

Phosphorus standards for rivers: Consultation on draft proposals*General Comments*

Scottish Water is committed to the protection and enhancement of the water environment. All stakeholders should continue to work together to ensure this is achieved through the most cost effective and sustainable approach, underpinned by sound science. This is essential in ensuring proposed investments deliver a cost effective environmental benefit.

We welcome the proposed approach to take account of observed biology when setting standards for phosphorus. However we do not consider this adjustment alone to be sufficient to support the implementation of measures to improve a water body to Good Status.

The consultation documents highlight a great deal of uncertainty in the understanding of the relationships between average phosphorus concentrations in water and biology. The documents do not present an improved understanding of these relationships, nor do they assess the impact of peak phosphorus discharges which are typically associated with rainfall driven agricultural run off.

It is imperative that measures to improve water body status are based on sound science and will deliver a known and measurable benefit. The likelihood of improvements to the status class of water bodies following the implementation of measures has not been presented.

However, the process will be useful in identifying lengths of water body where a better understanding is needed between phosphorus concentrations, biology, other pressures and environmental conditions that prevail along the water body under consideration.

We fully support the approach taken by SEPA through the first cycle of river basin planning in Scotland. This approach aims to understand the relationships between phosphorus and biology on a site by site basis in order to determine the most appropriate way to achieve Good Status. We will continue our work with SEPA to enhance this approach through the second and third river basin planning cycles. Additionally, since UKTAG, SEPA and Scottish Government are in agreement that it is not appropriate for the status of water bodies to be determined by phosphorus concentrations, we recommend that discussions are initiated on the amendment of the Water Framework Directive to reflect this.



Detailed Comments

Relevance of using phosphorus concentration to determine status

As noted above we welcome the recognition that there is no clear, well established relationship between phosphorus concentrations in water and biological status, and that in the absence of such a relationship, the use of average phosphorus concentrations to determine water body status is inappropriate.

The aim of the Water Framework Directive is to prevent deterioration and restore water bodies to Good Status. Using phosphorus as a proxy for the assessment of status makes the assumption from the outset that phosphorus is the key factor in this complex relationship. Scientific literature and data do not support this. Phosphorus concentrations can however, be useful to identify lengths of water body that require a closer review.

In Scotland, where biology appears to be impacted by phosphorus, Scottish Water and SEPA have agreed to undertake detailed site specific investigation to understand all of the factors involved. The presence of phosphorus may be a key factor in some cases. Where phosphorus is found to be an important factor, the source and concentrations (peak or average) of the phosphorus impacting the environment need to be better understood. This is needed to allow the correct programme of measures to be developed that will deliver the improvement desired.

Without a science led approach the desired outcome of improved status is unlikely to be achieved.

Mismatches

The approach taken to reduce mismatches is not appropriate since it makes the assumption that mismatches are a result of the phosphorus standard being too lax. Evidence of this has not been presented.

The aim of the work that has been carried out by UKTAG appears to have been to reduce the number of mismatches between phosphorus and biology status classes. The reduction in mismatches would be an improvement if it were as a result of an improved understanding between phosphorus concentration and biology. However, the way in which it has been achieved is through tightening phosphorus concentrations in the water environment and making the associated biological assessment more lax.

Phosphorus concentrations in water bodies can be very low yet biology is found to be impacted. In others the reverse is found. Additionally, according to table 5 of the consultation document, at 75% of sites across the UK there are classification mismatches. These examples suggest that phosphorus is rarely the key factor in the relationship.

Confounding factors

It is widely known that confounding factors, which include but are not limited to the presence of other nutrients such as nitrate and potassium, mineral content, stream bed composition, flow, shade, oxygen level and temperature have a significant effect on the relationship between phosphorus and biology. These relationships remain poorly understood. It is imperative that work is undertaken to better understand these. If the only factor in these complex relationships that is pursued is phosphorus, costly investment will be driven but little or no benefit will be achieved. A holistic approach must be undertaken, which takes into account all of the factors involved.

Site specific assessment

We fully support the use of the proposed methodology which incorporates site based assessment, as opposed to the use of typologies.

However, we note that the proposed equations to predict reference conditions and site specific phosphorus standards only take into account alkalinity and altitude (which we understand to be a proxy of stream power). We understand that the reference conditions are meant to be “an estimate of the natural condition of the site”. However, natural conditions are not defined.

If the aim is to define the condition of the site as untouched by humans, the equations should take into account shade and environmental change. Greater shading as a result of tree cover and a cooler climate would significantly decrease the sensitivity of water bodies to phosphorus. Additionally, the assessment does not take account of the phosphorus which is bound to sediments in the stream bed but leaches into the water column as soluble reactive phosphorus.

Methodology and standards

We note that the proposed default standards are not based on an improved understanding of the relationship between phosphorus and biology but are simply a tightened version of the existing standards, with the aim being to reduce mismatches. As detailed above, we do not support the approach of using phosphorus to determine status.

We are concerned that the use of annual mean concentrations to determine reference conditions and site specific phosphorus standards is too simplistic and does not represent the full range of conditions that drive eutrophication.

Agricultural run off contributes significant amounts of phosphorus and other plant nutrients and minerals to the water environment. Average concentrations of phosphorus could be significantly elevated by sampling events which incorporate agricultural run off. Examples such as these could be the cause of mismatches between phosphorus and biology status. This could also be the case where agricultural run off impacts biology but is not captured by sampling.

Recovery time and phasing of additional measures

Phosphorus problems may be long-standing, caused by long term inputs to water bodies and often leaving a legacy of phosphorus in sediments. Consequently, reduction in load can take a number of years to deliver benefit. We would like to understand how recovery time will be considered to ensure that costly measures are not sought where they are not needed.

For example, where agricultural run off of phosphorus and other plant nutrients and minerals has resulted in impacts to the biological assemblage of a water body but this input has subsequently been reduced or ceased, how will this be captured to ensure that further measures are not sought unnecessarily?

It is widely reported in literature that once measures have been undertaken with the aim to improve the condition of the biological assemblage in the water environment, improvements may not be seen for a number of years. The proposed methodology does not take account of this.

Presumption that WwTWs causing impacts

We note that 'discharges' and 'sewage' are mentioned a number of times in the consultation documents yet agriculture, which inputs significant quantities of phosphorus and other plant nutrients to the water environment is not mentioned. We are concerned that a presumption has already been made that all of the phosphorus in the water environment is contributed by WwTW. No evidence is offered to support this presumption.

It is imperative that we have a holistic view of the problem to ensure appropriate measures are selected. It is inappropriate that the questions posed in the consultation document refer to discharges. The regulation of discharges should only be considered by regulators as part of a range of measures to either prevent deterioration or restore to Good Status.

Consultation Questions

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| 1 | <p><i>Should the recommended new default standards be adopted as the basis for assessing status, decisions on whether or not to allow new discharges and identifying the likely scale of improvements that may be needed at existing discharges?</i></p> |
| <p>Water body status should be determined by assessing the condition of the biological assemblage and not through measurement of phosphorus concentration in the water column. If biology is found to be impacted, further investigation should be undertaken to determine the cause of this and the most sustainable and cost effective way to reduce it. If phosphorus concentrations are found to be a significant factor, only at this stage should discussions be held on discharges.</p> <p>Considering that the relationships between phosphorus, biology and other factors are poorly understood (and that this understanding has not improved since the first phosphorus standards were put in place in 2009), we do not believe it is appropriate to use the new default standards to assess status. As mentioned above, we have an agreement in place with SEPA to undertake detailed studies in order to understand the pressures and impacts on a water body prior to discussing measures.</p> | |
| 2 | <p><i>Should adjusted standards be used to assess status and take decisions relating to discharge control?</i></p> |
| <p>We believe that the current phosphorus standards should remain in place, albeit under a site specific assessment. These standards should be adjusted based on the observed biology such that costly measures are only implemented where they are required and will result in a measurable improvement.</p> | |
| 3 | <p><i>Should default standards be adopted as the basis for assessing status and decisions relating to new discharges and adjusted standards used, where applicable, when planning improvements at existing discharges?</i></p> |
| <p>Decisions relating to new discharges must not be taken based on the default standards. UKTAG, SEPA and Scottish Water agree that the relationship between phosphorus, biology and other factors is not understood well enough to take decisions based on phosphorus concentrations alone. Detailed studies must be undertaken in order to understand the pressures and impacts on a water body prior in order to inform decisions on new discharges.</p> | |