PUBLIC HEALTH BATHING WATER GROUP

ANNUAL REPORT

2018

Published July 2019

Legislation

The Bathing Water Quality (BWQ) Regulations 2008

As per the Bathing Water Qquality Regulations, the bathing season in any year runs from the 1st June to 15th September. Two microbiological parameters; Escherichia coli (E coli) and intestinal enterococci (IE) are monitored. For most identified bathing waters, no fewer than four samples are to be taken and analysed per bathing season.

Under the Bathing Water Quality Regulations (SI NO 79 of 2008) (BWQR) "*A local authority shall promptly notify the EPA and the Health Service Executive of any situation that has, or could reasonably be expected to have, an adverse impact on bathing water quality and on the health of bathers".*

According to the current 'Bathing water and Health Guidance' the Principal Environment Health Officer is the initial point of contact.

Legislative Roles of Departments of Public Health in relation to bathing water

The relevant legislation which covers the MOH role in relation to bathing water are:

- Infectious Diseases Regulations 1981; and
- Health (Duties of Officers) Order, 1949

If bathing water is a "probable" source of infection, investigation should be carried out under Infectious Diseases Regulations 1981 to confirm or rule out if there is any ongoing risk. If bathing water is assessed as being a risk, measures to ameliorate this risk are required to protect public health.

Arising from the Health (Duties of Officers) Order, 1949 legislation, PHDs should familiarise themselves with recreational bathing waters in their area. Information on identified bathing waters is available on https://www.beaches.ie/ and bathing water profiles can be downloaded. These contain information on the contributing catchment and identified pressures. Building up profiles of other popular but unregulated bathing areas in the region will take longer.

Under this legislation PHDs have a role in investigating bathing water as a non-infectious health risk, for example exposure to chemically contaminated water, and ascertaining the epidemiology of any illness associated with bathing water. If environmental health risks are found, the MOH shall advise the county council in relation to health.

The MOH should facilitate the implementation of the BWQR 2008.

Microbiological bathing water parameters

Under the BW regulations only two bacterial indicators, namely, *E. coli* and Intestinal enterococci (IE) are monitored. These are good indicators of faecally derived bacterial pathogens and their presence in water indicates human and/or animal faecal contamination. E coli is a good indicator in freshwater and IE persist for longer periods in sea water.

Viruses and other pathogenic organisms such as Cryptosporidium are not routinely monitored in bathing waters. No pathogens or microbial indicators of other human illness are monitored, for example indicators of respiratory illnesses, or skin, eye, ear, nose and throat infections.

Contents

Members of the Public Health Bathing Water Group

Dr Regina Kiernan, CPHM (Chair)

Dr Ina Kelly, CPHM

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Dr Sinead Donohue, CPHM

Dr Colette O'Hare, Surveillance Scientist

Dr Katharine Harkin, SpR

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Executive Summary

While this annual report focusses on the negative impact of exposure to contaminated waters on human health, there is increasing evidence of the benefits to both physical and mental health from using our bathing areas – our natural Blue Space. Ireland has some of the highest quality bathing areas in the world. We therefore strongly encourage people to go out and enjoy our Blue Space, though we do recommend that they should check the quality of the beach first on https://www.beaches.ie/ and to look out for any advisory messages before diving in.

The bathing water sampling programme covers a fifteen week period from the 1st June until 15th September each year. While including results from the sampling program, this report covers the period from the start of the 2018 bathing season (1st June), through a full year to the start of the next bathing season on the 1st June 2019.

Work Completed by Public Health Bathing Water Group

The following table shows the work completed by the Public Health Bathing Water Group in the past year.

Action	Progress
Develop and update guidance in bathing water	The following guidance was developed /updated Bathing Water and Health Guidance 2018[a] (updated in partnership with EHS)
Communications/resources	Continue to update HSE bathing water web pages https://www.hse.ie/eng/health/hl/water/bathing/bathing%20water.html with: 1. New links to guidance 2. New links to other sites of importance

[a] *Bathing Water and Health: 'A Health Service Executive guide for responding to incidents of microbiological pollution and other adverse circumstances in relation to both saline and fresh bathing water'*: 2019 https://www.lenus.ie/bitstream/handle/10147/623997/2019%20HSE%20Bathing%20Water%20and%20Health%20Guidance%204%202.pdf?sequence=5&isAllowed=y

Action - continued	Progress
Provide training to all those involved in protecting the health of the public from exposure to contaminated bathing water	Bathing water and Health Training day: March 2019. Proceedings available at https://www.hse.ie/eng/health/hl/water/bathing/training.html
Collaborate on research on the links between bathing waters and human health	Research completed by Dr K Harkin on Recreational Open Water and the risk of Infectious Disease – see Section 2.2.1
Annually review the data variables in the bathing water incident log to improve the completeness of data	Reviewed for the 2019 bathing season
Produce an annual report on an on-going basis	2018 report completed

Key Findings

The main bathing water incidents reported by public health departments for the 2018 bathing season are shown below.

2018 Bathing water incidents

Reported incidents	Types of incident
27 Incidents were reported to Public Health. • 19 identified beaches • 3 non-identified beaches • 3 from bay areas • 2 in freshwater lake	23 of the incidents were microbial contamination: • 21 in seawater • One in estuarine water, and • One in a freshwater lake. There were three jellyfish incidents. One algal bloom incident was reported in freshwater.

The number of incidents recorded in the PH incident log is lower than the 38 incidents reported by public health departments for the 2017 bathing season. This is probably due to

good weather conditions and reduced rainfall which prevailed during the 2018 bathing season.

Source of microbiological contamination

- Heavy rain has long been known to lead to contamination incidents and was the most reported cause of contamination despite the relatively good summer.
- A number of incidents related to the discharge of untreated wastewater into the sea. One incident was due to a blocked sewer causing sewage to discharge to sea while another was due to a temporary malfunction at a wastewater treatment plant.
- One incident in Lilliput Lough Ennell which required a detailed public health risk assessment and mitigating action is described in Section 3.3.2. Extensive investigation suggested that the most likely source of contamination was an inlet stream to the lake. Microbial source tracking indicated contamination due to cattle.

Non-microbiological incidents

A number of incidents of jellyfish stings over the summer of 2018 made local/national news.

Research

The research by Dr Katharine Harkin into illness associated with recreational use of open water emphasises the under-reporting of illness associated with recreational use of open water and that those most at risk were least likely to be aware of the risks. The finding that most participants of open water events do not receive information or advice on the risk of illness and on how to prevent it highlights a gap in evidence based public health advice in Ireland. Based on her findings Dr Harkin has developed advice to reduce the risk of illness amongst users of recreational open water.

Key Recommendations

Based on the findings of Dr Katharine Harkin's research we recommend that the advice developed by Dr Harkin should be disseminated to organisers of open water events. The advice should also be uploaded onto HSE public health web pages, including the HPSC site.

Public Health Bathing Water Group (PHBWG)

The PHBWG should

- Continue to increase awareness amongst public health professionals of the
    - Relationship, both positive and potentially negative, between recreational water exposure and public health
    - Legal responsibilities of Public Health Departments in this area
    - Key role of Public Health Departments in responding to bathing water incidents
    - Public health risk assessment that should be carried out when notified of a bathing water incident
- Continue to work collaboratively with the EHS as part of the HSE Bathing Water Group
- Continue to develop the HSE bathing water web pages
- Develop further guidance for Medical Officer of Health (MOH) and Public Health Departments on other potential hazards as need arises
- Continue to promote and advocate on bathing water health and safety issues for all bathing and recreational waters when engaging with all relevant stakeholders
- Monitor over time the impact of climate change on recreational water hazards
- Highlight the importance of minimising the development/spread of anti-microbial resistance through bathing waters and the environment

Preparation and prevention

Public Health Departments should prepare in advance for the bathing water season (BWS) each year by;

- Downloading bathing water profiles from the EPA's bathing water website https://www.beaches.ie/ to gain familiarity with the region's identified waters
- Populating, over time, a database of other bathing waters (monitored and unmonitored) in the region
- Identifying regional freshwaters that are used as recreational waters and are at risk of cyanobacterial proliferation and scum formation
- Working with Local Authorities (LAs) and Irish Water (IW) to ensure that corrective and control measures to protect bathing waters from contamination are progressed

- Working proactively with organisers of recreational water based activities such as swimming and triathlon competitions, surfing events, and swimming classes

Data gathering

The PHBWG recommends that

- The Bathing water incident log is completed by Public Health Departments to monitor trends over time and to feed into the annual Bathing Water report for shared leaning.

Acknowledgements

The Public Health Bathing Water Group would like to acknowledge the following:

- All those in the Public Health Departments around the country who gathered and provided data
- All those in the Local Authorities, Irish Water, the HSE's Environmental Health Services (EHS), and Environmental Nongovernmental Organisations who work to protect the health of the public from exposure to contaminated bathing water

1.0. Introduction

1.1. Blue Space

Ireland has some of the most scenic coastal and inland bathing areas in the world. We also have some of the most pristine bathing waters. 71% (103) of our bathing waters were classified as Excellent during 2018 and 15% (22) were classified as Good under the Bathing Water Regulations[b]. In 2018 a record high total of 90 Blue Flags were awarded, 83 to beaches and 7 to marinas[c]. The Blue Flag is an international award for beach excellence and is presented to beaches and marinas which have excellent water quality and which achieve high standards across a wide range of other criteria including environmental education, management of the environment, safety and other services. In addition, 59 Green Coast Awards were presented for 2018. The Green Coast Award is given to sites which have excellent water quality but which may be less developed and less populated than Blue Flag beaches.

While this annual report focusses on the negative impact of exposure to contaminated waters on human health, there is increasing evidence of the public health benefits of access to Blue Space[d]. This includes improvement in both physical and mental health and well-being[e],[f]. In addition there is evidence that the health benefits of Blue Space may be higher for those in lower socio-economic groups[g]. There is also evidence supporting the therapeutic use of Blue Care interventions for improving mental health[h]. There is continuing research exploring the relationship between the oceans and human health, e.g.

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[b] Bathing Water Quality in Ireland: A report for the year 2018. Environmental Protection Agency. Published: 2019. ISBN: 978-1-84095-835-5
https://www.epa.ie/pubs/reports/water/bathing/bathingwaterqualityinireland2018.html

[c] https://www.housing.gov.ie/water/water-quality/blue-flag-awards/blue-flag-and-green-coast-awards-2018

[d] Depledge, M. H., & Bird, W. (2009). The blue gym: Health and well-being from our coasts. Marine Pollution Bulletin, 58, 947–948. https://doi.org/10.1016/j.marpolbul.2009.04.019

[e] Gascon, M., Zijlema, W., Vert, C., White, M. P., & Nieuwenhuijsen, M. J. (2017). Outdoor blue spaces, human health and well-being: A systematic review of quantitative studies. International Journal of Hygiene and Environmental Health, 220(8), 1207–1221. https://doi.org/10.1016/j.ijheh.2017.08.004

[f] Dempsey, S., Devine, M. T., Gillespie, T., Lyons, S., & Nolan, A. (2018). Coastal blue space and depression in older adults. Health & Place, 54, 110–117. https://doi.org/10.1016/j.healthplace.2018.09.002

[g] Wheeler, B. W., White, M., Stahl Timmins, W., & Depledge, M. H. (2012). Does living by the coast improve health and well-being? Health Place, 18(5), 1198–1201. https://doi.org/10.1016/j.healthplace.2012.06.015

[h] Britton E, Kindermann G, Domegan C, Carlin C. Blue care: a systematic review of blue space interventions for health and wellbeing. Health Promot Int. 2018 Dec 18. PMID: 30561661 DOI: 10.1093/heapro/day103

the SOPHIE Project https://sophie2020.eu/. Members of the public should therefore be strongly encouraged to utilise our high quality bathing waters.

1.2 Public Health Bathing Water Report

This is the fifth annual report of the Public Health Bathing Water Group. The group supports departments of public health with regards to bathing water and its health impact, provides guidance and public health risk assessment tools for the management of bathing water incidents both during and outside the bathing water season and advocates for the wider protection of all bathing. In addition to the ongoing work of the group this report outlines bathing water incidents of the 2018 bathing water season (1st June to 15th September 2018) as defined by the bathing water regulations.

The report aims to

- Review the 2018 bathing water season from a public health perspective through an analysis of bathing water incident data collected by Public Health Departments
- Provide relevant background information on public health aspects of recreational bathing water
- Make recommendations to further progress work in this area.

1.3 Management of bathing water incidents

Under the the Bathing Water Quality Regulations (SI NO 79 of 2008) (BWQR) "*A local authority shall promptly notify the EPA and the Health Service Executive of any situation that has, or could reasonably be expected to have, an adverse impact on bathing water quality and on the health of bathers*".

With regard to bathing water, the MOH role is to investigate, prevent the spread of infection and remove conditions favourable to notified infections and outbreaks of likely bathing water origin; and to carry out a public health risk assessment with resultant advice in relation to possible hazards in bathing water. Hazards include microbiological and chemical contamination of the water, proliferation of cyanobacteria (algal blooms), excessive sun exposure, drowning and other risks such as jellyfish or rodent infestations.

Legislation of relevance to Public Health Departments to protect the health of bathers includes:

- Infectious Diseases Regulations 1981 as amended
- Health (Duties of Officers) Order, 1949

The HSE document *Bathing Water and Health: 'A Health Service Executive guide for responding to incidents of microbiological pollution and other adverse circumstances in relation to both saline and fresh bathing water'* was updated in 2019 by the HSE Bathing Water Group (this is a joint group compiling both public health and environmental health service members). This document provides guidance on the management of microbiological pollution and algal bloom incidents[i].

The Principal EHO (PEHO) is usually the first point of contact by the LAs for bathing water incidents. The PEHO should consult with the Consultant in Public Health Medicine (CPHM) / Medical Officer of Health (MOH) in their local public health department on any proposed advisory or prohibition notice and public health should complete a public health risk assessment. Public health should inform environmental health of any potential human illnesses with links to bathing water. We recommend that the guidance be followed to help protect the health of the public, but acknowledge that due to service requirements bathing water incidents are managed differently in different areas.

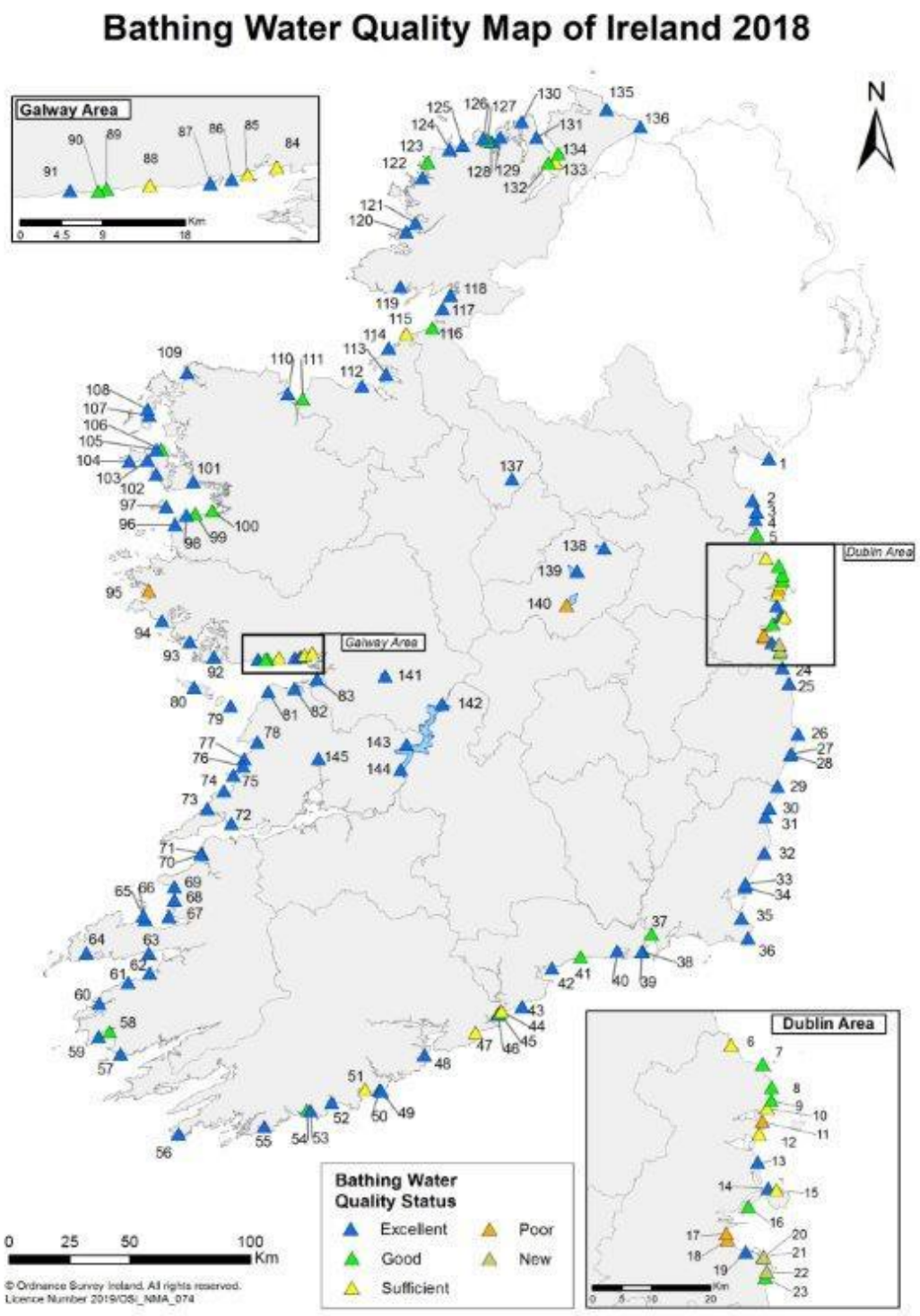
1.3.1 Identified and other bathing waters

An 'identified' bathing water is the legal term used for beaches and lakes managed under the Bathing Water Regulations. Local authorities are responsible for identifying bathing waters and they are generally those considered to be the most popular. For the 2018 bathing season there were 145 identified bathing waters in Ireland (EPA, 2019[j]) – figure 1.

[i] *Bathing Water and Health: 'A Health Service Executive guide for responding to incidents of microbiological pollution and other adverse circumstances in relation to both saline and fresh bathing water'*: 2019 https://www.lenus.ie/bitstream/handle/10147/623997/2019%20HSE%20Bathing%20Water%20and%20Health%20Guidance%204%202.pdf?sequence=5&isAllowed=y

[j] Bathing Water Quality in Ireland: A report for the year 2018. Environmental Protection Agency. Published: 2019. ISBN: 978-1-84095-835-5 https://www.epa.ie/pubs/reports/water/bathing/bathingwaterqualityinireland2018.html

Figure 1: Bathing water quality map of Identified waters in Ireland (EPA[k])



[k] Bathing Water Quality in Ireland: A report for the year 2018. Environmental Protection Agency. Published: 2019. ISBN: 978-1-84095-835-5
https://www.epa.ie/pubs/reports/water/bathing/bathingwaterqualityinireland2018.html

The majority of the bathing waters are rural and as such are subject to rural pressures (agriculture runoff, wastewater runoff) as opposed to those experienced around beaches near urban areas (urban pollution run off, sewage discharges).

Many other 'non identified' waters are used for recreational purposes. Some may be monitored voluntarily by local authorities for microbiological contamination. Some waters (seas, rivers, lakes, canals, disused quarries etc) despite being dangerous or unclean continue to be used for recreational water based activities frequently with tragic results.

1.3.2 Warning signs at beaches and other recreational water areas.

Under the Bathing water regulations a number of warning signs have been developed to cover commonly occurring situations such as:

- Likely deterioration of water quality (prior warnings)
- Actual deterioration of water quality in which it is not advisable to swim (advisory)
- Major pollution of water quality which poses an acute health risk to bathers (prohibition)

2.0 Public Health Bathing Water Group: Work Programme

The aim of the Public Health Bathing Water Group (PHBWG) is to support the HSE and MOH responsibilities in relation to bathing water and health. See Appendix 1 for the 2018 updated Terms of Reference. The PHBWG deal with both infectious disease incidents and other environmental hazards e.g. algal blooms. The work undertaken by the PHBWG since the last annual report is outlined in table 1.

Table 1: **Actions of the Public Health Bathing Water Group 2018-2019**

Action	Progress
Develop and update guidance in bathing water	The following guidance was developed /updated Bathing Water and Health Guidance 2018[I] (updated in partnership with EHS)
Communications/resources	Continue to update HSE bathing water web pages https://www.hse.ie/eng/health/hl/water/bathing/bathing%20water.html with: New links to guidance New links to other sites of importance
Provide training to all those involved in protecting the health of the public from exposure to contaminated bathing water	Bathing water and Health Training day: March 2019. Proceedings available at https://www.hse.ie/eng/health/hl/water/bathing/training.html
Collaborate on research on the links between bathing waters and human health	Research completed by Dr K Harkin on Recreational Open Water and the risk of Infectious Disease – see Section 2.2.1
Annually review the data variables in the bathing water incident log to improve the completeness of data	Reviewed for the 2019 bathing season
Produce an annual report on an on-going basis	2018 report completed

[I] *Bathing Water and Health: 'A Health Service Executive guide for responding to incidents of microbiological pollution and other adverse circumstances in relation to both saline and fresh bathing water'*: 2019 https://www.lenus.ie/bitstream/handle/10147/623997/2019%20HSE%20Bathing%20Water%20and%20Health%20Guidance%204%202.pdf?sequence=5&isAllowed=y

2.1 Bathing Water and Health Training Day

The HSE Bathing Water Group which is a collaboration between the PHBWG and members of the Environmental Health Services, jointly organised a training day for both services to enhance knowledge of the 2019 Bathing Water and Health: 'A Health Service Executive guide for responding to incidents of microbiological pollution and other adverse circumstances in relation to both saline and fresh bathing water'. This was a very well attended and received day held in March 2019.

The learning outcomes for the day were:

1. Understand the role of key stakeholders in responding to bathing water incidents
2. Be aware of the need for prompt communication between LAs, HSE (EHS and PH), and the EPA
3. Know the communication protocol for reporting bathing water incidents
4. Know the threshold levels in Table 1 of the HSE guidance document and the appropriate actions to take based on these
5. Know the criteria for lifting a bathing water prohibition
6. Be able to correctly list the five changes in the 2019 Bathing Water and Health Guidance
7. List the steps in performing either a PHRA or EHRA as appropriate

The invited speakers' topics included:

- Oceans and Human Health: Understanding the interconnections between people and the sea. *Dr Easkey Britton, Whitaker Institute, NUI Galway*.
- Antimicrobial resistance and the environment - what we know and what we need to know. *Dr Dearbháile Morris, Lecturer in Bacteriology, NUI Galway*
- Bathing Water Quality – The role of the EPA. *Mr Anthony Mannix Environment Protection Agency*

Proceedings available at https://www.hse.ie/eng/health/hl/water/bathing/training.html

2.2 Research

2.2.1 Recreational Open Water and the risk of Infectious Disease

This research was completed by Dr Katharine Harkin, Specialist Registrar in Public Health Medicine who is a member of the PHBWG.

Introduction

Healthy participation in water-based activities depends on water quality. Recreational open water events primarily refer to open water swimming but also includes bathing, kayaking, canoeing, sailing, boating, and surfing. In recent decades, the popularity of organised recreational water activities has grown substantially. The increasing availability of protective clothing such as wetsuits has allowed for year-round recreational water training and competitive events, especially in temperate regions such as Ireland[1].

Multiple studies have shown that contact with faecally contaminated water poses serious health risks[2-5]. Water becomes contaminated in a variety of ways including sewage effluent discharge, sewer overflow and agricultural run-off, worsened by weather events such as heavy rain. There have been reports of athletes who experienced illness following recreational contact with open water in Ireland[6,7] and large outbreaks of illness have also been reported elsewhere[8,9].

The aim of this project is to minimise the public health risk of infectious disease by developing evidence-based recommendations for recreational open water users.

Methodology

A literature review was undertaken which examined the epidemiology of illness among open water recreational bathers, and more specifically athletes. This concluded there is increased incidence of illness among bathers and those who participate in sports training or competition, with the majority reporting gastrointestinal symptoms. These participants are at higher risk if they swallow water or swim after poor weather conditions.

A country-wide online survey of recreational water users was also undertaken to assess awareness, behaviours and previous experiences of infection associated with recreational use of open water. The survey was sent by email to many national sporting organisations

who then forwarded it to their members. Furthermore, organisers of individual open water events were contacted directly and asked to distribute it among participants. A summary of the methodology is displayed in Figure 2.

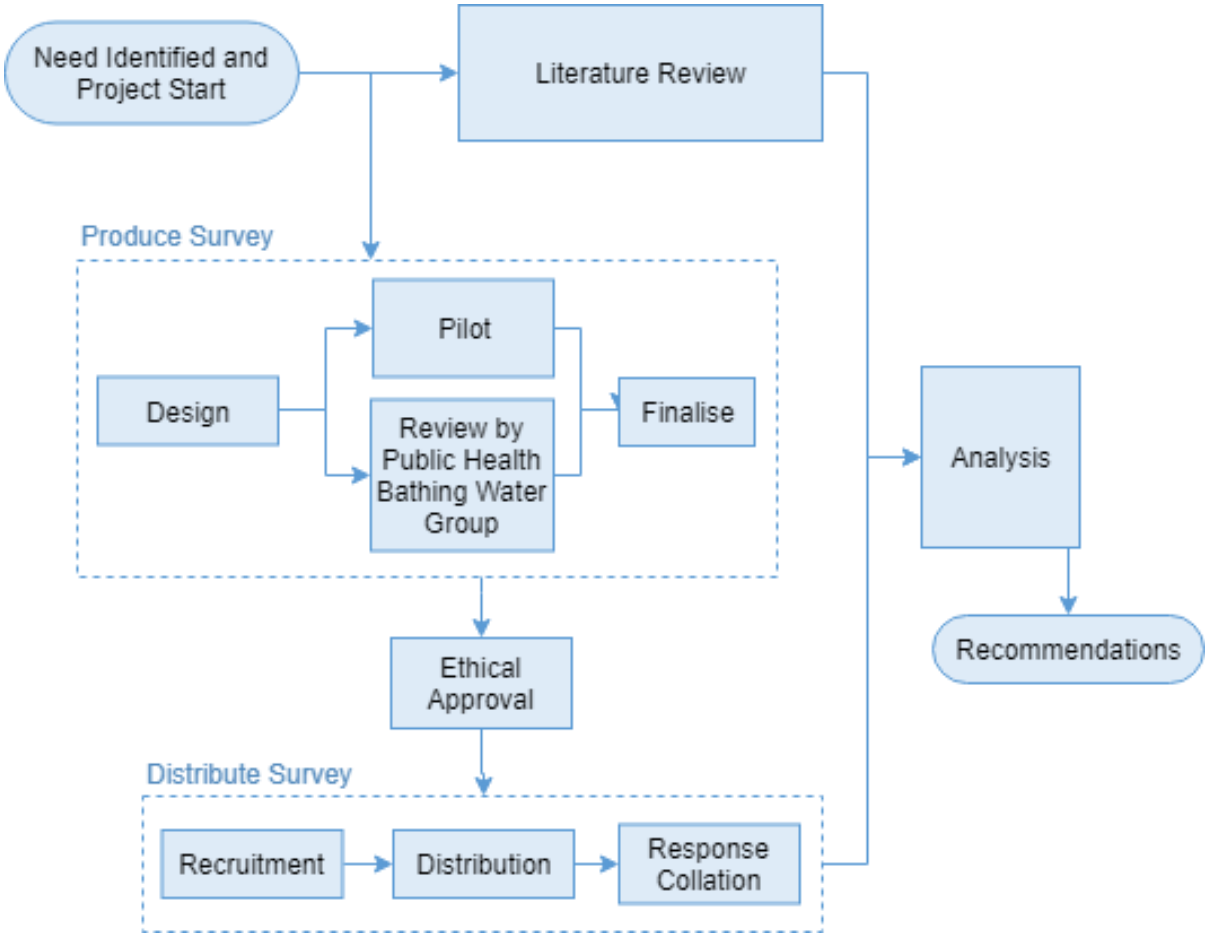


Figure 2: Summary of Methodology

Results

KEY FINDINGS
• 673 survey responses
• 56.2% male, 43.8% female
• Males have longer experience with water activities
• 61.5% are aware of risk of infection associated with open water contact
• 36.8% previously received information or advice about water-related illness
• 51.4% never forgo training/events due to water quality concerns
• **26.6% linked a previous illness to training or competing in open water**
• Most commonly reported symptoms are gastrointestinal
• 38.1% who experienced an illness attended a medical professional
• 43.9% who experienced an illness took time off work
• Higher likelihood of illness among those with longer experience
• Higher likelihood of illness among those who swallow water
• Higher likelihood of illness among those who sometimes cover cuts/grazes
• Lower likelihood of illness among those who wear protective clothing

A total of 673 respondents were included in the final analysis. 61.5% are aware there is infection risk associated with open water contact. Awareness of the risks associated with recreational open water is high among certain groups such as canoeists and kayakers. However, it is of concern that those who have the most intense water contact and report swallowing the most water such as swimmers and triathletes, are least aware of the risks. Just over one-third of respondents (36.8%) had previously received information about water-related illnesses or advice on how to avoid them. Most stated the source of information was word of mouth, e-mail or an information/safety talk at the event.

Results show there is a very high burden of disease with over one-quarter of respondents (26.6%) reporting that they had at least one illness, with many recalling multiple episodes. Gastrointestinal illness was the most frequently reported symptom. Illnesses were severe in many cases with 38.1% of those who experienced an illness having consulted a medical professional and 43.9% taking time off work.

Respondents were surveyed about behaviours which may influence the risk of infection. Almost half (48.7%) always wear protective clothing such as a wetsuit or booties during open water contact while 12.5% never do. Over three-quarters (76.7%) report always or sometimes getting water in their mouth or swallowing water during open water contact with only 3.3% never doing so. The participants' tendency to swallow water or get it in their mouth while participating in each activity is shown in Figure 3. A higher proportion of those participating in activities involving water submersion (e.g. open water swimming/swimming in a triathlon/surfing) report always swallowing water compared to those with less water contact (e.g. rowing/canoeing/kayaking).

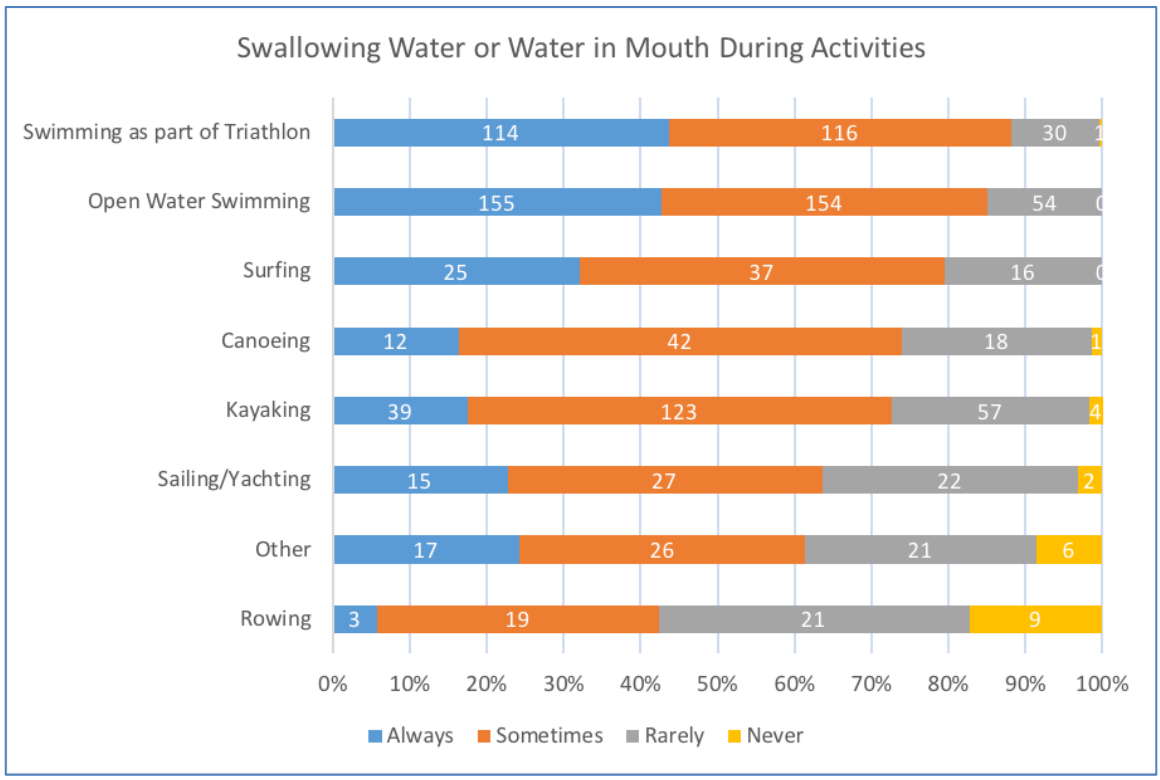


Figure 3: Respondents who get water in mouth or swallow water by sporting activity.

Swallowing water was found to be a significant predictor of illness as shown in Figure 4. No respondent who stated that they 'never' swallow water had experienced a previous illness. This is supported by a wealth of literature which concluded that swallowing water is the most significant risk factor for illness.

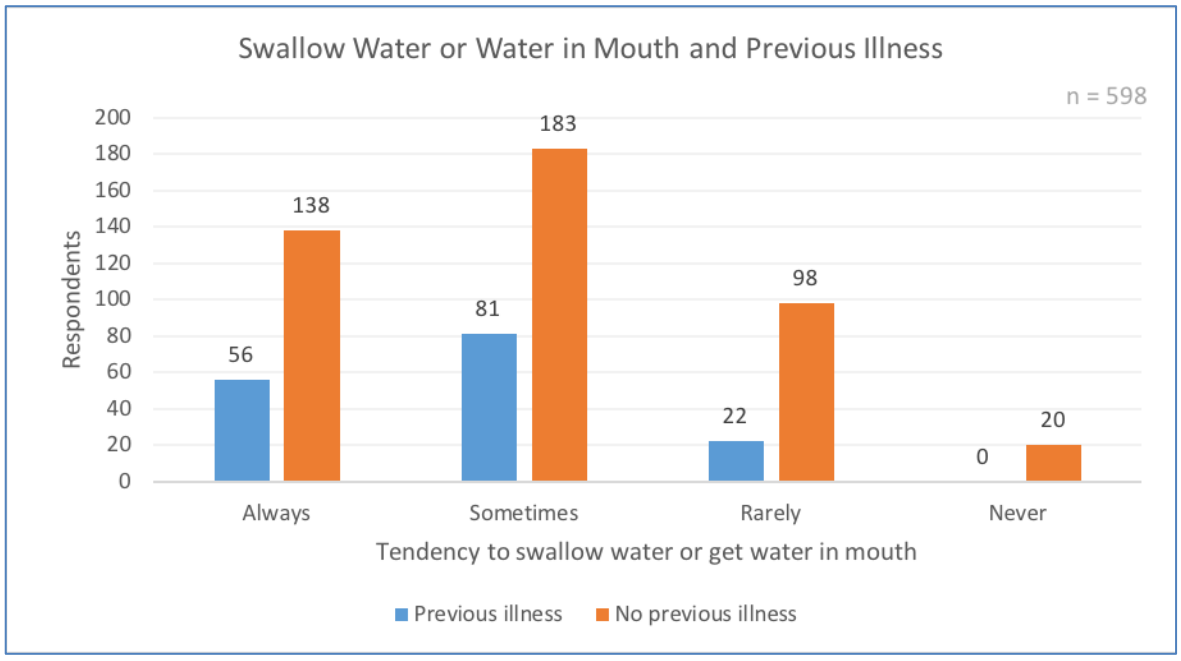


Figure 4: Water in mouth/swallow water and previous water-related illness.

Longer experience with recreational water activity is also a significant predictor of previous illness as displayed in Figure 5.

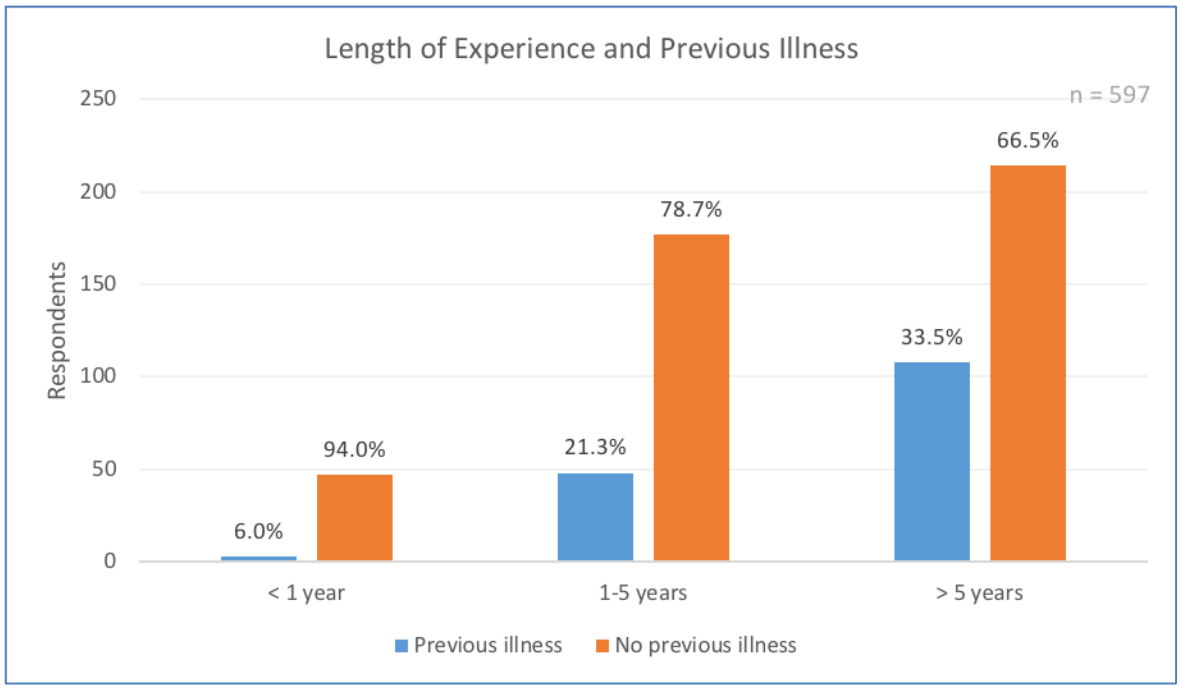


Figure 5: Respondents' length of experience and illness linked to contact with open water.

One third (33.5%) of those who have participated for more than five years have experienced a previous illness compared to 6% of those who have participated for one year or less.

Preventive behaviours are effective in reducing the risk of illness, with significantly lower likelihood of illness among those who always or sometimes wear protective clothing such as a wetsuit. However, those who sometimes cover cuts are significantly more likely to have experienced a previous illness. This finding is not evidenced in the literature and although reasons are speculated, this study does not yield a conclusive explanation.
Respondents were asked to cite the bodies of water to which they attributed their illnesses. Nine bodies of water outside Ireland were excluded from the analysis. Almost two-thirds (64.8%) named a river, 22.5% a coastline or beach and 12.7% a lake. The Liffey (n=45) and the Lee (n=13) were the most cited bodies of water.

Recommendations

The study yielded recommendations to minimise the risk of related illness among recreational water users. These recommendations are summarised below:

Advice to recreational water users
Before water contact
• Use beaches that meet quality bathing standards. This information is available on www.beaches.ie. For inland waters, where such information is not readily available, consult with locals or experienced others before using the water. • Be aware of recent weather events such as heavy rainfall which can wash contaminants or sewage into the water and make it unsuitable for bathing or related activities.
Where it is appropriate to enter the water
• Wear protective clothing where possible (wetsuit/booties etc.). • Cover cuts and grazes. • Minimise swallowing of water.

After exiting the water
• Wash hands before eating or drinking. • Clean all equipment thoroughly taking care to wash hands afterwards. • Shower as soon as is practical. • Upon illness following contact with recreational water, and having concerns for your health, contact your General Practitioner. They will likely request that a stool/faecal sample is submitted for testing. If you suspect the source of your illness is a risk for others, contact your local Department of Public Health for advice. • If you are unwell with gastrointestinal symptoms you must avoid swimming in open water or swimming pools for a minimum of 48 hours after symptoms resolve.

Discussion

Participation in sporting activities must be encouraged. However, this study has highlighted the substantive burden of illness among recreational water users. This is demonstrated by over one-quarter of respondents reporting in this study that they had at least one illness which they linked to recreational water activity, with many reporting multiple episodes. The majority of illness reported in this study was gastrointestinal but a significant number of respondents reported systemic symptoms (headache, fever) or ear, nose, throat and skin complaints. This problem is not unique to Ireland and a review of the literature showed that recreational water users are significantly more likely to experience illness, particularly gastrointestinal symptoms. There are increasing levels of participation in recreational water events in Ireland, resulting in a larger group at risk of illness.

Survey results revealed there is a deficiency in the awareness of risks associated with recreational open water use among participants with only 61.5% of participants aware of associated infection risks. Preventive behaviours have been shown to reduce the risk and this study identified scope to increase these preventive behaviours among participants so that risks can be minimised. Furthermore, raising awareness and highlighting the problem provides the opportunity for Public Health, sporting organisations and the public to advocate for improved water quality and increased testing.

References

1. Pond K. *Water Recreation and Disease, Plausibility of Associated Infections: Acute Effects, Sequelae and Mortality.* Geneva: World Health Organisation. 2005.
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4. Harder-Lauridsen NM, Kuhn KG, Erichsen AC, Molbak K, Ethelberg S. Gastrointestinal Illness among Triathletes Swimming in Non-Polluted versus Polluted Seawater Affected by Heavy Rainfall, Denmark, 2010-2011. *Plos One.* 2013;8(11):8.
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2.2.2 The PIER Project

Research is currently underway on the PIER project (Public health Impact of Exposure to antimicrobial Resistance in recreational waters) in NUI Galway[m]. The PIER project will explore the health and wellbeing impacts associated with antimicrobial resistance contamination of coastal waters. It will investigate if coastal water users are at a higher risk for colonisation and infection with antimicrobial resistant organisms and if this risk can be

[m] http://www.nuigalway.ie/medicine-nursing-and-health-sciences/medicine/disciplines/bacteriology/research/pier/index.html

reduced by wastewater treatment. The PIER project aims to inform environmental policy through examination of the human health and wellbeing outcome.

The PIER project objectives are:

- Complete a systematic review of the public health implications (colonisation and infection) associated with exposure to Antimicrobial Resistant Organisms (AROs) in recreational waters.
- Identify the carriage rate of AROs in the study (water users) and control groups at a specified point in time (point prevalence study).
- Examine the carriage rate of AROs in a cohort of the participants from the study and control groups over a 2 year period (cohort study).
- Determine the relative risk of colonisation from exposure to AROs in coastal waters.
- Identify if introduction of wastewater treatment impacts on colonisation with AROs.
- Examine the impact of ARO contamination of coastal waters on wellbeing and quality of life.
- Support the development of monitoring strategies, regulatory activities and policy development for AMR prevention and control in the environment.

Members of the PHBWG are Project Partners in this research.

3.0 Review of 2018 Bathing Water Incidents

3.1 Methodology

The bathing water incident log facilitates the capture of information on bathing water incidents reported to the Departments of Public Health during the bathing water season. The variables contained within the log are listed in Appendix II.

3.2 Microbiological results

The HSE document *Bathing Water and Health: 'A Health Service Executive guide for responding to incidents of microbiological pollution and other adverse circumstances in relation to both saline and fresh bathing water'* outlines the microbiological exceedances that should be notified to the HSE, the action levels, and recommended actions to protect public health (Table 2).

Table 2: Action levels in response to microbiological sample results (updated 2019)

Escherichia coli	Intestinal enterococci	Recommended Action *
> 2,000 E.coli	**OR > 250 I.E.**	**Issue of a Bathing Prohibition Notice (Appendix 8)**
≥1,000 - ≤2000 E.coli	**AND ≥ 200 I.E.**	**Issue of a Bathing Prohibition Notice (Appendix 8)**
≥1,000 - ≤2000 E.coli	**BUT < 200 I.E.**	**Issue of a Bathing Advisory Notice (Appendix 7) and re-sample immediately**
If re-sample is still ≥ 1000 E.coli		**Issue of a Bathing Prohibition Notice (Appendix 8)**
≥500 - <1,000 E.coli	**AND/OR ≥100 - ≤250 I.E.**	**Monitor situation and re-sample. Decision based on evidence available/details of pollution event.**
Any gross malfunction or leakage of the sewerage system or visual reports of sewage		**Issue of a Bathing Prohibition Notice (until the status of the bathing water quality can be verified).**
Where results are close to HSE bacterial action levels (up to 10% below action level) and/or not typical, a precautionary approach is advised with the issue of an appropriate bathing water notice.		

** Based on risk assessment, taking into account the beach profile, previous sampling history, probable source of contamination, evidence of human illness etc*

3.3 Key Findings

The main bathing water incidents reported by public health departments are shown in Table 3.

Table 3: 2018 bathing water incidents reported to public health departments

Reported incidents	Types of incident
27 Incidents were reported to Public Health. • 19 identified beaches • 3 non-identified beaches • 3 from bay areas • 2 in freshwater lake	23 of the incidents were microbial contamination: • 21 in seawater • One in estuarine water, and • One in a freshwater lake. There were three jellyfish incidents. One algal bloom incident~~s~~ was reported in freshwater.

The number of incidents reported by Departments of Public Health was 27, this compares to 38 incidents reported for the 2017 season. The number of incidents reported is fewer than the number reported to the EPA in 2018 (55 incidents), as not all departments submit completed bathing water logs, and some incidents do not require public health intervention.

Table 4 displays the types of bathing restriction notices posted in relation to these incidents

Table 4: Types of notices posted for microbial incidents, 2018

Notice	No. of incidents
	Microbial
Prohibition	**16**
Advisory	**2**
No notice posted	**3**
Not stated	**2**

3.3.1 Source of microbiological contamination

Heavy rain has long been known to lead to contamination incidents and was the most reported cause of contamination. A number of incidents related to the discharge of untreated wastewater into the sea. One incident was due to a blocked sewer causing

sewage to discharge to sea while another was due to a temporary malfunction at a wastewater treatment plant.

3.3.2 Lilliput, Lough Ennell, Westmeath

This incident came to the attention of the local Department of Public Health on 20th of June 2018 when the identified bathing area had high levels of *E.coli*. The bathing area was placed on a bathing prohibition notice. Some days later, a human case of verotoxigenic *E. coli* (VTEC) O157 VT2 was notified to public health, with a history of exposure to lake water while canoeing on 13/6/2018 at Lilliput, Lough Ennell. The water at Lilliput was tested and subsequently found to have VTEC O157 VT2. Based on this the identified bathing area of the lake was considered a probable source of infection under the Infectious Diseases Regulations 1981.

The beaches.ie website provided the most recent bathing water profile for Lough Ennell which contained an assessment of numerous microbial risks on the bathing water site, and the CPHM/ MOH also considered other additional potential risks in the public health risk assessment including:

- Nesting swans and other water fowl
- A *"herring bone"* patterned underground land drainage system installed by Westmeath County Council in the 1990s in order to drain an area of water-logged land at Lilliput.
- Two septic tanks located within the immediate catchment of the bathing area.
- Drinking water
- Contaminated vehicles entering the lake for water during drought
- Houseboats/boats with toilets
- Wastewater treatment plant within the bathing area catchment.

There was no evidence of risk from each of these, following site visit and assessment.
As part of the much more detailed investigation, microbial source tracking was carried out, indicating a predominantly ruminant contamination. While the wider catchment area is predominantly an agricultural area with relatively intensive grassland, there were no cattle

in the vicinity of the site during inspection and apparently no slurry had been spread nearby. Therefore testing of inlet streams was carried out to understand the catchment better.

Control issues arose as people were still using the bathing area despite warning signs, and signs had disappeared or been taken down over the previous few weeks. Therefore the control plan included:

- Information on the seriousness of VTEC to all stakeholders because of the potential for serious illness, irreversible health consequences and possible fatality and the importance of prevention of every single case.
- Increase the signage to ensure the public is well aware of the situation
- Inform organisers of events about the prohibition of bathing in the identified area

Extensive investigation suggested that the most likely source of contamination was an inlet stream to the lake. Low water levels during drought may have exacerbated the situation. As a result of this incident the classification for Lilliput, Lough Ennell deteriorated from Good in 2017 to Poor in 2018. Multi-agency support towards prevention and control of any further incidents will continue towards protecting this very important green and blue space.

3.3.3 Non-microbiological incidents

3.3.3.1 Jellyfish incidents

A number of incidents of jellyfish stings over the summer of 2018 made local/national news.

In the summer of 2018, six people reported that they were stung by Lion's Mane jellyfish. Five are understood to have been hospitalised. During June-Sept the Lion's Mane jellyfish invaded many western beaches, including Galway bay and beaches in Co Louth. As a result various clubs cancelled swimming events. Lion's Mane jellyfish have been regularly sighted on the east coast of Ireland but had previously never made an appearance along the west coast. However, in the past two years there have been several sightings of them on the western coastline from Mayo as far south as Cork.

Lion's Mane jellyfish have hundreds of tentacles and cause severe stings and are described as "very venomous and very dangerous'. They are extremely big (like coffee table) and cannot be mistaken for anything else. Lion's Mane jellyfish can also sting out of the water. Tentacles can be several yards in length and can be embedded in the sand.

Figure 6 Lions mane Jellyfish (LMJ) - Stock photo

Symptoms of LMJ stings include shortness of breath, vomiting, pain, nausea, numbness and in some cases anaphylactic shock.

What to do if you have been stung

- Remove yourself from the water / vicinity of the jellyfish
- If helping someone else make sure you don't get stung yourself
- Seek help and advice from lifeguards if you are on a lifeguarded beach
- Try to carefully remove any attached tentacles by
    - flushing the sting area with sea water
    - removing tentacles with gloved hands, clean stick, tweezers, or scraping gently with the edge of a credit card. Don't try to rub them off.
- Mild symptoms of pain and swelling can be treated with simple painkillers such as paracetamol and ibuprofen
- Mild itching at the sting site may respond to anti-histamine creams
- Apply a 'dry cold pack' to the area (i.e. place a cold pack or ice inside a plastic bag and then wrap this package in a t-shirt or other piece of cloth)

- Use HOT WATER for Portuguese Man O'War stings at approximately 45° Celsius for 20 minutes (Figure 7)
- Keep any puncture wounds clean and dry to avoid them getting infected
- **Seek medical attention if you develop any serious symptoms**

What not to do

- Don't rub the area
- Don't rinse with fresh water. Use sea water
- Don't urinate (pee) on the sting
- Don't use vinegar for the types of jellyfish stings that might happen in Ireland
- Don't use alcohol
- Don't put on a tight bandage

Figure 7 Portuguese Man O'War - Stock photo

The following website provides some useful information https://www.hse.ie/eng/health/hl/water/bathing/jellyfish-in-irish-coastal-waters.html.

And a card to assist with identifying the different types of jellyfish is available at http://www.iws.ie/_fileupload/jellyfish-id-card(1).pdf

3.3.3.2 Algal bloom

For 2018 Public Health departments received one report of algal bloom in a freshwater identified bathing water. However as a prohibition notice was in place for microbiological contamination there was no risk to human health.

Algal Bloom toxicity and dogs

There were reported deaths of dogs in the Mayo/Galway region which were suspected to be due to exposure to toxic algal scum. While water quality is a big factor in the formation of algae, it can be found in relatively unpolluted lakes and rivers so it is not possible to predict in advance where a problematic algal bloom may occur.

Although the EPA are not the lead agency in animal health, they have given some advice to both dog owners and other members of the public about how to deal with the problem.

- The public should avoid walking dogs in areas where algae form obvious scums or accumulations on lake shorelines.
- Feed and water your dog before going to a lake to lower the chance that they will drink water with algae in it.
- If your dog does encounter algae in the water, hose them down to stop them from cleaning themselves and ingesting toxins.
- Toxic algae can be very fast acting. If your pet has been exposed take them to a vet as soon as possible.
- Take photos of the algae to present to the vet as that information can be helpful, as well as a description of what your dog was doing.
- Any incident of animal deaths thought to be caused by algal blooms should be reported to the Local Authority.

4.0 Discussion

4.1 Public Health Bathing Water Group

2018 was the fifth year for the Public Health Bathing Water Group and considerable work was undertaken. Table 1 highlights the progress made by the PHBWG on last years' recommendations. These include:

- The development and update of guidance[n] in conjunction with the EHS
- Further development of the HSE Bathing Water webpage[o]
- Collaborated with EHS to organise and run a joint Bathing Water and Health Training Day in March 2019[p].
- Research carried out on the links between recreational use of bathing water and the risk of infectious disease. (Section 2.2.1)

The presentation by Dr. Easkey Britton at the Joint Training Day in March 2019 underscored the reason why we strive to ensure the health and safety of Irish bathing areas. The evidence supporting the importance of public access to this Blue Space for improved physical and mental health and wellbeing is increasing.

4.2 Public health review of the 2018 BW season

It can be seen from Table 3 that twenty seven bathing water incidents were dealt with by Public Health Departments. These were mainly of microbial origin. The number of incidents recorded in the PH incident log is lower than the 38 incidents reported by public health departments for the 2017 bathing season. This is probably due to good weather conditions and reduced rainfall which prevailed during the 2018 bathing season. However, a review of the incident at Lilliput Lough Ennell during 2018 highlights the volume of work that **c**an be entailed in performing a public health risk assessment, providing public health advice and the control measures required for bathing water contamination.

[n] *Bathing Water and Health: 'A Health Service Executive guide for responding to incidents of microbiological pollution and other adverse circumstances in relation to both saline and fresh bathing water'*: 2019 https://www.lenus.ie/bitstream/handle/10147/623997/2019%20HSE%20Bathing%20Water%20and%20Health%20Guidance%204%202.pdf?sequence=5&isAllowed=y

[o] https://www.hse.ie/eng/health/hl/water/bathing/

[p] Proceedings available at https://www.hse.ie/eng/health/hl/water/bathing/training.html

While heavy rainfall was the most common reported cause of contamination, there were a number of incidents related to wastewater or sewer discharge to bathing waters. We receive no reports about bathing water incidents from Dublin beaches. However, we know from the EPA report[q] that Merrion Strand, Sandymount Strand, Portrane (the Brook) Beach have been classified as poor with Merrion Strand in particular at risk of losing its Identified bathing water status in 2020 if it has another Poor rating in 2019. The EPA report found that urban wastewater is the most common pressure impacting Bathing Water status and recommended that improvements in urban wastewater systems should continue to be progressed to limit their impact on Bathing Waters. The PHBWG concurs with this recommendation.

4.3 Incidents with human cases of GI illness

There was one reported case of Verotoxigenic *E.coli* at Lilliput where bathing water was the only identified risk exposure. A case of cryptosporidiosis was reported in the west which the family felt was due to playing on a beach. However, the case lives in a rural area and the illness could not be definitively attributed to exposure at the beach.

4.4 Research

Dr Katharine Harkin, SpR in Public Health Medicine and a member of the PHBWG carried out research on the risk of infectious disease from utilising recreational open water. Some of the key findings from her survey were:

- Over one-quarter of respondents (26.6%) reported that they had at least one illness, several having multiple episodes.
- Gastrointestinal illness was the most common reported illness.
- Those who have the most intense water contact and report swallowing the most water such as swimmers and triathletes were least aware of the risks associated with recreational open water.
- Swallowing water was found to be a significant predictor of illness.

[q] Bathing Water Quality in Ireland: A report for the year 2018. Environmental Protection Agency. Published: 2019. ISBN: 978-1-84095-835-5
https://www.epa.ie/pubs/reports/water/bathing/bathingwaterqualityinireland2018.html

- Most of the respondents had not received information about water-related illnesses or advice on how to avoid them.
- The River Liffey and Lee were the most cited bodies of water as the source of exposure.
- Preventive behaviours such as wearing a wet suit were found to reduce the risk of illness, thus highlighting the preventable nature of illness associated with recreational open water use.

This research emphasises the under-reporting of illness associated with recreational use of open water and that those most at risk were least likely to be aware of the risks. The finding that most participants do not receive information or advice on the risk of illness and on how to prevent it highlights a gap in evidence based public health advice in Ireland. Based on her findings Dr Harkin has developed recommendations to reduce the risk of illness amongst users of recreational open water.

5.0 Recommendations

5.1 Public Health Bathing Water Group

The PHBWG should

- Continue to increase awareness amongst public health professionals of the
    - Relationship - both beneficial and potentially negative - between recreational water exposure and public health
    - Legal responsibilities of Public Health Departments in this area
    - Key role of Public Health Departments in responding to bathing water incidents
    - Public health risk assessment that should be carried out when notified of a bathing water incident
- Continue to work collaboratively with the EHS as part of the HSE Bathing Water Group
- Continue to develop the HSE bathing water web pages
- Develop further guidance for MOH and Public Health Departments on other potential hazards as the need arises
- Continue to produce an annual report
- Continue to promote and advocate on bathing water health and safety issues for all bathing and recreational waters when engaging with all relevant stakeholders including the Department of Communications, Climate Action and Environment and the Department of the Environment, Community and Local Government, Irish Water, Environmental Protection Agency, Local Authorities, Environmental Non-Governmental Organisations (eNGOs) and others.
- Expand membership of the group
- Monitor over time the impact of climate change on recreational water hazards
- Highlight the importance of minimising the development/spread of anti-microbial resistance through bathing waters and the environment

5.2 Preparation and prevention

Work can be done by Public Health Departments to prepare for the annual BW season including

- Downloading bathing water profiles from the EPA's Find a Beach website (http://beaches.ie/) to gain familiarity with the region's identified waters

- Populating, over time, a database of other bathing waters (monitored and unmonitored) in the region
- Identifying regional freshwaters that are used as recreational waters and are at risk of cyanobacterial proliferation and scum formation
- Working with LAs and Irish Water to ensure that corrective and control measures to protect bathing waters from contamination are progressed
- Working proactively with organisers of recreational water based activities such as swimming and triathlon competitions, surfing events, and swimming classes. The guidance in section 5.3 should be utilised by public health departments.

5.3 Recommendations for recreational water users

The following guidance for recreational water users was developed by Dr Katharine Harkin based on her research. We recommend that this advice should be disseminated to organisers of open water events. The advice should also be uploaded onto HSE public health web pages, including the HPSC site.

Advice to recreational water users
Before water contact
• Use beaches that meet quality bathing standards. This information is available on www.beaches.ie. For inland waters, where such information is not readily available, consult with locals or experienced others before using the water. • Be aware of recent weather events such as heavy rainfall which can wash contaminants or sewage into the water and make it unsuitable for bathing or related activities.
Where it is appropriate to enter the water
• Wear protective clothing where possible (wetsuit/booties etc.). • Cover cuts and grazes. • Minimise swallowing of water.

After exiting the water
• Wash hands before eating or drinking. • Clean all equipment thoroughly taking care to wash hands afterwards. • Shower as soon as is practical. • Upon illness following contact with recreational water, and having concerns for your health, contact your General Practitioner. They will likely request that a stool/faecal sample is submitted for testing. If you suspect the source of your illness is a risk for others, contact your local Department of Public Health for advice. • If you are unwell with gastrointestinal symptoms you must avoid swimming in open water or swimming pools for a minimum of 48 hours after symptoms resolve.

5.4 Data gathering

The PHBWG recommends that

- The capacity of the CIDR surveillance data system is improved by the addition of specific bathing water exposure variables into the datasets of key gastrointestinal illnesses as is the case with Verotoxigenic *E.coli* and cryptosporidiosis
- The BW incident log is completed by all Public Health Departments

5.4 Research

- Public Health should continue to support research work, both internally and with external agencies in relation to Bathing Water e.g. the PIER project.

6.0 Appendices

6.1 Appendix I: TOR

Public Health Bathing Water Group Terms of Reference 2018

Aim:	To support the HSE and MOH responsibilities in relation to bathing water and health
Objectives:	1. To develop public health guidance for: – MOHs (Medical Officers of Health)in relation to the investigation, prevention of spread and removal of conditions favourable to notified infections and outbreaks of likely bathing water origin; and – MOHs when carrying out public health risk assessment in relation to possible biological or chemical hazards in bathing water 2. To develop and circulate tools for risk assessment and risk communication 3. To provide a forum for the review of incidents and identify lessons learned 4. To assist in the standardisation of response across the health services areas - within Public Health and with Environmental Health and other HSE services 5. To facilitate CPD, Audit and Evaluation 6. To advocate as required including to raise bathing water issues of concern nationally with:- - DOH - DCCAE, DHPLG - EPA - Irish Water - Local Authorities - HSE - Other appropriate agencies.
Governance:	- The PHBWG reports to both the PHMCDG and PHMEHG
Membership:	- At least two CPHMs representing different Departments of Public Health - Directors of Public Health may wish to nominate additional CPHMs or other staff - Surveillance Scientist - SpR PHM
Selection of the Chair:	- The position of Chair of the group shall be rotated. - The term of office of the Chair of the group will be for a two year duration - The term of office can be extended for a further period
Meetings: **Audit of Outcomes**	- Approximately every 3 months. Meetings may be held as the PHBWG, or may be jointly held with the HSEBWG to facilitate completion of tasks outlined in the group's work-plan. - The Agenda and previous minutes with action items will be distributed at least a week before the meetings. - Outcomes will be reported to both the PHMCDG and PHMEHG - Representatives will liaise with other relevant groups eg National HSE BWG, Interagency BWEG - An annual review of the work of the Group should be undertaken in the 1st Quarter of the year for the preceding year. This should be documented in a brief report.

6.2 Appendix II: Data Dictionary

DATA DICTIONARY

Variable	Description and Instructions
Date	Please enter the date the incident was notified to public health or the date that public health became aware of the incident
County	Please select the relevant county from the drop down list
ID ref No	Please create a unique reference number for each water incident. You can use any number you wish or use the following template County-seq no-year. (eg for the 5th incident in Carlow in 2016 the ID ref no would be: CW-5-2016
Bathing Water Name	Please insert the name of the bathing water
Identified	Is the bathing water an identified bathing water under the Bathing Water Quality Regulations 2008? The list of identified bathing waters is available on http://splash.epa.ie/BathingWaters
SPHM	You may wish to populate a drop down list of departmental SPHM names to facilitate the insertion of the name of the SPHM principally involved
Water Type	Is the bathing water fresh water (eg a lake), saltwater (eg sea), or estuarine (eg meeting of river and sea)
Incident type	Bathing water contamination can occur from microbiological contamination, chemical contamination, cyanobacterial proliferation, overgrowth of marine macro-algae (seaweed) or overgrowth of marine phytoplankton. Bathing waters may also be deemed unsafe due to jellyfish or rodent infestation.
1st result E coli	Insert the numerical value per 100ml (cfu or MPN) for the first *Escherichia coli* result received
1st E coli sample date	Insert the date the sample was taken
1st result IE	Insert the numerical value per 100ml (cfu or MPN) for the first intestinal enterococci (IE) result received
1st IE sample date	Insert the date the sample was taken
Repeat E coli	Insert the numerical value per 100ml (cfu or MPN) for a repeat *Escherichia coli* result, if a repeat sample was taken
Repeat E coli sample date	Insert the date the repeat sample was taken
Repeat IE	Insert the numerical value per 100ml (cfu or MPN) for a repeat intestinal enterococci (IE) result, if a repeat sample was taken
Repeat IE sample date	Insert the date the repeat sample was taken
Chemical result	If the incident is one of chemical pollution, please indicate the chemical and any laboratory test result. Insert NA (not applicable) if not chemical incident
Human illness	Please select Yes / No from the dropdown list to indicate whether or not there is evidence of human illness
Number of cases	Insert the number (or approximate number) of human cases
Passive Case Finding	Please select Yes / No from the dropdown list to indicate whether or not passive case finding was undertaken. Passive case finding would equal checking CIDR (crypto, norovirus, salmonella, VTEC) ± other local departmental notifications for GI illnesses (eg paper records / enhanced surveillance forms).
Active Case Finding	Active case finding can be local (contacting local sources such as GPs, EDs etc), national (eg other PH depts), and international (ie contacting HPSC). Please select the appropriate response from the dropdown list to indicate the level of active case finding (if any) undertaken
Notices	Depending on the incident and the water sample results a number of different notices could be erected by the LA with advice from the HSE. The national HSE bathing water guidelines describe the different notices and when they should be used. For example, it may be necessary to issue an initial advisory notice and to subsequently issue a prohibition notice
Bathing prohibition notice	A bathing prohibition notice is posted where significant levels of contamination occur and informs bathers not to swim as swimming in the water may cause illness
Bathing advisory notice	A bathing advisory notice is posted when lower levels of contamination occur and advises bathers not to swim due to an increase in levels of bacteria
Prior warning notice	A prior warning notice is posted to protect bathers by warning them that the water may be contaminated over the coming days. Under the regulations a 'short-term pollution' event is defined as microbiological contamination that has a clearly identifiable cause and is not normally expected to affect water quality for more than 72 hours.
1st notice	Please select the type of initial notice posted from the dropdown list
Subsequent notice	Please select the type of subsequent notice (if any) posted from the dropdown list
Was source of contamination identified	Please select Yes / No from the dropdown list to indicate whether or not the source of contamination was identified.
Describe source if known	If the source of contamination is known please briefly describe.
Suspected source if source unknown	If the source hasn't been definitively identified a source is often suspected - please briefly describe
OCT	Was an OCT (Outbreak Control Team) established?
ICT	Was an ICT (Incident Control Team) established?
Additional actions taken	Please list any additional investigative or control actions taken

6.3 Appendix III: Abbreviations

BWEG	Bathing Water Expert Group
BWQR	Bathing water quality regulations
BWS	Bathing water season
CIDR	Computerised Infectious Disease Reporting system
CPHM	Consultant in Public Health Medicine
EHS	HSE Environmental Health Services
EPA	Environmental Protection Association
HSEBWG	HSE Bathing Water Group
IW	Irish Water
LAs	Local Authorities
MOH	Medical Officer of Health
PHBWG	Public Health Bathing Water Group
PH	HSE Public Health Departments
PEHO	Principal Environmental Health Officer
PHME&HG	Public Health Medicine Environment and Health Group
PHMCDG	Public Health Medicine Communicable Disease Group
PIER project	Public health Impact of Exposure to antimicrobial Resistance in recreational waters
SpRs	Specialist Registrars
STP	Short term pollution