November 2016 from: www.vancouversun.com/technology/Opinion+Herring+fishery+needs+integrated+management+plan/11505147/story.html.
- Lam, M. E., and Pauly, D. (2010). Who is right to fish? Evolving a social contract for ethical fisheries. *Ecology and Society*, 15(3), 16.
- Lam, M. E., and Pitcher, T. J. (2012). The ethical dimensions of fisheries. *Current Opinion in Environmental Sustainability*, 4(3), 364–373.
- McLeod, C., and Hobson-West, P. (2016) Opening up animal research and science–society relations? A thematic analysis of transparency discourses in the UK. *Public Understanding of Science*, 25(7), 791–806.
- Marris, C. (2015). The construction of imaginaries of the public as a threat to synthetic biology. *Science as Culture*, 24(1), 83–98.
- Mohr, A., and Raman, S. (2012). Representing the public in public engagement: The case of the 2008 UK stem cell dialogue. *PLoS Biol*, 10(11), e1001418.
- Moriarty, P. (2008). Reclaiming academia from post-academia. *Nature Nanotechnology*, 3(2), 60–62.
- Nowotny, H. (2014). Engaging with the political imaginaries of science: Near misses and future targets. *Public Understanding of Science*, 23(1), 16–20.

- Nucleus Nottingham (2016). Nucleus deliverable 4.6: Nottingham field trip report. *Horizon2020 NUCLEUS Project*. Retrieved 1 December 2016 from: www.nucleus-project.eu/wp-content/uploads/2016/08/4-06-NUCLEUS-Field-Trip-Report-Policymaking-Nottingham.pdf. [Now available at https://issuu.com/nucleusrri/docs/4-06_nucleus_field_trip_report_poli.]
- Raman, S., and Mohr, A. (2014). A social licence for science: Capturing the public or co-constructing research? *Social Epistemology*, 28(3–4), 258–276.
- Royal Society (2006). *Science and the Public Interest*. London: Royal Society. Retrieved 1 December 2016 from: https://royalsociety.org/~media/Royal_Society_Content/policy/publications/2006/8315.pdf.
- Rupke, N. A. (1987). Introduction. In N. A. Rupke (ed.), *Vivisection in Historical Perspective* (pp. 1–13). Beckenham: Croom Helm.
- Stengel, K., Taylor, J., Waterton, C., and Wynne, B. (2009). Plant sciences and the public good. *Science, Technology and Human Values*, 34(3), 289–312.
- Stiglitz, J. E. (1999). Knowledge as a global public good. In I. Kaul, I. Grunberg and M. A. Stern (eds), *Global Public Goods* (pp. 308–326). New York: Oxford University Press.
- Turner, S. (2015). *The Politics of Expertise*. London: Routledge.
- Twine, R. (2013). Addressing the animal–industrial complex. In R. Corbey and A. Lanjouw (eds), *The Politics of Species: Reshaping Our Relations with Other Animals* (pp. 77–95). Cambridge: Cambridge University Press.
- von der Porten, S., Lepofsky, D., McGregor, M., and Silver, J. (2016). Recommendations for marine herring policy change in Canada: Aligning with indigenous legal and inherent rights. *Marine Policy*, 74, 68–76.
- Welsh, I., and Wynne, B. (2013). Science, scientism and imaginaries of publics in the UK: Passive objects, incipient threats. *Science as Culture*, 22(4), 540–556.
- Wilsdon, J., Wynne, B., and Stilgoe, J. (2005). *The Public Value of Science*. London: Demos. Retrieved 1 December 2016 from: www.demos.co.uk/files/publicvalueofscience.pdf?1240939425.