



The value of bathing waters and the influence of bathing water quality: Final Research Report



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The value of bathing waters and the influence of bathing water quality: Final Research Report

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List of authors:

Peter Phillips^a, Clare Twigger-Ross^a, Isabel Cotton^a, Erin Gianferrara^b, Paula Orr^a, Francesco Cherchi^b, Kayleigh Wyles^c, Janine Boschoff^b and Paul Haydon^d

List of reviewers:

Ece Ozdemiroglu^b

Affiliations:

^a Collingwood Environmental Planning Limited

^b eftec

^c School of Psychology, University of Surrey

^d The South West Research Company

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Executive summary

Aims and objectives of the research project

The Scottish Government commissioned Collingwood Environmental Planning Limited (CEP) in association with Economics for the Environment Consultancy (eftec) to undertake a research project in Scotland that would investigate **the value of bathing waters and the influence of bathing water quality**. The project commenced in May 2017 and completed in March 2018.

The overall aim of the research was to provide a detailed and quantifiable socio-economic understanding of the value of Scottish bathing waters and the influence of bathing water quality (BWQ) to bathers, beach users and to the national and local economies.

Four specific research objectives were also addressed, as follows: (1) to assess the benefits of bathing waters and the value of bathing water quality at a local and national scale; (2) to assess the impact of the bathing water quality classification signs / symbols; (3) to understand and assess the benefits (or costs) of an improvement (or deterioration) in bathing water quality classification; and (4) to make recommendations for policy and practice, by providing recommendations on the management and assessment of designated bathing water sites, and the overall value of bathing water quality in Scotland.

The project brought together a number of perspectives on what the value of beaches and influence of bathing water quality mean to users of beaches in Scotland. A mixed methods approach was adopted which allowed the economic, recreational, social and emotional value of bathing waters to be investigated, providing a holistic understanding that is grounded in people's experience.

Summary of key findings

Main activities undertaken at bathing water sites. Walking, relaxing, dog walking and socialising / spending time with friends and family are the main activities as identified by both the onsite and online surveys. Water based immersive and non-immersive activities were also identified in both surveys but less frequently.

Bathing waters as economic assets. The local economic impact analysis based on the onsite survey data estimated total local economic benefits across the five case study sites as follows: (i) £19.4M local business turnover supported; (ii) 263 Full Time Equivalent (FTE) jobs related to visitor spend; and (iii) £8.8M in Gross Value Added (GVA).

Restorative benefits of bathing waters. Results from the onsite and online surveys revealed that the majority of respondents find beaches and bathing waters to be beneficial in terms of physical and psychological restorativeness (e.g. in terms of making visitors feel revitalised, calm and refreshed).

Focus groups reveal the multiple benefits of bathing waters. Evidence from the focus groups revealed how the local beach and the sea is integral to the recreational, social, wellbeing, community and economic benefits that local communities (and businesses) enjoy. Most of the participants visit their local beach at least a few times a week.

Limited awareness of rBWD designation and BWQ status. Results from the onsite survey revealed that the majority of respondents (60%) were not aware that the beach they were visiting was a designated bathing water. Of the 40% that did know, there was limited and / or incorrect awareness of the site's BWQ status (most respondents overestimated BWQ).

Awareness / use of rBWD signage. A high proportion (70%) of respondents to the onsite survey at Gullane said they had seen a rBWD electronic sign even though this site is not part of SEPA's electronic signage network. In addition, a high proportion (72%) of online survey respondents said that they hadn't seen / don't remember seeing any signs and, crucially, that they didn't look for them.

Behavioural response to advisory against bathing suggests limited concern about BWQ. The surveys showed that the majority of respondents would not change their decision to visit the relevant beach and the frequency of visits in future if they saw an advisory sign against. From this, it is reasonable to assume that permanent advice against bathing would have a somewhat minimal effect on recreational opportunities and visit patterns at Scotland's bathing water sites.

Limited concern about health impacts of BWQ among focus group participants though appetite for more / better BWQ information. Evidence from the focus groups showed that most participants who went into the water or who used the beach recreationally in areas where the BWQ was 'poor' were not concerned that current BWQ could potentially impact their health. There was also a general perception that existing BWQ information is poor. This meant there was an appetite for more / better information, particularly for those participating in water-based activities (e.g. wild swimming).

Monetary value of recreational visits to the five case study bathing waters. The estimated average willingness to pay (WTP) (all sites) was £8.90 per person per visit. On average, onsite survey respondents make around 40 visits to the bathing water per year meaning an annual expenditure of £356 per respondent. Across the five sites, this equates to a total annual estimated recreational value of £12.7M. These represent conservative proxies for the per person trip / annual and total annual monetary values of the recreational and access benefits enjoyed by visitors to the five case study sites considered in this research

Reduction in visits and loss of recreational value in the event of advisory against bathing. The results suggest that around 5% of onsite respondents and 29% of online survey respondents would visit less often, resulting in reductions in annual visits of 22,436 and 358,567, respectively. This equates to an estimated loss of recreational value of between £0.2M (onsite) and £3.19M (online) per year (applying the estimated WTP per visit of £8.90). These values can be interpreted

as the benefits of meeting 'sufficient' status (i.e. not displaying advice against bathing).

Amount households are willing to pay for BWQ improvements. Average WTP per household for a 1% reduction in the number of Scottish beaches failing to meet BWQ standards were estimated at £0.93 per household per year or £2M per year for all households in Scotland. This can be interpreted as the value of the benefits associated with this level of improvement in BWQ standards.

Deterioration in BWQ may impact the quality of visits if not the quantity. Statistical analysis of the onsite and online survey data revealed that perceived BWQ was found to be a key predictor (statistically significant) of wellbeing outcomes linked to the restorativeness benefits of bathing waters. This means that although respondents are not dramatically changing their behaviour following advisory against bathing, the quality of the visit would be diminished as the perceived restorative benefits received would be less.

Focus group participants were more affected by a change in BWQ than survey respondents. Results from the onsite and online surveys suggest that the cost of a deterioration in BWQ would be relatively small (as a function of reduced visits). This in contrast however to the strength of feeling expressed in the focus groups in response to the possibility of permanent advice against bathing. This shows how a more contextualised perspective can influence the values people place on natural assets (e.g. bathing waters).

Key learning about the overall value of bathing water quality in Scotland

Local economic benefits associated with visits to case study bathing water sites. Although it is not appropriate to extrapolate the case study local economic impact estimates (£19.4m business turnover, 263 FTE, £8.8M GVA), they give a sense of the potential magnitude of the economic benefits of Scotland's bathing waters, considering that there are 86 designated sites in total.

The value of recreational visits to case study bathing water sites. Data from the onsite survey revealed that the estimated WTP for recreational visits (the welfare value) to the five case study bathing water sites is: (i) £8.90 per person per visit; (ii) £356 per person per year; or (iii) £12.7M per year for all visits across all five sites.

The value of improving BWQ standards at the national level. Reducing the number of Scottish beaches failing to meet BWQ standards by 1% would result in benefits equating to £2M. This value can be used alongside the costs of meeting the same objective in CBA to inform policy decisions.

The overall importance of Scottish bathing waters. Visits to the beach are important for the respondents: nearly 50% of them visit more than once a month (across both onsite and online surveys). Respondents do various activities at the beach and receive various multiple benefits. The benefits received are significant, especially considering that physical and mental health and wellbeing benefits

(potentially the largest benefits delivered) have not been elaborated on in this study (beyond restorative benefits).

Recommendations for bathing water management

Prioritisation of management / investment. There is an argument for prioritisation of beach / BWQ management intervention and investment towards the types of activity people are most interested in undertaking on the beach / at the bathing water site (e.g. ensuring adequate provision of dog waste bins) This could contribute to more effective management within the authorities responsible for key aspects of beach management (e.g. SEPA, local authorities).

Managing pressures on bathing waters / the marine environment. Evidence from the focus groups suggests that members of the public have some concerns about the impact of development (as a pressure) on BWQ. These are legitimate concerns and development should be managed sensitively to ensure that BWQ (and other aspects of the water environment) are not adversely affected..

Improvements to BWQ information. Results from both surveys suggest that awareness of bathing water designation is low and that there is limited concern about BWQ and advisory against bathing, mainly because respondents don't go in the water anyway. There may be a case for more targeted BWQ information towards the smaller proportion of bathing water users / user groups who do go in the water. This could include awareness raising activities aimed at 'active user' groups such as surfers about the health risks associated with on-water immersive / non-immersive activities in poor BWQ.

Households value improved levels of BWQ quality – implications for policy. The online survey shows that the higher the bathing water status of the most visited beach is, the higher respondents are willing to pay to maintain it. The greatest value is attached to ensuring bathing waters that meet 'excellent' status. Respondents are indifferent to improvements at lower levels of bathing water quality but have significant WTP for moving from 'poor for 5 years' to 'excellent' of approximately £85 per household per year. This implies that in future, while achieving 'good' quality may become a policy objective, the additional benefits associated with this change may be small. WTP for a 1% reduction in the number of Scottish beaches failing to meet rBWD standards is £ 0.93, and WTP for one unit increase in litter removed (implies that 1% more beach litter is removed) is £0.44. The total WTP for households in Scotland for 1% reduction in bathing waters failing is estimated at £2 million per year. This value can be presented as an annualised benefit over a specified time horizon for use in decision-making, for example within policy.

Monetary values for policy appraisal, CBA etc. The research produced several values that can potentially be used by the Scottish Government and other stakeholders to inform bathing waters policy decisions, as part of CBA etc.

1. Introduction

The Scottish Government commissioned Collingwood Environmental Planning Limited (CEP) in association with Economics for the Environment Consultancy (eftec) to undertake a research project in Scotland that would investigate **the value of bathing waters and the influence of bathing water quality**. The project commenced in May 2017 and completed in March 2018. This document is the Final Research Report for the project.

The remainder of this chapter: sets out the aims and objectives of the research project (section 1.1); and outlines the purpose and contents of this Final Research Report (section 1.2).

1.1 Aims and objectives of the research project

The overall aim of this research project was to provide a detailed and quantifiable socio-economic understanding of the value of Scottish bathing waters, and the influence of bathing water quality (BWQ) to bathers, beach users, and to the national and local economies. In addition, four specific research objectives (RO) were set by the Scottish Government (see Table 1.1).

Table 1.1: Research objectives and headline research questions addressed

Research objectives (ROs)	Research questions (RQs)
RO1: To assess the benefits of bathing waters and the value of bathing water quality at a local and national scale.	RQ1: What are the range of benefits (economic, health, social and cultural) of bathing waters at the local and national levels and how can these be measured?
RO2: To assess the impact of the bathing water quality classification signs / symbols.	RQ2: What value do people put on information about bathing water quality (signs and signage), how do they understand that information (particularly information about changes in classification) and how does it influence beach visit decisions?
RO3: To understand and assess the benefits (or costs) of an improvement (or deterioration) in bathing water quality classification.	RQ3: How can the benefits (or costs) of an improvement (or deterioration) in bathing water quality classification be assessed, taking account of effects on the national as well as local economies and both short- and long-term effects?
RO4: To make recommendations for policy and practice, by providing recommendations on the management and assessment of designated bathing water sites, and the overall value of bathing water quality in Scotland	RQ4: What learning can be derived from the evidence about the management and assessment of designated bathing water sites and the overall value of bathing water quality in Scotland?

A suite of Research Questions (RQs) was developed subsequently by the project team, in discussion with the Scottish Government, to direct key aspects of the research, notably the review of existing evidence that was undertaken at the start of

the project (see Chapter 2). The ROs and RQs are directly related to each other as shown in Table 1.1 above. However, the RQs elaborate on the ROs to establish a more detailed framework for the research (e.g. a series of sub-research questions was also proposed and adopted, as explained at section 3.2).

1.2 Purpose and contents of this Final Research Report

This document is the Final Research Report for the Scottish Government funded project concerning **the value of bathing waters and the influence of bathing water quality**. It is intended to provide a comprehensive view of the research project's main findings as well as information on the methodological approach adopted. More detailed information on methods, data, values, model results etc are contained in a separate Technical Annexes volume. A standalone summary of main findings has also been produced, in line with the requirements for Scottish Government funded social research.

The report is structured as follows:

- This **introduction** chapter sets out the aims and objectives of the research and explains the purpose of this report and its structure;
- Chapter 2 sets out the **context for the research** including an outline of the policy context for bathing waters in Scotland and a summary of the results from the evidence review undertaken at the start of the research project;
- Chapter 3 explains the **methodology** adopted in the research project including the research framework (headline and sub-research questions) and the approach adopted to the main data collection and analysis tasks undertaken, both qualitative and quantitative;
- Chapter 4, the first results chapter, answers the RQ **what are the range of benefits of bathing waters at the local and national level**, by way of evidence produced through this research project;
- Chapter 5, the second results chapter, answers the RQ **how important to people is information about bathing water quality**, by way of evidence produced through this research project;
- Chapter 6, the third and final results chapter, answers the RQ **what are the benefits (or costs) of an improvement (or deterioration) in bathing water quality classification**, by way of the evidence produced through this research project; and
- Drawing on all the evidence produced in the research project, Chapter 7 draws some **conclusions** from the research including a summary of the main findings overall, key areas of learning and recommendations for the management and assessment of designated bathing water sites in Scotland, an explanation of what can be derived from the available evidence concerning the overall value of bathing water quality in Scotland and, finally, some recommendations for future research.

2. Context for the research

This chapter briefly sets out the context for the research project. Section 2.1 outlines the policy context for bathing waters in Scotland. Section 2.2 then presents a summary of existing evidence concerning the value of bathing waters and the influence of BWQ. The full evidence review has been published as a separate document alongside this Final Research Report.

2.1 Policy context for bathing waters in Scotland

Historically, key pressures on bathing waters in Scotland have been ‘point source pollution’ from sewage and ‘diffuse source pollution’ from agriculture (run-off), both of which are exacerbated by heavy rainfall. Significant investments in sewage treatment infrastructure led to an overall improvement in the quality of Scottish bathing waters in the mid-2000s, with a steady improvement continuing to date.

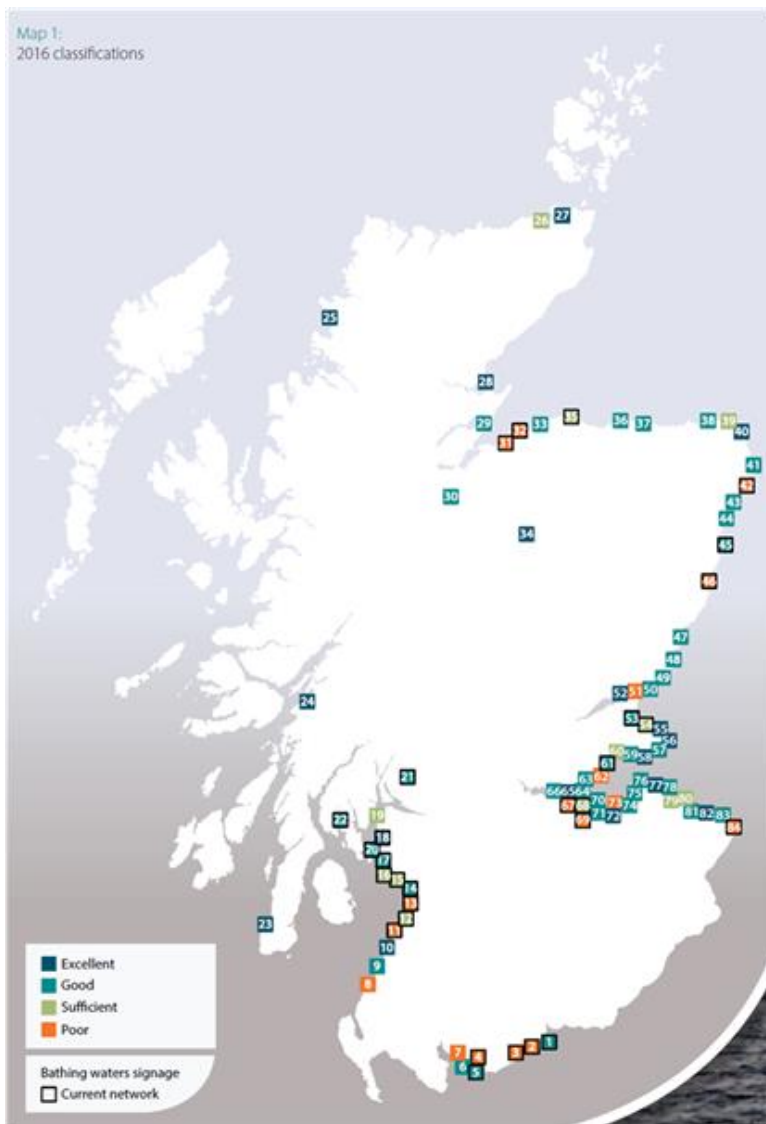


Figure 2.1: Location of designated water sites in Scotland and classification for the 2016/17 bathing water season (Source: SEPA, 2016)

However, in 2006, the revised Bathing Water Directive (rBWD) (2006/7/EC) replaced the previous Directive (76/10/EEC), setting more stringent bathing water quality (BWQ) standards for the protection of public health, to be met by 2015. The rBWD was translated into Scottish law by The Bathing Waters (Scotland) Regulations 2008. The higher standards of the rBWD resulted in a number of Scotland's bathing waters failing to meet the new quality targets. Bathing waters are classified by the Scottish Environment Protection Agency (SEPA) at the end of each bathing water season for the next year, to four levels of quality based on standards of bacteriological quality¹. The recent classifications for 2017/18 reveal that 11 out of 86 designated sites are ranked as poor (12.8%) (SEPA, 2017). Figure 2.1 above shows the location of designated bathing waters around Scotland and designations for the 2016/17 bathing water season².

The rBWD requires member states (MS) to achieve a bathing water classification of 'sufficient' and above for their designated sites. The key risk for MS concerns the provision in the rBWD whereby sites classified as 'poor' over five consecutive years can receive a 'permanent advice' against bathing. This requires a notice to be displayed at the site, advising beach users of the classification status³. For beach managers and other stakeholders (e.g. local businesses, local residents, user groups, conservation charities), this raises concerns over reputational damage, perceptions of poor environmental quality in a wider sense etc, that might somehow erode the 'value' of the bathing water site (i.e. in terms of the various benefits derived from the site). In effect, this is the key 'stick' based mechanism for rBWD compliance. The issue of the value of bathing waters and the influence of BWQ on value is the key question investigated in this research.

Table 2.1: Recent trends in bathing water classification for the five case study sites

Site	Bathing water classification		
	2015/16	2016/17	2017/18*
Ayr (South Beach)	Sufficient	Poor	Poor
Gullane	Excellent	Excellent	Excellent
Nairn (Central)	Poor	Poor	Sufficient
Portobello (West)	Poor	Poor	Poor
Troon (South Beach)	Good	Sufficient	Good

* 2017/18 classifications to be confirmed by European Commission (EC) Spring 2018.

¹ SEPA produces annual BWQ classifications (excellent, good, sufficient and poor) which describe the general water quality condition of bathing locations based on four years monitoring data. These classifications are calculated at the end of each bathing season for display at beaches on the following season.

² A map of bathing water classifications for the 2017/18 bathing water season was not available at the time of writing.

³ If any location were to have five consecutive 'poor' classifications, then a 'permanent' advice against bathing notice or sign would have to be displayed at these locations for the whole bathing season.

Table 2.1 above shows recent trends in rBWD classification for the five case study bathing water sites considered in this research (see section 3.2 for full details of the case study aspect of this research). This serves to illustrate the issue of rBWD compliance and the associated risk to MS and local stakeholders of permanent advice against bathing in the sense that Ayr (South Beach) and Portobello (West) are at risk of permanent advice against bathing, particularly Portobello (West) which has now had three consecutive years of poor BWQ. The dynamics of the systems involved (sewage treatment, agricultural run-off, hydrology) combined with seasonal variation in weather patterns mean that wet summers in 2018 and 2019 could put Portobello (West) at significant risk of permanent advice against bathing. Conversely, Nairn (Central) saw an improvement in BWQ in the 2017/18 season from 'poor' to 'sufficient', meaning that it is no longer (currently) at risk of permanent advice against bathing.

The challenge of implementing the rBWD lies in balancing the costs to stakeholders (e.g. water companies, the agricultural sector, local authorities) of maintaining BWQ classification at 'sufficient' or better at all designated bathing water sites versus the costs of not maintaining 'sufficient' status (e.g. in terms of loss of tourism revenue and uptake of informal recreation opportunities). The costs to stakeholders of maintaining 'sufficient' status are generally known (e.g. the cost to water companies of maintaining or upgrading waste water treatment infrastructure). However, the costs of not maintaining 'sufficient' status, in terms of the loss of the range of benefits provided by bathing waters, are less well understood. This is because: (i) the range and (monetary) value of benefits provided by bathing waters is not fully understood; and (ii) it is not known how members of the public would respond to permanent advice against bathing.

There are a range of benefits that marine and coastal environments offer to society, including economic, health and wellbeing and social and cultural benefits. Bathing waters and the impact of the rBWD represents a sub-set within this. A key question for bathing waters policy therefore concerns the 'value'⁴ of these benefits, the influence of BWQ on the range of benefits provided and the resultant changes in value that may be caused by a decrease (or increase) in BWQ. The outputs of this research are envisaged to help clarify these costs and benefits by identifying the monetary (and other) value(s) of bathing waters, the costs associated with a deterioration of BWQ and individuals' willingness to pay (WTP) for an improvement in BWQ.

There are a range of additional policy drivers to be taken into consideration that influence the management of bathing water sites. These include both statutory (European and Scottish laws regarding water quality standards) and non-statutory (Scottish Government commitments) policies. Key areas of environmental (and other) policy complimenting the rBWD include:

- The **Water Framework Directive** (2000/60/EC), which provides a framework to manage the water environment, of which bathing waters are a protected

⁴ Value in the broadest sense including monetary and non-monetary values.

aspect. The Directive was transposed into Scots law by the Water Environment and Water Services (WEWS) (Scotland) Act 2003;

- The **Water Resources (Scotland) Act 2013**, which sets out responsibilities of Scottish Water and Scottish Ministers. Key relevant elements relate to “permit the taking of steps for the sake of water quality” and improvements in sewerage services;
- The **Marine Strategy Framework Directive** (MSFD), in contributing to reaching "good environmental status" by 2020;
- The **Marine (Scotland) Act 2020** which directs the requirement for marine planning in Scottish inshore waters, including policies and management measures to balance social, ecological and economic objectives, which may include measures on bathing waters where relevant; and
- The **Community Empowerment (Scotland) Act (2015)**, which places an increased duty on public bodies to ensure that communities can influence decisions about services.

As such, this study on understanding and measuring the value of bathing waters and the influence of BWQ in Scotland is both timely and important, given the overall policy context for bathing water, the risks concerning successive poor classifications under the rBWD as well as the importance of engaging local communities (as outlined in the Community Empowerment Act).

2.2 Evidence review summary – what is known already?

As part of the early stages of this research project, an evidence review was undertaken to identify:

- Existing knowledge, research and practice concerning bathing water values and valuation in Scotland, the wider UK, and other similar contexts (e.g. northwest Europe);
- The influence of BWQ and other issues, including the range of benefits (e.g. economic, health and wellbeing) derived from bathing waters; and
- The factors that can influence individuals’ choice of bathing water, and the influence of BWQ signs and signage on these choices.

The full evidence review has been published as a separate document alongside this Final Research Report. The evidence review has also been drawn on extensively in the write-up of this Report, particularly in terms of: (i) providing highlights of the current state of knowledge at the start of each results chapter; and (ii) facilitating a comparison of the results from this current study with evidence from previous studies (to identify divergence, similarities etc) as part of mini discussion / synthesis sections at the end of each results chapters. A summary of the results from the evidence review are provided in the sub-section below.

2.2.1 The benefits of bathing waters

This part of the review identified what is known about the range and type of benefits provided by bathing waters at local and national levels. Key findings include:

- A variety of frameworks are used across the literature reviewed for the classification of benefits from bathing waters. Examples include ecosystem services (Ghermandi *et al.*, 2010; UK NEA, 2011) and total economic value (TEV) (Hynes *et al.*, 2013; Oliver *et al.*, 2016; Johnston *et al.*, 2017);
- The review identified various benefits of bathing waters that can be organised under several categories (economic, health and wellbeing, social and cultural);
- Bathing waters sites are important assets for local, regional and national economies (Tudor and Williams, 2006; Vaz *et al.*, 2009; Gillespie *et al.*, 2016; Reed and Buckmaster, 2015; Philips and House, 2009; Morrissey and Moran, 2011; Hynes *et al.*, 2013; Ballance *et al.*, 2000). By way of example, a recent (2016) survey in Scotland (Visit Scotland, 2016) showed that domestic visits alone to Scottish seaside locations generate an average of 1.5 million trips and £323M in expenditure per annum;
- The literature reviewed identified various physical and psychological benefits derived by visiting or being close to coastal environments (including bathing waters). These include improvements in: (i) mood and cognitive attention⁵; (ii) self-reported health (White *et al.*, 2013a); (iii) quality of life⁶; (iv) physical health (reduced blood pressure)⁷ (Hipp and Ogunseitan, 2011; Wyles *et al.*, 2016; GESAMP, 2015); and (v) reduced stress⁸.
- Social and cultural benefits cover a range of aspects including the way in which high quality bathing waters can contribute to a sense of ownership and pride of place for local residents and communities (Barnes, 2008). Beaches also offer an ideal environment for children and adults to learn about coastal environments, giving rise to educational benefits (Wyles *et al.*, 2017).

2.2.2 Methods and approaches for measuring the benefits of bathing waters

This part of the review brought together evidence relating to methods and approaches for measuring the benefits of bathing waters and the implications of changes in BWQ for local and national economies. Key findings include:

- Studies tend to use a combination of economic methods incorporating questions that identify current and intended use, but also capturing the emotional response to beaches and coastal environments;
- There is limited literature on the impacts of a change in bathing water classification on the benefits provided by bathing waters (Cascade Consulting

⁵ van den Berg, Koole, & van der Wulp (2003) and Karmanov & Hamel (2008): in Hipp and Ogunseitan (2011).

⁶ Ogunseitan (2005), de Vries, Verheij, Groenewegen, & Spreeuwenberg (2003): in Hipp and Ogunseitan (2011).

⁷ Chang, Hammitt, Chen, Machnik, & Su (2008): in Hipp and Ogunseitan (2011).

⁸ Velarde, Fry, & Tveit (2007): in Hipp and Ogunseitan (2011)

and eftec, 2009; eftec *et al.*, 2014; Accent, 2010; eftec, 2002). However, quantitative measures that have been used include changes in the ‘number of visitors’ and ‘frequency of trips’ to bathing water sites due to an improvement or deterioration in BWQ (Hanley *et al.*, 2003; McKenna *et al.*, 2011; Gillespie *et al.*, 2016). There is also some evidence (Nahman and Rigby, 2008) suggesting that changes in BWQ would have a greater economic impact than loss of Blue Flag status (a UK-wide beach award scheme); and

- Three possible approaches for assessing the local economic impact of Scotland’s bathing waters have been identified in the review. On balance, it is felt that the Cambridge Model⁹, which produces the final economic outputs: (i) business turnover, (ii) associated employment supported by expenditure and (iii) GVA estimates, adapted for use in Scotland, was the most appropriate approach for use in this project.

2.2.3 Factors that influence beach visitors’ use of bathing waters

This part of the review identified what is known about the importance people put on information (signs and signage) about BWQ as a factor influencing beach visit decisions. Key findings include:

- From the sources reviewed, there is only a small literature addressing the nature / type of information that influences peoples’ beach choice decisions (Tudor and Williams, 2006; Phillips and House, 2009; McKenna *et al.*, 2011; Shepherd, 2014). Further, only three sources in the review dealt explicitly with signage (eftec, 2002; eftec *et al.*, 2014; Oliver *et al.*, 2016);
- Explicit and implicit information about a beach and its associated bathing water / BWQ influences beach choice decisions. Implicit information relates to beach user perceptions concerning the attributes, characteristics and features of different types of beach (e.g. remote rural vs urban) (Morgan, 1999; Vaz *et al.*, 2009);
- There are a wide variety of factors that can influence beach choice decisions, over and above BWQ. These can be categorised in terms of: (i) facilities; (ii) bathing and swimming safety; (iii) sand and water quality – includes BWQ; and (iv) access and parking (Morgan, 1999); and
- Water quality along with wider notions of ‘beach cleanliness’ is frequently cited as one of the top three factors influencing beach choice decisions (Morgan, 1999; Ballance *et al.*, 2000, Tudor and Williams, 2006, Vaz *et al.*, 2009, McKenna *et al.*, 2011, Shepherd, 2014). However, it is unclear how members of the public define and understand these factors.

⁹ The Cambridge Model is a computer-based economic impact model developed by PA Cambridge Economic Consultants Ltd, Geoff Broom Associates and the Regional Tourist Boards. It uses a standard methodology capable of application throughout the UK. It therefore offers the potential for direct comparisons with similar destinations throughout the country. The approach was the subject of independent validation (R.Vaughan, Bournemouth University) in December 1994. The Model was judged robust and the margins of error acceptable and in line with other modelling techniques.

2.2.4 Awareness, understanding and influence of beach signs

This part of the review identified what is known about how / what people understand about the information presented on BWQ signs and signage, particularly in terms of information concerning changes in classification. Key findings include:

- From the sources reviewed, there is very limited evidence against this question, specifically empirical evidence. Only three sources reviewed (eftec, 2002; eftec *et al.*, 2014; Oliver *et al.*, 2016) deal specifically with peoples' understanding of BWQ signs and signage and mainly in terms of setting the research agenda, identifying knowledge gaps etc;
- The effectiveness of different means of communicating BWQ information is poorly understood (e.g. in terms of what types of information is presented and how) (Oliver *et al.*, 2016). Accordingly, further research is needed to better understand this aspect, informing the design of effective signs and signage;
- Empirical evidence from a Scottish study (Ayrshire coast) (Hanley *et al.*, 2003) showed that the majority of survey respondents were not confident in making judgements on water quality. Further, 60% said they know very little about the issue; and
- It has been suggested that the symbols used on existing statutory signage under the rBWD provides little useful information on what the different classifications might mean in terms of health risks (Oliver *et al.*, 2016).

2.2.5 Recommendations for bathing water / beach management in Scotland

This part of the review used the available evidence to identify recommendations for bathing water / beach management in Scotland. These initial recommendations have been elaborated following the empirical stages of this research project (see the conclusions chapter of this report). Key findings include:

- Information on bathing water / beach values (e.g. economic, socio-cultural) can play a key role informing management decisions (e.g. planning facilities, determining access and transport capacity) (Ballance *et al.*, 2000). It is also important to bear in mind that some more rural / remote sites can be highly valued precisely because they have few amenities and facilities (Morgan, 1999; Vaz *et al.*, 2009);
- Information on the type and range of recreational user groups that make use of a particular bathing water / beach can be useful for informing management decisions (Morgan, 1999; Phillips and House, 2009; McKenna *et al.*, 2011; Hynes *et al.*, 2013). For example, practical concerns over safety whereby investment to improve BWQ could be targeted towards sites of high use in terms of immersion and on-water recreational activities (Hynes *et al.*, 2013); and
- There may be scope to improve existing beach / BWQ signage by: (i) making signs more interactive, especially for children; (ii) increasing the space on beach signs allocated to BWQ issues; and (iii) better use of social media to communicate information on BWQ issues (Shepherd, 2014).

3. Methodology

3.1 Introduction

Given that the aim of the research was to investigate both economic and wellbeing benefits of bathing waters, this research project used a mixed methods approach to collect quantitative and qualitative primary data. The fieldwork component of the research was conducted at five bathing water sites across Scotland in the summer and early autumn of 2017.

3.2 Research questions addressed and overall research approach

The following research questions (RQ) were used to focus the research:

- RQ1 What are the range of benefits (economic, health, social and cultural) of bathing waters at the local and national levels, and how can these be measured?
- RQ2: What value do people put on information about bathing water quality (signs and signage), how do they understand that information (particularly information about changes in classification) and how does it influence beach visit decisions?
- RQ3: How can the benefits (or costs) of an improvement (or deterioration) in bathing water quality classification be assessed, taking account of effects on the national as well as local economies and both short- and long-term effects?
- RQ4: What learning can be derived from the evidence about the management and assessment of designated bathing water sites, and the overall value of bathing water quality in Scotland?

To fully address these research questions a mixed-methods approach was developed for the project and, as such, each chapter on the findings reports from across the range of data sources used (quantitative and qualitative). The project addresses the issue of the value of bathing water from a number of perspectives. Figure 3.1 shows the relationship between those value perspectives and the type of data collected and analysis that was carried out.

Two fieldwork methods were used across five bathing water sites of varying bathing water (rBWD) classifications together with an online survey to a nationally representative sample of the Scottish population. The intention was to provide a mix of quantitative and qualitative evidence about perceptions of bathing water quality, including:

- Response to different forms of information provision;
- The range of economic, cultural, and health and wellbeing benefits provided by beach visits; and
- Potential changes in attitudes and behaviour in response to changes in bathing water quality.

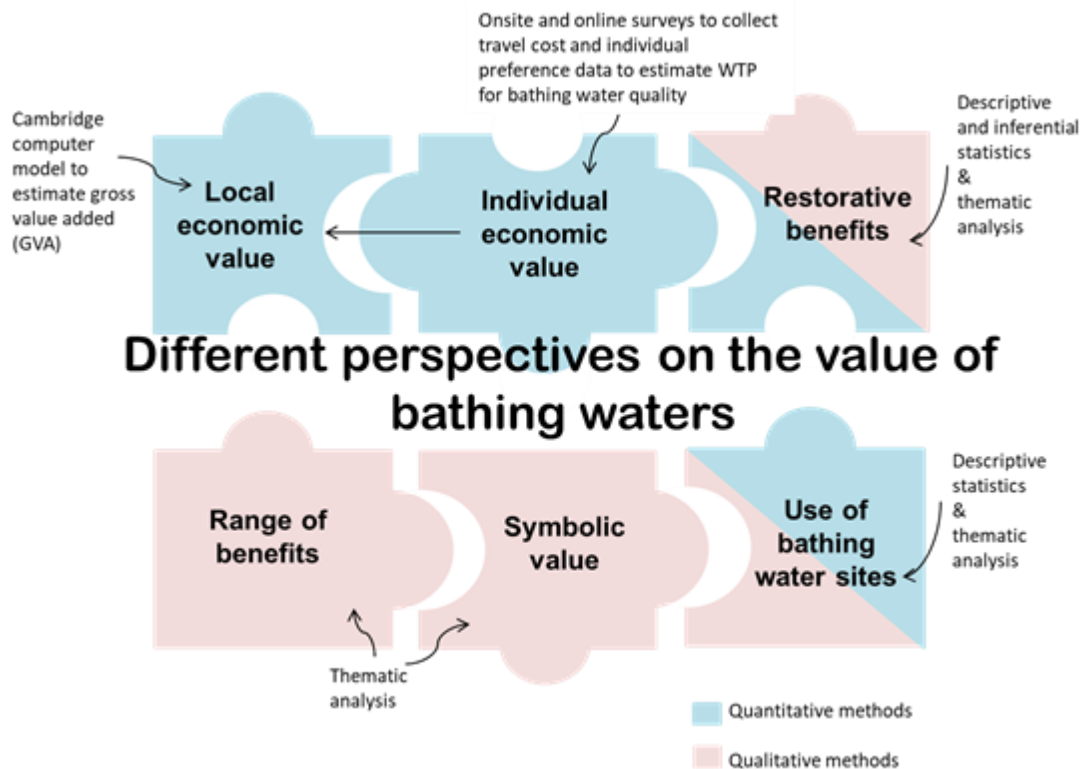


Figure 3.1: Relationship between different perspectives on the value of bathing water and methods for their investigation

The fieldwork methods used were as follows:

1. An onsite survey of over 500 visitors (in total) to the five bathing water case study sites across Scotland;
2. Six focus groups in the five bathing water case study sites with community members, businesses and one specific user group (wild-swimmers); and
3. An online survey of 1,000 representative of the Scottish population to gather their preferences for bathing water quality at the site they visit most often (users) or most associate with (non-users) and for the characteristics of all bathing water sites in Scotland.

The methods provided complementary information to ensure that the research objectives could be met. The five chosen case study sites are listed below and shown geographically along with their current (2015/16) rBWD status on Figure 3.2.

1. Nairn (Central), Highlands;
2. Ayr (South Beach), South Ayrshire;
3. Troon (South Beach), South Ayrshire;
4. Portobello (West), City of Edinburgh; and

5. Gullane, East Lothian.

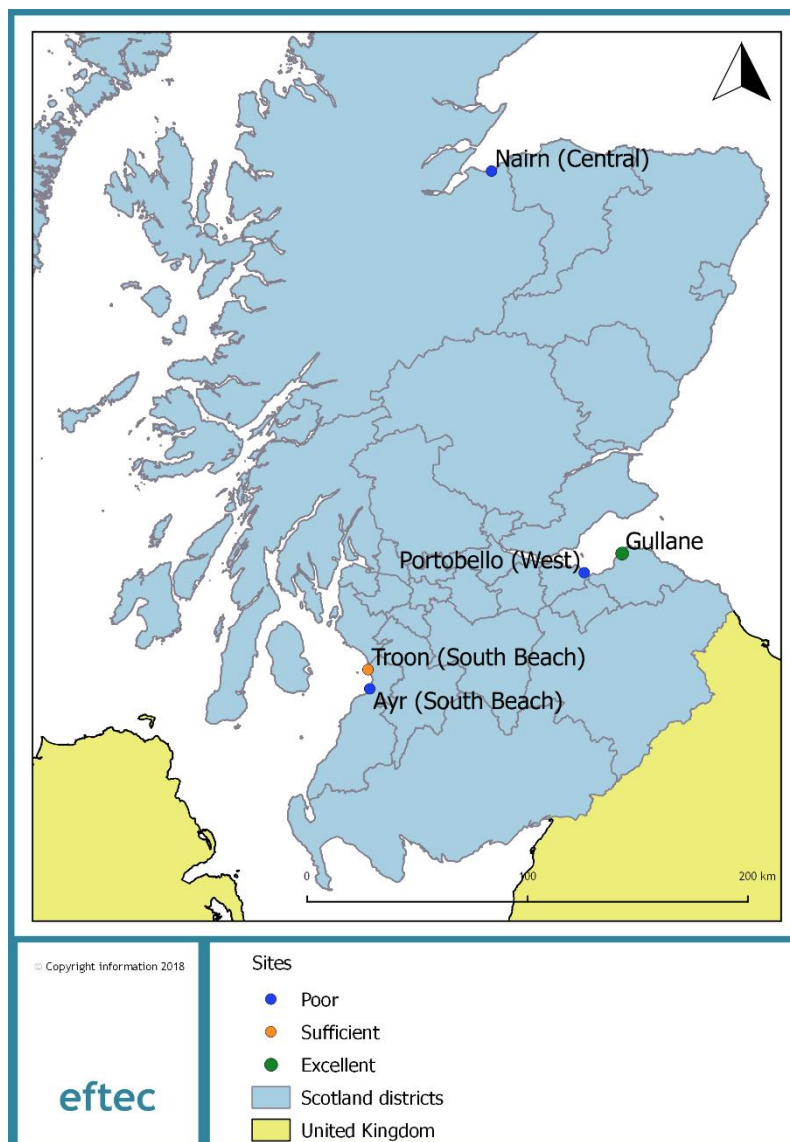


Figure 3.2: Location and current (2015/16) rBWD status of the five case study bathing waters considered in the research (onsite survey and focus groups)

The locations were chosen to represent a range of bathing water quality (rBWD) classifications (10-year average) and site types, as shown in Table 3.1 below. The bathing water site types were intended to be a pragmatic categorisation, identified through discussion with the Steering Group as follows: (i) ‘coastal resorts’ are locations with resort features / amenities (e.g. promenades, large caravan sites); (ii) ‘coastal towns’ are locations where the bathing water site is closely connected to a larger coastal settlement; and (iii) ‘coastal villages’ are sites linked to smaller coastal settlements that can be readily classified as villages¹⁰.

¹⁰ The typology of bathing water sites was developed collaboratively with the Steering Group. Allocation of all Scottish bathing water sites to one of the categories was undertaken by the SEPA representative on the Steering Group. The typology and categorisation is arbitrary to a degree, though it does take cognisance of published data on settlement size, rurality etc (e.g. the Scottish Government urban-rural classification series: <http://www.gov.scot/Topics/Statistics/About/Methodology/UrbanRuralClassification>). A more robust

Table 3.1: Rationale for study site selection

rBWD status ¹¹	Coastal resort	Coastal town	Coastal village
Poor	Ayr (South Beach)	Nairn (Central) Portobello (West)	
Sufficient			
Good	Troon (South Beach)		
Excellent			Gullane

3.3 Data collection methods

3.3.1 Onsite survey

The aim of the onsite survey was to understand more fully the purpose and benefits of bathing water visits, including information about the visitors (age, gender, etc), their expenditure and activities undertaken, and how these would change if bathing water sites failed to meet sufficient status. Responses more particularly relevant to the econometric analysis included information about respondent’s choice of beach (including substitutes considered) and their journey to the beach, including the mode of travel, the distance they travelled, the time it took, where they started their journey, and how often they visit. These responses were then used within a trip generating function (TGF) and individual travel cost model (ITCM) which examine how the number of visits an individual makes to a site changes as travel costs (distance and time) change, whilst other factors that would influence the choice are kept constant (such as substitute sites, household size, age, and household income). This is interpreted as the WTP for access to the sites, and a **minimum** indication of how valuable the benefits of a visit are perceived to be (based on the common economic assumption that if the benefits were perceived to be less than the costs, the activity would not be undertaken).

The onsite survey questionnaire was developed in collaboration between eftec, CEP, and the Scottish Government. It was based on the survey design of previous large-scale bathing water research undertaken by eftec. In order to maximise the level of participation in the survey at each case study site, the questionnaire length was kept to around 15 minutes. The content of the questionnaire is set out in Table 3.2 below. The full onsite survey instrument is included at Annex 6 in the standalone technical annexes volume.

Showcards were used to present respondents with detailed information, where necessary, and the range of possible response options, where relevant. Annex 2 in

approach might consider data on settlement size (population) e.g. as a means of distinguishing more clearly between the ‘coastal town’ and ‘coastal village’ categories.

¹¹ rBWD status as per 2015/16 bathing season

the standalone technical annexes volume sets out details of the application of the onsite survey data in the estimation of visitor expenditure and gross value added (GVA), the trip generating function (TGF) analysis and travel cost models (TCM).

Interviews were conducted in-person at the five case study sites . In total 516 interviews were conducted, spread evenly across the locations (between 102 – 105 at each site).

In advance of the interviews, the project team liaised with local contacts and beach managers to ensure relevant local stakeholders were informed and permission was sought where appropriate.

Table 3.2: Onsite survey content

Questionnaire section	Data collected
Visitor profile	Type of visit, party composition, purpose of visit, accommodation, travel and expenditure
Details of beach usage	Time spent at beach, activities undertaken
Attitudes towards water quality and cleanliness	Perception of quality of beach, perceived restorativeness, awareness of information signs and designation
Visits to other Scottish beaches	Frequency, activities undertaken, distances travelled
Future visit behaviour	Likely response to BWQ advisory signs
Demographics and geographic information	Postcode, household income, age, gender, ethnicity

Survey respondents were selected using a random probability approach in which every ‘nth’ person at the location was approached for interview. This approach ensures the sample of survey respondents is broadly representative of the visitors to the beach during the period of time that the interviewer is present. The interviews were conducted between July and September 2017; during weekdays and weekends and both term and school holiday times. This covered a useful spread of times and conditions over which visitation may differ, as interviews were conducted regardless of the weather. The study did not intend to provide a comprehensive year-round perspective but focused on the bathing water season. Interviewing was conducted using a computer aided personal interview (CAPI) methodology. Each interviewing shift lasted six hours.

Response data was processed and analysed. The results are reported on their own and are inputted to the local economic impact analysis.

3.3.2 Online survey

The purpose of the online survey was to provide a nationally representative sample to understand the purpose and benefits (for both users and non-users) of bathing water visits, and how these would change if bathing water sites failed to meet sufficient status.

The online survey also more explicitly explored the preferences of individuals for different environmental quality outcomes through a stated preference approach using a discrete choice experiment (DCE). An example is shown in Figure 3.2 below. The scope of the online survey was wider: the onsite survey was only about the visit to the beach during which the interview took place, while the online survey covered the beach the respondent visits most often (users) or most associated themselves with (non-users) as well as all bathing waters in Scotland more generally.

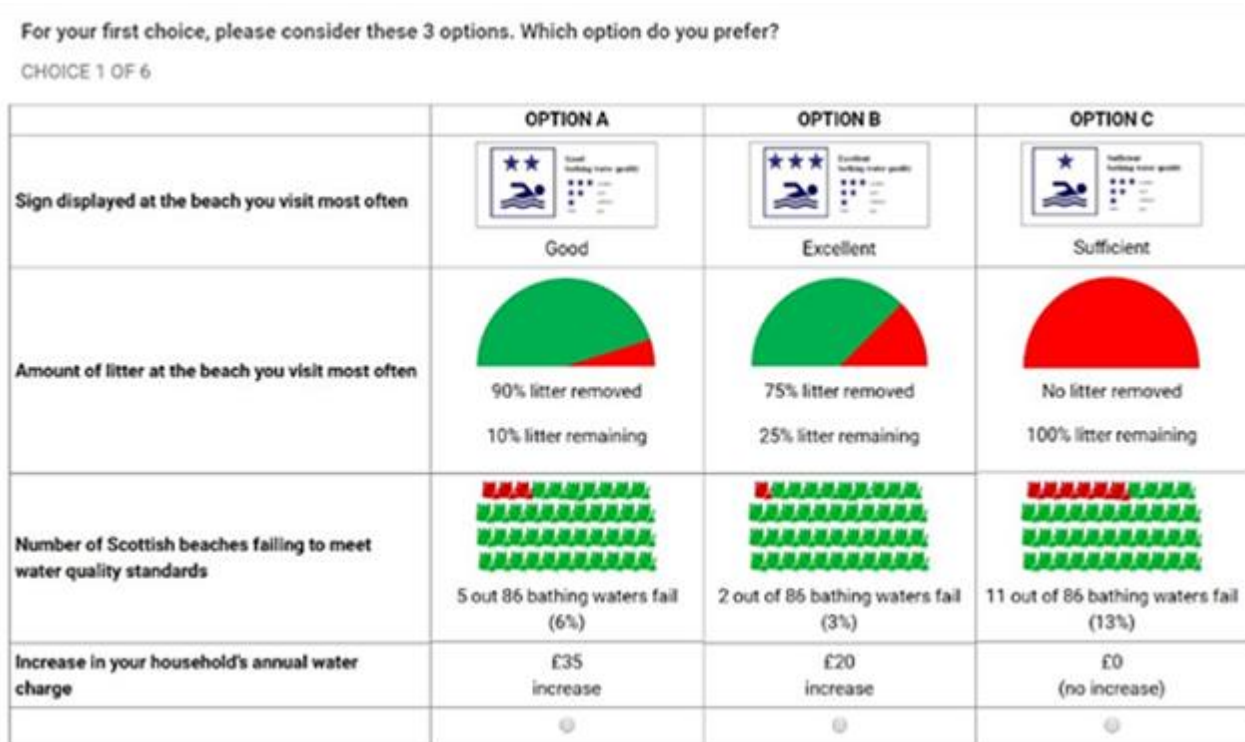


Figure 3.3: Survey choice card used in online survey

In particular, respondents were required to select their preferred option from three alternatives that traded-off changes in:

1. The total number of bathing waters in Scotland failing to meet 'sufficient' status (% bathing waters failing);
2. The bathing water status of the beach they visit most often (users) or that they feel the most association with (non-users) ('poor', 'sufficient', 'good' or 'excellent');

The cleanliness of the beach they visit most often or feel most association with (% litter removed); and

3. The cost to their household to secure these improvements (paid through increased water bill – which is a 'payment vehicle' used in previous bathing water related surveys).

Option C in Figure 3.3 is the 'current situation' that does not involve respondents paying anything more than they currently do.

A (stated) choice experiment uses this process to derive estimates of respondents' preferences for the various improvements, by presenting respondents with repeated choices across experimentally designed alternative bundles of improvements, and asking them to choose their most preferred bundle from the available set in each repeated choice. When one of these characteristics is the cost of the bundle and customers choose one bundle (a specified package of improvements) over others, they implicitly reveal their trade-off between their income (money) and the single improvements included in each bundle in their choice set. Such a trade-off is the marginal "willingness to pay" (WTP) value of that characteristic of the bundled good (i.e. the value of a one unit change in provision of an improvement)

The choices of respondents can then be used to estimate marginal WTP for changes in these outcomes. This complements the onsite survey by providing a nationally representative sample, information from both users and non-users of bathing waters and marginal values for differing levels of environmental quality.

Table 3.3: Online survey content

Questionnaire section	Data collected
Visitor profile	Type of visit, party composition, purpose of visit, accommodation, travel and expenditure
Details of beach usage	Time spent at beach, activities undertaken
Attitudes towards water quality and cleanliness	Perception of quality of beach, perceived restorativeness, awareness of information signs and designation
Visits to other Scottish beaches	Frequency, activities undertaken, distances travelled
Attitudes toward levels of litter, site-specific and nation-wide sites with failing BWQ	Perceived cleanliness of beach most visited / most associated with, preferences for levels of reduction in litter at the site, and preferences for differing levels of beaches in Scotland with 'poor' status
Future visit behaviour	Likely response to BWQ advisory signs
Demographics and geographic information	Postcode, household income, age, gender, ethnicity

The development of the online survey questionnaire followed that of the onsite survey, with input from the project team and the Scottish Government, and consideration given to keeping a reasonable questionnaire length (~20 minutes). There were some differences, however, in the content of the online survey which can be seen in Table 3.3. The full online survey instrument is included at Annex 6 in the standalone technical annexes volume.

The online survey was run during October and November 2017 using an online panel of the populations of Scotland maintained by Survey Sampling International (SSI), a market research company. Sampling quotas for gender, age, and socio-

economic group were used to ensure a nationally representative sample of 1,013 respondents.

Data from the responses were processed and analysed. Annex 3 in the standalone technical annexes volume sets out the details of this analysis.

3.3.3 Focus groups

The focus groups allowed further exploration of people's attitudes and values towards bathing water quality classifications and water quality information on beaches, focussing on residents and business people in the five case sites (although noting that six focus groups were held, as explained below).

A mixture of business and community views were collected, to allow a comparison between these perspectives, with local business focus groups held at Nairn and Ayr, and local community focus groups at Troon, Gullane, and Portobello. Two focus groups were held in Portobello: (i) a local community session as was the case in Troon and Gullane; and (ii) a specific session with a group of wild swimmers who swim off Portobello. Community participants were recruited through community councils and other local organisations, social media channels, advertisements and direct approaches. The online platform Survey Monkey was used to facilitate sign up. Business participants were sought through the local authority, business associations and direct approaches. A small monetary incentive (£30) was provided for all participants.

The focus groups involved 4-11 participants (6 on average). The profile of the participants for all the focus groups can be found in Annex 8 in the standalone technical annexes volume. The community focus groups participants were mainly women (85%), with a range of ages, and employment statuses. The business focus group participants were more balanced in terms of gender (61% female, 39% male) comprising a mix of businesses (in terms of types and size).

Three additional telephone interviews were conducted after the focus group meetings with businesses that had been unable to attend (two in Ayr and one in Nairn) to provide a wider range of input.

The focus group schedule (see Annex 7) was developed to explore issues emerging from the results of the two surveys, and included a scenario exercise which compared participants' expectations of future visits to the beach, based on two different scenarios:

1. In the **first future scenario** the water quality of the local site had improved and participants were asked if that changed what they might do and feel, and if it might change opportunities for their communities; and
2. In the **second future scenario** the water quality of the local site had deteriorated and again participants had to comment on how that might affect their actions and feelings, together with an assessment of impacts on their local communities.

The sessions were facilitated by two members of the project team, one of whom took notes throughout, to capture detailed information about the process, while the facilitator introduced topics and prompted discussion. A pilot was conducted in Troon and was assessed as having achieved the desired outputs. Therefore, results were merged with data from the subsequent focus groups.

3.4 Analytic approach

The analysis adopted a mixture of quantitative and qualitative approaches, which are outlined in more detail in the following sub-sections.

3.4.1 Quantitative analysis methods

The sub-sections below introduce the quantitative analytical tools used in the research.

Descriptive statistics

Descriptive statistics (%) for all the questions on both surveys (onsite and online) were carried out. Details of the demographics (e.g. age, gender, socio-economic group (SEG), ethnicity, employment status) for all participants can be found in Annexes 2 and 3. Descriptive statistics for all the questions can be found in Annex 5. The specific analytic statistics used for different aspects of the survey data are discussed in the following paragraphs.

Revealed preference method

Revealed preference methods use data about individuals' behaviour in an actual market to estimate the value they place on goods and services that are not marketed. In this project, a travel cost approach was adopted using data on expenditure an individual or household group makes for and during a visit to a bathing water site as a minimum proxy of the benefit they receive from the visit. The underlying assumption is that people would not spend more to visit a site than the enjoyment they get from the site, even if the latter is not in monetary terms.

The onsite survey elicits information from respondents about their visits to bathing waters, including the: frequency of visits; activities undertaken; and visitor spend. The use of visitor spend data feeds into the local economic impact assessment (discussed further in the following sub-section). The survey also captures information regarding how (and if) visitors would change their behaviors if they saw a sign advising against bathing due to poor water quality. A so-called trip-generating function (TGF) is created using this information to calculate the number of visits to a bathing water site by an individual per year as determined by a series of explanatory factors, including the availability of substitute sites. These factors are summarised and discussed in Annex 2 in the standalone technical annexes volume.

If the TGF can successfully predict the number of visits currently, it can also be used to predict future visits under different circumstances of the important factors. The function is applied to estimate the reduction in visitor numbers based on the respondents' reaction to advisory signs being displayed. The loss of visitor spend

in the local area and recreational value due to a reduction in visits can then be estimated.

The TGF is based on the specification of a model presented in Annex 2 Table 10. The overall model fit for the results shown in Annex 2 Table 10 is good ($R^2 = 0.617$) and the findings are valid given that they are in line with prior expectations.

The monetary value of recreation visits (£/visit) – in terms of WTP for access and recreation opportunities – is estimated via an individual travel cost model (ITCM). As previously mentioned (section 3.3.1), the WTP is interpreted as a **minimum** indication of how valuable a visit is to the visitors (based on the common economic assumption that if the benefits were perceived to be less than the costs, the visit would not be undertaken). This is calculated as the current (baseline) or reduction in the number of trips to a site multiplied by the value per trip measured in terms of travel costs. The ITCM examines how the number of visits an individual makes to a site changes as travel costs (distance and time) change, whilst controlling for substitute sites, overnight visitors, total expenditure, age, and household income. The travel cost elements apply the following assumptions for distance and distance to substitute sites: travel time is valued at 75% of the average wage rate and fuel cost at £0.30/mile.

Analysis of local economic impacts

Local economic impact analysis was conducted to add to the quantitative evidence exploring the range of economic benefits provided by beach visits. Expenditure data was gathered through the onsite survey for the following broad spend categories associated with bathing water / beach usage:

- Eating and drinking in cafes, pubs, restaurants;
- Buying food, drinks or snacks from shops;
- Shopping such as souvenirs and items for the beach;
- Tourist activities such as local attractions or water sports lessons;
- Travel and transport, for example fuel or train tickets;
- Car parking; and
- Accommodation.

The data collected from the onsite survey on expenditure, group size and mode of transport was supplemented by local and site-specific data. The most relevant supporting information for the economic impact modelling relates to estimates and proxies of total visitors to bathing waters including visitor data provided by SEPA, data on car parking capacity, and data on accommodation capacity.

Overall the analysis features four discrete steps:

1. Estimation of the number of annual visitors to sites using available tourism data;

2. Estimation of expenditure per site visitor per day based on the onsite survey results;
3. Estimation of total visitor spend per year for each site from steps 1 and 2; and
4. Application of the Cambridge Model to generate:
 - a. Estimates of business turnover supported;
 - b. Estimates of associated employment supported by expenditure; and
 - c. Estimates of gross value added.

Further information on the local economic impact analysis, including key assumptions, is provided in Annexes 3 and 4 in the standalone technical annexes volume.

Stated preference method

Based on analysis of the choice experiment responses, values for improvements in bathing water quality and beach characteristics, in terms of WTP for these improvements, were estimated. Analysis of choices made by respondents reveals the premium they are willing to pay for incremental improvements in each attribute. Technically WTP for an attribute is estimated by dividing the coefficient for that attribute by the coefficient of the cost attribute.

Further details of the estimation strategy, including the model specification that provided the best fit to the data and model results, are provided in Annex 3.

Analysis of restorative benefits

In order to analyse the factors associated with perceptions of the restorative benefits of bathing waters and the specific role of BWQ within this, regression analyses were carried out on both the onsite and online data. Factors included in the analyses were drawn from previous research (e.g. Wyles *et al.*, 2016). The variables included in the analysis are listed below:

- Age;
- Gender;
- Perceived BWQ;
- Mode of transport;
- Companions;
- Distance from home;
- Frequency of visits to this beach; and
- Purpose of visit.

To examine the effect of a potential deterioration in BWQ on perceptions of restorativeness, t-test and ANOVAs were carried out. The t-test tested whether if the water quality deteriorated it would affect the restorative potential of the site by comparing respondents' views on the current status with those if it deteriorated to 'poor' (advisory against bathing). An ANOVA was carried out to see what influences the relationship between BWQ and perceived restorativeness, comparing those who did a water activity with those who did not.

3.4.2 Qualitative analysis method

An audio recording was made of all focus group sessions, to allow transcription and thematic analysis. In analysing this data, an inductive (bottom-up) as well as a deductive (top-down) thematic approach was used. This involved coding the data according to themes that appeared in the focus group transcripts (inductive) or were included in the focus group schedule (deductive). This allowed answers to the questions posed, but also prevented constraining the data by only looking at already named categories.

The software package Dedoose¹² allowed codes to be added to transcript text, and then for those excerpts to be exported separately, to enable a further exploration of specific themes. Focus group findings were summarised, their main themes deduced, and linkages within and across focus group discussions explored in relation to the research questions. Using Dedoose allowed an identification of codes that appear most frequently, and this was used as a pragmatic means of prioritising analysis.

¹² <http://www.dedoose.com/>

4. What are the range of benefits of bathing waters at the local and national levels?

4.1 Introduction

This chapter presents the results from the research project in relation to RQ1 i.e. the range of benefits of bathing waters and reasons for visiting given by participants in the research. The evidence review clustered types of benefits into economic, health, social and cultural and these will be drawn out and commented on through this chapter.

The benefits that marine and coastal environments offer to society are well recognised and documented (eftec *et al.*, 2014; GESAMP, 2015; Ghermandi *et al.*, 2010; Brown *et al.*, 2006; MEA, 2005; Watson *et al.*, 2001; GESAMP, 2001). Some of these emerge from products and services that are traded in markets, and can be easily expressed in monetary terms. These include the provision of food and tourism which generate increasingly significant revenues in coastal and marine areas (UNEP, 2008). Beyond these market benefits, the Scottish Government highlights the benefits that people gain from the environment recognising that “by managing the environment well we can provide many more benefits and greatly improve our quality of life”¹³. Such improvements include benefits for physical and mental health, well-being and other social and cultural benefits for local communities and visitors alike.

The types of activities that people undertake at beaches both directly and indirectly realise the range of benefits identified in the literature. For example a local resident going for a walk on the beach realises physical (getting exercise) and mental (reducing stress) health benefits together with the cultural benefit of reinforcing a sense of belonging. Local economic benefits may follow if the walker then buys a drink or icecream from a local shop. Most activities will have multiple benefits, both intended and unintended.

In establishing the range of benefits realised from beach visits the research focussed on asking participants:

- The purpose of their beach visit (onsite survey);
- Activities they would mainly carry out at the beach (online survey); and
- Ways in which beaches were part of their lives (focus groups).

Data to respond to this RQ was collected through Question 10 within the on-site survey and Question 19 in the online survey together with evidence from the focus groups. These questions focused on the reasons people gave for visiting the beach from which we can derive the types of benefits they attribute to their visits.

¹³ SEWeb benefits from the environment pages: <http://www.environment.scotland.gov.uk/get-informed/people-and-the-environment/benefits-from-the-environment/>.

4.2 Quantitative results – onsite and online surveys

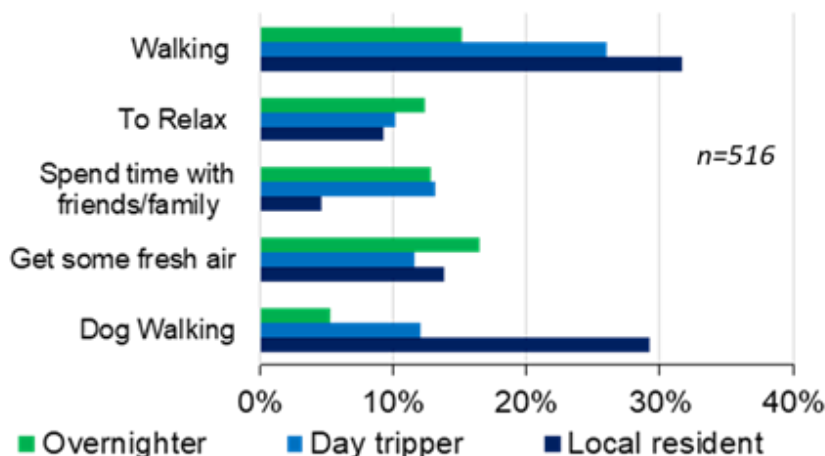
4.2.1 Activities undertaken / motivations for visiting the site

Both the onsite and online surveys gathered information from respondents on activities undertaken at sites, the most important factors in determining which site to visit, as well as the attitudes toward bathing waters in terms of relaxation and restorative properties.

For the onsite survey, the most common purposes of their beach visit mentioned by respondents were ‘walking’ (49% of respondents), ‘relaxing’¹⁴ (37%), ‘socialising / playing’¹⁵ (31%) and ‘dog walking’ (29%). 8% of respondents spent time doing activities in the water, such as ‘swimming’, but due to the survey being conducted during the summer months, this is likely to be a higher proportion than can be found at other times of the year. Other less frequent activities / motivations for visiting the beach include ‘nature and bird watching’, ‘spending time in amusements’ and ‘being on holiday in the area’.

For the online survey, there were similarities with the onsite survey, with ‘walking’ being mentioned by most respondents (71% of respondents) followed by ‘get some fresh air’ (62%), ‘to relax’ (54%) and ‘spending time with friends / family’ (42.5%). ‘Eating out in restaurants’ was also popular (33%) with ‘dog walking’ being mentioned by 26% of respondents. With respect to water activities, 7% said they ‘swam’ and 17% said that they would ‘paddle’.

Figure 4.1 below presents more detail on the top five purposes visitors gave for being at the beach from the onsite survey



Note: Participants could provide more than one answer and the answers were prompted.

Figure 4.1: Top five purposes for visits as % of total purposes for visits – onsite survey (drawing on data from onsite survey Question 10 What is the purpose of your visit (to the beach) today?).

¹⁴ This includes the activities / motivations: ‘to relax’; ‘get some fresh air’; and ‘sunbathing’

¹⁵ This includes the activities / motivations: ‘spending time with friends / family’; and ‘play with children’

As expected, purposes for visiting the sites differ slightly across visitor types. For example, and perhaps not surprisingly, ‘walking’ and ‘dog walking’ are the dominant purposes behind local residents’ visits, while ‘relaxing’ and ‘getting fresh air’ are common reasons across all respondents. Figure 4.2 shows the differences across the five case study sites. There is some variation although ‘walking’ is the top purpose for four of the five sites. ‘Getting fresh air’ and ‘relaxing’ were important in Portobello and Nairn, and ‘spending time with friends and family’ was a key purpose in Troon.

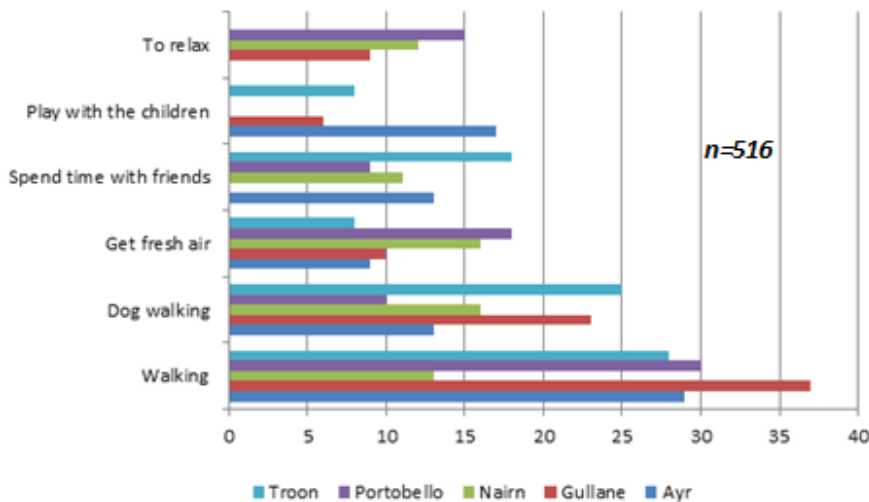
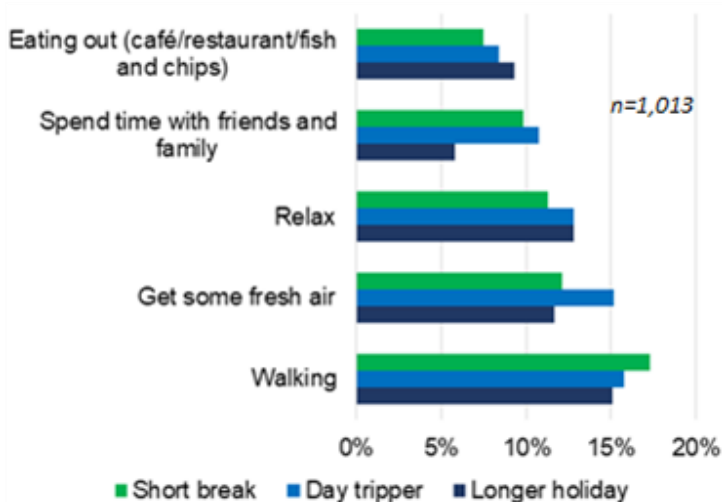


Figure 4.2: Top five purpose for visits by study site – onsite survey (drawing on data from onsite survey Question 10 What is the purpose of your visit (to the beach) today).

Figure 4.3 below presents the reported activities undertaken by online respondents when visiting bathing waters. As shown, ‘walking’ also remains one of the top activities undertaken together with ‘get some fresh air’, followed by ‘relaxing’ and ‘spending time with friends / family’. ‘Eating out’ (café / restaurant / fish and chips) is the only activity / motivation which differs from the onsite survey findings.



Note: Participants could provide more than one answer and the answers were prompted.

Figure 4.3: Top five activities on visits – online survey (drawing on data from online survey Question 19 What activities do you mainly do when you visit the beach?).

In comparison with the evidence reviewed (see standalone volume and section 2.2), the focus of the reasons respondents gave for their visits can be broadly split into: recreational (walking, dog walking); social (spending time with friends / family, play with the children); and health (get fresh air, relax). These findings confirm the range of activities at the beach.

4.2.2 Economic benefits – results of local economic impact analysis

A further key benefit highlighted by the evidence are local economic benefits. Across the literature reviewed, bathing water sites are identified as an important asset for the local, regional and national economy (Tudor and Williams, 2006; Vaz *et al.*, 2009; Gillespie *et al.*, 2016; Reed and Buckmaster, 2015; Phillips and House, 2009; Morrissey and Moran, 2011; Hynes *et al.*, 2013; Ballance *et al.*, 2000). The economic benefits of tourism are wide-ranging and include direct benefits to economy in the form of revenue emerging from tourist expenditure on travelling, local amenities, leisure activities and recreation in and around the visiting area, as well as, benefits in job creation in the wider economy.

To examine these benefits, a local economic impact analysis was carried out for the five study sites considered in this research (see section 3.4.1 and Annex 2 in the standalone technical annex for details of the method). This used visitor data provided by SEPA in order to estimate the total annual visits to each site. Adjustments have been made using Scottish coastal seasonality data (Great Britain Tourism Survey and Great Britain Day Visits Survey) to account for the potential impacts of the timing of the fieldwork on the annual outputs provided. The results of this estimation are provided in Table 4.4 below. It should be noted however that the underlying visitor data is likely to be a significant underestimate, and therefore the subsequent calculations represent conservative estimates.

Table 4.4: Estimated annual visits by visitor type and study site

Visitor type	Study site				
	Ayr	Gullane	Nairn	Portobello	Troon
Overnighters < 5 miles	33,000	2,000	13,000	9,000	4,000
Overnighters > 5 miles	10,000	8,000	17,000	10,000	4,000
Day visitors	169,000	98,000	12,000	60,000	24,000
Residents	294,000	71,000	43,000	94,000	38,000
Total visitors	505,000	180,000	84,000	173,000	70,000

Note: visitor data provided by SEPA.

Table 4.5 presents the estimated visitor spend per year at each site. As expected, on average, visits by overnighters are associated with higher spend, followed by day visitors and local residents.

Table 4.6 presents the local economic benefits estimated for the annual visitor spend in each local area. Across the five sites, beach visitors support nearly £20 million in local business turnover, nearly 300 full time equivalent (FTE) jobs, and nearly £9 million in gross value added (GVA).

Table 4.5: Estimated annual visitor spend by visitor type and study site (£m)

Visitor type	Study site				
	Ayr	Gullane	Nairn	Portobello	Troon
Overnighters < 5 miles	£5.0	£0.4	£2.5	£1.2	£0.3
Overnighters > 5 miles	£0.2	£0.1	£0.3	£0.1	£0.0
Day visitors	£1.8	£0.4	£0.1	£0.3	£0.2
Residents	£1.1	£0.1	£0.1	£0.2	£0.1
Total visitor spend	£8.2	£1.0	£3.0	£1.8	£0.6

Table 4.6: Estimated current local economic benefits of beach visits (£m)

Metric	Study site					
	Ayr	Gullane	Nairn	Portobello	Troon	Total
Local business turnover supported	£11.2	£1.1	£3.7	£2.7	£0.7	£19.4
FTE employment related to visitor spend	155	14	49	36	10	263
Estimated GVA	£5.1	£0.5	£1.6	£1.3	£0.3	£8.8

4.2.3 Restorative benefits

The surveys had a specific focus on what has been termed the “restorative” benefit of beaches. Blue spaces and coastal environments have been shown to have a beneficial impact on well-being (Fleming *et al.*, 2014) and to support psychological restoration. These restorative qualities have been more recently used as a framework to describe and measure the restorative effect that bathing water sites have on making visitors feel revitalised, calm, and refreshed (Hipp and Ogunseitan, 2011; Wyles *et al.*, 2014; 2016; 2017). To examine this, both the onsite and online surveys asked respondents how far they agreed / disagreed with statements (on a scale of 1 – 10) surrounding the ability of beaches to help them to relax, restore and recover. For the onsite survey a one item question was asked but, as there was more time in the online survey, four items were asked.

Tables 4.7 and 4.8 below present the results from the onsite and online survey set of questions. For the online survey in particular, the proportion of respondents who

agreed or strongly agreed (score of 7 or higher) is presented (as there were multiple related questions asked). As shown, the majority of respondents agree or strongly agree with each of the statements.

Table 4.7: Response to onsite survey Question 21 This is an environment where I am able to rest, recover my ability and focus (% of respondents)

To what extent do you agree with the statement...	Number (n)	Percentage (%)
1 – not at all	2	0%
2	5	1%
3	8	2%
4	14	3%
5	69	13%
6	48	9%
7	72	14%
8	113	22%
9	74	14%
10 – completely	111	22%
<i>Totals</i>	516	100%

Table 4.8: To what extent respondents agree with the following statements about their visits to the beach (score of 7 or higher) – online survey (% of respondents)

Statement	Number (n)	Percentage (%)
This is an environment where I am able to rest, recover my ability and focus	732	76%
This is a place which is away from everyday demands and where I am able to relax and think about what interests me	750	78%
This place is fascinating: it is large enough for me to discover and be curious about things	554	58%
This is a place which is very large, with no restrictions to movements; It is a world of its own	508	53%
In this place it is very easy to orient, and move around so that I can do what I like	753	78%

On average, respondents rated the beach they were visiting as highly restorative providing further insight into the benefits of visiting beaches.

4.2.4 The influence of perceived bathing water quality on perceptions of restorativeness

For the both the onsite and online survey data, further analysis using multivariate statistics (regression analysis) found that perceived BWQ was found to be a key predictor of these wellbeing outcomes, with those who perceived a poorer water quality experiencing less health and wellbeing benefits from their visit. This finding remained even when controlling for other factors (such as demographics and visit characteristics) that have been previously found to influence wellbeing benefits of visits to the coast.

Specifically, for the onsite survey perceived water quality explained 3.8% of the variance of the wellbeing measures ($R^2 = .041$, adjusted $R^2 = .038$, a statistically significant model ($p < .001$). The co-efficient found that as water quality declined, the wellbeing outcome decreases (Beta = -.201, $p < .001$).

For the online survey the perceived water quality explains 15.6% of the variance of the wellbeing measures ($R^2 = .157$, adjusted $R^2 = .156$, a statistically significant model, $F(1, 776) = 144.66$, $p < .001$). The co-efficient found that as water quality declined, the wellbeing outcome decreases (Beta = -.381, $p < .001$).

This highlights that perceived water quality of the sea (i.e. BWQ) impacts enjoyment of the beach, and thus the quality of wellbeing benefits received. Importantly, this finding shows how perceptions of BWQ can influence health and wellbeing benefits of bathing waters, linked to restorativeness. The restorative benefits are further discussed in Chapter 6 in relation to the potential impact a deterioration in BWQ might have on them

4.3 Qualitative results – focus groups

4.3.1 Key messages from the focus groups

The local beach and sea is integral to recreational, social, wellbeing, community and economic benefits that the local communities enjoy. Within this, the quality of the beach and sea is integral to participants' enjoyment of the beach.

The local beach and sea was seen as part of everyday life and participants' locality and a strong sense of ownership and identity was felt by participants in relation to their local beach.

4.3.2 Recreational benefits

Overall, 'walking', 'swimming', and 'dog-walking' were the most common recreational uses of the seaside identified in the focus groups. All focus groups discussed the use of the seaside for 'walking', with many participants using it for 'dog-walking'. The beach and the sea are also used for a wide-range of water sports and other hobbies. Although 'swimming' was mentioned in all focus groups, other water sports varied between the study sites. Water sports were discussed

more in Gullane and Troon than the other focus groups, reflecting the beaches' suitable conditions. Activities mentioned include 'sailing', 'coastal rowing', 'windsurfing', 'canoeing', and 'paddle-boarding'.

"It's always been part of the community, whether it's fishing and people going and watching fisherman come ashore, or whether they're swimming in the sea...and you've now got open water swimming, which has become more and more popular" (Nairn focus group participant)

Activities enjoyed outside of the water include 'beach volleyball', 'rockpooling', 'fishing', and 'collecting material from beaches' (e.g. shells). On a more national level, all focus groups agreed their local beaches were visitor attractions or national holiday destinations. Both business focus groups (Nairn and Ayr) spoke about the local holiday parks that are used by tourists. Having poor BWQ was seen in both groups as particularly problematic in continuing to attract tourists to use local holiday accommodation. In some locations, participants spoke about sailing holidays.

Participants in Troon and Ayr spoke about the enjoyment of their beach and the sea in the winter season, and felt they could enjoy the winter months more when it is less busy with tourists. In all focus groups it was revealed that most participants visited the beach at least a few times a week, with some visiting everyday or more than once a day. This underlines how central the use of the beach and the sea is to everyday life:

"I walk on the beach, I swim on the beach. Daily use" (Portobello swimmers focus group participant)

There was some comment in Troon around potentially "anti-social" activity by young people in the summer on the beach. Troon had made national headlines with reports of 6,000 young people coming to the beach for a party¹⁶. The participants were sanguine about it recognising the value of the beach for everyone yet realising that some of the young people were "going over the top":

"...stressful three months studying for their Highers, they finish their Highers at the end of May and they all get together, arrange on Facebook to come down to a nice beach, because they know it's nice down here, and occasionally things get out of hand. That's it, that's all it is. And some old people in the town don't like seeing young people having a good time" (Troon focus group participant)

4.3.3 Emotional connection & wellbeing

The emotional and wellbeing benefits gained from spending time at the seaside was a strong theme, often discussed at length and eliciting strong reactions in the focus groups. The enormity of the sea was felt to give a sense of perspective on life and an opportunity to connect with nature (some focus groups also spoke about enjoying spotting wildlife).

¹⁶ <https://www.dailyrecord.co.uk/news/scottish-news/troon-teen-invasion-sees-cops-10824303>

The seaside was also felt to provide a sense of space and an escape from everyday life. Indeed, seclusion and quietness was chosen as one of the top-three factors for visiting beaches in the focus group at Gullane. At a more national level, participants saw their local beaches as a resource enjoyed by visitors from nearby cities. Thus, space and escaping the pressures of everyday life were considered benefits at both the national and local levels:

“It’s very spiritual, if you’re into health it’s very good, if you go into the water five minutes later you’ve forgotten anything you were worried about before you went in” (Gullane focus group participant)

All focus groups associated the sea with calm and therapy, a distraction from everyday concerns. One participant stressed that they smile whenever they think about the sea, as it evokes warm emotions. The psychological benefits of the sea and the coast were seen as providing a better quality of life in terms of these locations being a less stressful place to live:

“It’s uplifting, and the open air and the fresh air, and just walking along the edge of Fisher’s Wharf, the connection with nature, these are all uplifting things” (Nairn focus group participant)

It was common in the focus groups for participants to relate the wellbeing benefits of their local beach and sea to different senses / sensory experiences, including: the feeling of fresh air (Ayr, Nairn & Portobello); the smell of the sea (Portobello & Troon); the sound of the waves (Troon, Nairn & Ayr); and the feeling of one’s feet in the water or sand (Troon). Others considered that being by the sea contributed to their physical health: one participant spoke about having fewer allergies when living by the sea.

“My mother-in-law used to come down here in the summer...to sit down on the rocks with her feet in the water. So something about the contact with the water that’s important as well. She had walking difficulties and she always felt great sitting for half an hour” (Troon focus group participant)

The perception of water quality, a common theme, tied into this sensory reaction to the sea: the sight of clean water was thought of as being inextricably linked to the sense of enjoyment participants get from the sea. Participants often discussed wider notions of beach cleanliness and the clarity of the water when asked about BWQ (this is discussed explicitly in Chapter 5).

4.3.4 Aesthetic benefits

All focus groups discussed the wide-ranging benefits from the scenery of the seaside. Enjoying sunsets and the view of the sky and stars was linked to emotional wellbeing. The scenery was also said to be a source of inspiration, and used for photography and artistry in many of the focus group locations. In half of all focus groups, participants spoke of seeking a view of the sea every day from their window, as if it is part of their home:

“(Where we live) has not got a lot of space but we like to think we’ve got the whole of the beach and the area beyond as a back garden” (Nairn focus group participant)

This theme of ownership and local identity was a theme running through all of the focus group discussions. Participants in Nairn, Ayr and Troon felt that the backdrop of the Black Isle peninsula and Arran, respectively, made their local beach unique. Similarly, the view of the sky and sunsets was said to be part of both participants’ enjoyment of the beach and sea and the local identity of the town / suburb, in all focus groups bar one. Five focus group discussions spoke about an attachment to watching stormy or changing weather conditions, and watching seasons pass.

4.3.5 Social and community benefits

Participants in the Gullane and Portobello community focus groups spoke about forming social connections with individuals who also participate in the same activities on the beach and the sea (e.g. surfing). It was felt that this elicits a sense of community. Participants also spoke about using the beach as a place to connect to local residents and meeting new people and as a location for community activities. It was evident in all focus groups bar one that the beach is a place with family ties and traditions, as many participants bring visiting family and friends to their local beach.

“My child grew up here and he could always meet his friend and this is the flat they always wanted to meet in, or other people on the sea, they all naturally want to congregate down at the sea. So it’s a kind of magnet in that way” (Portobello swimmers focus group participant)

The educational benefits of beaches / bathing waters were put forward in nearly all focus groups. Participants in Nairn revealed that their local beach is used by nearby schools for teaching, while the local beach and sea is used by children from inner cities or deprived communities to visit the seaside, allowing play, contact with nature, and education (Troon, Portobello):

“I work in Edinburgh in deprived communities and we bring the kids to North Berwick every year and a lot of them have never seen the beach before” (Gullane focus group participant)

Strong community ties to the beach were evident, as all participants in all locations mentioned community-organised beach ‘clean-ups’ of litter and debris. Thus, there is a sense of pride and responsibility in maintaining one’s local beach and sea. Finally, the seaside appears to be an important space to use for events and festivals, with Troon, Ayr and Portobello detailing the festive and annual events that take place at / using their local beach. Participants in Ayr, Troon and Portobello, however, spoke about antisocial behaviour on their local beach by young people in the summer months, with noise, leftover litter and debris. In Ayr, it was felt that organising events on the local beach is a positive distraction for young people, preventing anti-social behaviour from occurring.

4.3.6 Economic benefits

The local beach and sea was seen as a pivotal attraction in Troon and by participants in both of the business focus groups (Nairn and Ayr). There was some disagreement amongst participants as to how directly businesses are impacted by tourist numbers to the local beach and sea, but both business focus groups felt that there are at least positive indirect or secondary effects from visitors to the local beach.

“The tourist’s pound goes very far, it trickles in and not just the caravan parks, the hotels and everything. We obviously have to buy supplies, we have to use the plumber, the joiners, the painters and decorators and we have to buy everything so if business is good for us then it’s good for everybody, there is a big knock on effect” (Ayr focus group participant)

It was felt that the use of restaurants and seaside businesses were associated with visits to the local beach and sea. For example, participants in Nairn reflected that visitors are more interested in restaurants with a sea view. One business in Ayr felt that the unique selling point of their business is inextricably linked to the identity of the west coast of Scotland. It was also commonly felt by participants that there are unexploited benefits of their local beach, and that there are opportunities to further develop the beach and promenade.

“I think there needs to be more creative ideas and ways of being able to utilise the beach and the water space in order to really benefit the towns, and in particular somewhere like Ayr. As we say we look out there and it’s flat and nothing is happening on it but there are also no real enterprises that seem to be encouraged to create activity and a focus” (Ayr focus group participant)

Many participants felt there was a need to balance development and higher numbers of visitors given limited local space and services. Indeed, management of the coastal environment was a theme discussed strongly in four of the six focus groups. Of this and directly impacted by water quality, there was concern about management of waste water in the context of new housing and urban developments in the Gullane and Portobello focus groups. Only in Portobello was there a sense of potential tension between tourism development and other economic activities. In the community focus group one of the participants ran a traditional children's play facility on the beach and felt this was didn't fit in with the image that the local authority wanted to create for visitors; several other members of the group also referred to expensive coffee shops contrasting with the more community cafe in the local leisure centre which was being closed down.

4.4 Discussion and synthesis

4.4.1 Range of benefits enjoyed from the local beach and sea by individuals

Both the surveys and focus groups highlight a range of benefits enjoyed from the local beach and sea, with ‘walking’ and ‘dog-walking’ the most common uses. The importance of one’s local beach and sea for wellbeing was also a key finding from both the surveys and focus groups. Similarly, the onsite survey and focus groups

both found that perceived water quality impacts one's enjoyment of the beach, and thus the wellbeing benefits and there was broad agreement of this finding within and between focus groups. The value of the beach and sea to the local economy was highlighted in the business focus groups with the discussion of direct and indirect benefits. The local economic analysis provides information on possible extent of that local economic value.

A similar broad range of benefits was spoken about in focus groups and revealed in the surveys as in the literature (as identified in this projects' preceding evidence review). The broad categories of benefits are economic, health and wellbeing, social, and cultural. In particular, the social and cultural benefits of bathing waters as co-shaping local identity and providing personal wellbeing were two strong themes across focus groups that are present in the literature (Kyle *et al.*, 2004; White *et al.*, 2013a; Wyles *et al.*, 2017, Wyles *et al.*, 2014; White *et al.*, 2013b). Where perhaps the focus groups found additional benefits to the evidence review, these were environmental benefits, in terms of the habitat provided for wildlife by (good quality) bathing waters.

Water quality and its wider associated notions of beach 'cleanliness' was a top three factor across the community focus groups, as found in several other studies (e.g. Wilson *et al.*, 1995; Morgan, 1999; Ballance *et al.*, 2000; Phillips and House, 2009; Vaz *et al.*, 2009). The range of factors influencing choice of beach reported in Morgan (1999) are: facilities, bathing and swimming safety, sand and water quality, access, and parking. Amenities and accessibility were also chosen in the focus groups as top three factors. Scenery and quietness were also spoken about in the focus groups. Further there was some discussion of the need to balance development with preserving the nature of the place. There was a strong feeling of ownership and identity with beaches in all the groups, translating into a sense of pride in that fact that visitors come from far away to use the beaches (and equally, the sense that poor water quality and reduced tourism reflect badly on the town and its inhabitants).

5. How important to people is information about bathing water quality?

5.1 Introduction

This chapter presents the results from the research project in relation to RQ2 i.e. what value do people put on information about BWQ etc. The evidence review highlighted a range of findings relevant to RQ2 that help to position the results presented in this Chapter in the context of the existing literature. Perhaps most notably, within the scope of the evidence reviewed (see standalone volume), a main conclusion was that there is only a small literature dealing explicitly with the nature / type of information influencing peoples' beach choices (Tudor and Williams, 2006; Phillips and House, 2009; McKenna *et al.*, 2011; Shepherd, 2014). Further, only three of the sources reviewed deal explicitly with signage related aspects (eftec, 2002; eftec *et al.*, 2014 Oliver *et al.*, 2016). Other key findings from the evidence review include:

- Explicit and implicit information about a beach and its associated BWQ can influence the decision to visit a beach (Morgan, 1999; Vaz *et al.*, 2009; McKenna *et al.*, 2011; Oliver *et al.*, 2016). Explicit information can include rBWD electronic or manual signage, forecasts and warnings about abnormal events (Oliver *et al.*, 2016) alongside beach awards as composite indicators of various aspects of beach quality (McKenna *et al.*, 2011). Implicit information relates to beach user perceptions of the attributes / characteristics / factors of different types of beach (Morgan 1999; Vaz *et al.*, 2009);
- Evidence shows how different types of beach user favour different types of beach depending on the activity (or activities) to be undertaken (Balance *et al.*, 2000; Coombes and Jones, 2010). Also, the characteristics of individuals and groups (e.g. socio-economic background) can influence the relative importance of different factors governing beach choice (GESAMP, 2015) including BWQ (Shepherd, 2014). It follows, therefore, that different user groups are likely to have different BWQ (and other) information requirements (Oliver *et al.*, 2016);
- A study in England revealed how beach users rank and utilise BWQ information sources differently (Shepherd, 2014). Although the Environment Agency (EA) is the most widely used source, it was ranked fourth in terms of quality criteria (ibid);
- Various survey based studies have assessed the importance of different factors influencing beach choice, including factors within the following broad categories: (i) facilities; (ii) bathing and swimming safety; (iii) sand and water quality; and (iv) access and parking (Morgan, 1999). Except for one Irish study (McKenna *et al.*, 2011), the sources reviewed show that water quality is consistently one of the top three factors influencing beach choice (Wilson *et al.*, 1995; Morgan, 1999; Balance *et al.*, 2000; Hanley *et al.*, 2003; Tudor and Williams, 2006; Phillips and House, 2009; Vaz *et al.*, 2009; eftec *et al.*, 2014;

Shepherd, 2014). While definitions and interpretations of BWQ are variable amongst members of the public (Morgan, 1999), the evidence suggests that information on BWQ is likely to be important, given the importance of this factor influencing beach choice; and

- There is very little evidence on what people understand about the information presented on BWQ signs and signage, including information about changes in classification under the rBWD using statutory signage. There is also critical uncertainty concerning how members of the public interpret and act on BWQ information, especially in terms of the risk of illness associated with different microbial water standards, as per the rBWD (Oliver *et al.*, 2016).

5.2 Quantitative results – onsite and online surveys

5.2.1 Reasons for visiting the beach

Figures 5.1 and 5.2 below present the point of origin for onsite survey respondents' journeys to the beach by site and visitor type respectively.

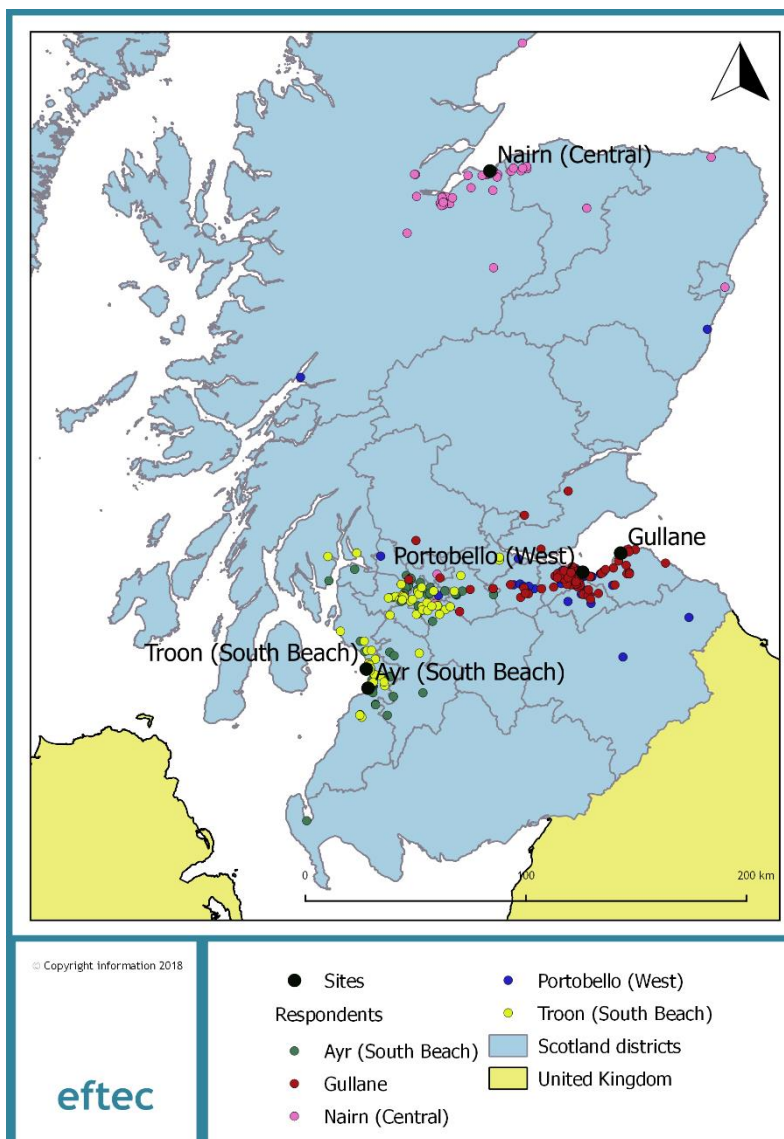


Figure 5.1: Point of origin for onsite survey respondent journeys by site

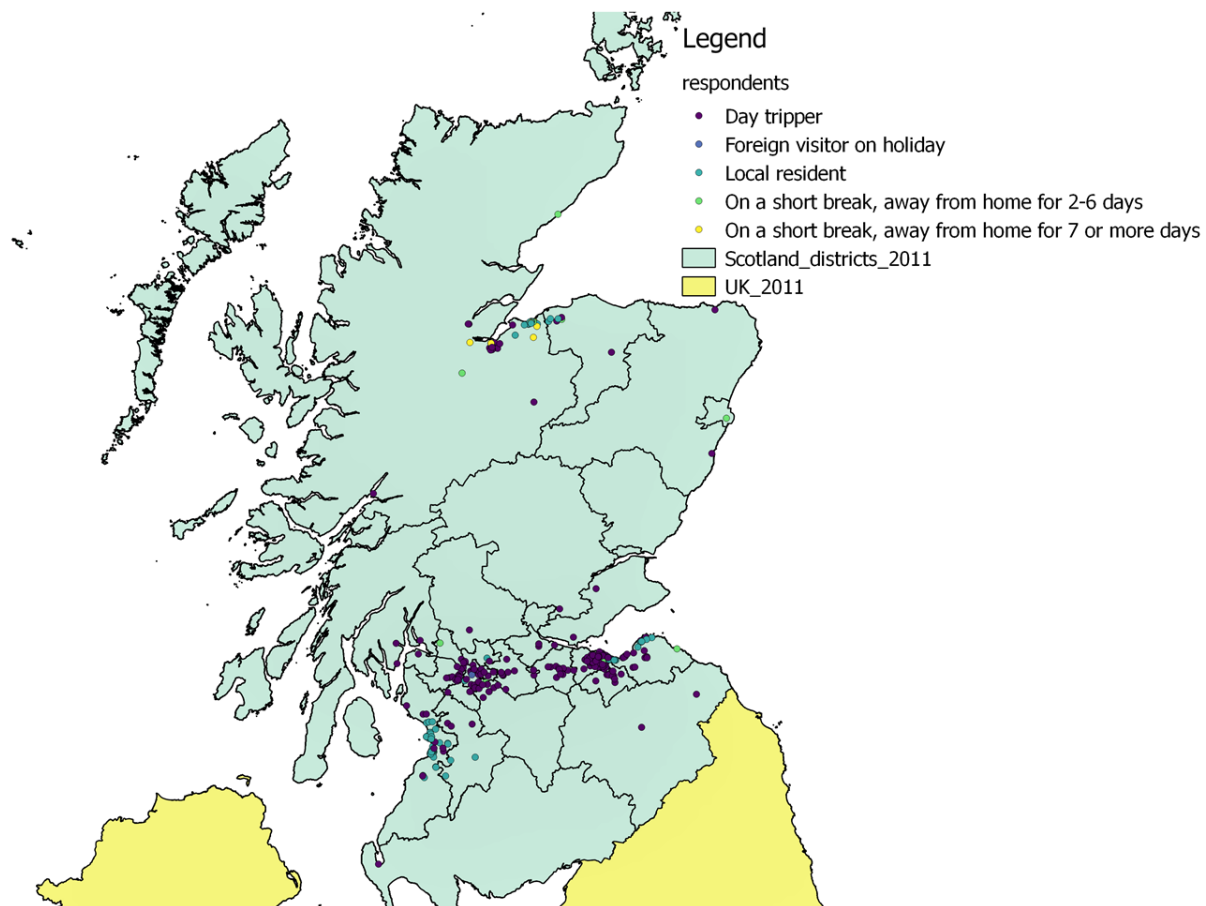


Figure 5.2: Point of origin for onsite survey respondent journeys by visitor type

The reason for visiting a beach, including the type of activity / activities to be undertaken during the visit, can affect BWQ information requirements. For example, tourists can place high importance on beach cleanliness (Ballance *et al.*, 2000) whereas ‘active recreationalists’ (e.g. surfers) can place more emphasis on physical factors like weather and surf conditions (Hynes *et al.*, 2013). Although somewhat counter intuitive therefore, the former may require more information on BWQ and beach cleanliness factors even though the latter are more likely to undertake immersive activities¹⁷.

Both surveys sought to understand the motivating factors behind beach choice by asking respondents to pick their top three factors / reasons for visit from a predetermined list (along with a free text ‘other’ option). This data can therefore provide an indication of potential BWQ information requirements.

In the onsite survey, cleanliness of the beach was the second most important factor (18%) behind natural beauty / scenery (21%). Water quality as a specific factor was much less important (2%) although water quality and wider notions of beach cleanliness are sometimes conflated (Wilson *et al.*, 1995; Morgan, 1999). The

¹⁷ It has been suggested that recreationalists involved in immersion and on water non-immersion activities make continuous assessments of water quality, which may be a mitigating factor (Ravenscroft and Church, 2011).

importance of beach cleanliness suggests that BWQ information and information on wider beach cleanliness (ibid) might be important to the onsite survey population.

In the online survey, walking (16%), getting some fresh air (15%), relaxing (13%) and spending time with friends / family (11%) were the more popular reasons for visiting the beach. Participation in immersive activities were identified much less frequently: kayaking / canoeing (0.34% / n=16); kite surfing (0.26% / n=12); surfing (0.32% / n=15); windsurfing (0.13% / n=6); and swimming (2% / n=115)¹⁸. This focus on low level / less active recreation (i.e. akin to more touristic, family based user groups) suggests that BWQ information may be important to the online survey population, in line with Balance *et al.* (2000) and Hynes *et al.* (2013).

5.2.2 Awareness of rBWD designation and signage

Results from the onsite survey revealed that the majority (60%) of beach visitors were not aware that the site was a designated bathing water. Of the 40% (n=211) that did know, Figure 5.3 presents their awareness of water quality at the site¹⁹. As shown, 40% of those who were aware that the site was a designated bathing water also claimed that they knew the water quality. Of these, only around 13% were correct. Interestingly, nearly all of the incorrect respondents overestimated the bathing water quality.

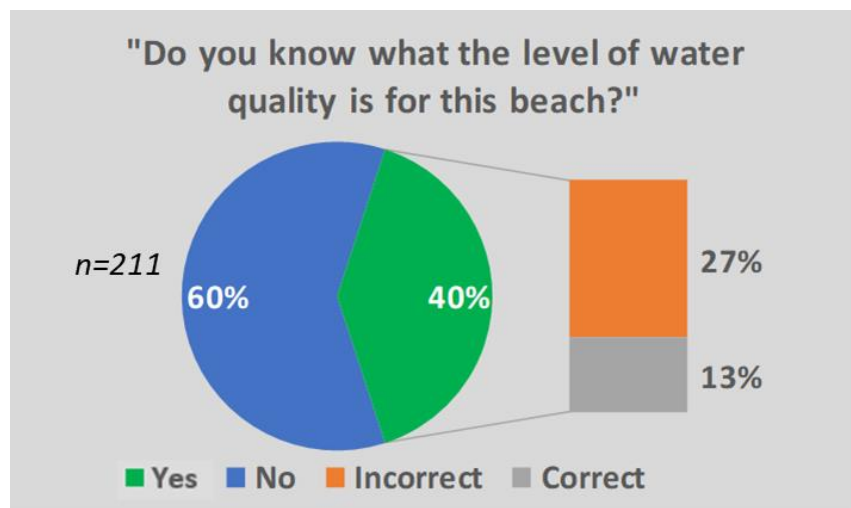


Figure 5.3: Respondent awareness of bathing water classification status – onsite survey (drawing on data from onsite survey Questions 17-19)

In both surveys, respondents were asked about signage that they had seen on their visits to beaches. In the onsite survey, a multiple choice question listed various types of signage that respondents may have seen and 54% of respondents said that they had seen an rBWD electronic sign on their visit that day. Interestingly, this includes respondents at Gullane which is not part of SEPA's electronic signage

¹⁸ In the online survey, data concerning 'reasons for visiting the beach' was drawn from Q9: *What are the top three factors that you consider when deciding to visit the beach?* The fact that respondents were required to identify **three** factors explains why absolute values for the number of respondents identifying that factor (n) are higher than would be expected for the same percentage value (%) for the sample population alone (i.e. some 4,704 factors were identified in Q9).

¹⁹ Respondents who did not know that the site was a designated bathing water were not asked further questions about their knowledge of water quality at the beach.

network (i.e. there are no electronic signs at this beach that respondents could have seen). Further, 70% of Gullane respondents said that they had seen an electronic sign, which is a larger proportion than any of the other four case study sites which do have electronic signs²⁰. 16% of onsite survey respondents also said that they had seen information about an abnormal situation under the terms of the rBWD²¹. In the online survey, respondents were asked a more specific question on whether they had seen signs about bathing water quality. Only 14% said they had. Interestingly, 72% of online survey respondents said that they hadn't seen any signs and, crucially, that they didn't look for and don't remember seeing any signs. This is in contrast to the 8% that looked for but didn't see any signs. One possible reason for these findings (including the issues at Gullane) might be the seemingly confusing nature of rBWD signage whereby members of the public report that information is not overly intelligible (Oliver *et al.*, 2016) and can be mixed-up with other on-beach messaging (Shepherd, 2014). Also, evidence from the focus groups (section 5.4.1) and the surveys (section 5.2.3) suggest limited concern about BWQ, hence why such a large proportion of online survey respondents had not seen or looked for BWQ signage.

In the onsite survey, respondents were asked to specify which information sources they use when deciding which beach to go to from a predetermined list. The majority (80%) of respondents did not use any sources at all. Much smaller proportions used tourist information websites (4%), Trip Advisor (2%), other mobile phone apps (4%) and national / local newspapers or magazines (1%). Importantly, only two respondents used rBWD status signs at the beaches and none used Scottish Government or SEPA webpages. Conversely, 2% of respondents reported that they use electronic signs at beaches with live BWQ forecasting.

5.2.3 Response to advisory sign against bathing

Across both surveys, the majority of respondents revealed that they would not change their behaviour if, on a visit to the beach, they saw an advisory sign against bathing. Table 5.1 below presents the participants' responses to bathing advisory signs in both surveys. Overall, around 45% (onsite) and 31% (online) stated that they do not go in the water anyway, whilst around 6% and 4% (respectively) said they would still go in the water as planned. Around half of the respondents in both surveys indicated that they would stay at the beach but not enter the water²². A further 3% (onsite) and 7% (online) stated that they would travel to an alternative beach, while 1% (onsite) and 4% (online) would leave and not visit another beach. This pattern of responses is fairly consistent across different visitor types.

²⁰ By contrast, 62% of respondents at Ayr (South Beach), 37% at Nairn (Central), 53% at Portobello (West) and 52% at Troon (South Beach) said they had seen an rBWD electronic sign on their visit to the beach that day.

²¹ An abnormal situation is defined by the rBWD as "*an event or combination of events impacting on bathing water quality at the location concerned and not expected to occur on average more than once every four years*". The abnormal situation (and associated decline in BWQ) could be as a result of various pressures or incidents, the crucial factor though is that they are unrepresentative of the BWQ at a given site.

²² Note that, due to the survey being conducted during the summer months, the sample is likely to have more interest in swimming than can be found in visitors at other times of year.

Similarly, the majority of respondents from both surveys (64%) stated that an advisory sign against bathing would not lead them to change how often they visited the / a beach in the future. For the onsite survey, this proportion is relatively consistent across visitor types: 88% of local residents, 77% of day trippers and 86% of overnighters would not change their future behaviour in terms of frequency of visit to the beach.

Table 5.1: Response to ‘advice against bathing sign’ – both surveys (drawing on data from Question 22 in the onsite survey and Question 26 in the online survey)

Behaviour response options in the survey	Percentage of respondents stating an answer (%)	
	Onsite survey	Online survey
I never go in the water anyway	45	31
I would stay at the beach and would go in the water	6	4
I would stay at the beach but not go in the water	45	55
I would leave and go to another beach	3	7
I would leave and not go to any beach	1	4

Base: All respondents stating an answer (onsite n=516; online n=963)

Of those respondents who stated that advisory against bathing would change the frequency of their future visits, over three-quarters stated that they would visit less often (onsite and online). This is in comparison to only 15% (onsite) and 24% (online) who stated that they would not visit at all as a result (see Table 4.2 below).

These results suggest that for a large proportion of visitors (95% in the onsite survey and 71% in the online), it is reasonable to assume that permanent advice against bathing will have a somewhat minimal effect on their recreation opportunities and visit patterns. This inference is also supported by previous large-scale national survey findings for England where ~70% of the sample reported that an advisory sign would not impact the frequency of visits (ettec *et al.*, 2014).

As shown in Table 5.2, a higher proportion of online respondents (29%) than on-site respondents (5%) reported that seeing an advisory sign would change the frequency of their visits in future. This discrepancy may be explained by two factors:

- Onsite respondents are asked to make decisions about the beach they visited on that day. For the majority of on-site visitors (users) they have already made at least that day’s visit to the survey beach with (reported) lack of knowledge about the water quality, and so, it can be assumed that water quality was / is not a key factor in their decision to visit that beach; and
- The sample of online respondents is comprised of both users and non-users of bathing waters, and they are asked to make decisions based on future

hypothetical visits to a site they either frequent most often or have the most association with. For some, decisions might be made based on a beach they rarely (or perhaps never for non-users) visit, while for others they may have a larger set of beaches to consider in their decision making. In choosing between this larger set of beaches, information about bathing water quality could become a more important factor.

Overall the qualitative and quantitative evidence supports that the majority of visitors would not change the frequency of visits in future if they saw an advisory against bathing

Table 5.2: Response to ‘advice against bathing sign’ (frequency of visits) – both surveys (drawing on data from Questions 23 and 24 in the onsite survey and Questions 27 and 28 in the online survey)

Behaviour response options in the survey	Percentage of respondents stating an answer (%)	
	Onsite survey	Online survey
Seeing this sign would change frequency of visits	5	29
<i>Of those: I would visit less often</i>	85	74
<i>Of those: I would no longer visit the beach</i>	15	24

Base: All respondents stating an answer (n=309)

5.3 Qualitative results – focus groups

5.3.1 Key messages from the focus groups

Across all focus groups, most participants who went into the water or who used the beach recreationally were not concerned that current BWQ was impacting their health. In Gullane and Portobello, it did not generally stop participants from using the water for swimming or water sports. However, some participants in Portobello who swim regularly in the water stopped swimming on an occasion when the water had a foul smell, and contacted SEPA.

Particularly in the Nairn, Ayr and Troon focus groups, participants were concerned that information about poor BWQ could damage the reputation of and tourist visits to the beach and area.

While most participants didn’t seek BWQ information regularly, they expected that the authorities would work to prevent quality from deteriorating to a ‘poor’ designation. In a sense therefore, participants expect the Scottish Government and other agencies (e.g. SEPA) to ensure that BWQ is not harmful to health. In addition, some participants also actively contacted SEPA about BWQ information and to find out what measures were being taken to address problems.

For the participants who do seek information about BWQ, the information provided by the Scottish Government was considered inaccurate and insufficient and the use of other forms of information, such as social media, is common.

It was conveyed that information about BWQ was very important for beach activities, particularly activities in the water, and participants would like to see more information, both about BWQ and more general (e.g. safety) information.

5.3.2 Public assessment of BWQ information

A unanimous message from all focus groups was that information on BWQ is insufficient. Therefore, although most participants across the focus groups highlighted that they do not actively seek BWQ information, this may be because they judge that the information available is not useful:

“I feel I’ve stopped checking it [noticeboard] because the one time I actually wanted to get some information on it, it was dead or wasn’t up to date or something like that, so I don’t regularly check it anymore” (Gullane focus group participant)

Indeed, feedback from five of six focus groups showed how participants feel that BWQ signs are obscure and could usefully convey more information. Participants felt that the signs raised unanswered questions about pollution and water quality testing that they would like answered. For example, all focus groups considered BWQ status information to be irrelevant because it is not regularly updated and participants recognise that BWQ is constantly changing. In addition to more detailed information about BWQ, participants in Gullane, Portobello, Troon and Ayr expressed the desire to see more detailed general information (e.g. on safety):

“It could also be used for general information because you can anything...missing kids and stuff, the number of times the lifeboat is called out for kids being lost, if you had an information sign there to say ‘child lost, age such and such, look out for them” (Troon focus group participant)

Furthermore, participants in Troon felt that signage on beaches needed to be in more prominent locations, to make visitors more aware of the information. Lastly, participants in Portobello and Gullane expressed shock and discontent that the sea only gets tested for BWQ during a defined bathing ‘season’:

“This annoys me – that isn’t the bathing season. The bathing season is 1st January to 31st December” (Gullane focus group participant)

5.3.3 Accessing BWQ information

Although there was a general belief expressed by participants that most members of the public don’t actively seek information about BWQ, Nairn participants felt that some people would. It was very much person-specific as to whether participants check BWQ themselves: across all focus groups, most participants don’t check BWQ; however a minority in Gullane and Portobello do look online and have proactively contacted SEPA.

“I contacted SEPA but it’s really hard to get the information...that’s my frustration with it, we can’t get any information” (Portobello swimmers focus group participant)

Participants that use the water for swimming or water sports were more likely to seek information about BWQ, although some such users do not choose to. All focus groups revealed how participants didn't feel that BWQ was likely to affect their own health, regardless of whether they go into the water or not. There was broad agreement between focus groups that participants relied mainly on personal observations, particularly the presence of natural debris or litter and the clarity of the water, to assess BWQ.

"I think it's the tideline. The things that are on the beach that have been washed up previously at the top end of the tide is also an indication of how clean the beach is" (Nairn focus group participant)

Participants in Gullane and Portobello who swim regularly in the sea mentioned an occasion when the smell of the water made them concerned about its quality and put some people off going into the water, but this was not mentioned as a factor for participants who don't come into contact with the water.

5.3.4 Impact of rBWD signage and 'poor' BWQ

In half the focus groups (Troon, Ayr, Nairn) it was felt strongly that having good BWQ is integral to the local economy. In Nairn (one of the business orientated focus groups), participants discussed how visitors to the town have asked local businesses why there are poor water quality signs at the local beach. There was a view that visitors checking BWQ status would choose to visit another beach (if / where BWQ was poor) and business would be lost:

"If you're checking out where you want to go along the coast and you discover that Nairn has got poor water quality today you'll pass on by...we've missed the business, because our water quality has been marked down" (Nairn focus group participant)

Thus information depicting poor BWQ was considered to be highly impactful on local business because of the potential for reputational damage to the local town, a view shared by participants across the focus groups in Troon, Ayr and Nairn. Further, a common theme from all focus groups was that BWQ becomes an issue when designation deteriorates to 'poor', at which point local and visitor usage of the beach / bathing water changes. There is therefore an expectation that poor BWQ will / should be addressed by government:

"I think the whole of Ayr would be up in arms if we thought that sign was going to be slapped on Ayr...it again goes back to their identity as a town and it's hugely important that it's perceived to be accessible and clean and healthy" (Ayr focus group participant)

"And I don't really think there is any kind of excuse for it. You knew and you've been monitoring it and if it's just been going bad, bad, bad, or you weren't happy with the findings or the averages or whatever, then you couldn't make changes? But it's whether you're choosing to invest in that, to make the changes. I would be really disappointed..." (Portobello evening focus group participant)

5.3.5 Recognition of rBWD signage

Some participants recognised the rBWD signage and felt that the messages were self-explanatory. In most focus groups, however, participants were unfamiliar with the specifics of the rBWD signage, although they were aware of the location of the rBWD noticeboards on their local beach promenade. In Gullane and Portobello, signs were interpreted by some participants as an indication of swimming safety rather than water quality.

“The sign itself, it doesn’t say why, maybe it should show some sewage in the water in front of the swimmer or something...it just says advice against bathing, as you say it could be sharks or...” (Portobello evening focus group participant)

In four focus groups, conversations about BWQ information sparked discussions about the Blue Flag Award, revealing that participants associated the Blue Flag Award with BWQ, with seemingly more recognition than the rBWD signage.

5.3.6 Sources of BWQ information

Since the formal rBWD information on BWQ status was not considered sufficiently detailed or up-to-date, a sub-set of participants who did seek BWQ information turned to other sources of information. Swimmers and water sports enthusiasts spoke of using social media, word-of-mouth, the local press and community water sports clubs for information. Therefore, participants who actively seek out BWQ information rely instead on social networks and their own judgement to consider the quality of the water:

“And social media now, if you’re in a club you will...we’re in a club and people might update with ‘saw lots of dead things today, you might want to not go in the water’” (Gullane focus group participant)

“If we were going up to the west coast I would get in contact with local swimmers there and say ‘where’s a good place to swim?’ So if there was a sign like that but someone had told me it was okay and there were other swimmers there I’d probably just go in” (Portobello swimmers focus group participant)

One rule of thumb mentioned in the Gullane and Portobello focus groups was to avoid going into the water for between 24 hours and up to three days after a storm event. Therefore, these participants did not choose to look at noticeboards, at least not principally, for information on BWQ. Other participants who did not actively seek information about BWQ mentioned that they did come across relevant information in the local press, on social media and by word of mouth. Generally, this seemed to be reports of problems with beach or water cleanliness; e.g. several participants in Ayr mentioned a report of beach contamination that had circulated among dog walkers.

5.3.7 Desirability of access to live BWQ information

Where the use and perception of BWQ information has varied between and within focus groups, the desire for real-time / live information on BWQ was a strong consistent theme across all sessions. Participants at all focus groups spoke of a

need for year round and up-to-date information for use by the public, due to the use of beaches and the water outside of the bathing season.

“I’ve tried to google the website for current updates and it’s really difficult to find and it doesn’t seem terribly up to date as maybe...it’s been updated in the past week and I want to know now, live time, what’s going on” (Gullane focus group participant)

If BWQ information was updated regularly, it was felt that citizens would be more inclined to actively seek out such information. Participants also felt that water quality fluctuates greatly, and this needs to be taken into account. Participants suggested the creation of an app that could provide regular updates about BWQ at local beaches, or integrating real-time BWQ status updates with local weather data.

“And if the trends continue and people are going for more and more outdoor pursuits...then they’re going to look at the water quality in the sea...there’s no doubt about it, the more instantaneous that information is the more people are going to have a little app that comes up” (Nairn focus group participant)

Participants in Gullane and Portobello went so far as to express that they would not trust the information about BWQ if it was not live or updated more frequently. On the other hand, participants did not see the source of the information as a problem (i.e. whether the information came from SEPA, the local authority or another organisation).

5.4 Discussion and synthesis

The results described above highlight several interesting findings in relation to the importance that people attach to information about bathing quality. These are summarised in the sub-sections below.

5.4.1 Limited concern about BWQ

Results from both the onsite and online surveys and the focus groups suggest that respondents / participants have limited concerns about BWQ (certainly in terms of health impacts). In both surveys, the majority of respondents revealed that they would not change their behaviour if they saw an advisory sign against bathing noting, however, that this is (in part) because a sizeable proportion of respondents stated that they do not go in the water anyway (in both surveys).

In the focus groups, most participants (including those that go into the water or use the beach recreationally) do not have concerns about BWQ impacting their health. However, the results here are more nuanced as participants tended to expect that the relevant authorities (e.g. Scottish Government, SEPA) will be taking action to ensure that BWQ is not harmful to health (i.e. that BWQ status does not deteriorate to ‘poor’). In contrast, participants at half of the focus groups (Troon, Ayr, Nairn) had marked concerns that ‘poor’ BWQ would lead to reputational damage impacting the local economy.

The existing literature (as considered in the evidence review) contains only sparse evidence concerning the general impact of BWQ information / rBWD signage and

the specific impact of 'poor' BWQ / rBWD designation on beach user choices and preferences (Oliver *et al.*, 2016). However, there is a reasonable literature on the motivating factors behind these choices and water quality has consistently been a highly ranked factor influencing beach choice, from studies in the mid 1990s through to the present day (e.g. Wilson *et al.*, 1995; Morgan, 1999; Ballance *et al.*, 2000; Phillips and House, 2009; Vaz *et al.*, 2009; Shepherd, 2014). This would appear to be at odds with the findings from this current study (i.e. where survey and focus group results suggest limited concerns about BWQ) although previous large-scale national surveys for England (eftec *et al.*, 2014) had similar findings.

5.4.2 Conflicted appetite for BWQ information among focus group participants

Results from the six focus group sessions highlighted some interesting inconsistencies in terms of participants' appetite for and use of BWQ information. In particular: (1) most participants do not check statutory BWQ information; (2) participants tended to rely on their own observations and judgement to assess BWQ (e.g. presence of debris and litter, water clarity); and (3) participants who went into the water or use the beach recreationally do not seem to have concerns that poor BWQ may be affecting their health. Point (2) might be particularly concerning for regulatory and public health stakeholders given that visual indicators of cleanliness do not in anyway align to the rBWD indicators and monitoring regime (i.e. faecal bacteria measurements).

In spite of this, a unanimous message from all focus groups was that information on BWQ is insufficient. This is, in part, due to concerns that BWQ information is less relevant / accurate as the testing regime is seen to be insufficiently frequent to capture the dynamic nature of BWQ. Across the focus groups there was a consistent demand for additional / better BWQ information, including real-time / live information, potentially in app / online format and accompanied by other relevant information (e.g. beach safety). So, whilst superficially the desire for additional BWQ information might seem strange given that existing information is little used, this is perhaps because the reliability / usability of information provided under the current system is considered to be inadequate.

The results here are somewhat aligned with existing literature on challenges and opportunities for BWQ signage. In particular, the assertion that there are critical areas of uncertainty concerning how members of the public will interpret and act on different BWQ information (Oliver *et al.*, 2016), reflecting the participants' inconsistent use of / appetite for BWQ information. Further, in contrast to eftec (2002), the focus group results seem to suggest an appetite for a more complex system of BWQ information, including e.g. much more granular / real-time predictions to account for the dynamic nature of BWQ (although the specific type of messaging preferred was not discussed). The preference for BWQ information in app / online form reinforced Shepherd's (2014) finding that citizens would prefer more interactive BWQ information, with a preference for social media based provision.

5.4.3 BWQ information requirements among different user groups

The motivations for visiting a beach (e.g. preferences concerning facilities, the activity / activities to be undertaken) can affect beach information requirements, including for BWQ. There is some evidence from existing literature to suggest that 'active recreationalists' who undertake immersive activities (e.g. surfers) place a greater emphasis on information on physical factors like weather and surf conditions (Hynes *et al.*, 2013). In contrast, those involved in 'less active' recreation who are less likely to undertake immersive activities (e.g. tourists, families) are more focussed on issues concerning beach cleanliness, access to facilities etc (Ballance *et al.*, 2000). This is somewhat counterintuitive as one might expect those people involved in immersive activities to be more concerned with BWQ issues.

Results from both the online and onsite surveys suggest that the majority of beach visit motivating factors expressed by respondents are relevant to 'less active' recreational uses (e.g. walking, getting some fresh air, spending time with friends and family). In line with the literature therefore, the inference is that the information needs of these people are likely to be focussed on issues concerning access to facilities provision, beach cleanliness and potentially BWQ (Ballance *et al.*, 2000). However, as an interesting departure from evidence in the existing literature (Ravenscroft and Church, 2011; Hynes *et al.*, 2013), participants in the Portobello wild swimmers' focus group did seem to value BWQ information, having checked information online as well as proactively contacting SEPA about BWQ issues. Ravenscroft and Church (2011) suggest that 'active recreationalists' constantly undertake their own assessments of risks (including in relation to poor BWQ). This type of approach was partially evidenced in the focus group data whereby participants explained how they use their own observations and judgements to assess BWQ.

Interestingly, the proactive approach to sourcing BWQ information from relevant authorities (e.g. SEPA) and ability to 'self-assess' BWQ risks expressed by some focus group participants is at odds with previous survey based research by Hanley *et al.* (2003). In this study, a survey with beach users along the Ayrshire coast found that 60% of respondents did not feel confident about their knowledge of BWQ issues or their ability to assess risks and make judgements on BWQ (ibid).

6. What are the benefits (or costs) of an improvement (or deterioration) in bathing water quality classification?

6.1 Introduction

This chapter presents the results from the research project in relation to RQ3. The evidence review highlighted some findings of relevance to RQ3 that help to position the results presented in this Chapter in the context of the existing literature. Principally, this relates to evidence on the various categories and types of benefit provided by beaches, bathing waters and bluespaces (economic; health and wellbeing; and social and cultural benefits). Within the scope of the literature reviewed however (see standalone volume), evidence on specific monetised costs and benefits associated with a deterioration or improvement (i.e. a change) in BWQ was relatively sparse (eftec, 2002; Mourato *et al.*, 2003; Cascade Consulting and eftec, 2009; Accent, 2010; eftec *et al.*, 2014). Stronger evidence is available concerning the range of possible benefits (as identified empirically and / or theoretically) as opposed to any quantification of these benefits or analysis of correlation between benefits and BWQ (see Chapter 3). However, some studies have explored the benefits or costs of an improvement in BWQ, though not necessarily in monetary terms (Hanley *et al.*, 2003; Nahman and Rigby, 2008; Coombes and Jones, 2010; McKenna *et al.*, 2011; Hynes *et al.*, 2013; Czajkowski *et al.*, 2015; Gillespie *et al.*, 2016). Other key findings from the evidence review include:

- Across the literature reviewed, there is a common set of indicators used to measure the costs and benefits of a change (improvement) in BWQ. This includes a change in the **number of visitors** or the **frequency of trips** undertaken (Hanley *et al.*, 2003; McKenna *et al.*, 2011; Gillespie *et al.*, 2016). Data on visitor numbers and frequency of trips (combined with other data on distance travelled, mode etc) provides the basis for the travel cost method (revealed preference). Gillespie *et al.* (2016) showed how a deterioration in BWQ will reduce the benefits gained from a site resulting in reduced trips / demand. Hanley *et al.* (2003) showed how 63% of respondents would visit a beach more frequently if BWQ improved;
- In their South African study, Nahman and Rigby (2008) attempted to establish the difference between the impact of a change in BWQ (10% decline) as opposed to a change in the blue flag status of a beach (loss of status) on visitor numbers. The impact of the change in BWQ was more pronounced than the loss of Blue Flag status (39% reduction in visits versus 6%). Nahman and Rigby (*ibid*) also estimated the economic losses associated with these changes highlighting losses of £6-7 million per annum in relation to the 10% deterioration in BWQ; and
- Stated preference methods such as choice experiments can be a useful means of measuring individuals' willingness to pay (WTP) to secure an

improvement in BWQ (Hynes *et al.*, 2013; Czajkowski *et al.*, 2015). These methods have also been used to explore and monetise the health benefits associated with improvements in BWQ as a result of reduced risks to human health from bathing (WHO, 2003). Mourato *et al.* (2003) estimated the marginal WTP for a 1% reduction in the risk of gastrointestinal illness across all bathing waters in England and Wales to be £1.10 per household per year. These value estimates were subsequently used by Cascade Consulting and ettec (2009) to estimate health benefits of compliance with rBWD microbial standards in Scotland at £5.8 million (over 25 years).

6.2 Quantitative results – onsite and online surveys

6.2.1 Costs and benefits of deterioration and improvements in BWQ

This analysis estimated the change in (aggregate) recreation value associated with a site failing to attain ‘sufficient’ status under the rBWD, stemming from reduced visitor numbers. The calculated reduction in recreation value provides a measure of benefits in terms of the avoided loss of value if the site attains sufficient status. The monetary value of benefits, that are derived by individuals from visits to bathing waters, is measured in terms of their WTP for access and recreation opportunities, which represents the surplus (net benefit) that individuals experience from recreational visits to bathing waters over and above the costs associated with those visits. WTP is interpreted as a **minimum** indication of how valuable the benefits of a visit are perceived to be, and the following results are therefore conservative. Estimated WTP per visit is £8.90 (see Table 6.1) and is calculated based on individual travel cost models (ITCM) explained previously in the method Chapter (and discussed further in Annex 2), which uses the onsite survey data. To put this into context, across the sample, on average, respondents make around 40 visits per year²³. Applying the average travel cost per visit, this results in an average annual expenditure of £356 per respondent. Nearly equal to the average household water bill in Scotland (£351), this is not an insubstantial sum.

Table 6.1: Estimated WTP for recreation visits (£/visit), onsite survey data

‘Best fit model’	WTP (£/visit)
Overall	£8.90

Table 6.2 below provides the estimated annual baseline recreational value²⁴ (= current annual visits × value per visit) by individual sites and visitor type. As shown,

²³ Based on a weighted average of annual visits across the sample.

²⁴ Note that the analysis described here focuses on the recreational value associated with bathing waters (so called direct human ‘use value’). It does not consider the potential wider benefits of improvements in coastal water quality to wildlife and habitats. In addition, the focus on recreation value does not capture the potential ‘non-use’ value that may also arise in relation to improved water quality. This relates to the preference that individuals may hold for improved environmental quality even though they do not directly or indirectly use a site. Non-use values stem from altruistic (benefits to others) and bequest (benefits to future generations) motivations. Non-use benefits are

recreational values vary widely across sites from £0.9m – £6.1m, with Ayr and Gullane having the largest estimated value. As expected, recreational values are highest for local residents who visit the sites. Across all five sites the estimated annual recreation value is just under £13m.

Table 6.2: Baseline annual estimated recreational value (£m) by visitor type and study site, onsite survey data

Visitor type	Study site					Total
	Ayr	Gullane	Nairn	Portobello	Troon	
Overnighters	£0.4	£0.1	£0.3	£0.2	£0.1	£1.0
Day visitors	£1.6	£0.9	£0.3	£0.6	£0.2	£3.7
Residents	£4.1	£1.5	£0.5	£1.4	£0.6	£8.0
Total	£6.1	£2.5	£1.0	£2.2	£0.9	£12.7

Note: Both Portobello and Nairn have two designated bathing waters, while this study only estimates values associated with one from each: Portobello (West); and Nairn (Central).

The benefits of meeting ‘sufficient’ status (i.e. not displaying advice against bathing) can be explored in annual terms as the avoided loss of recreation value. This is based on the stated reduction in visits reported by a small proportion of respondents and the value (WTP) per visit (= reduction in visits x value per visit). Table 6.3 below presents the reduction in visits reported by respondents of the onsite and online survey. In total, 5% of onsite respondents and 29% of online respondents reported that seeing an advisory sign would change the number of times they would visit in the future. In terms of the number of visits, onsite survey respondents reported 700 fewer visits a year and online respondents nearly 4,000 fewer visits annually. This represents a reduction in visits of between 2% (onsite) and 35% (online) of the total estimated annual visits made by the survey samples.

As discussed in Section 5.2, the differences in reactions to seeing an advisory sign across the two survey samples may be due to subtle differences in the subject and framing of survey questions. Onsite respondents are asked to make decisions about the beach they visited on that day – a decision they made mostly without information on water quality. Online respondents are comprised of both users and non-users of bathing waters, and they are asked to make decisions based on future visits to a beach they rarely (or perhaps never for non-users) visit.

explored in the online survey detailed in this report, they are represented by the WTP of the general public for improvements in bathing water quality in Scotland.

Table 6.3: Reported annual reduction in visits by onsite and online survey respondents

	Onsite (5% visitors say they would make fewer trips)	Online (29% visitors say they would make fewer trips)
Reduction in visits - people visit less often	702	3,351
Reduction in visits - people no longer visit	12	458
Total reduction in visits	713	3,809
% of total visits by sample	2%	35%

The impact of advisory signs on the total annual visitor numbers (i.e. not only the survey sample) can be estimated by extrapolating the proportion of visits that will be reduced to the total estimated visits to the five sites. Table 6.4 below presents the results of this calculation, showing how the total estimated reduction in visits is between 22,000 and 360,000 per year. Applying the WTP per visit of £8.90, the estimated loss of recreation value due to a bathing advisory sign is between £0.2 million and £3.19 million per year.

Table 6.4: Estimated annual loss in recreation value

	Onsite (5% of sample say they would make fewer trips)	Online (29% of sample say they would make fewer trips)
Estimated annual visits	1,012,000	
% of visits lost	2%	35%
Total reduction in visits	22,436	358,567
Total loss of recreation value £m per year	0.20	3.19

Note: Annual visits based on SEPA data and adjustments have been made using Scottish coastal seasonality data (Great Britain Tourism Survey and Great Britain Day Visits Survey) to account for the potential impacts of the timing of the fieldwork on the annual outputs provided.

Based on analysis of the choice experiment responses, values for improvements in BWQ and beach characteristics – in terms of WTP per household and in total for national improvements – are presented in Table 6.5 below. Further model specifications are discussed in Annex 2. WTP for each attribute is determined by the ratio of the marginal utility associated with a one unit increase in the attribute and the marginal utility associated with a one unit increase in cost (i.e. in respondents' water bill).

Table 6.5: Value of improvements in bathing water quality, online survey data

Willingness to pay (WTP) estimates	£ / household / year	Total WTP £ million / year
National - number of Scottish beaches failing to meet water quality standards - 1% reduction (roughly 1 less beach failing of the 86 Scottish bathing waters)	0.93 (0.49 - 1.36)	2 (1 – 3)
	From 'poor for 5 years' to 'sufficient'	39.38 (31.89 – 46.87)
Bathing water status – beach visited most often	From 'poor for 5 years' to 'good'	46.06 (36.96 – 55.16)
	From 'poor for 5 years' to 'excellent'	84.76 (53.14 – 116.39)
Litter – 1% litter removed at beach visited most often	0.44 (0.25 – 0.62)	-

Notes: Base: Choice experiment analysis (n=1,013). 95% confidence intervals in parenthesis (Delta method). Total WTP estimated using the total number of households in Scotland in 2016 of 2.45 million (NRS, 2016).

As shown, the estimated WTP per household for improvements in BWQ at the beach visited most often increases with higher status levels. The greatest value is attached to ensuring a bathing water meets 'excellent' status, with the WTP for the shift from 'poor for 5 years' to 'excellent' of approximately £85. The additional value from achieving other status levels is relatively marginal. In particular, the value for the shift from 'poor for 5 years' to 'sufficient' (approximately £39) is not statistically different from the value for the shift from 'poor for 5 years' to 'good' (approximately £46), as is shown in the overlapping 95% confidence intervals on Figure 6.1. Likewise the value for a shift from 'good' to 'excellent' is not statistically different, however shifting from 'poor' to 'excellent' is.

These results indicate that the subtle differences in BWQ that are achieved by shifting from 'sufficient' to 'good' may not be of particular value to visitors. It is reasonable to assume that because visitors can swim at both levels, the other water quality improvements achieved from 'sufficient' to 'good' and the benefits from this may be less apparent. The results also show that there is a premium for a site achieving 'excellent' status, and may be due to the additional awards (e.g. blue flag) that can be acquired at this status.

WTP for the number of Scottish beaches failing to meet water quality (1% reduction in bathing waters in Scotland failing) and WTP for one unit increase in litter removed (implies that 1% more beach litter is removed) are statistically significant, and are valued at £0.93 and £0.44 per household per year respectively.

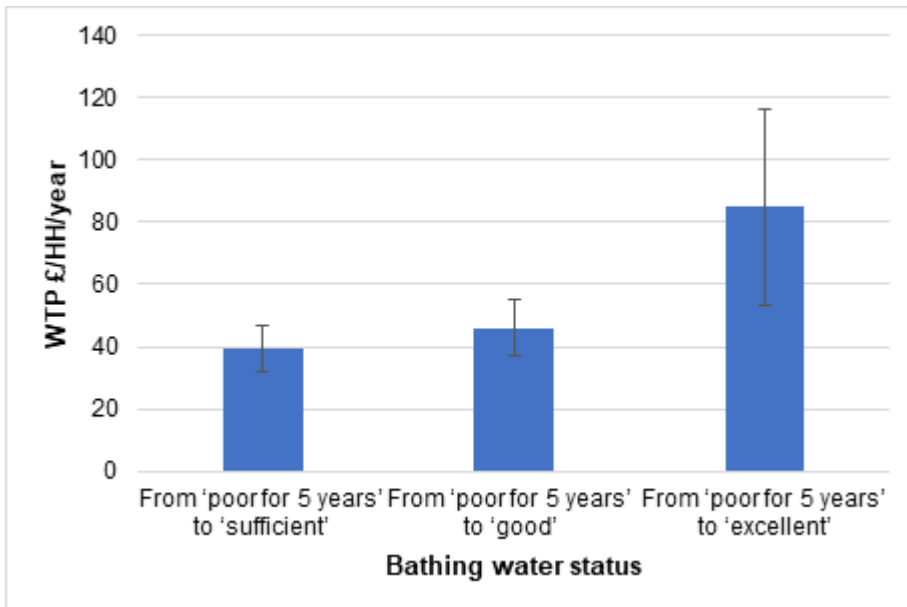


Figure 6.1: Value of improvement in individual bathing water status, online survey

The total WTP per year presented in the final column of Table 6.5 is calculated as the WTP per household multiplied by the number of household in Scotland (NRS, 2016). As shown, reducing the number of Scottish beaches failing by 1% is associated with a value of £2 million per year. This value can be presented as an annualised benefit over a specified time horizon for use in decision-making, for example within policy appraisal and / or for comparison against the costs of achieving the reduction in beaches failing within a cost benefit analysis. The WTP values for bathing water status and litter are 'per beach' values and can be aggregated further based on a user population of a particular beach, but were not aggregated as part of this study.

6.2.2 Economic impact of advisory against bathing

As part of the onsite survey visitors were asked whether advisory against bathing signs would change the number of visits they make to survey sites, or whether they would stop visiting. The vast majority of respondents indicated that advisory signs and associated water quality implications would not change the number of visits they make. However, for the small proportion that would visit less frequently or discontinue visits, it is possible to estimate the impact in terms of lost expenditure from those visitors. In order to do this, it is necessary to calculate the average spend per visitor per day, which can then be applied to the reduction in visits.

Table 6.6 below presents estimated spend per person per day using survey data as compared to estimates using survey data along with supplementary national data (i.e. Great Britain Tourism Survey and Great Britain Day Visits Survey). As shown, expenditure estimates based on the onsite survey data alone are more conservative compared to those that also take into account national data. In subsequent calculations both estimates of daily expenditure are used in order to provide a range of potential loss in expenditure.

Table 6.6: Average spend per visitor per day (with supplementary national data comparison), onsite survey data

Visitor type	Study site									
	Ayr		Gullane		Nairn		Portobello		Troon	
	Survey data	Survey & Nat'l	Survey data	Survey & Nat'l	Survey data	Survey & Nat'l	Survey data	Survey & Nat'l	Survey data	Survey & Nat'l
Overnighters	£39	£87	£27	£46	£35	£74	£28	£51	£29	£55
Day trippers	£11	£43	£5	£18	£7	£28	£5	£19	£7	£26
Residents	£4	£15	£2	£7	£3	£11	£2	£7	£2	£8

Based on the breakdown of average spend by visitor type across the sites (Table 6.6), Table 6.7 below presents the estimated average expenditure overall across all five survey sites.

Table 6.7: Average spend per visitor per day (with supplementary national data comparison) overall, onsite survey data

Visitor type	Survey data	Survey & Nat'l
Overnighters	£32	£63
Day trippers	£7	£27
Residents	£3	£10

Note: Figures have been rounded to the nearest whole number.

As detailed at section 6.2.1, using onsite survey data, it is estimated that seeing an advisory sign would reduce the number of visits each year by just over 22,400 (see Table 6.4). Table 6.8 below presents a breakdown of the estimated reduction in visits by visitor type. This has been calculated by apportioning the reported reduction in visits by visitor type. For example, day trippers had the highest reported reduction in visits (58% of all visitors who reported they would change frequency of future visits) followed by local residents (35%), then overnighters (8%).

Table 6.8: Estimated reduced visits, onsite survey data

Visitor type	Onsite survey
Total reduction in visits	22,436
Of which Local residents (35% of those who would change visit behaviour)	7,766
Of which day trippers (58% of those who would change visit behaviour)	12,944
Of which overnighters (8% of those who would change visit behaviour)	1,726

Table 6.9 below presents a range of estimated loss in visitor expenditure per year to the local economy due to a decrease in visits by survey respondents (= estimated reduction in visits by visitor type x average spend per visit by visitor type across all sites). As shown, it is estimated that failing to meet sufficient status could result in lost visitor spend of between £169,100 and £535,900 each year. This is a high-level estimation, and once again, as the vast majority of respondents indicated advice against bathing would not impact the number of visits they make, the results are small compared to total annual expenditure. Nonetheless it is a useful relationship to explore, and can be updated in future to consider more significant impacts to visit numbers.

Table 6.9: Estimated annual loss in visitor expenditure (£/year), onsite survey data

Visitor type	Average spend data used	
	Survey data	Survey & national data
Overnighters	55,200	108,700
Day trippers	90,600	349,500
Residents	23,300	77,700
Total estimated loss of visitor spend per year	169,100	535,900

6.2.3 The impact of a deterioration of BWQ on the restorative benefits of bathing waters

In order to examine the impact of a perceived deterioration of BWQ on the restorative benefits of the beach environment multivariate analyses were carried out (t-test, ANOVA). For the onsite survey whilst the scenario ‘poor’ bathing quality environment was still rated positively in terms of being an environment where people were able to ‘rest, recover my ability and focus’ ($M = 7.58$, $SD = 1.98$), this was still a significant drop from their ratings compared to the better quality environment ($M = 8.66$, $SD = 1.55$). This was found to be a statistically significant drop in rating, $t(515) = 14.002$, $p < .001$, $d = 0.55$ (a medium effect). Similarly, for the online survey, the scenario ‘poor’ bathing quality environment was still rated positively in terms of being an environment where people are able to ‘rest, recover my ability and focus’ ($M = 6.42$, $SD = 2.31$), this was still a significant drop from their ratings compared to the better quality environment ($M = 7.60$, $SD = 1.65$). This was found to be a statistically significant drop in rating, $t(963) = 16.09$, $p < .001$, $d = 0.51$ (a medium effect). Figure 6.2 illustrates this for the onsite survey.

Further analyses were carried out to understand whether the activities that people are carrying out influences the relationship i.e. do the activities they do mediate this relationship? For the onsite survey a relationship was found between activity and drop in wellbeing: specifically, the drop in the wellbeing score was greater for those who had said they would undertake or had already undertaken a water-related activity during that visit. Specifically a mixed ANOVA found that as well as wellbeing ratings significantly dropping, $F(1,514) = 211.25$, $p < .001$, partial eta squared = .29 (medium effect) there was also a main effect for whether people intend to have contact with the water (Q13), $F(1,514) = 6.02$, $p = .002$, partial eta squared = .01 (small effect). This finding was not replicated in the online survey.

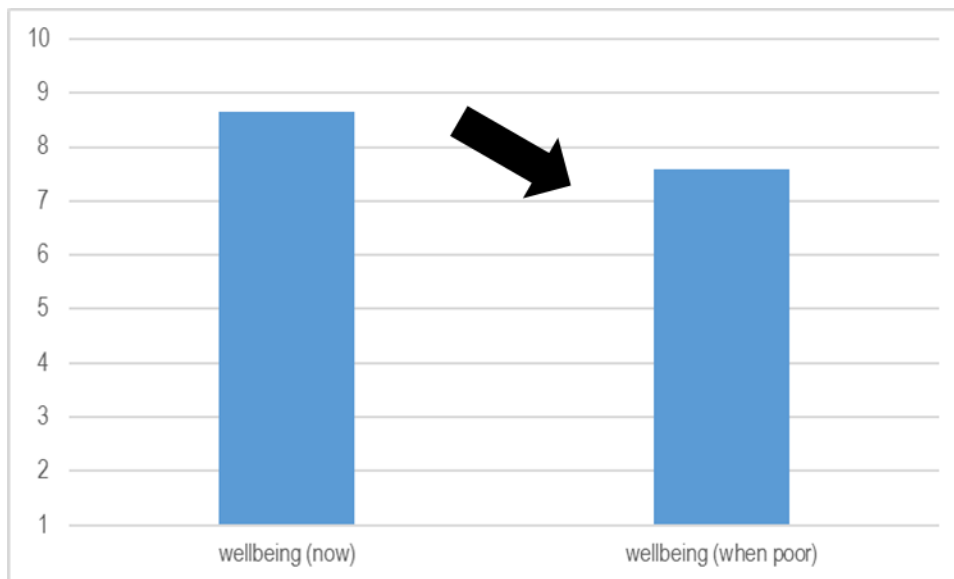


Figure 6.2: The self-reported change in wellbeing scores if water quality would worsen (onsite survey)

6.3 Qualitative results – focus groups

Opinions about the possible impact of an improvement or deterioration in bathing water quality classification were elicited by asking focus group participants and interviewees about two scenarios twenty years in the future:

- In the first, there is real-time information about bathing water quality at beaches in Scotland. The bathing water quality at the beach is rated 'excellent' and this information is shown on a board at the beach. The bathing water quality at the beach compares well with other Scottish beaches; and
- In the second, there is also real-time information about bathing water quality. The bathing water quality at the beach is rated 'poor' and this information is shown on a board at the beach.

For both scenarios, participants were asked in what ways, if at all, does this situation change conditions for them personally (and their businesses in the case of the business focus groups and interviews) and for the local community: does it open up new possibilities? does it create risks or problems?

6.3.1 General comments on rBWD classification

In several focus groups, participants commented that BWQ changes frequently, for example as a result of rainfall and that classifications applied to a whole season don't reflect these changes. This comment was made in relation to the positive as well as the negative scenario:

"The water quality is not a constant. As we said earlier on, it depends on rainfall, outflow from farmland. So for instance Nairn could be bad this week and in a month's time it could be good, because it depends on the weather. So Troon could be good or it might be excellent or it might be poorer. So if you take a broad view it's not always going to stay the same" (Troon focus group participant)

6.3.2 Impacts of BWQ on feelings and behaviours

Participants in the community focus groups said that an improvement in BWQ classification would change how they felt and what they did. Several said that the 'excellent' classification would make them happy: *"I'd just feel smug and happy that I lived in Troon"* (Troon focus group participant). At Portobello, one participant thought that it would increase her sense of pride:

"And I think [...] so you would be really proud if you could say [...] the water quality at Portobello is excellent, it's better than elsewhere, but just now it is a bit of a joke when you speak about Portobello" (Portobello evening focus group participant)

Focus group participants mentioned some ways in which behaviour might change if there were an improvement in BWQ, such as visiting the beach or going in the water more often:

"And I think the other thing is you'd like to think that if our water quality got better that we might see more wildlife and that would definitely make me want to get in the water more, seeing more things" (Gullane focus group participant)

"If it's going to be excellent, surely if people are going to get this information they're going to want to come here. It's a no-brainer" (Nairn focus group participant)

Box 6.1: Conversation about implications of improved BWQ for open swimming at Portobello focus groups

"P1: It [improved BWQ] would get more people in the water potentially"

"P2: If that cleared up there I would definitely swim much more. At the moment I swim laps down here, I swim up as far as Bath Street but I don't ever go past that. But I would love to swim all the way up"

"P1" Yes, that's very true"

(Discussion between Portobello swimmers focus group participants)

“I would definitely visit more. I would just go to Gullane instead because I know I can swim there and I know it’s going to be okay. But if I knew it was excellent [at Portobello] I’d be more likely to go here instead” (Portobello evening focus group participant)

Safety for children was mentioned in most of the focus groups as an important benefit of improved water quality and general cleanliness of beaches:

“I think we’d put our kids in. I think it’s a factor on how you put your children in the water and think about letting your children use the water, I think that’s more of a factor. Certainly a lot of parents who aren’t necessarily as water-knowledgeable as we might be because we’re actively interested in it, if they knew the beach was clean they wouldn’t be so worried about handing them over to me to give them surf lessons...” (Gullane focus group participant)

Open swimming is an increasingly important activity on the Scottish coasts and swimmers felt that improved bathing water quality could open up new possibilities as illustrated in Box 6.1 above.

Despite these potential benefits, several people mentioned other factors that influence their choice of beaches to visit which would not be affected by an improvement in BWQ:

“[Portobello West] is lovely if you’re actually on the beach [...] but in terms of facilities and anything to make it appealing, once you step off the beach it’s very, very bleak. For that reason I’m not sure excellent bathing water quality would attract me to that end of the beach” (Portobello evening focus group participant)

In response to a query about whether business would increase: “Probably not. People who are coming to my business are not coming to the beach. It is next to the beach but that is not what people come for” (Ayr focus group participant, B&B proprietor)

6.3.3 Impacts of BWQ on business

As illustrated in Box 6.2 below, most of the business focus group participants felt that improved BWQ would have positive effects on tourism, bringing more people to the area, and that would have positive knock on impacts for other local businesses.

Box 6.1: Conversation about implications of improved BWQ for business at Nairn and Ayr focus groups

“P1: I think it’s something else to sell, absolutely, it would have a positive impact”

“P2: We’d be able to have more events like water sports, we could encourage that”

“P1: Certainly [it would result in] more use of the water because you can boast about it and promote it”

“P2: It could only have a beneficial effect on the businesses”

(Discussion between Ayr business focus group participants)

“If the quality is excellent then it means we’ve got an easier job to sell Nairn as a destination, if we have to fight against negatives that makes the job that much harder” (Nairn business focus group participant)

6.3.4 Impacts of a deterioration in BWQ classification on feelings and behaviours

When asked to consider the second scenario of a deterioration in BWQ classification at the local beach, many focus group participants were quite upset at the thought. For many participants, the beach is part of their own and others’ identity and heritage:

“...there’s generations of people in Glasgow whose grandparents always came to Troon, that’s where they went. So that would be damaged as well, a lot of people would be really upset about the fact that their childhood memories were destroyed when they came down if the beach quality [was poor]” (Troon focus group participant)

However, many non-swimmers felt that the change would have little impact on their own behaviours and activities:

“Even if the water quality is not good [...] it’s not going to stop you walking on the beach or appreciating the view or the sand” (Troon focus group participant)

There was general agreement that a deterioration in bathing water quality classification would have a negative impact on the development of water sports projects and businesses:

“The project that I’m involved in with the water sports centre [...] we’ve already had discussions with a not-for-profit company, a charity, who wants to come up here and deliver stand up paddling. That wouldn’t happen if the water quality was constantly going to be poor. So from an economic point of view [...] it is vital to tourism and to the economy, the quality of the water, because this sort of things couldn’t happen. You wouldn’t send your kids to a beach to do any water sports if you thought there’s a risk of them coming away with some sort of...” (Troon focus group participant)

“...they’re looking at the west coast of Scotland as being a massive marine tourism destination from Inverkip all the way down, Largs marina, a big

investment is going on, if it's all linked in and tied in and people want to be able to enjoy the water and do the water sports etc. would those investments be happening if they felt that people were not going to be able to get wet or not happy to get wet and not wanting little kids falling in off their skis and probably gulping lots of water? The PR aspect of it could be massive” (Ayr focus group participant)

The scenario of a deterioration in BWQ classification made many people ask how the situation might be allowed to get to such a state. In several places it was suggested that if this scenario did happen in practice, there would be an outcry from the local community:

“The other thing about Troon is we’ve got such vocal and proud people living in the town that it’s something we wouldn’t put up with for long. As you say, gobby residents would be on the backs of the Community Council and the Council and SEPA saying ‘get this right, it’s not good enough” (Troon focus group participant)

“We’ve always got the beauty of the bay and the area, the perception and the aesthetics of it probably wouldn’t change from this. But I think it would affect how we see it and there would certainly be some strong opinions viewed, I’m sure, within the community” (Gullane focus group participant)

“I think the whole of Ayr would be up in arms if we thought that sign was going to be slapped on Ayr, that the water is not of a quality where people should be going into it. I think they would be really up in arms because they would take it as a personal thing, it again goes back to their identify as a town and it’s hugely important that it’s perceived to be accessible and clean and healthy” (Ayr focus group participant)

6.4 Discussion and synthesis

6.4.1 Deterioration in BWQ may impact the quality of visits if not the quantity

Results from the analysis of onsite survey data show how the economic value of a loss of recreation value due to a deterioration in BWQ is relatively small. This is because in the event of an advisory against bathing, only a small proportion of respondents would change their behaviour to the extent that they would not visit the site (i.e. the number of people affected and therefore the aggregate recreation value they receive from visiting the bathing water site is relatively small). Despite this, further analysis of the survey data using multivariate statistics showed how perceived BWQ is a key predictor of health and wellbeing outcomes linked to the restorative nature of beaches and bathing waters. In essence, the restorative value of a visit decreases as perceptions of BWQ decrease also.

So, although a deterioration in BWQ will not necessarily affect the quantity of visits to a bathing water site, it can affect the quality in terms of a reduction in the restorative benefits received by visitors. As outlined in Chapter 4, this may be because people would still visit the beach but not enter the water (around half of the survey respondents indicated that this would be their behaviour), which may be important in terms of the restorative benefits received. This finding is in line with

other studies that have investigated the impact of changes (deterioration) in BWQ (including wider notions of beach cleanliness) on the perceived restorative qualities of bathing waters (Hipp and Ogunseitan, 2011; Wyles *et al.*, 2016). Further, the calculations of lost recreation value due to people no longer visiting the beach in the case of advisory against bathing do not account for the health costs associated with increased illness due to contact with contaminated water.

6.4.2 Focus group participants are more affected by a deterioration in BWQ than survey respondents

As discussed above, results from the onsite survey suggest that the cost of a deterioration in BWQ would be relatively small. However, this is in sharp contrast to results from the focus groups given the strength of feeling during discussions around the impact of a deterioration in BWQ. Although 'strength of feeling' and 'costs due to loss of recreation value' are clearly quite different indicators, this finding shows how a place-based, contextualised perspective (i.e. from the local residents / businesses in the focus group setting) can influence the values people place on natural assets, such as bathing waters. Also, the focus group setting gives participants more time and space to reflect on the issues and draw out a more reasoned response to the scenario (i.e. a deterioration in BWQ) than may be the case during the administration of a survey instrument. Another factor, however, concerns the nature of the focus group participants who were all local residents or local business owners. Most likely these people will have greater place-attachment (to the site) and therefore may have stronger feelings / responses to a hypothetical deterioration in BWQ. Notwithstanding this, the surveys and focus groups are different yet complementary research tools and the different results should be considered with this in mind.

7. Conclusions

7.1 Summary of key findings

7.1.1 The benefits of bathing waters at the local and national levels

Main activities undertaken at bathing water sites. Walking, relaxing, dog walking and socialising / spending time with friends and family are the main activities as identified by both the onsite and online surveys. Water based immersive and non-immersive activities were also identified in both surveys but less frequently. Different types of visitors undertake different main activities. Walking and dog walking are dominant among local residents whereas relaxing and getting fresh air are common across all visitor types.

Bathing waters as economic assets. Bathing water sites are important assets for local, regional and national economies as revealed by the evidence review, as well as by the onsite and online surveys. The local economic impact analysis based on the on-site survey data estimated total local economic benefits across the five case study sites as follows: (i) £19.4M local business turnover supported; (ii) 263 Full Time Equivalent (FTE) jobs related to visitor spend; and (iii) £8.8M in Gross Value Added (GVA).

Restorative benefits of bathing waters. Results from the onsite and online surveys revealed that the majority of respondents find beaches and bathing waters to be beneficial in terms of physical and psychological restorativeness (e.g. in terms of making visitors feel revitalised, calm and refreshed). The online survey asked more detailed questions about specific aspects of restorativeness. Aspects that online respondents identified with particularly strongly included the notion of a beach / bathing water as: (i) a restful environment where ability and focus can be recovered; and (ii) a place away from everyday demands where people can relax and think about their interests.

Focus groups reveal the multiple benefits of bathing waters. Evidence from the focus groups revealed how the local beach and the sea is integral to the recreational, social, wellbeing, community and economic benefits that local communities (and businesses) enjoy. Within this, participants highlighted how the quality of the beach and the sea is integral to their enjoyment (e.g. the sight of 'clean' water was thought of as being inextricably linked to the sense of enjoyment participants get from the sea). Furthermore, the local beach and sea were seen as part of everyday life and participants' locality and a strong sense of ownership and identity was felt by participants in relation to their local beach. Most of the participants visit their local beach at least a few times a week.

7.1.2 The importance of information about bathing water quality

Factors / motivations that influence individuals' choices about which beaches to visit would also influence BWQ information requirements. For example, tourists can be more focussed on beach cleanliness whereas 'active recreationalists' (e.g. surfers) can place more emphasis on physical factors, such

as surf / swell conditions. In the onsite survey, 'natural beauty / scenery' (21%) was the most important factor influencing beach choice followed by 'cleanliness of the beach' (18%). The importance of beach cleanliness as a motivating factor suggests that BWQ information may be important.

Limited awareness of rBWD designation and BWQ status. Results from the onsite survey revealed that the majority of respondents (60%) were not aware that the beach they were visiting was a designated bathing water. Of the 40% that did know, there was limited and / or incorrect awareness of the site's BWQ status. Most respondents overestimated BWQ and, crucially, only 5.2% of respondents (n=27) correctly identified the BWQ at the site they were visiting.

Awareness / use of rBWD signage. Results from the onsite and online surveys identified the types of signage that respondents had / have seen during beach visits. A high proportion (70%) of respondents to the onsite survey at one site (Gullane) said they had seen a rBWD electronic sign even though this site is not part of SEPA's electronic signage network. In addition, a high proportion (72%) of online survey respondents said that they hadn't seen / don't remember seeing any signs and, crucially, that they didn't look for them. Responses to the onsite survey revealed that the SEPA bathing waters webpage is not used as an information source when deciding which beach to go to.

Behavioural response to advisory against bathing suggests limited concern about BWQ. The surveys showed that the majority of respondents would not change their decision to visit the relevant beach and the frequency of visits in future if they saw an advisory sign against bathing on a visit to the beach. From this, it is reasonable to assume that permanent advice against bathing would have a somewhat minimal effect on recreational opportunities and visit patterns at Scotland's bathing water sites (although respondents in the online survey demonstrated their WTP for improvements in BWQ – see section 7.1.3). This echoes the limited interest in rBWD signage expressed by respondents in the online survey (see above). Similar results were found in a previous large-scale national survey for England where circa 70% of the sample reported that an advisory sign would not impact the frequency of their visits (eftec et al., 2014).

Limited concern about health impacts of BWQ among focus group participants though appetite for more / better BWQ information. Evidence from the focus groups showed that most participants who went into the water or who used the beach recreationally in areas of "poor" BWQ were not concerned that current BWQ could have an impact on their health was impacting their health. However, concerns were expressed at three of the sessions that information about poor BWQ could result in reputational damage to the area (e.g. for local businesses). There was an expectation that relevant authorities would be working to prevent BWQ from deteriorating to a 'poor' designation. There was also a general perception that existing BWQ information (e.g. on static and electronic rBWD signage) is poor and, as such, some participants turn to alternative sources (e.g. social media, word-of-mouth, local sports clubs). This meant there was an appetite for more / better information, particularly for those participating in water-

based activities (e.g. wild swimming). It was felt that signage could usefully convey more information (e.g. water safety).

7.1.3 The benefits (or costs) of an improvement (or deterioration) in bathing water quality classification

Monetary value of recreational visits to the five case study bathing waters.

The travel cost method was used to design the onsite survey which estimated visitor Willingness to Pay (WTP) on the basis of the cost of travelling to / from the site and for access and recreation opportunities. The estimated average WTP (all sites) was £8.90 per person per visit. On average, onsite survey respondents make around 40 visits to the bathing water per year meaning an annual expenditure of £356 per respondent. Across the five sites, this equates to a total annual estimated recreational value of £12.7M.

Reduction in visits and loss of recreational value in the event of advisory against bathing.

The onsite and online surveys revealed how respondents would change their behaviour in the event of an advisory against bathing, including those respondents who would no longer visit (see section 7.1.2). Results suggest that around 5% of onsite respondents and 29% of online respondents would visit less often, resulting in reductions in annual visits of 22,436 and 358,567, respectively. This equates to an estimated loss of recreational value of between £0.2M (onsite) and £3.19M (online) per year (applying the estimated WTP per visit of £8.90). These values can be interpreted as the benefits of meeting 'sufficient' status (i.e. not displaying advice against bathing).

Amount households are willing to pay for BWQ improvements. Choice experiment questions undertaken as part of the online survey asked respondents for their preferences for the BWQ at all beaches in Scotland and at the beach they identify with the most. Average WTP per household for a 1% reduction in the number of Scottish beaches failing to meet BWQ standards were estimated at £0.93 per household per year or £2M per year for all households in Scotland. This can be interpreted as the value of the benefits associated with this level of improvement in BWQ standards. It is potentially a useful input for cost benefit analyses (CBA) (i.e. comparing the costs of achieving the 1% reduction with this benefit) (see section 7.3). Estimated WTP per household for improvements in the bathing water quality at the beach visited most often increases with higher status levels. The greatest value is attached to ensuring a bathing water meets 'excellent' status, with the WTP for the shift from 'poor for 5 years' to 'excellent' of approximately £85.

Deterioration in BWQ may impact the quality of visits if not the quantity.

Statistical analysis of the onsite and online survey data revealed that perceived BWQ was found to be a key predictor (statistically significant) of wellbeing outcomes linked to the restorativeness benefits of bathing waters (see section 7.1.1). This means that although respondents are not dramatically changing their behaviour following advisory against bathing (i.e. a high proportion of respondents would still visit the beach / bathing water), the quality of the visit would be diminished as the perceived restorative benefits received would be less.

Focus group participants were more affected by a change in BWQ than survey respondents. Results from the onsite and online surveys suggest that the cost of a deterioration in BWQ would be relatively small (as a function of reduced visits). This is in sharp contrast however to the strength of feeling expressed in the focus groups in response to the possibility of permanent advice against bathing. This shows how a place-based contextualised perspective (i.e. from the local residents / businesses in the focus groups) can influence the values people place on natural assets, such as bathing waters.

7.2 Recommendations for bathing water management

Prioritisation of management / investment. There is an argument for prioritisation of beach / BWQ management intervention and investment towards the types of activity people are most interested in undertaking on the beach / at the bathing water site (e.g. ensuring adequate provision of dog waste bins), including in relation to different types of site (e.g. maintaining 'light touch' intervention at sites that are valued for their remoteness, aesthetics / landscape quality etc). Such an approach could contribute to more effective management (including in terms of resource allocation) within the authorities responsible for key aspects of beach management (e.g. SEPA, local authorities).

Managing pressures on bathing waters / the marine environment. Evidence from the focus groups suggests that members of the public have some concerns about the impact of development (as a pressure) on BWQ (e.g. the capacity of waste water treatment infrastructure to accommodate further coastal development, including housing). These are legitimate concerns and development should be managed sensitively to ensure that BWQ (and other aspects of the water environment) are not adversely affected. This should extend to the management of land based activities (e.g. agriculture, forestry) where appropriate regulatory / incentive mechanisms are available.

Improvements to BWQ information. Results from both surveys suggest that awareness of bathing water designation is low and that there is limited concern about BWQ and advisory against bathing, mainly because respondents don't go in the water anyway or because they, on average, would happily modify their behaviour to not go in the water if / when required. The results were more nuanced in the focus groups suggesting a degree of ambivalence about BWQ (e.g. participants expressed limited concern about the health impacts of BWQ whilst at the same time expressing a desire for more / better BWQ information).

There may be a case for more targeted BWQ information towards the smaller proportion of bathing water users / user groups who: (i) do go in the water; (ii) would be less likely to modify their behaviour in the event of advisory against bathing; and (iii) have expressed an interest in more / better BWQ information (e.g. more real-time information accounting for the dynamic nature of bathing water systems). This could include awareness raising activities aimed at 'active user' groups such as surfers (who, evidence shows, are less likely to take account of BWQ information) about the health risks associated with on-water immersive / non-immersive activities in poor BWQ.

There is also a case for communication with wider users, especially as the focus group findings suggested that there was interest in the designation and status once discussed with participants, though this was combined with some scepticism as to its accuracy and reliability. As in other areas of risk communication and management (e.g. flood risk management), we would suggest that there is potential to work with local citizens to develop an approach of communicating BWQ issues that draws upon local knowledge. There could also be merit in developing a citizen science project to help collect data on BWQ (e.g. as part of more granular monitoring to account for the dynamics of bathing water systems).

Households value improved levels of BWQ quality – implications for policy.

The online survey shows that the higher the bathing water status of the most visited beach is, the higher respondents are willing to pay to maintain it. The greatest value is attached to ensuring bathing waters that meet 'excellent' status. Respondents are indifferent to improvements at lower levels of bathing water quality but have significant WTP for moving from 'poor for 5 years' to 'excellent' of approximately £85 per household per year. This implies that in future, while achieving 'good' quality may become a policy objective, the additional benefits associated with this change may be small. WTP for a 1% reduction in the number of Scottish beaches failing to meet rBWD standards is £ 0.93, and WTP for one unit increase in litter removed (implies that 1% more beach litter is removed) is £0.44. The total WTP for households in Scotland for 1% reduction in bathing waters failing is estimated at £2 million per year. This value can be presented as an annualised benefit over a specified time horizon for use in decision-making, for example within policy.

Monetary values for policy appraisal, CBA etc. The research produced several values that can potentially be used by the Scottish Government and other stakeholders to inform bathing waters policy decisions, as part of CBA etc.

7.3 What can be derived from the available evidence about the overall value of bathing water quality in Scotland?

Consideration of multiple perspectives on 'value'. This project has brought together a number of perspectives on what value of beaches and influence of bathing water quality mean to users of beaches in Scotland. By taking a mixed methods approach the economic, recreational, social and emotional value of bathing waters have been investigated, providing a holistic understanding that is grounded in people's experience.

Local economic benefits associated with visits to case study bathing water sites. Although it is not appropriate to extrapolate the case study local economic impact estimates (£19.4m business turnover, 263 FTE, £8.8M GVA), they give a sense of the potential magnitude of the economic benefits of Scotland's bathing waters, considering that there are 86 designated sites in total.

The value of recreational visits to case study bathing water sites. Data from the onsite survey revealed that the estimated WTP for recreational visits (the welfare value) to the five case study bathing water sites is: (i) £8.90 per person per visit; (ii) £356 per person per year; or (iii) £12.7M per year for all visits across all five

sites. These represent conservative proxies for the per person trip / annual and total annual monetary values of the recreational and access benefits enjoyed by visitors to the five case study sites considered in this research. On the other hand, the data suggests that 22,436 fewer visits would be likely to take place following an advisory against bathing at the case study sites, equating to an estimated loss of recreational value of £0.2M per year.

Use of the WTP value to estimate total recreational value at different scales.

The per trip WTP value (£8.90) based on travel cost can be applied to estimate recreation value at other bathing water sites or at the aggregate for all bathing waters in Scotland. When applying the values produced from this study, Defra's value transfer guidelines should be used (eftec, 2009). These guidelines emphasise transparency and the appropriate use of sensitivity analysis to address concerns of accuracy.

The value of improving BWQ standards at the national level. Reducing the number of Scottish beaches failing to meet BWQ standards by 1% would result in benefits equating to £2M. This value can be used alongside the costs of meeting the same objective in CBA to inform policy decisions.

The overall importance of Scottish bathing waters. Visits to the beach are important for the respondents: nearly 50% of them visit more than once a month (across both onsite and online surveys). Respondents do various activities at the beach and, as a result, receive various multiple benefits. The benefits received are significant, especially considering that physical and mental health and wellbeing benefits (potentially the largest benefits delivered) have not been elaborated on in this study (beyond restorative benefits).

Factors influencing beach / bathing water choice. The study identified various factors influencing choice of which beach / bathing water to visit. Water quality / BWQ was not a priority issue (although a wider notion of 'beach cleanliness' was identified as important in the onsite survey). BWQ is clearly important to people (e.g. given the choice experiment results, evidence from the focus groups) but because the majority of people don't go in the water, it is not seen as a risk. While it is not pleasant to see a sign advising against bathing, only 29% (online survey) and 5% (onsite survey) said it would impact how often they would visit the beach / bathing water in future.

7.4 Future research

The following are recommendations for future research that could address some of the gaps and / or additional questions highlighted in this research project:

A cost benefit analysis using the findings of this study. Future work should compare the benefit of maintaining BWQ at 'sufficient' status (i.e. avoiding advisory against bathing) (or any other policy target) to the cost of doing this. Conservative monetary values for the benefits in this equation have been obtained through this study (for the five case study sites and in terms of a nationally representative value), addressing a specific gap identified by the Scottish Government in the brief for this project. This analysis would require matching the data on costs associated

with managing pressures (e.g. waste water treatment infrastructure, agricultural land management) to bathing water quality improvements and to benefits.

The role of litter in impacting visitor numbers at beaches / bathing water sites and the benefits they receive should be explored further. Given perceptions of 'beach cleanliness' identified in the literature and responses to the onsite and online surveys revealing motivating factors behind beach choice, litter and wider beach cleanliness has the potential to be more significant than water quality in determining the quantity and quality of beach visits.

The extent to which perceived restorativeness impacts on beach visits could be further explored. This could also include a more in-depth look at health and wellbeing effects, perhaps for specific sub-groups of the population (e.g. groups with particular illnesses who could benefit from beach visits or where beach visits could facilitate active recreation). This study focused on general visits made by the general public. More active and restorative visits could generate additional benefits for specific groups – while the groups are likely to be smaller in number, value to the individual could be higher than average²⁵. Such information, along with the results of this study, could be used in a cost benefit analysis of implementing the rBWD or, more generally, for preparing a comprehensive Natural Capital Account for Scotland – including for bathing water assets.

Assessing future trends in recreational usage of bathing waters and climate change impacts. Long-term trends in Scotland and elsewhere in the UK suggest adjustments in work-life balance such that people will have more free time / time available for recreation and potentially more disposable income. Given this, it may be reasonable to assume that in the future, more recreational visits are made to bathing waters with an associated increase in recreational value (i.e. WTP per person per visit x number of visits) and local economic benefits. Furthermore, climate change is expected to influence future levels and type of recreational usage at beaches including hotter drier weather prompting increased visits for relaxing, sunbathing, swimming and paddling though loss of beach area due to sea level rise may constrain this somewhat (Coombes and Jones, 2010). The interplay between these factors and the implications for bathing water and beach management, including in relation to climate projections for different Scottish regions, should be considered carefully in the context of future research and monitoring requirements.

Overall, this research project has demonstrated how Scottish bathing waters deliver multiple benefits to local people and their communities, local businesses and visitors, covering many different aspects. The impact of BWQ on these benefits suggests that bathing waters should be an ongoing area of policy and management for the Scottish Government, SEPA and other key stakeholders.

²⁵ Examining the active visits made by adults to natural environments the study estimated the annual value of these visits as approximately £2.18 billion. Other research has estimated the Quality of Adjusted Life Years (QALYs) associated with physical activity in nature together with making a monetary estimate of the social value of these QALYs made (White *et al.*, 2016). More recent work on valuing natural capital (eftec *et al.*, 2017) show that the health-related value that greenspaces support through physical activity of visitors is significant and suggests it would be worthwhile investigating this further for beaches and bathing waters.



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