



EPA Research - 2017 Call

EPA Research – Water Research Call 2017

Technical Description

The EPA Research Programme is funded by the Irish Government.

Environmental Protection Agency Research Call 2017: Water

This document provides the **Technical Description** for the Environmental Protection Agency (EPA) **Water** Research Call 2017. Applicants should read the following carefully and also consult the other documentation provided (i.e. Guide for Applicants, Guide for Grantees, EPA Terms and Conditions for support of grant awards).

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1. Introduction

The EPA's Research Programme 2014-2020 is designed to identify pressures, inform policy and develop solutions to environmental challenges through the provision of strong evidence-based scientific knowledge:

- **Identifying Pressures:** Providing assessments of current environmental status and future trends to identify pressures on our environment.
- **Informing Policy:** Generating evidence, reviewing practices and building models to inform policy development and implementation.
- **Developing Solutions:** Using novel technologies and methods that address environmental challenges and provide green economy opportunities.

Ireland's Water Resources

Ireland's State of the Environment Report 2016¹ states that overall the assessments of water quality and quantity, show significant challenges ahead to bring all waters to a satisfactory level, and to protect waters already in good condition. Of concern is that preliminary results from the River Basin Management Plan preparation indicate that there has been no overall improvement in water quality over the first river basin planning cycle. Elevated nutrient concentrations continue to be the most widespread water quality problem in Ireland, arising primarily from human activities such as agriculture and waste water discharges to water from human settlements, including towns, villages and rural houses (EPA, 2016).

EPA Water Research

The EPA Research Programme has a strong focus on policy and is driven by national regulations and European directives. A sustained Water Research Programme is an essential component of Ireland's role in protecting its water resources and meeting its requirements under water-related EU directives, the United Nation's Sustainable Development Goals and national policies.

The EPA Research Programme has allocated funding of approximately € 1.68m for new commitments as a result of this 2017 Water research call. The overall aim of the water pillar is to support relevant water policy and to protect our water environment, contributing to achieving excellent water quality in Ireland.

The EPA Research Water Pillar deals with groundwater, surface water, transitional and coastal water; as well as wastewater, drinking, bathing and shellfish waters. The EPA Research Water Pillar is structured into five thematic areas of research, as follows:

- Theme-1.** Safe Water;
- Theme-2.** Ecosystem Services and Sustainability;
- Theme-3.** Innovative Water Technologies;
- Theme-4.** Understanding, Managing and Conserving our Water Resources; and
- Theme-5.** Emerging and Cross-cutting Issues.

Multi- and inter-disciplinary research is required on these themes, with expected social, economic, technological, environmental and policy impacts.

¹ [Ireland's Environment 2016 – An Assessment](#). Environmental Protection Agency, 2016.

Funding Structure

The EPA invites research proposals under the specific topics listed in Table 1. These proposals will be Medium-Scale or Large-Scale Projects:

- **Medium-Scale Project** will typically last from 24 to 36 months with an indicative cost range of €100,000 to €350,000;
- **Large-Scale Project** will typically last from 36 to 48 months with an indicative costs range of €350,000 to €500,000.

Cofunding and Partnerships



As part of the EPA Research Call 2017: Water, one topic will be cofunded on a 50:50 basis with the Department of Agriculture, Food and the Marine (DAFM)

In carrying out its mandate, DAFM undertakes a variety of functions including:

- Policy advice and development on all areas of Departmental responsibility.
- Representation in international especially EU and national negotiations.
- Development and implementation of national and EU schemes in support of Agriculture, Food, Fisheries, Forestry and Rural Environment.
- Monitoring and controlling aspects of Food Safety.
- Control and audit of public expenditure under its control.
- Regulation of the agriculture, fisheries, and food industries through national and EU legislation.
- Monitoring and controlling animal and plant health and animal welfare.
- Monitoring and direction of State Bodies engaged in the following areas - research training and advice - market development and promotion- industry regulation and development-commercial activities.
- Direct provision of support services to Agriculture, Fisheries, Food and Forestry.

DAFM operates three 'public good' competitive research funding programmes for agriculture, food and forestry to support innovation and economic success across the bioeconomy. DAFM also provides support for Irish involvement in the EU Horizon 2020 research funding programme.

Value for Money

All research proposals must **build on findings and recommendations** from past and current research² projects (where relevant) and **demonstrate value for money**.

Open Access and Open Data

All projects must comply with the EPA's **Open Data** and **Open Access** rules, which are aligned with Horizon 2020 for the 2014-2020 EPA Research Programme.

Where project outputs include data and/or technical solutions (websites, developed software, database solutions etc.), the format of same **must be agreed with the EPA** to ensure that they are compatible with EPA IT infrastructure and can be maintained by the EPA after the completion of the project.

² including EPA-funded, other Irish and EU and international research projects and initiatives/activities

List of Topics

Table 1: List of topics included in the EPA Research Call 2017: Water

Call Topic Ref.	Thematic Areas and Project Titles	Max. Budget (€) per project
Safe Water		
Water 2017 Call Project 1	Detection, monitoring and risk assessment for contaminants of emerging concern in Irish receiving waters	€350,000
Ecosystem Services and Sustainability		
Water 2017 Call Project 2	Evaluating the role of riparian zones for the effective management of Irish rivers	€500,000
Water 2017 Call Project 3	Taxonomy and Genetics of Arctic char in Ireland	€150,000
Understanding, Managing and Conserving our Water Resources		
Water 2017 Call Project 4	Potential for the use of drones for the purposes of open lake water sampling	€150,000
Water 2017 Call Project 5	Remote sensing of surface waters in Ireland	€250,000
Water 2017 Call Project 6	Management of the small stream network for improved water quality and maintenance of catchment biodiversity and ecosystem services	€500,000
Water 2017 Call Project 7	A framework for implementation of targeted approaches for water and catchment management in rural areas	€500,000 To be cofunded 50:50 with DAFM

Application Process

Making an application online:

Applications must ONLY be made online at <https://epa.smartsimple.ie>

Guide to the EPA online application system:

The guide to the EPA online application system, '2017 Quick guide to the EPA online portal (making an application)', is available for download at

<http://www.epa.ie/pubs/reports/research/opencalls/currentcalldocuments/>.

What to include in the application form:

To make the best application possible, it is recommended that you read the '2017 EPA Research guide for applicants' before drafting and submitting an application, available at:

<http://www.epa.ie/pubs/reports/research/opencalls/currentcalldocuments/>.

To make an application under any of the topic areas:

Applicants must choose the correct Call Topic Reference, as indicated in this Document from the list under the OPEN Calls heading on the homepage of SmartSimple the EPA's Grant Application and Project Management system.

It is the responsibility of the **Applicants** to ensure that proposals are submitted before the **call deadline**, and of the relevant **Grant Authoriser** (i.e. Research Offices / Managing Directors for companies) to ensure that the proposals are authorised before the **organisation approval deadline**.

FAILURE TO MEET EITHER OF THE ABOVE DEADLINES MEANS YOUR PROPOSAL WILL NOT BE CONSIDERED FOR FUNDING

2. Call Content

Theme 1: Safe Water

Water quality and human health may be threatened by emerging pollutants, priority substances, endocrine disruptors and emerging risks, such as pathogens (including antibiotic resistant bacteria and viruses), cyanotoxins and nanomaterials. Key knowledge gaps remain concerning their environmental behaviour in surface water, treated waters and groundwater, and their impact on human health through the irrigation of crops, water supply, distribution and storage in rural or urban environments. In addition, water quality and supply can be threatened by climate change, natural hazards and extreme events, such as droughts and floods.

This thematic area will:

- Provide a better understanding of the fate and behaviour of new or poorly understood contaminants and their impacts on water quality with a particular emphasis on drinking and bathing waters, and on ecosystems and human health.
- Improve our resilience to climate change, extreme events and natural hazards. It will support the implementation and refinement of the relevant policies and also develop new tools and best practices in relation to water infrastructure and the prediction & management of natural hazards to ensure that economic investments in this area will result in the on-going availability and delivery of high quality water.
- Develop a better understanding of the socio-economic aspects, governance and behavioural changes associated with this area, including impact of water charges on water consumption, as well as behavioural changes.

One topic is included in this 2017 EPA Water Call under *Theme 1: Safe Water*:

2017 Water Call - Project 1	Detection, monitoring and risk assessment for contaminants of emerging concern in Irish receiving waters
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Project Title: Detection, monitoring and risk assessment for contaminants of emerging concern in Irish receiving waters

Project Type: Medium-Scale Project

*To make an application under this topic area, you must use the following **Call Topic Reference:***

Water 2017 Call - Project 1

Background:

Pollution of Irish and European waters with contaminants of emerging concern is a ubiquitous problem. Until recently, environmental regulations worldwide had not required explicit testing for these contaminants in water bodies. However, given growing concern about contamination of aquatic environment with these substances, legislation such as the Water Framework Directive (WFD) and the Environmental Quality Standards Directive (EQSD) at a European level and associated legislation at a local level has recently begun to acknowledge this potential problem. The identification of these contaminants and associated analytical methods may contribute to a possible Specific Pollutants List for Ireland under the Water Framework Directive (WFD) and the development of proposals for consideration in the future EU Watch List.

The aim of this proposed research project is to identify contaminants of emerging concern in the aquatic environment, including low-level pharmaceuticals, pesticides and Personal Care and Cosmetic Products (PCCPs) for Ireland. It may also further refine/develop new analytical methods with low appropriate levels of detection.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- A literature review of sources, receptors, extent of the issue, monitoring methods of contaminants of emerging concern including low-level pharmaceuticals, pesticides and PCCPs for Ireland in Ireland and EU.
- Developing a prioritised list of contaminants of emerging concern including low-level pharmaceuticals, pesticides and PCCPs for Ireland focusing on new Priority Substances determined as a result of the WFD Article 16 review and River Basin Specific Pollutants.
- Conducting sampling and analysis of influent and effluent at Ireland's Urban Waste Water Treatment plants (UWWTPs) representative of Irish river basin catchments, as well as the associated receiving waters.
- Existing and innovative analytical techniques for detection of these contaminants for influent and effluent at representative Urban Wastewater Treatment Plants across Ireland river basins.
- Mapping data generated onto appropriate river basin management tools for predictive and simulated determinations, working towards developing a risk assessment methodology.

Outputs arising would inform the development a possible Specific Pollutant List for Ireland. Avail of existing data to support risk assessment including use of EPA SAFER metadata. The project will add considerable value as it leverages off existing research in this area and will increase our understanding of their occurrence and levels in receiving water (creating a baseline). Ultimately, it should support existing and future WFD monitoring programmes and regulations.

Outputs from this project **MUST** build on existing research and other information. Please refer to [Section 3](#) for more information regarding EPA-funded expected outputs.

Applicants MUST consult with Irish Water before submitting their proposal to ensure that it is feasible.

Please email your draft proposal/query to research@epa.ie, who will then liaise with Irish Water.

Project Structure and Funding:

This topic is a **36-month Medium Scale** project, with an **indicative** budget of up to **€350,000** (which includes a 5% provision for communication costs³). Please refer to the **2017 Guide for Applicants** for further details.

³ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Theme 2: Ecosystem Services and Sustainability

Water demand and availability pressures, amplified by climate change (including the apparent changing frequency and severity of extreme events, such as floods and droughts) have increased the stress on water bodies and associated ecosystems. The environment does not exist in isolation; it both affects and is affected by many aspects of our lives.

Environmental resources and ecosystem services are direct inputs into the economy. The concept of ecosystem services is based upon the assumption that there is a connection between good ecological status and the provision of several benefits, such as water supply, food supply, biodiversity, landscape value, and others. It is already used by some managers and decision makers as a powerful tool for building and implementing programs of measures. Approaches using ecosystem services could therefore support the Water Framework Directive (WFD) objectives.

This thematic area will:

- Further our understanding of ecosystems context, functions and processes, and safeguard natural resources for future generations by identifying measures to help the adaptation and reaction to current and future pressures on the aquatic environment.
- Develop new tools in the field of ecological engineering and early warning systems.
- Develop a better understanding of the socio-economic aspects, governance and behavioural changes associated with this area, including issues of preservation vs. Restoration costs and the demonstration of the economic value and social benefits of aquatic ecosystem services.

Two topics are included in this 2017 EPA Water Call, under Theme 2: <i>Ecosystem Services and Sustainability</i> :	
2017 Water Call - Project 2	Evaluating the role of riparian zones for the effective management of Irish rivers
2017 Water Call - Project 3	Taxonomy and Genetics of Arctic char in Ireland

Project Title: Evaluating the role of riparian zones for the effective management of Irish rivers

Project Type: Large-Scale Project

*To make an application under this topic area, you must use the following **Call Topic Reference:***

Water 2017 Call - Project 2

Background:

Riparian zones are a significant biome in their own right, with riparian woodlands which were formerly widespread now recognised to be one of the rarest native woodland types in Ireland⁴. Centuries of landscape modification have often resulted in a significant change in the relationship between riparian areas and river channels in Ireland. Lotic⁵-riparian interactions can be complex, but it is well-established internationally and through an increasing number of national research programs that their management is essential to preserve the integrity of fluvial ecosystems and to help meet environmental objectives. The diverse range of ecosystem services and environmental benefits are generally well known and include potential reductions in sediment and nutrient discharge to watercourses, amelioration of acidification, improved river hydromorphological function, control of invasive species and climate and flood mitigation. The importance of riparian habitat has been further embedded by the Water Framework Directive (WFD) where its integrity is assessed for hydromorphology and used subsequently in classification. Recent research has demonstrated that the riparian zone has a fundamental influence on the hydromorphology of rivers and flood plains⁶.

The draft River Basin Management Plans 2018-2021⁷ highlights the importance of the physical condition of river channels and the requirement to develop and improve our understanding. It is anticipated that a key focus during this cycle of the WFD will be to build the evidence base to help define the appropriate environmental supporting conditions that are required for rivers. While basic riparian management strategies are necessary for all watercourses, water bodies will have differing requirements, depending on their natural characteristics or the presence of particular species and habitats of management concern. Lotic-riparian interactions also operate at different scales, from the catchment to intermediate and local reach scales, and individual water bodies may require intervention at one or all of these levels. In order to promote *the right measure in the right place*, it is necessary to have a full understanding of the range of ecosystem benefits from differing riparian management interventions and how to design and target these effectively.

Fencing and/or buffer strips have been the mainstay of new guidelines and for river enhancement and agri-environment schemes in Ireland for decades, because of the common sense view of the linkages between a degraded riparian and habitat quality. But riparian zone management can be a costly intervention and a lack of future management commitments can potentially offset some of the ecological benefits (e.g. tunnelling of lower order streams). A consensus on their effectiveness is somewhat limited because the performance of these measures has not always been sufficiently evaluated. Linear riparian zones can be easily bypassed, or a lack of uptake of riparian measures having a sufficient buffer distance can also diminish their effectiveness. It has been suggested that novel strategies focused on critical source areas in conjunction with a more dynamic management of watercourse boundaries could provide a more successful alternative. For example, mitigation measures are needed in the riparian zones of river water bodies in poorly drained areas, where WFD status is less than good and the significant issue is phosphate.

Empirical data to evaluate the success of previous or alternative riparian measures for a greater range of conditions and land use types in Irish catchments would be beneficial.

⁴ Native Riparian Woodlands – A Guide to Identification, Design, Establishment and Management
<http://www.woodlandsofireland.com/sites/default/files/No.%204%20-%20Riparian%20Woodlands.pdf>

⁵ *Relating to, or living in fast flowing water.*

⁶ EU FP7 Project REFORM <http://www.reformrivers.eu/>

⁷ <https://www.catchments.ie/public-consultation-draft-river-basin-management-plans-ireland-2018-2021/>

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- The international literature (with a strict relevance to Ireland) on:
 - the multiple environmental benefits of riparian zones, e.g. water quality, biodiversity, flood mitigation and greenhouse gas emissions;
 - specific environmental benefits of mitigation measures, including costs where available in riparian zones; and,
 - threats to the riparian zone from land management activities; and
 - assessment of the present state of and gaps in research for Irish conditions.
- The existing Irish legislation, national policies, guidelines and measures for relevant land uses that underpin the protection of riparian habitats, using supporting statistics, where available.
- Building on existing EPA catchment characterisation and other available datasets, to develop a national-scale model⁸ to evaluate and inform the selection of appropriate mitigation measures in riparian zones required to achieve multiple environmental benefits, e.g. water quality, biodiversity, flood mitigation and greenhouse gas emissions, in different biophysical settings.
- What are the best practice management options to prevent negative impacts and to achieve rehabilitation of the riparian zone?
- What are the most appropriate riparian zone mitigation measures that take account of biophysical setting, multiple benefits and costs?
- Based on the outcomes from the above research, undertake a limited number of field demonstrations to assess the effectiveness of i) riparian zone rehabilitation, and ii) mitigation measures in riparian zones, for different scenarios.

The outputs from the research will improve understanding of riparian management requirements for Irish rivers in individual catchment and land use contexts. It will further inform debate around agri-environment schemes and Programme of Measures (POMs) through an evaluation of the effectiveness of riparian management interventions and the provision of data to support a transparent and scientific rationale to identify susceptible water bodies, to help target POMs for the specific catchments and ecosystems where they will provide the greatest environmental benefit. The research will also provide a further opportunity to explore relevant linkages between ecological process and hydromorphology in Ireland in support of WFD implementation.

Outputs from this project MUST build on existing research and information available. Please refer to [Section 3](#) for more information regarding EPA-funded expected outputs.

Project Structure and Funding:

This topic is a **36-48 month Large Scale** project, with an **indicative** budget of up to **€500,000** (which includes a 5% provision for communication costs⁹). Please refer to the **2017 Guide for Applicants** for further details.

⁸ Any models being produced/generated from the research must be fully compatible/transferrable to the EPA by the completion of the project (i.e. post-completion transfer/maintenance of model should be taken into consideration when preparing the proposal).

⁹ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Project Title: Taxonomy and Genetics of Arctic char in Ireland

Project Type: Medium-Scale Project

*To make an application under this topic area, you must use the following **Call Topic Reference:***

Water 2017 Call - Project 3

Background:

Arctic char is one of the rarest fish species present in Ireland today. To date, this unique glacial relict has been reported in only 84 lakes across the island of Ireland. Arctic char populations occur in mainly deep cold lakes across Ireland and are at risk from numerous pressures. It is thought that they were the first freshwater fish to recolonise Ireland after the last Ice Age, more than 13,000 years ago. These early inhabitants would have been anadromous¹⁰ undertaking feeding and spawning migrations similar to the sea trout and salmon. In Ireland, they lost their anadromous behaviour sometime after the last ice age. In most cases, they are not physically landlocked as many of the lakes where they are resident support populations of diadromous¹¹ salmon and eel.

It has been confirmed that 47 of these lakes have extant populations of Arctic char, 10 lakes have an unknown population status and the remaining populations have been confirmed as extinct. Unfortunately, there has been a steady loss of these rare natural populations of Arctic char in Ireland over the last century (approximately 33%). The Irish Red list has classified the status of the Arctic char as “Vulnerable”. Of the 44 extant populations Inland Fisheries Ireland (IFI) have identified at least 11 of these to be at risk and require urgent conservation measures to prevent their extinction. To date, this species has been given little protection in Irish legislation compared to other fish species that are commercially or recreationally valuable, such as eel, salmon and brown trout. It is extremely important that conservation measures and legislation are introduced to prevent further losses and protect the species.

One of the major obstacles in assessing the threat to many fish species in Ireland (especially non-commercial ones or those not fished by recreational anglers) concerns the enormous gaps in our knowledge of their biology, taxonomy, conservation and genetics. It has long been recognised that Arctic char display an unusually high degree of variance in their physical characteristics and also in characteristics of life-history, behaviour, colouration and ecology. Researchers have found that the species exhibit levels of variability in form that are much greater than in other fish species. Considerable variation has been shown to take place between and within Arctic char populations. Researchers in Europe have demonstrated that Arctic char populations can exhibit three to four different variants or morphotypes in lakes. Each of these variants exhibits different patterns of habitat use, spawning location and timing of reproductive behaviour. Some of these populations are reproductively isolated and this can lead to genetic divergence. However, to-date limited research has been undertaken in this area in Ireland.

Each Arctic char population is usually confined to a single body of water and therefore the entire population is vulnerable to the effects of pressures, such as pollution, diseases, water abstraction, etc. Researchers have stated that the number of separate populations is more important than the number of individuals in a population. It is therefore highly desirable to have some knowledge of the genetics of the Arctic char and the degree of genetic variation within and across stocks, in order to manage this rare species, as most of the populations in Ireland have remained genetically separate since they colonised Ireland after the last Ice Age.

Arctic char are of national, international scientific and heritage interest from an ecological, genetic and evolutionary perspective. They are ideal models for monitoring climate change and are indicators of long-term water quality. They are susceptible to abstraction pressures, as their spawning grounds are at the margins of lakes. They are excellent indicator species (relevant to the Water Framework Directive and Habitats Directive) and are sensitive to the introduction of invasive or new species (locally non-native). They are present in many habitats of oligotrophic vegetation included in the Annex I of the Habitats

¹⁰ *Ascending rivers from the sea for breeding.*

¹¹ *Migratory between salt and fresh waters.*

Directive and are considered one of the type specific indicator species for these habitat types. Their population trends can provide valuable evidence as to an ecosystems health and balance.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- The taxonomic status of Irish Arctic char populations.
- The genetic variation between Irish Arctic char populations.
- The genetic variation within populations and investigate if polymorphism exist in Irish lakes.
- The relationship, if any, between the environmental pressures and the genetic variations.
- Combining field and experimental studies on sympatric¹² morphs (if they exist in Ireland).
- Using phenotypic and genetic variation to determine conservation value of Arctic char in Ireland.
- Carrying out an economic analysis of the potential loss of Arctic char populations.

The proposed project would run in tandem with IFI's national monitoring programmes and mainly use samples already collected and archived. Some additional fieldwork could be undertaken in a limited number of lakes in collaboration with IFI. It is essential that this project be carried out in close linkages with IFI and the EPA.

Applicants MUST consult with IFI before submitting their proposal to ensure that it is feasible. **Please email your draft proposal/query to research@epa.ie, who will then liaise with IFI.**

Outputs from this project MUST build on existing research and information available. Please refer to [Section 3](#) for more information regarding EPA-funded expected outputs.

Project Structure and Funding:

This topic is a **36-month Medium Scale** project, with an **indicative** budget of up to **€150,000** (which includes a 5% provision for communication costs¹³). Please refer to the **2017 Guide for Applicants** for further details.

¹² Originating in or occupying the same geographical area.

¹³ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Theme 4: Understanding, Managing and Conserving our Water Resources

This thematic area will contribute to better use and protection of water resources, by gaining a better understanding of (i) the potential impacts of human activities, such as abstractions, discharges and land-use on groundwater, rivers, lakes, estuaries and coastal waters; (ii) the views of local communities and the ways of encouraging behavioural change; and (iii) the means of minimising these impacts. Particular attention will be given to pressures on water arising from agricultural activities. Regulatory measures are essential tools to ensure compliance with environmental standards of water quality and quantity. Understanding the mechanisms leading to improved water management will lead to better policy design, implementation and adaptation.

This thematic area will:

- Further an integrated approach to water management by improving our understanding of the impact of pressures on water quality and quantity, looking at adaptive water management approaches, as well as socio-economic issues.
- Promote the concept of water foot-printing while increasing water resource efficiency and reducing water pollution.
- Strengthen socio-economic approaches to conserve our water resources, covering governance issues, such as public participation and decision-support systems (DSS), as critical tools to integrate scientific knowledge into decision-making and facilitating buy-in/ policy acceptance from the public.
- Deal with socio-economic considerations and practical measures for mitigating the impacts of pressures.

Four topics are included in this 2017 EPA Water Call, under *Theme 4: Understanding, Managing and Conserving our Water Resources*:

2017 Water Call - Project 4	Potential for the use of drones for the purposes of open lake water sampling.
2017 Water Call - Project 5	Remote Sensing of Surface Waters in Ireland.
2017 Water Call - Project 6	Management of the small stream network for improved water quality and maintenance of catchment biodiversity and ecosystem services.
2017 Water Call - Project 7	A framework for implementation of targeted approaches for water and catchment management in rural areas.

Project Title: Potential for the use of drones for the purposes of open lake water sampling
Project Type: Medium-Scale Project
*To make an application under this topic area, you must use the following **Call Topic Reference:***
Water 2017 Call - Project 4

Background:

There are currently 378 open water lake sites that are required to be sampled in accordance with the Water Framework Directive (WFD) National Lake Monitoring programme. Open lake water sites are those that require the use of a boat. In many cases, access to lakes can be a problem with the lack of slipways, etc. Sampling of lakes is also very expensive and resource intensive, given the need for boats of different sizes for small and large lakes. There are also significant health and safety risks associated with boat sampling. The purpose of this project is to assess if the use of drones could be a potential solution to these challenges. The research would need to ascertain if the drones could make use of GPS technology to take samples at designated sampling locations, take water samples using containers of various sizes, as well as take field measurements (where appropriate) at the time of sampling.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- Investigation of the current potential of drone technology for the purposes of water sampling.
- Determination if current technology can be adapted to meet current WFD lake sampling requirements, including consideration of multi-depth sampling.
- Assessment of the drone's capacity for taking field measurements, e.g. temperature, dissolved oxygen, pH, conductivity etc. The results of the field measurements are to be validated with standard monitoring techniques.
- Examination of remote data management possibilities for in-situ field measurements.
- Based on the outcomes of the above research, undertake a field demonstration to further evaluate the potential to replace the use of boats with drones for surface water body, as well as turlough sampling.

The research and its expected outputs would provide the evidence regarding the potential use of drones as a more cost effective, less labour intensive and safer WFD lake sampling programme.

Outputs from this project **MUST** build on existing research and information available. Please refer to [Section 3](#) for more information regarding EPA-funded expected outputs.

Project Structure and Funding:

This topic is a **24-36-month Medium-Scale** project, with an **indicative** budget up to **€150,000** (which includes a 5% provision for communication costs¹⁴). Please refer to the **2017 Guide for Applicants** for further details.

¹⁴ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Project Title: Remote Sensing of Surface Waters in Ireland

Project Type: Medium-Scale Project

*To make an application under this topic area, you must use the following **Call Topic Reference:***

Water 2017 Call - Project 5

Background

The Water Framework Directive (WFD) requires the monitoring of water bodies for ecological status. A key component of this is the level of phytoplankton growth in standing waters, traditionally indicated by the concentration of chlorophyll *a*. The large number of lakes in the country (12,000) means that only a small proportion can be included in the National Lake Monitoring programme (220). A similar situation exists for transitional and coastal waters (TRAC). In addition, the seasonal and spatial resolution of data could currently be improved on in lakes and TRAC. For lakes, one of the WFD-required components: the frequency and intensity of blooms, is currently not assessed, and remote sensing could provide a cost-effective solution to this.

Recently the European Commission has launched the COPERNICUS programme with new generation satellites designed to detect environmental change launched in 2016 at a cost of over 6 billion. At EU level, the 4-year EU FP7-SPACE INFORM¹⁵ project aims to develop novel and improved user-driven products for inland water quality monitoring by using innovative remote sensing methods integrated into biogeochemical models which fully exploits the improved spectral, spatial and temporal capabilities of upcoming Earth Observation missions. Initial research from this new data has indicated that chlorophyll *a* and other parameters can be estimated from the latest high resolution imagery. This has the potential to change the paradigm of aquatic monitoring in Ireland.

This project could examine the suitability of the raw and processed data from the COPERNICUS programme for use for monitoring of Irish surface water bodies and production of GIS maps.

Objectives & Expected Outputs:

Proposals submitted under this topic could consider:

- Collation and alignment of existing data on Irish lakes, TRAC and other open water surfaces that matches satellite overpass and availability of cloud-free imagery on a seasonal basis.
- The range of water quality parameters feasible to be predicted – such as chlorophyll *a* (key focus on a seasonal basis), phytoplankton bloom occurrence and intensity, phytoplankton groups, colour, DOC, suspended sediment, presence and depth of stratification.
- Calibration and validation of remote sensing estimates for a range of parameters building on the [INFORM](#) project.
- Field validation/ground truthing, including in-situ radiometric measurements for atmospheric correction to improve estimates where needed.
- Developing a clear and user friendly data-handling process of image capture and parameter estimation (including GIS protocol) that could be incorporated into future operational water monitoring programmes in Ireland¹⁶.
- Estimation of parameters for the unmonitored population of lakes and TRAC waters seasonally.
- The use of citizen science projects and catchment group interest in local water body data and how it could inform the potential dissemination of the project outputs

The research and its expected outputs would develop a suitable methodology to gather information on the ecological quality of the very large proportion of Irish lakes and TRAC water bodies that are unmonitored. This could result in a very cost-effective way of assessing the unmonitored lakes in the future as the remote sensing imagery provided by COPERNICUS is free. It will also allow wide-scale estimation of colour and DOC, the loss of which has been increasing as a result of climate change. The funding of the research will ensure

¹⁵ <http://inform.vgt.vito.be/content/home>

¹⁶ Any models being produced/generated from the research must be fully compatible/transferrable to the EPA by the completion of the project (i.e. post-completion transfer/maintenance of model should be taken into consideration when preparing the proposal).

that Ireland capitalises on its substantial investment into the COPERNICUS programme and also better meets its requirements under the WFD – especially regarding the frequency and intensity of algal blooms, which have socio-economic and health implications¹⁷.

Outputs from this project MUST build on existing research and information available. Please refer to [Section 3](#) for more information regarding EPA-funded expected outputs.

Project Structure and Funding:

This topic is a **24-36-month Medium-Scale** project, with an **indicative** budget up to **€250,000** (which includes a 5% provision for communication costs¹⁸). Please refer to the **2017 Guide for Applicants** for further details.

¹⁷ <http://www.sciencedirect.com/science/article/pii/S1568988316300300>

¹⁸ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Project Title: Management of the small stream network for improved water quality and maintenance of catchment biodiversity and ecosystem services

Project Type: Large-Scale Project

*To make an application under this topic area, you must use the following **Call Topic Reference:***

Water 2017 Call - Project 6

Background:

Worldwide, there is growing interest in the role of small water bodies, such as springs, headwater streams, ponds, small lakes and ditches, in catchment water quality protection, local and regional biodiversity and provision of ecosystem services. Small streams are particularly important in terms of their influence on downstream water quality and their contribution to catchment biodiversity. They constitute a high proportion of the river network (77% in Ireland) and due to their high water-land interface are particularly vulnerable to anthropogenic inputs and climate change.

The draft River Basin Management Plans 2018-2021 proposes to establish a “Blue Dot Catchments Programme”: a network of river and lake catchments where the objective is to protect and restore high ecological status. These small streams, in some cases, are at high ecological status and therefore the research could inform the work of this programme. Hydrological dynamics and modelling of flow-chemistry-ecology interactions are important to gain a deeper understanding of critical time periods for ecosystems.

In terms of biodiversity a primary need is to further document the biological diversity of headwaters/small streams and the spatial population dynamics of species within stream networks, including the relative importance of environmental factors and links to other aquatic and terrestrial habitats. There is a need to better understand the environmental conditions, which support the high regional biodiversity of some biological groups—e.g. macro invertebrates. Studies have typically been developed through an upstream/downstream paradigm, but interactions across landscapes may be as important. This information would inform management of catchment biodiversity.

The aquatic communities of short coastal streams are also largely unknown in much of Western Europe, including Ireland. Their contribution to migratory fish production (sea trout) and coastal fisheries is likely to be very important. Here again, this information would inform measures to protect these benefits.

Objectives and Expected Outputs:

Proposals submitted under this topic could consider:

- The scientific understanding of the contribution of headwaters/small streams (generally zero to 2nd order streams) to the physical, chemical and biological integrity of downstream waters and to catchment ecosystem services.
- The effects of nutrient processing (autotrophic and heterotrophic uptake), cycling and export of nutrients in headwaters on nutrient status further downstream.
- How hydrological and habitat alteration of headwaters affects ecological processes in the larger catchment to inform their management.
- The level of intervention in SWBs required to have a measurable effect throughout a catchment on both water quality and quantity, and overall delivery/maintenance of ecosystem services.
- The impact of climate on hydrological and physico-chemical conditions and ecological processes in small streams.
- How engagement of citizen science in small stream monitoring could complement the activities of Local Authority Water and Communities Offices (LAWCO) and raise overall awareness of the importance of small streams?
-

The research and its expected outputs would clearly identify the role of small streams in overall catchment water quality and support efforts to meet the WFD objectives, in particular for the protection and restoration of high status sites. In terms of biodiversity, address significant knowledge gaps relating to aquatic biodiversity in small streams and support efforts to meet regulatory targets. For example the European Commission communication ‘A Blueprint to Safeguard Europe’s Water’ (EC 2012) strives to halt

increasing deterioration in water quality, associated loss of biodiversity and degradation of ecosystem services in the EU by 2020. The EU Biodiversity Strategy headline target is to halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restore them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss. Inform measures and management options for protection of both water quality and biodiversity in the small stream network.

Outputs from this project MUST build on existing research and information available. Please refer to [Section 3](#) for more information regarding EPA-funded expected outputs.

Project Structure and Funding:

This topic is a **36-48-month Large Scale** project, with an **indicative** budget of up to **€500,000** (which includes a 5% provision for communication costs¹⁹). Please refer to the **2017 Guide for Applicants** for further details.

¹⁹ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

Project Title: *A framework for implementation of targeted approaches for water and catchment management in rural areas*

Project Type: Large Scale

*To make an application under this topic area, you must use the following **Call Topic Reference:***

Water 2017 Call - Project 7

This topic is cofunded with the Department of Agriculture, Food and the Marine.

Background:

Mitigation measures to control water pollution by agricultural activities are largely implemented at farm-scale in Ireland. The existing ‘one size fits all’ national measures, such as those in the Good Agricultural Practices Regulations, are mainly applied and commonly seen by farmers as a compliance issue. This “push” approach to farmer adoption of the measures can often generate negative perceptions. Farmers are aware of the within and between farm variations that exist because of the bio-physical (e.g. soil/subsoil/bedrock drainage capacity, sensitivity of ecosystems), socio-economic and farming system characteristics. More recently, research and demonstration projects are providing evidence on the “pull” approach, where farmers actively engage in the implementation of measures because they understand the benefits of implementation in terms of increased production efficiency leading to profitability and improving the quality of their natural capital.

A sense of urgency for a change in approach to the current knowledge exchange process to ensure the implementation of best practice on farms has been recently added by the Government’s new strategy for the agri-food and bioeconomy sector, Food Wise 2025. It clearly states that its ambitious targets for primary production in agriculture must be built on the twin pillars of economic competitiveness and environmental sustainability. This is commonly referred to as sustainable intensification (SI). Indeed, the achievement of environmental sustainability is set against a background of national legally binding and time limited obligations, including those of the Water Framework Directive (WFD).

Significant research has been conducted over the last two decades leading to the development of the measures required to reduce contaminant losses from agriculture to water. However, the research has identified the need to target their implementation to reflect the bio-physical setting. The research includes EPA-funded PATHWAYS project²⁰, the Agriculture Catchment Programme (ACP)²¹, the EPA Catchment Characterisation Tool²², Diffuse Pollution Risk Mapping, source apportionment models, Teagasc Heavy Soils programme²³ and Phosphorus Risk Indexes.

The new EPA Pollution Impact Potential maps can now be used to locate and focus investigative assessments on critical source areas (CSAs) within the areas of catchments where the water quality is unsatisfactory. The implementation of customised measures in these areas is likely to be essential as a means of achieving the WFD objectives. The application of existing measures within the remaining catchment area is currently considered to be sufficient to meet water quality targets and is being evaluated by the ACP. However, the implementation and operation of this “new” approach (targeting measures to potential CSAs) will create a significant challenge for researchers, policy makers, advisers and farmers.

There has been no incentive or policy driver in Ireland to delineate CSAs and use them to focus measures. The challenge and urgency of the WFD requires research into the development and establishment of an operational framework for the implementation of targeted measures in CSAs that is preferably community-based, and will involve all catchment stakeholders, national institutional structures and policy makers with the objective of achieving Food Wise 2025 SI targets with a particular focus on the WFD objectives.

Objectives and Expected Outputs:

Proposals submitted under this topic could consider

²⁰ <http://erc.epa.ie/smartsimple/displayFullProjectDetails.php?internalID=9>

²¹ <http://www.teagasc.ie/aqcatchments/>

²² <http://erc.epa.ie/safer/iso19115/displayISO19115.jsp?isoID=196>

²³ <http://www.teagasc.ie/heavysoils/>

- What operational framework and associated approaches can be employed that take account of farmer viewpoints, the potential of incentives and the administration and advisory support, as a means of ensuring effective mitigation measures (national and targeted), both in terms of environmental protection and costs?
- What are the administrative, operational, practical and behavioural barriers to implementation of both national and CSA-based measures at farm- and catchment-scale, and how can they be overcome?
- What are the different cohorts of farmers as regards compliance with environmental legislation and if different methods are needed to engage these different cohorts?
- What is the role of knowledge exchange and what are the approaches needed to ensure that it takes place and is effectively monitored? In considering the role of knowledge exchange, the information in the *AgImpact Project Report*²⁴ should be evaluated.
- How can existing tools/methods that enable targeted approaches be used to cost effectively target mitigation measures at agriculture diffuse and small-point sources in catchments across a wide geographical area?
- What administrative, operational and practical costs need to be taken into consideration when implementing these tools/methods?
- What mechanisms exist nationally that would enhance the establishment of an operational framework and how would this project be linked to such mechanisms?

The outputs of this work would be the establishment of a demonstration framework, with operational guidelines and a five-year roadmap based on using targeted measures as a means of successful integrated catchment management²⁵. While the emphasis is on considering targeted measures, this framework and approaches should take account of the need to make the existing measures more effective. The involvement of key stakeholder representatives will be critical.

This project will require, at a minimum, an integrated team of socio-economic and bio-physical scientists, to successfully carry out the research.

Outputs from this project MUST reference and build on existing research and information available such as the EPA/Teagasc-funded Irish Soil Information System (<http://gis.teagasc.ie/soils/>) and the activities of the National Rural Network (<http://www.nationalruralnetwork.ie/>). Please refer to **Section 3** for more information regarding EPA-funded expected outputs.

Project Structure and Funding:

This topic is a **36-48-month Large Scale** project, with an **indicative** budget of up to **€500,000** (which includes a 5% provision for communication costs²⁶). Please refer to the **2017 Guide for Applicants** for further details.

²⁴ <http://www.epa.ie/pubs/reports/research/water/researchreport175.html>

²⁵ Daly, D., Archbold, M. and Deakin, J. 2014. Water Framework Directive implementation and integrated catchment management. Where are we now? Where are we going? An EPA view. Proceedings of National Hydrology Conference, 2014. Proceedings available at: <http://www.opw.ie/hydrology/>.

²⁶ For example, a €100,000 grant award is made up of €95,000 for project costs, and €5,000 for communication costs (€3,000 of which relates to communication activities and events which take place over the lifetime of the project and €2,000 which relates to post completion dissemination costs).

3. Expected Outputs

For all projects submitted under the 2017 Water Call, **expected outputs include, but are not limited to:**

- **Final Report**, which should provide a clear and detailed account of all the steps and methodologies used during the project and ensure that the objectives, set out above, are met – including recommendations.
- **Synthesis Report** (20-30pp), which provide a clear non-technical summary of the research and of the recommendations.
- **Dissemination 2-pager**, which will be used to disseminate the findings of the research to the key stakeholders.
- **Workshop/Dissemination event(s)** to all stakeholders in the relevant arena (e.g. Policy, monitoring, regulatory, NGOs, media, public, etc.).

The list provided above is indicative and relevant alternatives will be considered. Please consult the **2017 Guide for Applicants, 2017 Guide for Grantees** and the **EPA Terms and Conditions of award** for the full list of interim and final reporting requirements.

In addition for the topic cofunded with the Department of Agriculture, Food and the Marine (DAFM), the successful project will be required to fully acknowledge the sources of funding, as well as clearly use the funders' logos on all outputs.

A **dedicated website/webpage/Twitter account** should be created and maintained, presenting the project and work carried to-date.

It is also expected that a number of **dissemination outputs**, such as posters, leaflets, newsletters, policy briefs, peer-reviewed publications and presentations, will arise from the projects.

It is essential that applicants clearly demonstrate, in their proposal, the **policy-relevance** of the outputs of their proposed research; the **applicability** of their findings; and how these outputs address a knowledge-gap and can be **efficiently transferred/applied to the implementation** of water-related policies and the protection of our water resources.

4. Indicative Timeframe

5th May 2017:	Call Opening
26th June 2017 (5pm):	Deadline for queries relating to the technical contents of this call
3rd July 2017 (5pm):	Deadline for submission of applications by applicants
14th July 2017 (5pm):	Organisation Approval Deadline for authorisation by Research Offices
July/September 2017:	Evaluation Process
September/October 2017:	Negotiation²⁷
November 2017:	Grant Award of Successful Projects

²⁷ The EPA may consider calling the shortlisted applicants for interview at this stage.

5. Further Information

Information on current research projects being supported by the programme is available in the Research Section of the EPA web site (www.epa.ie/researchandeducation/research).

Alternatively, for further information on this call, please contact research@epa.ie

Follow us on Twitter [@eparesearchnews](https://twitter.com/eparesearchnews) to keep up-to-date with all of our activities

Additional Documents available from the EPA website:

<http://www.epa.ie/pubs/reports/research/opencalls/currentcalldocuments/>

- *2017 EPA Research Guide for Applicants*
- *2017 EPA Research Guide for Grantees*
- *2017 EPA Research Terms & Conditions for Support of Grant Awards*
- *2017 Quick guide to the EPA on-line portal (How to make an application)*
- *EPA's Open Data and Open Access Rules*

All queries MUST be submitted to research@epa.ie .

All queries, other than on the submission process, should be submitted by the 26th June 2017, 5pm at the latest. No queries will be entertained afterwards.