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## Deliberating Future Issues: Minipublics and Salmon Genomics

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# Deliberating Future Issues: Minipublics and Salmon Genomics

## Abstract

In this paper we are interested a class of issues that are especially difficult to address through public engagement processes. These are issues which should (or must) be addressed in the current period but have associated costs, benefits, and impacts that are concentrated in the future. These issues – which might be called ‘future issues’ – are difficult to manage democratically because any public opinions that might help guide policy decisions have not yet developed. At the same time, governments and administrative agencies are often compelled to act before the full implications of these issues are evident and before potentially affected publics are formed and aware of the implications or consequences of these developments. At best, governments and administrators can try to facilitate positive developments or prevent negative outcomes by anticipating potential concerns or conflicts associated with future issues and addressing these in the current period. We argue that small deliberative forums that combine random-selection, education and deliberation are a practical solution to this dilemma. These small forums – or minipublics – can be used to simulate discursive opinions on subjects that have not, or have not yet become topics of widespread public discourses. Our analysis is based on data from a minipublic on salmon genomics that was conducted in November 2008 by the Centre for Applied Ethics at the University of British Columbia. We argue that participating in deliberative events like this one can help citizens develop substantive opinions on technologically and temporally complex issues. We also argue that minipublics can be used to develop anticipatory maps of collectively sanctioned recommendations and discursively developed concerns or considerations. Minipublics on future issues can offer policy makers important insights into the likely parameters of public debates that have not – or have not yet – occurred.

## Keywords

Democratic Theory, Public Policy, Deliberation, Representation, Public Engagement, Minipublics, Future Issues

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## Introduction

In recognizing that administrative agencies must, out of necessity, engage in policy development in addition to policy implementation, scholars have promoted public engagement processes that are aimed at giving citizens a more substantive role in policy development at the bureaucratic level (e.g., Warren, 2009). Indeed, some administrative agencies are now mandated to conduct community or public engagement processes as part of their policy development work (e.g., Goodin & Dryzek, 2006). The normative objective (which is not always articulated or achieved) is to enhance the democratic legitimacy of the vast number of public decisions which must be made outside the fray of formal political or legislative processes. But this is more easily conceived of than achieved. Affected communities, or *potentially* affected publics, are not often engaged and are often unaware of many of the issues and implications associated with a majority of the decisions that administrative agencies make on a day-to-day basis.

In this paper we are interested in a particular class of issues that are especially difficult to address through public engagement processes. These are issues which can (or should) be addressed in the current period but which have associated costs, benefits, and impacts that are concentrated in the future. These issues – which might be called 'future issues' – are often associated with technological developments in science, engineering, and communications. Nevertheless, many social, urban, demographic, and environmental issues are also temporally complex. For the purposes of this paper we conceive of a 'future issue' as any issue that could (or should) be addressed in the current period even though its impacts will not be manifest until some time in the future.

There are a number of reasons why future issues are difficult to address democratically. In the first place, most citizens will not be familiar with these issues or their potential impacts in the current period. Stakeholders and experts may be consulted, but it is difficult to assess the values, concerns, and priorities of lay citizens *before* they become aware of the potential impacts of future issues. The second and related reason is that future issues, by virtue of their status as nascent or emerging issues, are not well defined politically in the current period. Many current issues, whether politically settled or still controversial, have well known and established political dimensions that decision-makers *can* take into account when making public policy (Warren 1996). If for no other reason, the political dimensions of these issues will be comparatively clear simply because those who are affected are *actually* affected by impacts that are manifest in the current period. The particular difficulty with future issues is that their political dimensions, and their status as public issues, have yet to be defined and very much depend on decisions that are made in the current period. The nature, extent, and severity of political disagreements on future issues – or the robustness of alignments of the public interest – will only become clear as time progresses, as the issues develop and when potentially affected publics become actually affected.

This will only happen when the ethical, social, economic, or cultural implications of current period decisions become manifest.

Thus, from a democratic perspective, future issues create a kind of time-order problem: How can current period public policy be guided by values, concerns, and priorities that: 1) have yet to be developed; and 2) will themselves be affected by whatever decisions are made in the current period? This is an intractable problem that cannot be solved but might nevertheless be mitigated. At best, governments and administrators can try to facilitate positive developments or prevent negative outcomes (both of which will have practical benefits and political payoffs) by anticipating potential concerns (or conflicts) associated with future issues and by addressing these in the current period. In this paper, we argue that small-scale deliberative forums, or minipublics, can be an effective means of achieving these goals.

We start by exploring the theoretical context, and some of the practical difficulties associated with conducting public engagement processes on future issues. From a theoretical perspective, we are interested in how, in Jürgen Habermas' (e.g., 1987, 1996) terms, the governmental and bureaucratic systems might remain responsive to concerns emanating from the public sphere. In order for these interactions to gain and sustain legitimacy, governments and public administrators must be confident that the public input they receive is meaningful, reasonably well informed, and (at least plausibly) representative of a broad range of public interests or concerns. These conditions are especially difficult to obtain for those issues where public attention is minimal or nonexistent, where informed opinions are scarce, and where potentially affected publics do not yet exist. Obtaining (legitimate) democratic guidance on these issues requires a division of *participatory* labour and this, in turn, raises difficulties – but also efficiencies – that are familiar from theories of political representation. We also explore some of the normative and practical reasons for doing public engagement on future issues.

Next, we conduct an analysis of a minipublic on salmon genomics. We use this topic as an example of a potentially important future issue. Although issues surrounding salmon are a prominent topic of public debate on the West Coast of North America, where diminishing salmon stocks have raised environmental, economic, and cultural concerns (especially among Aboriginal groups), the subject of salmon genomics (and the associated project of sequencing the salmon genome) has not been a topic of widespread public discussions. In spite of its low public profile, however, this technology will add to the complexity of the political concerns associated with the production of salmon on the West Coast of North America.

Salmon genomics might seem like an unlikely topic for the subject of a paper on democratic and deliberative theory. It is, and this is precisely the point – we are interested in exploring deliberation on public issues that do not – or do not yet – occupy a prominent place in public discourses. Nonetheless, this paper is intended to be a contribution to a recent body of literature on science, democracy,

and deliberation (e.g., Avard, et al., 2009; Brown, 2009; Walmsley, 2009). More specifically, in this paper we are interested in how policymakers can effectively and efficiently obtain democratic input on issues that are technically and temporally complex. We argue that minipublics can provide some insight into the potential political dimensions of future issues like salmon genomics.

Our analysis is conducted in two stages. In the first stage we are interested in processes of *individual* opinion formation. The relevant question in this case is the following: Are minipublics an effective means of creating, simulating, or forging substantive opinions on future issues? Using pre- and post-event survey results, we show that minipublics can help individuals develop substantive opinions on a technologically and temporally complex issue like salmon genomics. The reason we are interested in exploring individual opinions is that they are the building blocks of collectively forged deliberative outputs (O'Doherty & Burgess, 2009). Nevertheless, we are not primarily interested in how this deliberation event affected the substance of the beliefs, opinions, and concerns of the participants. This has been explored elsewhere (O'Doherty, Burgess, & Secko, 2010). Instead, in this paper, we are primarily interested in how minipublics might be used to guide public policy on future issues once individual opinions have been collectively tested in deliberation and turned into deliberative outputs.

In the second stage of our analysis, we explore the substantive content of these collectively forged and deliberatively tested outputs. Next we consider how and why these deliberative outputs might be useful to policymakers who are grappling with decisions on future issues. We argue that minipublics can be used to develop anticipatory maps of collectively sanctioned recommendations and discursively developed concerns or considerations. We argue that these deliberative outputs, products of actual deliberations between well informed and engaged citizens, have a certain legitimacy as public opinions that are also reasonably likely to be important to future citizens. Of course the recommendations of minipublics and the judgements of current period policymakers should be reassessed and reconsidered in future public discourses, and they may even be challenged or rejected. Nevertheless, we argue that minipublics on future issues can offer policymakers important insights into the likely parameters of public debates that have not yet occurred.

## Theoretical Context

Habermas (e.g., 1987, 1996) has argued that in democratic societies the 'system', which includes the economy as well as public administrative agencies, must remain responsive to opinions, concerns, and considerations originating in a discursively-oriented public sphere. He argues that discursive processes which aim at obtaining mutual understanding among participants should, under ideal conditions, produce sets of collective opinions which are widely acceptable precisely *because* they have been agreed to in an environment rich with

information about the concerns, interests, and objectives of others. From this perspective, public engagement, and especially deliberative public engagement is a matter of policy justification and legitimation. Public engagement is necessary in policymaking processes because policies which affect the public sphere, but are made in isolation of the expressed interests, concerns, values, and priorities of those who are affected, cannot be considered legitimate from a normative democratic perspective (e.g., Goodin 2007). This is of particular concern when political decisions are being made in the bureaucratic sphere because these will be one step removed from representational politics and two steps removed from the public sphere.

As Fung (2006) has argued, "the principal reason for enhancing citizen participation in any area of contemporary governance is that the authorized set of decision-makers – typically elected representatives or administrative officials – is somehow deficient." This shortcoming could be explained by any number of reasons including a lack of "knowledge, competence, public purposes, resources, or [the] respect necessary to command compliance and cooperation" (p.67). Fung (2006) argues that there are legitimation problems which "stem from unintentional rifts between officials and the broader public of their constituents" and that these disconnections grow more profound "as the circles in which political decision-makers operate become more distant from those of ordinary citizens" (p. 70). On this account, public engagement processes can help close these widening gaps and thereby legitimize public decisions, especially those that are made within otherwise closed bureaucratic spheres (e.g., Nabatchi 2010).

There are, of course, a number of practical difficulties related to making policy based on discursive opinions emanating from the public sphere. If policymakers are supposed to respond to input (in any form) which emanates from the deliberative public sphere, how can they be confident that the input they receive accurately represents considered and well-informed deliberative opinions? The opinions received from 'the public sphere' may instead be those of only the most powerful and organized groups in society. Or they may reflect only those who have the most to win or lose from a specific policy decision.

In addressing these concerns – and in focusing on designing effective public engagement processes (e.g., Fung 2003, 2006; Goodin & Dryzek 2006; Smith 2009) – scholars have also specified some of the goals and consequences of public deliberation. According to Carcasson & Christopher (2008), this list includes the following: improved democratic skills; issue learning; improved democratic attitudes; effective individual and community-based public action; improved institutional action; and improved community decision-making and problem-solving (p. 2).

In this paper we are primarily interested in how the legitimation functions of public deliberations also help to create conditions for improved institutional action and policy outcomes. Of course, from a broader perspective, we *are* interested in issue learning, democratic skills development, and enhanced

democratic attitudes, but we do not think that minipublics are particularly well suited to achieving these goals. Minipublics engage small groups of citizens in intense deliberations for relatively short periods of time. Those who are involved in these processes can, and often do, learn a lot about specific topics and public policy issues, and they may develop important democratic skills along the way. Nevertheless, even high-profile minipublics usually do not successfully engage large numbers of citizens in widespread public debates and deliberations (e.g., Chambers 2009). From our perspective, the practical advantage of the minipublic is precisely the opposite. They are an effective means of producing legitimate divisions of participatory labour. This, in turn makes it possible to engage small sections of the public on a larger number of issues, many of which would otherwise be decided in the bureaucratic sphere with little or no public input.

In the case of future issues, there is a kind of latent public interest that must be assessed before public policies can be made in a way that is both legitimate (in the current period) and likely to be acceptable to the future publics that will come to be affected. Minipublics can help policymakers anticipate some of the concerns and considerations that are likely to be relevant to a more substantive public interest, and that may or may not become evident at some point in the future. Perhaps more importantly, addressing potential concerns in the current period may help towards developing more socially sustainable policies, which in turn will assist in preventing potentially controversial issues from becoming explosive political issues in the future.

These arguments are echoed by scholars in the Science & Technology Studies literature, who argue that, in general, engagement with social aspects of science and technology occurs too far “downstream” in the policymaking process. Because too many political and technological commitments are made “upstream” during research and development stages, such public engagement will not have the opportunity to have meaningful influence. On the other hand, engagement that is conducted “upstream” allows identification of a range of alternative perspectives, which in turn identifies key social players to involve in research and development (e.g., Wynne 2001). Brown (2009), similarly, argues that “public deliberation and representation is required, not only in cases of obvious technical failure or public controversy, but also at the front end of technical development. It is required to prevent unjust power relations from becoming embedded within an expert consensus” (p. 90).

From a more general perspective, Gundersen (2006) has argued that anticipatory public discussions can help refocus public concerns on longer-term needs and considerations as well as alternative policy options. Anticipatory public discussions can help identify, explore, and test conceptual possibilities that might otherwise be neglected in political processes that focus only on *how* or *when* previously identified goals or objectives might be reached. Public discussions also help refocus public concerns on *why* certain policy objectives or possibilities should be pursued. In an earlier study, Gundersen (1995) found that even one-on-

one deliberations can enhance foresight among participants and encourage them to adopt longer-term perspectives on environmental issues. This suggests that it is necessary to do public engagement on future issues, not only to justify and test existing policy approaches but also to encourage creative thinking, to help identify alternative policy solutions, and to expand the range of (potentially) acceptable policy outcomes.

At the same time, doing public engagement on future issues raises special challenges, at least one of which is directly related to the concern that unjust power relations may become entrenched early in decision-making processes. Future issues have social, political, cultural, ethical, or economic impacts that may be manifest only at some point in the future. This means that public opinion in the current period is unlikely to be well informed, developed, organized, or articulate. This in itself is a challenge for those who wish to obtain public input on future issues, but it is a special challenge because subsections of the population, such as groups or individuals who have financial interests in technological developments, may be very well organized and articulate in the current period. In these circumstances, unstructured inputs, concerns, or opinions on future issues that apparently emanate from the public sphere are likely to be biased in favour of those who have vested interests in any policies that might or might not be developed in these areas. This is a practical problem that must be addressed by those who aim to conduct deliberative public engagement events on future issues.

In summary, there is a fundamental problem related to doing public engagement on future issues. If public opinion has not yet developed, and if future public concerns, values, and opinions will depend in part on decisions which are made in the current period, how can governments or public administrators obtain democratic guidance on these issues? How can opinions at time  $t + 1$  guide decisions which must be made at time  $t$ ? This is an intractable problem that must be mitigated because it cannot be solved. In this paper, we argue that small deliberative forums – or minipublics – may be a practical means of confronting and addressing this dilemma.

## **Why Minipublics?**

Minipublics have received a lot of attention from scholars in recent years (e.g., Brown 2006; Carson 2008; Flynn 2009; Fung 2003, 2006; Goodin & Dryzek 2006; Nabatchi 2010). Most conceptions of the minipublic evoke, in one way or another, Robert Dahl's suggestion that a 'mini-populous' might be drawn from a larger population in such a way that it would adequately reflect the diversity of the larger public (p. 342). In terms of size, minipublics can range from a few hundred participants to only a couple of dozen. James Fishkin's (e.g., 1991, 1995) "Deliberative Polls" are composed of hundreds of randomly-selected participants. The British Columbia Citizens' Assembly on Electoral Reform involved 160 randomly-invited participants (Warren & Pearse 2008). Examples of small-scale processes involving approximately 25 participants include Citizens' Juries (see

Crosby 1995) and Planning Cells (see Dienel & Renn 1995).<sup>1</sup> The minipublic on salmon genomics which is the focus of this paper was a small-scale forum that combined random selection, education, and deliberation. As explained below, each of these design features has a specific function and rationale when it comes to holding public deliberations on future issues.

Regardless of the size and design of a minipublic, the objectives are generally the same. As Goodin & Dryzek (2006) explain, minipublics are "designed to be groups small enough to be genuinely deliberative, and representative enough to be genuinely democratic" (p. 220). Although the macro-political objectives of minipublics are not always realized (e.g., Chambers 2009), Goodin & Dryzek (2006) have theorized some of the ways in which minipublics can influence the larger publics from which they are drawn. These include directly impacting public policy, initiating or informing more inclusive public debates, legitimizing policy development processes, building constituencies, and resisting co-optation. Goodin & Dryzek (2006) also argue that minipublics might be used to 'market test' public policy proposals. Our analysis builds on this approach. We argue that minipublics can be used to inform policy development processes and expand the range of policy options by giving policymakers insights into public discussions which have not yet happened.

This approach offers a number of benefits. In the first place, small deliberative forums allow for a division of labour between those who are willing or able to dedicate some time and energy to an unfamiliar public issue and the vast majority who, by necessity, cannot. Although an element of self-selection bias is inevitable, it is possible to use randomized recruitment mechanisms to ensure that a wide variety of lay members of the public are included in such deliberative forums (Longstaff & Burgess 2010). This division of participatory labour substantially increases the number of public issues which might be subject to some democratic influence in the administrative sphere.

Furthermore, random selection (or invitation) can help balance the public's interests against those of stakeholders and vested interests. As argued above, this is a special concern when it comes to future issues because stakeholders may be the only parties who are motivated to participate in the current period. Random selection mechanisms help mitigate this problem by making personal appeals to individuals. As such, this is one means of encouraging diverse groups of individuals to participate in deliberations on issues that they might otherwise never have considered. Warren (2008) has argued that participants in minipublics can be understood as 'citizen representatives'. They are citizens in the sense that they remain a part of the citizen body as they are performing their representative functions. Furthermore, regardless of their positions within society more broadly,

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<sup>1</sup> It should be noted that although Dienel's term 'Planning Cells' invokes a sense of time with respect to 'planning for the future', the temporal dynamics of using small deliberative forms to provide guidance on *future issues* have not been fully developed in his writings (e.g., Dienel & Renn, 1995).

participants do not owe their membership in the minipublic to anything other than their status as members of the larger public. They are representatives in the sense that they are engaged in thinking, talking, and acting on behalf of those who are not involved. In minipublics on future issues, participants might also be considered ‘citizen representatives’ because most will enter the process *as citizens* with few prior personal opinions and even fewer individual investments in the issues that are at stake. Ideally, this will make it easier for them to represent something that looks like the public interest, rather than something that they know is in their own personal interest.

The educative component of minipublic processes helps ensure that participants can actively obtain and process information that is relevant and necessary for making competent decisions or recommendations, or for expressing informed concerns or opinions. The deliberation component plays a role in further developing the quality of these opinions by ensuring that individual opinions are tested against the (possibly conflicting) concerns, interests, or objectives of others. Deliberation is also the means by which (newly formed) individual opinions on future issues are transformed into public priorities, opinions, values, and concerns. On the whole, minipublics can help participants develop structured – and substantive – deliberatively tested opinions where these did not previously exist. In turn, carefully designed deliberative processes can provide policymakers with meaningful, useful, and legitimate public input on future issues where this kind of democratic guidance would be otherwise difficult or impossible to obtain.

## Data and Methods

The following analysis examines the outcomes of a minipublic on salmon genomics. This is an example of a topic that clearly meets our definition of a future issue. Although salmon itself is a hot topic for debate on the West Coast of Canada and the US, with controversy around such issues as the sustainability of fish farming and overfishing, most citizens do not have well-developed opinions on, or knowledge of, the social, political, economic, cultural, or environmental issues related to salmon genomics. Nevertheless, governments and policymakers will have to face the prospects of addressing questions such as the use of genomic technologies to enhance aquaculture activities (e.g., through brood stock selection), regulation and impact assessment of DNA vaccines, international regulations and agreements regarding Intellectual Property (IP) issues involved in

applications of salmon genomics, and the production of transgenic fish.<sup>2</sup> Few individuals have well-developed opinions about the benefits and risks of technologies that may be enhanced or developed through the use of salmon DNA sequencing, but most *will* be directly or indirectly affected by these technologies at some point in the future.

In November 2008 the Centre for Applied Ethics at the University of British Columbia convened a forum of 25 British Columbians to deliberate the social, economic, environmental, cultural, ethical, and political issues related to the sequencing of the salmon genome (for a more detailed overview of the deliberation design and results see O'Doherty, Burgess, & Secko 2010). The event design was based on a similar forum that was conducted on the issue of human tissue biobanking in BC in 2007 (Burgess, O'Doherty, & Secko 2008).

Participants were recruited using random-digit dialing to obtain a demographically stratified sample based on BC Statistics–Municipal Population Estimates (Statistics British Columbia, 2009) and the 2001 Canadian Census data for occupation, age, sex, religion, and ethnicity. While a small sample is not capable of satisfying formal statistical representativeness of the population of BC, Table 1 demonstrates that participants were successfully recruited to reflect the diversity of BC residents (see, as well, Longstaff & Burgess 2010). The minipublic was made up of near equal numbers of men and women, from both rural and urban areas, representing a range of occupations, religions, and ethnicities. Young people are the only identified group who were not well represented in the minipublic. This is a potential concern, especially with respect to deliberations on issues that are more relevant to the future than to the current period. In the future, it may be possible to adjust recruitment methods or to provide additional incentives to encourage more young people to get involved in minipublic deliberations.<sup>3</sup> Despite this potential concern, the deliberations do not

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<sup>2</sup> It is important to distinguish between salmon genomics (including scientific activities involved in the sequencing of full salmon genomes), and genetic modification of salmon. There are many applications of salmon genomics that do not involve genetic modification, such as the use of salmon genomic technologies to select brood stock with desired traits. Importantly, a full sequencing of the salmon genome is not necessary for the production of transgenic fish. Indeed, transgenic salmon have already been created without the full sequence being available (the AquAdvantage™salmon). However, arguably salmon genomic technologies (and the sequencing of the full salmon genome, in particular) will facilitate further development of transgenic fish and their commercialization.

<sup>3</sup> Participants in the minipublic on salmon genomics were paid 100 dollars a day as an incentive to join the deliberation and to cover any incidental costs associated with the event. Survey-based experiments show that monetary incentives can work to encourage individuals to agree to join hypothetical deliberations (Neblo et. al. 2010, p. 574). It is possible that larger monetary incentives would induce more young people to participate in minipublic deliberations. That being said, previous events run by the Centre for Applied Ethics at the University of British Columbia have successfully recruited younger participants without additional monetary incentives (e.g., Longstaff & Burgess 2010). This suggests that while additional monetary incentives might be an effective means of encouraging young people to participant in these events, this will not be necessary in each case.

appear to have been biased against longer-term viewpoints or farsighted policy concerns. As discussed below, the deliberative outputs from this event specifically address a number of future-oriented concerns such as the labeling of GM salmon and the regulation of new genetic technologies.

Nor does attrition appear to have been a problem. To achieve the objective of having 25 participants, recruitment involved oversampling to 32. Of these, 26 registered at the beginning of the event, and 25 completed the entire deliberation.

A key element in the design of the deliberation involved providing participants with sufficient information to be able to engage in informed discussions. This process of information provision was not seen as an end in itself, but rather as an important step in creating an environment in which meaningful

**Table 1: Participant demographics**

<b>Gender</b>	Female	12	<b>Occupation</b>	Not working	6
	Male	13		Aquaculture	3
<b>Region</b>	Greater Vancouver	14	Construction	2	
	Rural BC	11	Manufacturing	1	
<b>Age</b>	<20	1	Wholesale trade	1	
	20-24	0	Retail trade	0	
	25-29	0	Finance and real estate	1	
	30-34	0	Health care and Social services	2	
	35-39	2	Educational services	3	
	40-44	5	Business services	0	
	45-49	5	Other	6	
	50-54	2	<b>Religion</b>	Catholic	2
	55-59	2		Protestant	3
	60-64	4		Christian, other	5
>65	4	Sikh		1	
<b>Ethnicity</b>	Chinese	2	Other religious affiliation	2	
	South Asian	2	No religion	12	
	Aboriginal	3	<b>Total</b>	<b>25</b>	
	Non minority	18			

and legitimate deliberation could take place (c.f. Wynne 2006, regarding criticism of deficit models of public understanding of science). A critical feature in providing this information to participants was to ensure that it was balanced and accessible, and thus did not bias the deliberation. To achieve this aim, relevant information sourced from the peer-reviewed and policy literature, as well as popular news articles, were collated by the research team over the course of several months. Balance of information was achieved by ensuring that the perspectives of different interest groups were reflected and contextual information related to vested interests (e.g., commercial interests of fisheries and aquaculture) were explicit. Overall, the aim was to make available to participants the diversity of views available on the topic.

Information was also presented in different modalities to take into account differences in learning styles among participants. Before the event, participants

were provided with learning materials, including access to a private website (<http://salmongenotalk.com/>), an information booklet prepared by the organizers of the event, and annotated collections of media and journal articles. They were also asked to complete a short pre-deliberation survey. This survey was administered for a second time after the event in order to measure any changes in individual opinions that might have occurred over the course of the event. Both surveys were administered via the NERD online platform (Danielson 2007) and 20 of the 25 participants completed both the pre- and post-deliberation surveys.

During the event, participants heard presentations from five speakers who were either experts or stakeholders on issues related to salmon or salmon genomics. Speakers were not selected to be unbiased in the presentation of their own material; rather, they were specifically selected to represent different and potentially conflicting perspectives in order to give participants access to a range of different views about the topic.

The event was staged over two non-contiguous weekends in November, 2008. During the course of the event, participants deliberated over the issues that were most important to them in both small groups and within the large group. On the first weekend, participants were asked to discuss their hopes and concerns around the sequencing of the salmon genome. In the period between the two weekends participants were encouraged to explore issues further with each other (via the private website) and with friends and family. During the second weekend participants were asked to answer the following question: *Should the Salmon Genome be Sequenced? Why or Why Not?* There was overall support for sequencing the salmon genome, but participants believed that there is a need for strong regulations on potential applications arising from the project as well as a federal regulatory body. They also expressed support for international treaties (recognizing that this is not merely a national issue) as well as public engagement and education processes. In addition, they recommended that genetically modified (GM) salmon be labeled, if and when it is made available for consumption. These conclusions and recommendations were ratified by the group (O'Doherty, Burgess, & Secko 2010).

## Results and Analysis

In what follows, we pursue two lines of inquiry. The first looks at whether minipublics are an effective means of encouraging individual participants to develop structured and substantive opinions on future issues. The second line of inquiry looks at how collectively forged and deliberatively tested opinions might be used to help guide public policy on future issues.

Addressing the first question requires examining processes of individual opinion formation. In this case, we are not specifically interested in the content of individual opinions, or in any changes of opinion that might have occurred over the course of the deliberations. These topics are addressed in O'Doherty, Burgess,

& Secko (2010). In this paper, our primary interest is in exploring whether participants at this event formed opinions where no opinions previously existed. This is of interest because individual opinions are the necessary building blocks of collectively forged and deliberatively tested opinions, concerns, rationales, and priorities. Although individual opinions and policy preferences can be a useful source of public input, we believe that deliberatively tested opinions, considerations, and rationales should carry more weight in decision-making processes. Accordingly, after first examining processes of individual opinion formation, we turn our attention to the content of collectively forged and deliberative tested opinions and rationales in order to illustrate how these might be used to help guide public policy on salmon genomics.

## **Individual Opinion Formation**

As mentioned above, our research design included a pre- and post-deliberation survey (see Table 2). This survey contains 22 items asking respondents whether they strongly agree, agree, disagree, or strongly disagree with statements related to salmon genomics and certain contextual issues. These statements range from the general – such as, ‘the salmon genome should be sequenced’ – to the very specific: ‘Sequencing the salmon genome will help to understand the effect of industrial waste on wild salmon’. Other items ask for opinions on policy objectives: ‘New regulations are needed to address issues related to salmon genomics.’ The survey items also included two separate ‘no opinion’ options: a ‘Don’t Know’ category and a ‘Don’t Care’ category. For the purposes of our analysis, these two categories were collapsed and treated as a single ‘no opinion’ category. By comparing ‘no opinion’ rates in the pre-deliberation survey with ‘no opinion’ rates in the post-deliberation survey, we are able to examine the impact of deliberation on opinion formation.

The survey also includes a comment box under each of the 22 items. One of the (additional) advantages of running small-scale deliberative forums is that it is possible to explore, in some detail, both aggregate results and the nuanced concerns of individuals. Tracing processes of opinion formation is difficult because opinions must be expressed before they can be measured, and it is rarely possible to identify any earlier time in which specific opinions did not yet exist. Our survey design allows us to compare the contents of comment boxes for ‘no opinion’ answers, in the pre-deliberation survey, to the contents of comment boxes on the same items in the post-deliberation survey. It also allows us to link initial ‘no opinion’ answers in the pre-deliberation survey with substantive opinions expressed in the later stages of the deliberative process. These analyses suggest that small-scale deliberative forums can be used to forge structured opinions on an unfamiliar future-oriented issue like salmon genomics.

Table 2 shows that the deliberative event helped participants develop structured opinions about social, environmental, ethical, environmental, and

policy issues related to the developing science of salmon genomics. Overall, 25 percent of all responses on the pre-deliberation survey were in 'no opinion' categories. On the post-deliberation survey, only 10.5 percent of all responses were in these categories. This reflects the fact that the 'no opinion' response rate is higher on the pre-deliberation survey on every question except for one. It is worth pointing out that our research design is a relatively conservative test of whether or not deliberative processes can help forge opinions in unfamiliar policy terrains. First, surveys are generally biased in the direction of substantive opinion, in that respondents are free (and encouraged) to express substantive opinions no matter how much or how little they may have thought about the relevant issues. Second, participants in this process were provided with an information booklet on salmon genomics prior to filling out the pre-deliberation survey. Irrespective of whether individual participants read this booklet, this step allows us to attribute changes from 'no opinion' categories to substantive response categories to participation in the deliberative process and suggests that similar results could not be obtained by simply sending information packages in the mail.

The results presented in Table 2 also suggest that the deliberative event helped participants transform general sentiments into more detailed opinions about the emerging science of salmon genomics. Many of the questions with the lowest 'no opinion' response rates on the pre-deliberation survey asked for opinions on questions which are already a part of the public debate in British Columbia. These include concerns about protecting already depleted wild salmon stocks and concerns about labelling GM food products. All 20 participants who filled out the pre-deliberation survey were willing to express substantive opinions about the importance of protecting wild salmon stocks, with 95 percent agreeing that this should be a high priority issue and only one of 20 disagreeing with this statement. Similarly, all but one of 20 participants expressed substantive opinions about the importance of labelling GM salmon (see also Nep & O'Doherty 2009). 90 percent agreed that GM salmon should be labelled despite the increased costs to consumers, and only one participant disagreed with this statement. Other items with low 'no opinion' response rates on the pre-deliberation survey asked participants for opinions about general issues such as whether the salmon genome should be sequenced and whether it is important to maintain genetic diversity in salmon populations.

By comparison, questions about more specific technical issues, regulatory options, or cultural concerns elicited the highest 'no opinion' response rates on the pre-deliberation survey and the most significant changes across the two waves of the survey. This is important because detailed and informed opinions on unfamiliar or future-oriented issues are difficult or impossible to acquire using traditional methods of public consultation such as town hall meetings or opinion polling.

**Table 2: 'No Opinion' Responses Pre- and Post-Deliberation**

Question	Percent 'No Opinion'		
	Pre	Post	Difference
The salmon genome should be sequenced	10.0	5.0	5.0
Sequencing the salmon genome is important to understand the basic biology of salmon	5.0	10.0	-5.0
Sequencing the salmon genome will help to understand human evolution	35.0	30.0	5.0
Protecting wild salmon should be a high priority in British Columbia	0.0	0.0	0.0
Sequencing the salmon genome will help to conserve and restore wild salmon stocks	40.0	10.0	30.0
New regulations are needed to address issues related to salmon genomics	30.0	0.0	30.0
Sequencing the salmon genome has no role in making salmon farming more sustainable	50.0	20.0	30.0
I approve of GM salmon	25.0	5.0	20.0
GM salmon should be made available for human consumption	30.0	25.0	5.0
Sequencing the salmon genome will help to understand the effect of climate change on wild salmon	30.0	10.0	20.0
It is important to maintain genetic diversity in salmon populations	10.0	5.0	5.0
Sequencing the salmon genome will help to understand the effect of industrial waste on wild salmon	25.0	10.0	15.0
Stores and restaurants should sell only wild salmon	20.0	10.0	10.0
Canada should not invest in sequencing the salmon genome if there are no significant financial benefits to this country	25.0	5.0	20.0
Sequencing the salmon genome will help to understand the effect of hatcheries on wild salmon	40.0	35.0	5.0
Selective breeding of salmon stocks for desired traits is acceptable	30.0	10.0	20.0
Genetically modifying salmon for desired traits is acceptable	30.0	10.0	20.0
Sequencing the salmon genome will not threaten First Nations' knowledge and values	40.0	15.0	25.0
I don't care how salmon is produced (wild, farmed, GM), as long as it is inexpensive	10.0	5.0	5.0
It is important to label salmon products (wild, farmed, GM) in spite of increased cost to the consumer	5.0	0.0	5.0
I object to sport fishing on the grounds that it is cruel to fish	15.0	0.0	15.0
Canadians will benefit from sequencing the salmon genome	45.0	10.0	35.0
<b>Average</b>	<b>25.0</b>	<b>10.5</b>	<b>14.5</b>

\*Statistically significant at the 0.1 level (two-tailed test)

\*\*Statistically significant at the 0.05 level (two-tailed test)

\*\*\*Statistically significant at the 0.01 level (two-tailed test)

By contrast, Table 2 suggests that small-scale deliberative processes can be an effective means of forging substantive opinions on quite specific questions which many participants have not encountered before. For example, on the pre-deliberation survey half of the participants were unwilling or unable to express substantive opinions about whether sequencing the salmon genome could play any role in making fish farms more sustainable. After participating in the deliberation, this 'no opinion' response rate dropped to 20 percent, at which point 70 percent of these participants disagreed or strongly disagreed with this statement. Similarly, on the pre-deliberation survey 30 percent of participants opted to reserve their judgement on whether new regulations are needed to address issues related to salmon genomics. After the deliberative events, all 20 participants who filled out both waves of the survey expressed substantive opinions on this issue: 85 percent of these participants agreed or strongly agreed that new regulations on salmon genomics are required.

The deliberation also helped individuals develop substantive opinions on cultural issues related to salmon genomics. On the pre-deliberation survey, 40 percent of participants withheld judgement on the question of whether sequencing the salmon genome would threaten First Nations knowledge and values. On the post-deliberation survey, this 'no opinion' response rate was reduced to 15 percent.

It is also interesting to note that although all but one participant expressed an opinion on the question of labelling GM salmon, 25 percent on the pre-deliberation survey expressed no opinion as to whether or not they approved of GM salmon. On the post-deliberation survey, all but one respondent was willing to express an opinion on this issue, at which point 75 percent of the participants who filled out both waves of the survey refused to grant a stamp of approval for GM salmon, 15 percent were moderately supportive and one participant strongly favoured the idea. Respondents were similarly cautious in expressing support for the potential benefits of sequencing the salmon genome in the pre-deliberation survey. In that survey 45 percent declined to express a substantive opinion. In the post-deliberation wave, only 10 percent declined to express an opinion and 75 percent agreed or strongly agreed that Canadians will benefit from sequencing the salmon genome in some way, at some point in the future.

Table 2 suggests that deliberative events *can* help forge substantive opinions on policy questions that many citizens are not – or are not yet – familiar with. Analyses of the comment boxes associated with each question on our survey provide additional insight into processes of qualified opinion formation and the more nuanced concerns of citizens. For example, with respect to the question of whether Canadians will benefit at some point in the future from the sequencing of the salmon genome, one respondent in the pre-deliberation survey could not answer this question because, as he put it, this “depends on how [the salmon genome] is used.” After the deliberation this respondent expressed disagreement but he added the following comments: “Whether [Canadians] ‘will’ [benefit]

depends on properly directing research and resources. At this time, without effective regulation and oversight, it seems that sequencing is likely to cause more damage than benefits.” Other respondents who declined to offer substantive responses to this question on the pre-deliberation survey expressed qualified *support* for the idea that sequencing the salmon genome will benefit Canadians in the future. According to one respondent the potential lies in proceeding with this research “properly and in a controlled way.” Another believes that sequencing the salmon genome will benefit Canadians if this knowledge is used “for more research that will lead to understanding why our fish are diminishing.”

Deliberative democrats have argued that ‘good’ deliberation requires participants to maintain provisional opinions which may be adjusted, changed, or enhanced by the arguments, opinions, and knowledge of other participants (e.g., Gutmann & Thompson 2004). This is a tall order that is not easy to fill. Scholars have also pointed out that it may be too demanding to expect individuals to remove themselves, even temporarily, from their strongly held beliefs, opinions, values, and life experiences (e.g., Sanders 1997). Others have demonstrated that in practice many deliberants are willing and able to maintain provisional positions, especially on issues which are relatively unfamiliar such as electoral system reform (Warren & Pearse, 2008).

Our analysis indicates that at least some of our participants were not only willing and able to reserve judgement on both noncontroversial and (potentially) sensitive issues, but they were also explicit about doing so. One participant, for example, indicated on the pre-deliberation survey that he did not have enough information to decide whether new regulations are needed to address issues related to salmon genomics: “I hope the upcoming event regarding the salmon genome will inform me as to what regulatory changes are required.” On the post-deliberation survey this participant strongly agreed that new regulations are required but he added the qualification that new regulations should be made general enough so they can be duplicated and applied to the genomics of other species “with little margin of error.”

Another respondent was equivocal with respect to the culturally sensitive issue of whether sequencing the salmon genome would affect First Nations’ knowledge and values. In the pre-deliberation survey he said, “As a non-First Nations person, I do not feel I can speak to this statement.” In the post-deliberation survey his opinion on this matter is based on exchanges that occurred in the deliberation environment. “Although I am not First Nations, I have learned that the threat of GM made possible by DNA sequencing is seen by First Nations people as a threat to the viability of the salmon. In addition, the substitution of a ‘quick fix’ to salmon survivability by GM is in contradiction to First Nations’ principles of good environmental stewardship.” Another respondent was similarly apprehensive on the pre-deliberation survey. She asked “I would wonder if First Nations people would feel threatened?” She then added, “I am sure that they would feel so.” On the post-deliberation survey she expressed strong agreement

that First Nations' knowledge and values would be threatened by sequencing the salmon genome.

Many comments on other questions show a similar willingness to remain equivocal when information is lacking or when the perspectives of others should be consulted. For example, one participant expressed the following with respect to whether sequencing the salmon genome will help conserve and restore wild salmon stocks: "Although I'm inclined to believe this, I am not conversant on the issue to make this statement." On the post-deliberation survey, he expressed support for the idea but added that "the next steps" in GM research must be "done in conjunction with" other successful environmental efforts.

Another participant expressed similar concerns in the pre-deliberation survey on the question of whether or not to approve GM salmon. "I'm hesitant to state a strong opinion as there are possible chemical combinations that I would want tested before releasing GM salmon into the environment or harvesting [it] as a food stock." On the post-deliberation survey, this respondent expressed support for GM salmon but added that this support is "conditional" and based on the report his small group gave to the larger group "that various stages, precautionary principles and [an] onus of proof [should] apply."

On the question of whether GM salmon should be made available for human consumption, one participant who did not express a substantive opinion on the pre-deliberation survey expressed strong disapproval on the post-deliberation survey, stating that "not enough is understood [about GM salmon] to take this position at this time." In this case, over the course of the deliberative process, a non-opinion was transformed into a substantive opinion, as the participant was made familiar enough with this issue to express both disapproval and caution.

These examples of individual opinion formation suggest minipublics can be used to forge opinions on a future-oriented issue like salmon genomics that is currently unfamiliar but potentially important to the cultural, environmental, and economic future of British Columbia. Before the deliberative event many participants were unwilling or unable to express substantive opinions on questions related to salmon genomics. On the pre-deliberation survey all but one participant gave a 'no opinion' response to at least one of the 22 survey questions. The mean 'no opinion' response rate on the first wave of the survey was 5.5 questions. On the post-deliberation survey, 5 respondents gave substantive answers to all 22 questions and the mean 'no opinion' response rate dropped to 2.3 questions. Analyses of the comment boxes associated with each question indicate that deliberation can be a useful source of information about complex policy questions. For many participants, the deliberations were sources of insight into the opinions, concerns, and objectives of others. This suggests that minipublics can be effectively used to forge opinions on public issues that do not, or have not *yet* come to occupy a prominent position in public discourses.

In the remainder of the paper we shift our attention from processes of individual opinion formation to collectively forged deliberative outputs. We use

specific examples of deliberative outputs to more fully explore how these might be used to inform (and improve) public policy decisions. We argue that minipublics can provide policymakers with access to deliberatively tested rationales, public priorities, and collective concerns that would otherwise be difficult or impossible to obtain.

## Deliberative Outputs

The deliberative outputs of a minipublic can be conceptualized as the ratified conclusions reported by participants as the results of their deliberations, whether these reflect consensus or clearly articulated disagreement (O'Doherty & Burgess 2009). However, we argue that in order to obtain insights into deliberatively tested opinions, in many instances it is important to go further and use the outcomes of the forum to reconstruct the arguments, rationales, and concerns underpinning recommendations that appear to have elicited mutual understanding (if not agreement) among the participants in our process.

More specifically, we argue that minipublics can be used to develop 'maps' of deliberatively forged rationales and concerns which, in turn, can be used to guide, inform, or support policy decisions, or even “redeem” them if and when these decisions are challenged in future public debates and discourses. This does not imply that small deliberative forums can or should be used to infer or predict what public opinion *would* look like if it were more deliberative. Nor do we recommend using minipublics to try to predict what public opinion *will* look like in the future. Instead, we believe that minipublics can be a source of articulated concerns, interests or rationales that have some reasonable probability of being important to citizens in future political discussions, if or when these occur.

These concerns can also be understood as dimensions of policy decisions that governments or policymakers must be accountable for if their current period decisions are to gain acceptance among potentially affected future publics. The concerns, interests, and rationales articulated in small (current period) deliberative forums may be re-evaluated in future discourses, placed in newly relevant contexts, and subsequently reordered, just as additional concerns may be raised or previously dismissed concerns resurrected. Nonetheless, minipublics provide decision-makers with a means of anticipating the likely parameters of public debates that have not yet occurred. To the extent that governments and decision-makers aim to develop policies that will help maintain the public trust (MacKenzie & Warren, 2010), reflect the concerns of potentially affected publics, and mitigate against the possibility that technologically complex issues (like salmon genomics) could become politically complex problems in the future, minipublics are a means of accessing – or developing – maps of potential concerns, interests, or relevant arguments on issues around which there are, in the current period, few substantive public opinions.

The issue 'map' produced by the salmon genomics minipublic is comprised of the following set of underlying but recurring themes: transparency, information, accountability, and choice. To the extent that these concerns can be addressed in policies related to the emerging science of salmon genomics, it should be possible to maintain the public trust even with respect to issues that harbour latent controversies. This is not to say that policymakers should follow the directives of minipublics and implement specific policy recommendations in every case. In some cases this may be appropriate, in other cases it will not be feasible even if it is desirable. What minipublics on future issues provide is some insight into the sorts of concerns which must be accounted for in whatever policies are eventually adopted.

To make these arguments clearer, we briefly discuss three deliberative outputs from the salmon genomics minipublic. The first addresses the question of labelling genetically modified (GM) salmon. The second looks at the issue of governance. The third addresses issues of public education and engagement.

*Labelling GM Salmon.* The minipublic strongly (and collectively) supported the mandatory labelling of GM food products. It is worth noting that the issue of labelling GM salmon, while not entirely unrelated, is rather distanced from the issue of sequencing the salmon genome (which constituted the topical focus of the deliberation). The fact that the labelling issue featured prominently in the deliberative outputs can therefore be attributed additional significance, in that members of the minipublic felt strongly enough about the issue to include it in their discussion reports (see Nep & O'Doherty 2009, for an analysis focused exclusively this issue).

While some GM plant products are commercially available for consumption in Canada, GM animal products are not on the market and the Department of Fisheries and Oceans has not, to date, received any applications “to import or grow [genetically engineered] fish for commercial use or release” (Department of Fisheries and Oceans Canada 2009). Interestingly, since the time of the deliberation, the issue of GM salmon and associated labelling has significantly risen in prominence owing to a recent announcement by the US Food and Drug Administration regarding its consideration of approving GM salmon for human consumption (e.g., Voosen 2010) and holding public engagements for this purpose. The issue of processing applications for GM animal food products and deciding if, and under what conditions, these products might be brought to market is thus increasingly becoming a reality for decision-makers. Decisions of whether labels on GM products should be made mandatory will need to be made accordingly.

At this point in time the Government of Canada has opted not to impose mandatory labelling regulations on GM food products. The deliberative outputs generated by the minipublic on salmon genomics suggest that it might be prudent to revisit this position – but this is not news in itself. There are many indications

that the public is generally wary of GM products and supports labelling regulations (Castle 2007; Gaskell, Allum, Bauer, et. al. 2000). Analyses of our minipublic deliberations provide additional insight into the probable parameters of an informed debate on labelling GM food products. These analyses, in turn, can help policymakers better understand what public calls for labelling represent. Although the issue of labelling GM foods is well covered in the academic literature, it generally does not incorporate public opinion. The debate often centres around the issue of autonomy, with proponents on either side arguing for ways in which labelling (or lack thereof) might infringe on consumer autonomy. It is ironic, then, that many of these debates are carried out in the abstract, without meaningful consultation or understanding of the actual values and preferences of potential consumers. Particularly for policymakers, it seems that arguments pertaining to the labelling issue are deficient if they do not incorporate in a meaningful way the complexity of public discourse surrounding the issue of GM labelling.

What *are* the underlying concerns of those who continue to support labelling regimes after listening to the concerns of others and considering potential tradeoffs such as economic costs? An analysis of discussions on this topic reveals that participants' support for labelling was informed by four dominant concerns (Nep & O'Doherty, 2009). First, labelling was seen by some as a means of mitigating irrational fears of GM products without diminishing the importance of legitimate concerns and reservations. Second, and more important, labelling was symbolic of a larger concern for transparency. Participants expressed concerns about public decisions being made – by elected officials, bureaucrats, researchers, or companies – while potentially affected publics remained unaware of, or closed off from these decision-making processes. They saw labelling as an important component in a larger effort to make public decision-making processes more transparent, including (or perhaps especially) those involving technically or ethically complex issues. Third, participants viewed labelling as a mechanism of consumer control. When GM foods are labelled consumers have a choice as to whether or not they want to buy and consume these products. Fourthly, calls for mandatory GM labels can be understood as expectations of mistrust with respect to the actions, or probable actions, of governments, bureaucracies, and biotechnology companies. These last three concerns are linked in important ways: transparency enhances control which, in turn, provides mechanisms for rejecting or, conversely, trusting the decisions made by remote actors, such as governments, public administrators, research institutes, or biotechnology companies.

Nep & O'Doherty's (2009) analysis suggests that if or when GM animal products such as salmon are made available for consumption in Canada, the labelling issue, and all of the underlying concerns that this issue represents, should be addressed in regulatory frameworks. If the Government of Canada decides not to adopt a mandatory labelling regime, it may nonetheless be necessary to justify

this decision by anticipating (some of) the underlying concerns that citizens are likely to express if and when this issue becomes part of a wider public discourse.

Results from our deliberative forum suggest that if, or when, GM salmon products are made available commercially, citizens will express concerns about choice, control, and transparency; and if these concerns are not addressed, citizens are likely to harbour mistrust for those responsible for making public decisions and those responsible for bringing these products to grocery store shelves.

*Governance.* The minipublic also strongly (and collectively) supported the general principle of establishing a powerful, transparent, and independent regulatory body to oversee and guide the development of salmon genomics and other emerging technologies. The underlying concerns, in this case, are of particular relevance to the problems of making policy on future issues. Our participants recognized that developing technologies based on science such as salmon genomics have long-term social, environmental, cultural and economic consequences that are currently unknown. This means that public administrators responsible for the ongoing management of these technologies must act as trustee representatives in leadership roles and design forward-looking governance structures that will (ideally) maintain the public trust as this (and other technologies) develop and unanticipated issues emerge. Minipublics can provide policymakers with insights into how these practices and institutions might best be structured.

In this case, the minipublic did not recommend a design for a regulatory body. Instead, they articulated underlying concerns which can be used as guides in the development of trustworthy governance structures. Specifically, they recommended a single regulatory body that would operate at the highest possible level. Their preference was for a global regulatory regime but they recognized that this may not be feasible in the short term. Instead, they suggested that a federal regulatory body be established with the aim of providing leadership, as well as national and international coordination on this issue which is not (and cannot) be contained within national or subnational borders. They also recommended that the regulatory body function outside the political realm and independent of vested interests. Following from this point, the group insisted that a well-designed (and hence trustworthy) governance structure would be transparent about who is making decisions and about who *should* be making decisions. They also emphasized the need for strict sanctions or penalties for failing to follow rules or guidelines. In addition to these recommendations, which were supported and ratified by the minipublic as a whole, one of three small groups recommended institutionalizing a form of anticipatory governance. They suggested that the onus to prove that developing technologies are safe be placed on researchers and developers and not on governments, users, or consumers.

Although one might expect the general public to be wary of emerging technologies, especially those involving the food supply, there is no indication that the minipublic wished to restrict the science of salmon genomics. Far from it.

They supported the development of this technology but only in conjunction with the establishment of trustworthy governance structures. Their collective recommendations provide insight into specific design considerations that should be taken into account when such governance structures are developed.

*Public Education and Engagement.* A third deliberative output that is relevant to the drawing of this anticipatory 'map' has to do with public education and engagement. Our participants strongly supported the development of government sponsored education campaigns to increase public awareness about the many issues related to the developing science of salmon genomics. This suggestion reflects and emphasizes the cultural and economic importance of salmon in British Columbia. The group felt that public information and engagement opportunities would enhance individual choice as well as public influence over decisions related to salmon genomics. More specifically, they were concerned about dispelling unfounded fears pertaining to the development of these technologies.

This concern is of interest because it speaks to Gundersen's (2006) observation that deliberations focused on future issues can increase the range of politically feasible options. In this case, the deliberative group identified education and public engagement as a means of dispelling irrational fears of emerging technologies without dismissing legitimate concerns – opening up the possibility for applications of the technology which might otherwise be seen as politically or social infeasible simply because they are not well understood. This suggests that policymakers, who might otherwise view this issue as one which is too obscure to be of interest to most members of the general public, might instead invest in public education programs and engagement processes in order to increase the number and range of politically viable options.

In summary, this anticipatory 'map' emphasizes the following themes: transparency, information, accountability, and choice. Our participants repeatedly articulated these concerns. In some cases they provided specific recommendations for how this issue can be addressed in the future in ways that are likely to maintain the public trust. If or when GM salmon products are made available these should be labelled, an independent regulatory body should be established, and information at all stages of development should be made available to lay citizens and those involved in public engagement processes. Policies that effectively meet these objectives will help maintain the public trust, enhance the legitimacy of decisions made in the administrative realm, and expand the number and range of politically feasible options.

## Conclusion

Results from our pre- and post-deliberation surveys illustrate that minipublics can be used to help individual participants develop substantive opinions on technically and temporally complex issues like salmon genomics. Our analysis of the deliberative outputs, and the concerns or considerations that underpin these recommendations, illustrates how these small deliberative forums might be used to influence, inform, and improve public policy decisions. We show that these forums can provide decision-makers with insight into deliberatively tested and collectively forged public priorities, rationales, and considerations related to the emerging science of salmon genomics. In more general terms, our analysis illustrates that minipublics are a potentially rich source of public input, especially in policy areas where substantive public input is otherwise hard to come by.

Outstanding concerns about the legitimacy of very small deliberative forums being used to inform public policies that affect (or potentially affect) everyone might be mitigated by the following considerations. First, public administrators routinely rely on small groups of experts to develop arguments that are used to inform and subsequently support policy decisions. Minipublics composed of randomly-selected citizens should not (and cannot) replace the role of experts in policy development. But these forums can supplement the roles played by technical experts. Minipublics are particularly useful (and normatively required) on questions where the technical solutions supplied by experts affect values maintained by citizens. For example, technical experts cannot and should not make decisions regarding tradeoffs between economic efficiencies offered by salmon genomic technologies and the cultural values they may or may not threaten without the additional input from potentially affected publics.

Second, although promoting an active, deliberative, and well-developed public sphere has intuitive appeal, it is becoming increasingly clear that deliberative democrats, no matter how much they might value widespread participation and deliberation, must accept some division of participatory labour and a concomitant theory of 'citizen representation' (Warren 2008). The number and variety of issues that governments and bureaucrats must address is far too large – they cannot all be the subjects of widespread public deliberation or even the topics of larger deliberative events like Citizens' Assemblies or Deliberative Polls. But this does not mean that democratic standards on issues around which public opinion has not, or has not *yet*, developed should be lowered or abandoned. Minipublics provide opportunities for *some* citizens to contribute to policymaking processes that would otherwise proceed with no public input at all. Even so, this division of labour is not necessarily contrary to the ideal of a highly participatory deliberative society. Dienel & Renn (1995), for example, have argued that in a highly deliberative society everyone could expect to have an opportunity to participate in a small deliberative forum at some point in their lives – much as we now expect at some point in our lives to be called for jury duty.

Nor are these admittedly exclusive forums incompatible with more inclusive democratic practices. Minipublics are not replacements for other democratic processes or widespread public debates and discourses – they are instead supplements to these more inclusive processes. Gaining access to maps of the articulated concerns, interests, and considerations of citizens – even a small number of citizens – is a normative imperative from a democratic perspective, and it is especially important on policy questions where no substantive public opinion currently exists. *If* emerging issues become salient at some point in the future, the concerns, rationales, or arguments used to inform public policy decisions may be reconsidered, accepted or rejected in more inclusive democratic processes. At the same time, minipublics can help public administrators formulate policies that are more sensitive to a wider range of public concerns, and thus help to decrease the likelihood that potentially controversial issues will become politically explosive. Furthermore, although those who participate in small deliberative forums are acting as representatives for all those who are not participating, political accountability rests with those who make public decisions, such as administrators who are indirectly accountable to the public via elected officials.

From a practical perspective, minipublics that actively engage only a small number of citizens are, as we have argued, an effective means of obtaining legitimate divisions of participatory labour. Nevertheless, from an analytical perspective, small sample sizes can be a disadvantage. We should be cautious about drawing firm conclusions from our analysis of this single case study. In order to draw more robust conclusions, it will be necessary to conduct additional analyses of similar minipublic processes. Future researchers might look at how deliberative events are affected by the subjects or topics that are deliberated – for example, how so-called ‘cold’ deliberations – such as those on future issues or unfamiliar topics – are different from ‘hot’ deliberations on controversial topics (Fung 2003). Future research might also focus on what motivates participants to join deliberations on topics that are not currently controversial or politically salient. From a theoretical perspective, more work needs to be done in exploring relationships between active deliberation, democratic capacity-building, public perspective-taking, and future-oriented thinking. The very act of deliberating might help broaden citizens' perspectives and thereby help them negotiate the space between past and future.

Our objectives in this paper are much more modest. We have argued that minipublics can be conceived of as one component in a deliberative system that includes the public sphere, citizen representatives, public administrators, and elected officials. In this model, minipublics help to increase the porosity of the administrative and political spheres in order to make them more responsive to concerns emanating from the public sphere. In particular, we have argued that these minipublics can supply limited but useful public input on the potential political dimensions of future issues, recognizing that this kind of input would otherwise be difficult or impossible to obtain.

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