CONSULTATION

Response Document

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Significant Water Management Issues for Scotland

(Scottish Environment Protection Agency)

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Introduction to CIEEM

The Chartered Institute of Ecology and Environmental Management (CIEEM), as the leading membership organisation supporting professional ecologists and environmental managers in the United Kingdom and Ireland, welcomes the opportunity to comment on this consultation.

CIEEM was established in 1991 and has over 6,000 members drawn from local authorities, government agencies, industry, environmental consultancy, teaching/research, and voluntary environmental organisations. The Chartered Institute has led the way in defining and raising the standards of ecological and environmental management practice with regard to biodiversity protection and enhancement. It promotes knowledge sharing through events and publications, skills development through its comprehensive training and development programme and best practice through the dissemination of technical guidance for the profession and related disciplines.

CIEEM is a member of:

- Environmental Policy Forum
- IUCN – The World Conservation Union
- Professional Associations Research Network
- Society for the Environment
- United Nations Decade on Biodiversity 2011-2020 Network
- Greener UK
- Irish Forum on Natural Capital (working group member)
- National Biodiversity Forum (Ireland)
- The Environmental Science Association of Ireland

CIEEM has approximately 600 members in Scotland who are drawn from across the private consultancy sector, NGOs, government agencies, academia and industry. They are practising ecologists and environmental managers, many of whom regularly provide input to and advice on land management for the benefit of protected species and biodiversity in general.

We welcome the opportunity to participate in this consultation and would be happy to be involved in the development process. Please contact Jason Reeves (CIEEM Head of Policy and Communications) at JasonReeves@cieem.net with any queries.

Comments from CIEEM

General Comments

The River Basin Management Plans (RBMPs) provide a good and ambitious framework for improving and protecting Scotland's water environment. The plans also present real opportunities for synergistic partnerships to deliver multiple benefits for the water environment, economy and society. We would like to see clear consultation with communities and NGOs through the development of RBMPs and prioritising of actions, especially on a landscape scale and through a catchment systems approach. Without resource and the will from partners, the RBMPs are at risk of remaining unused 'roadmaps'. It would be good to see how the Sector plans link in with RBMP in helping to deliver

protection and improvement of the water environment across the full range of ecosystem services and capitals. Also, it is good to see integration with the UN Sustainable Development Goals and the Scottish Government's National Outcomes.

It is reassuring to see evidence of successful and innovative measures having been implemented and the real improvements as a result of these. Scotland's leading approach in dealing with rural diffuse pollution through identifying priority catchments and farm visits is making a real difference on the ground. Compliance with the diffuse pollution general binding rules (GBRs) has increased in some catchments from 26% initially to 95% after revisits.

Some aspects of SEPA's monitoring programme have shown areas of improvement, for example, assessments of hydro-power impacts. However, as with other statutory agencies there have been dramatic reductions in monitoring, especially with ecological survey work, and this is a real cause for concern. With climate change, long-term monitoring of water temperature and flow changes and the associated ecological impacts is even more imperative, and these aspects of monitoring should be ring-fenced against future funding cuts.

Although aspects of new technologies such as eDNA have the potential to support SEPA's goal of protecting Scotland's environment by characterising ecosystems, detecting threats, and assessing harm to the environment, it cannot be at the expense of ecological monitoring. Investment in genetic monitoring should be seen to complement existing types of ecological monitoring or to be used in particular aspects such as aquaculture. Good interpretation is essential if the most value is to be achieved from what will be vast amounts of data.

Despite the progress being made, there are concerns that aspects of the plan are not ambitious enough and elements need to be strengthened to deal with the increased pressure on Scotland's water environment. For example, there are no measures planned for invasive non-native species (INNS) in the third cycle and the language used around 'avoiding' rather than 'preventing' deterioration indicates a lack of commitment. We would like to see greater emphasis given to catchment-scale approaches to climate change, INNS and diffuse pollution.

'Scotland's water environment 2019: A summary and progress report' shows the state of the water environment mid-way through the second RBMP cycle. Overall improvements were shown to have increased by only 2.2% from 63.5% to 65.7% since the beginning of the cycle. With less than 2 years of the 2nd cycle left, there is still a long way to go to meet the ambition of 71.2% of water bodies being in good or better condition by 2021. Considering resources allocated towards this, we hope to see significant improvements and a greater ambition for targets in the future to address the remaining 29% of waterbodies.

Scottish Ministers expect all remaining environmental targets to be met by 2027. There are concerns that this is unachievable. Most of the improvements still to be made are to the 'difficult to address' water bodies, and many of these have been left until the third RBMP cycle. A review and publication of the main barriers to improvement and identification where joint working with other bodies may assist in the achievement of these goals would be welcomed.

Improving water bodies that are impacted by physical modifications, including fish barriers, will entail major civil engineering works that can take several years to complete. There is a risk of leaving the lower priority water bodies until a later phase of the programme and missing their objectives by 2027. There is a limited number of specialists experienced in this type of work, leading to over-reliance on the same specialists to deliver improvements to physically modified rivers, fish barriers and hydro-power easement schemes. This presents a real risk of missing the 2027 targets.

There is also a risk that by prioritising those water bodies where SEPA are confident that measures are needed, those with lower priority will also be at risk of missing the 2027 deadlines.

Consultation Response

Do you think we have identified the most important issues that are impacting on our water environment in Scotland?

Water scarcity

Drought conditions are likely to become more common and more severe under a changing climate, leading to continued conflicting interests in catchments with several different types of water users[1]. This must be managed to ensure resilience is maintained. 'Scotland's water environment 2019: A summary and progress report' states there are no actions for agricultural irrigation in the third cycle as they are predicted to have been addressed by 2021. There are concerns that the 'flexible and responsive' regulatory controls to deal with rapidly progressing low flows may not go far enough to safeguard resilience for food production.

It is crucial that there is greater linkage to the Scottish Land Use Strategy and Scottish Forestry Strategy to deal with water scarcity[2]. Different land uses can dramatically affect demands on water use and land use choices will need to be made to build resilience against prolonged periods of low rainfall[3]. For example, crops with lower irrigation needs and tree species with low evapotranspiration rates will need to be selected in areas of Scotland that are most at risk of drought[4]. It must be recognised that the impacts of climate change are different across Scotland and different strategies will need to be applied. The east coast of Scotland is predicted to be most affected by more frequent and severe periods of water scarcity and in addition, these areas have a high population density and agricultural land cover.

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[1] Voski, A. (2019). Implications of Water Scarcity on Aquatic Resource Management and Ecosystem Services in Scotland. DOI: 10.13140/RG.2.2.10824.37128.

[2] Waajen,A.C. (2019). The increased risk of water scarcity in Scotland due to climate change and the influence of land use on water scarcity: issues and solutions. ClimateXChange Report. https://www.climatexchange.org.uk/media/3680/cxc-water-scarcity-climate-change-and-land-use-options.pdf

[3] Brown, I., Towers., Rivington, M. & Black, H.I.J. (2008). Influence of climate change on agricultural land-use potential: adapting and updating the land capability system for Scotland. *Climate Research*, **37**, 47-57. DOI: 10.3354/cr00753.

[4] Brown, I., Dunn, S., Matthews, K., Poggio, L., Sample. J. & Miller, D. (2012). Mapping of water supply-demand deficits with climate change in Scotland: land use implications, CREW report 2011/CRW006

There is also a potential link to the National Planning Framework 4. In our response to the call for ideas[5], we called for localisation of production of goods and services, such as local food production for communities and energy production and distribution. This would result in significant changes in water demand in urban areas away from traditional farmland areas.

There are concerns that low flows and associated increased water temperature will have a detrimental effect on fisheries and aquatic biodiversity (see comments under rural land use and restoring resilience). As well as low flows impacting on temperature, low flows may prevent migratory fish movement and impact aquatic invertebrates. Identification of habitats and species, such as the freshwater pearl mussel that are particularly vulnerable to water scarcity, need to be considered and reviewing designated natural heritage sites and features that might be most at risk from water scarcity needs to be ongoing in collaboration with SNH, River Trusts and fishery boards.

There needs to be close co-operation with local authorities on water scarcity due to the high number of rural properties in Scotland that are on private water supplies. Climate change is likely to cause issues in areas that have not previously experienced water scarcity. The severity of impacts in previously impacted areas, such as the East coast of Scotland, is likely to increase, so communication channels and support needs to be in place for these scenarios.

SEPA's National Water Scarcity Plan[6] should be re-visited in light of the monitoring data that SEPA collects during extensive dry periods to understand the impact of low flows and our increased knowledge of climate change in Scotland and regional differences in predicted rainfall.

Although initiatives have been set up in SEPA to monitor water scarcity impacts, such as asking people to e-mail **LowFlowImpacts@sepa.org.uk** to inform about dry private water supplies, dead fish, rivers with isolated pools etc., plus water scarcity reports and drought risk assessment tools, people are largely unaware of these resources. Therefore, raising public awareness and a citizen science approach would help generate useful data to supplement monitoring that SEPA is undertaking plus raise the profile of this issue and what members of the public can do. SEPA in conjunction with Scottish Water and the Scottish Government should implement an awareness raising campaign to increase understanding of the intrinsic value of water resources and ways everyone can utilise water more efficiency.

Waste water discharges

Septic tanks and privately owned waste water treatment systems are not controlled by Scottish Water and responsibility for maintenance and upgrade falls to the private owner. Poorly maintained systems will continue to have the potential to cause local and diffuse pollution issues and action is needed to improve monitoring and regulation in these cases.

Combined Sewer Overflow (CSO) improvements are required to reduce pollution during storm events. These types of improvements require expensive engineering projects which lie with Scottish Water and ultimately, the public purse. A programme to deliver the

[5] https://cieem.net/resource/national-planning-framework-4-call-for-ideas-response/

[6] SEPA (2015). *Scotland's National Water Scarcity Plan* https://www.sepa.org.uk/media/219302/scotlands-national-water-scarcity-plan.pdf.

improvements required needs to be properly planned and phased. There is currently the risk that some target deadlines will not be met by 2027.

We are pleased to see that source control plans and initiatives are under development to reduce the amount of pollutants reaching the water environment in the first place. This will reduce the energy required in treating waste water. However, they are voluntary measures that not all businesses, retailers etc. will implement. Monitoring of uptake of the initiatives will be required to assess if more stringent measures are required. We are, however, concerned that using language such as 'it will take time for these initiatives on source control to take effect' demonstrates a lack of urgency. There is also a risk that some water bodies will miss the 2027 deadline.

It is reassuring to see that, in some cases, waste products are being viewed as a potential resource rather than a waste. There will still be energy use associated with producing a useful product but this may be an acceptable trade-off as energy may be lower than the energy required to treat and return to the water environment. This fits well with the Scottish Government's Circular Economy Strategy for Scotland[7].

Again, climate change needs to be built into this as during low flow events, there is reduced dilution capacity in rivers and, as a consequence, the concentrations of pollutants and discharge can increase markedly. Equally, high rainfall events and localised flooding can also cause issues such as bank erosion and loss of bankside habitats.

Rural land use

Scotland's well-regarded approach to addressing rural diffuse pollution is demonstrating real improvements to the water environment through good partnership working and innovative measures. For example, it has been essential in priority catchment work. A greater emphasis on a catchment-wide approach would be welcomed.

Concerns around structural and ecological integrity remain, particularly surrounding loss of bank cohesion due to poaching by livestock, loss of root material which may contribute to bank erosion, soil and nutrient loss into the aquatic environment. This is of particular concern for freshwater species such as freshwater pearl mussel that are unable to tolerate these conditions. Macroinvertebrates and salmonid eggs are also intolerant of increased sedimentation.

Fungal mycelial networks can impart a great deal of cohesive strength to soils as well as acting as bioremediators, but runoff can overwhelm and deplete soil fungi particularly when it contains nitrogen fertilisers and, or pesticides.

It is reassuring that a shift towards more efficient resource use is being promoted through nutrient and soil management planning. While this more sustainable use of land will help protect soils and improve water quality, there are concerns that it will not be enough to achieve the improvements required. Again, there is a risk that these water bodies will miss 2027 deadlines.

[7] Scottish Government (2016) Making Things Last: a circular economy strategy for Scotland. https://www.gov.scot/publications/making-things-last-circular-economy-strategy-scotland/pages/2/

Restoring resilience in physically modified rivers

There are multiple benefits to be gained from restoring resilience in physically modified rivers, including improved public amenity, health and well-being, flood risk management and intrinsic ecological benefits.

Nature-based techniques used as part of river restoration projects will help improve bank cohesion and reduce soil erosion and nutrient inputs. For example, restoring meanders in previously straightened rivers and reconnecting rivers with natural floodplains allows for increased flow variability, deposition of sediment and reduced flooding events downstream. This increases resilience and availability of habitats.

Bank stabilisation can also be achieved using nature-based solutions, for example, using root wads. An example of this is shown by the River Restoration Centre, where willow root wads were installed in a highly mobile area of the River Dulias in Wales, successfully reducing fine sediment levels in the river[8]. Riparian tree planting will also help with shading to reduce impacts of high temperatures on the water environment. Evidence from analysis of a 105-year data set of river temperatures on the River Spey have shown that river temperatures are warming, especially since the 1960s[9]. Scottish rivers are thought to be particularly susceptible to such change, with an increase of 2°C or more predicted by 2050 for rivers in the Scottish Highlands[10].

Monitoring of the potential for adaptation measures to minimise these impacts such as riparian tree planting, controlling of abstractions and river restoration should be built into SEPA's monitoring programmes. The importance of riparian buffer strips for example has been recently highlighted[11] and there are fantastic opportunities for SEPA to engage with other partners such as the River Dee Trust, alongside the Dee District Salmon Fishery Board in their ambitious £5.5 million project[12] to plant alder, willow, rowan, birch, aspen and Scots pine along the tributaries of the River Dee to mitigate against rising river temperatures especially in upper reaches of the catchment to help tackle the decline in salmon numbers. Knowledge from this can be used to inform the strategic direction of catchment management under climate change.

We would welcome the use of biodiversity enhancement principles in designing riparian habitats. We have produced a briefing on '*Biodiversity Net Gain (BNG) in Scotland'*[13] which provides further detail, as well as producing the first UK principles on delivering BNG, together with the Construction Industry Research and Information Association (CIRIA) and

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[8] The River Restoration Centre (2013) *Manual of River Restoration Techniques,* Chapter 4.8 *Bank Protection using Root Wads.* Available at: https://www.therrc.co.uk/MOT/Low-res/2013_Update_2.pdf.

[9] Pohle, I., Helliwell, R., Aube, C., Gibbs, S., Spencer, M. & Spezia, L. (2019). Citizen science evidence from the past century shows that Scottish rivers are warming. *Science of the Total Environment*, **659**, 53-65.

[10] Cappell, R., Tetzlaff, D.& Soulsby, C. (2013). Will catchment characteristics moderate the projected effects of climate change on flow regimes in the Scottish Highlands?. *Hydrological Processes*, **27**, 687-699. doi: 10.1002/hyp.9626 .

[11] Cole, L., Stockan, J. & Helliwell, R. Managing riparian buffer strips to optimise ecosystem services: A review. *Agriculture, Ecosystems and Environment*. **296**, https://doi.org/10.1016/j.agee.2020.106891

[12] http://www.riverdee.org.uk/news/2020/a-million-trees-to-save-our-salmon

[13] CIEEM (2019) *Biodiversity Net Gain in Scotland*. Available at: https://cieem.net/resource/biodiversity-net-gain-in-scotland-briefing/ (accessed: 23/03/2020)

the Institute of Environmental Management and Assessment (IEMA)[14]. Further guidance has now been published to help professionals and UK industry address this challenge and to achieve 'Net Gain' targets for biodiversity[15]. We believe that the approach could be successfully applied as part of an integrated land use strategy.

We would also welcome clearer standards on appropriate riparian vegetation buffer widths.

Creation of deeper pools can provide a refuge for aquatic invertebrates during low flow conditions. Creation of *in situ* artificial refugia such as deep pools and preserving certain bank structures e.g. undercut banks, as habitats for freshwater species would be welcomed at the restoration project stage. These would help to mitigate higher water temperatures[16].

Natural solutions such as beaver reintroduction can be variable in terms of reducing water temperatures but could increase heterogeneity of refugia available. We also recognise that reintroduction of beaver may not be appropriate in some catchments.

We note that the focus is just on rivers, not on lochs or coastal water bodies but this may be reflective of prioritising waterbodies for improvement. Appropriate river basin management or catchment management must include these bodies as well as rivers.

There are concerns that delivery of the level of improvements is over-ambitious, especially since the specialists required to carry out the work are likely to be the same as those engaged in dealing with barriers to fish migration. In addition, the projects will entail major civil engineering works with lengthy lead-in times, potentially taking several years to complete. This poses a risk to achieving the improvements required by 2027.

Man-made barriers to fish migration

Removal of barriers in rivers can enable improved passage of migratory species, such as salmon, through rivers. Even minor obstacles may cumulatively reduce a fish's motivation to migrate and may result in abandonment, as well as affecting the flow and temperature.[17]

There are over 200 barriers to fish migration that will need to be addressed in the third cycle and some of these will entail major civil engineering projects that could take up to 5 years to complete. Prioritising those where prime habitat or a larger area of good habitat is present upstream is a practical stance. However, there is still a concern there is limited specialist capacity, particularly if those specialists are also working on restoring physically modified watercourses. There is also a risk that the lower priority water bodies will result in having extended deadlines past 2027.

A focus on a catchment approach with priorities for local communities and biodiversity would be welcomed.

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[14] CIRIA, CIEEM, IEMA (2016) *Biodiversity Net Gain: Good practice principles for development*. Available at: https://cieem.net/resource/biodiversity-net-gain-good-practice-principles-for-development/ (accessed: 23/03/2020)

[15] CIRIA, CIEEM, IEMA (2019) *Biodiversity Net Gain: Good practice principles for development, A Practical Guide.* Available at: https://cieem.net/resource/biodiversity-net-gain-good-practice-principles-for-development-a-practical-guide/ (accessed: 23/03/2020)

[16] Robson, B., Chester, E. & Allen, M. (2013). *Novel methods for managing freshwater refuges against climate change in southern Australia*. Published by National Climate Change Adaptation Research Facility, Gold Coast.

[17] Marschall, E.A., Mather, M.E., Parrish, D.L., Allison, G.W., & McMenemy, J.R. (2011). Migration delays caused by anthropogenic barriers: modelling dams, temperature, and success of migrating salmon smolts. *Ecological Application*, **21**, 3014-3031.

Hydropower

Scotland has committed to generating 100% of its annual electricity from renewables by 2020, of which hydropower is a significant contributor. This commitment has to be balanced against the effects of infrastructure associated with hydropower on the water environment.

Prioritising the sites where evidence shows ecological impacts are present is to be welcomed, as is the gathering of further evidence to improve ecological understanding at sites where confidence that improvement is needed is lower. However, since investment and cost of improvements falls on a small number of companies, there is a risk that objectives will be revised based on disproportionate cost and technical infeasibility. As well as evidence gained on the challenges with fish passage at large dams, wider ecological effects need to be determined for invertebrate assemblages and species of ecological concern such as freshwater pearl mussels[18].

Phasing the measures required for improvement is pragmatic but there is concern that this will result in extended deadlines due to the technical challenges and expense involved.

Consideration should also be given to using cool water freshets to mitigate high temperatures in waters affected by lower flows downstream.

Fish farming and wild fish interactions

With the Scottish finfish aquaculture sector set to grow, there is the increased risk of harm to the coastal environment, as outlined in the review of the environmental impacts of salmon farming in Scotland[19]. Interactions between wild fish and escaped farmed fish can result in sea lice transmission[20] and adverse genetic impacts through interbreeding[21]. Both of these may be contributing to salmon and sea trout losses in the marine environment. Finfish aquaculture adds a significant amount of nutrients to sea lochs in Scotland through feed and biological waste, resulting in eutrophication and algal growth[22] and altered species composition[23].

While we welcome the development of the new spatial management framework that directs developers toward locations where significant impacts on biodiversity are avoided, this should not detract focus from SEPA's responsibilities to monitor and regulate the

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[18] Addy, S., Cooksley, S.L. & Sime, I. (2012). Impacts of Flow Regulation on Freshwater Pearl Mussel (*Margaritifera Margaritifera*) Habitat in a Scottish Montane River. *Science of the Total Environment*. **15**, 318-28 10.1016/j.scitotenv.2012.05.079

[19] Tett, P., Verspoor, E., Hunter, D. *et al.* (2018). Review of the environmental impacts of salmon farming in Scotland. Report for the Environment, Climate Change and Land Reform (ECCLR) Committee. The Scottish Parliament, 196 pp.

[20] Costello, M.J. (2009). How sea lice from salmon farms may cause wild salmonid declines in Europe and North America and be a threat to fishes elsewhere. *Proc. R. Soc. B*. **276**, 3385-3394

[21] Butler, J.R.A. & Watt, J. (2003). Assessing and managing the impacts of marine salmon farms on wild Atlantic salmon in western Scotland: identifying priority rivers for conservation. Pp. 93-118 in: Mills D (ed.). *Salmon at the Edge*. Blackwell Science, Oxford

[22] Wu, R.S.S. 1995. The environmental impact of fish culture: Towards a sustainable future. *Marine Pollution Bulletin*, **31**, 4-12.

[23] Anon. (2002). Review and synthesis of the environmental impacts of aquaculture. The Scottish Association for Marine Science and Napier University. Scottish Executive Central Research Unit, Edinburgh, Scotland.

sector. Building on the evidence-based revised regulatory framework, which was an important development with widespread consultation, tighter regulation and enforcement, resulting in full compliance should be the goal. There should also be ambition to move beyond compliance, working with developers to achieve net benefits for biodiversity.

It would be good to see what links the measures have with the finfish aquaculture sector plan.

Invasive non-native species (INNS)

It is disappointing that there are no specific actions planned for INNS in the third cycle. With a changing climate, an increase in water transfers and other pathways such as water-based recreation, there is more risk of introductions and non-native species that are already present extending their ranges and potentially becoming invasive[24,25.] We would welcome reference being made to biosecurity plans including marine biosecurity plans, with foci being on preventative measures, 'horizon scanning', early warning and effective rapid response. With respect to the latter, too often there is no champion or responsible agency to fund and co-ordinate action. This urgently needs addressing.

Many of the water bodies that are affected by INNS still achieve Good status under the WFD, but they cannot achieve High status. This gives a misleading picture as it looks as though many water bodies are already achieving their objective of Good status. More than 20% of Scotland's transitional water bodies are at risk of failing to meet their environmental objectives as a result of INNS. More knowledge is needed on the extent and severity of the problem in lochs and coastal waters.

SEPA should be part of any projects building on the Scottish Invasive Species Initiative (SISI) project[26]. Co-ordinated control programmes involving a wide range of partners and stakeholders have a much greater chance of success in the long term. Several projects have adopted such an approach and lessons can be learnt from initiatives such as the Tweed Invasives Project[27], which is increasingly seen as a blueprint for others to follow; with a strategic catchment-scale, partnership approach widely recognised as an effective way of controlling INNS.

Ensuring that the GB Non-native Species Secretariat is appropriately resourced and competent to assist in providing early warnings of species moving towards Scotland would be propitious and cost-effective in the medium to long term. Not knowing that New Zealand Pigmyweed (*Crassula aquatica*) had reached Scotland and subsequently failing to take effective action has been costly environmentally and economically.

Integrating the growing number of certified invasive plant management specialists into responses and management projects would significantly improve the sustainability and

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[24] Truscott, A.M., Soulsby., C., Palmer, S.C.F., Newell, L. & Hulme, P.E. (2006). The dispersal characteristics of the invasive plant *Mimulus guttatus* and the ecological significance of increased occurrence of high-flow events. *Journal of Ecology*, **94,** 1080-1091. https://doi.org/10.1111/j.1365-2745.2006.01171.x

[25] Čuda, J., Rumlerová, J.B, Skálová, H. & Pyšek, P. (2017). Floods affect the abundance of invasive *Impatiens glandulifera* and its spread from river corridors. *Diversity and Distributions*. **23,** 342-354. https://doi.org/10.1111/ddi.12524

[26] Scottish Invasive Species Initiative (SISI) https://www.invasivespecies.scot/

[27] The Tweed Forum (2020). The Tweed Invasives Project: 18 Years of Catchment-wide Control - Best-practice manual. https://tweedforum.org/our-work/projects/tweed-invasives-project/

effectiveness of such campaigns. There appears to be an acceptance that INNS management can be left largely to volunteers, which cannot be sustainable. We would not expect volunteers to take the lead in identifying and dealing with water pollution. Encouragement should be given to the structured provision of training and certification of professional specialists for other taxa including macroinvertebrates (freshwater and marine) and fish (freshwater and marine).