

**UK Technical Advisory Group
on the Water Framework Directive**

Response to stakeholders' submissions

**UKTAG Stakeholder Review on
UK ENVIRONMENTAL STANDARDS AND CONDITIONS
(PHASE 1)**

Final

September 2006

(SR1 – 2006)

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SECTION 1 - INTRODUCTION

The UK Technical Advisory Group (UKTAG) sought comments on the scientific principles underpinning the first proposals for environmental standards to underpin the implementation of the Water Framework Directive. The report was released for stakeholder review and made available on the UKTAG website.

This document is intended to represent the main points of responses received. It summarises the key issues along with the response of the UKTAG. It has not been possible to reflect all the responses in full. It should be read in conjunction with the revised and final *UKTAG report (August 2006) UK Environmental Standards and Conditions (Phase 1)*.

This document and revised report will be available on the UKTAG web-site and will be made available on request.

Questions posed by the UKTAG for the stakeholder review

The UKTAG asked stakeholders to provide comments on:

1. Is the report clear in explaining how we have reviewed and developed the proposed UK environmental standards and conditions?
2. Do you think that the approach we have taken, as identified in the report and supporting technical documents:
 - a. uses the best science currently available? If not, please tell us of any existing information or scientific methods that could improve the proposed approach.
 - b. identifies the environmental standards and conditions required to achieve the Directive's objectives to achieve Good Ecological Status? (recognising that the standards under other EC Directives will also apply)?
3. What further research and development is required to strengthen the approaches over the first cycle of river basin planning?
4. Are there any other issues in relation to the UKTAG's approach to developing UK environmental standards and conditions you wish to comment on?

Responses submitted

In total, 41 responses were received by the UKTAG and are listed in Annex 1.

The submissions provided views from non-government environment and fishing organisations, the academic sector, the water industry, energy, whisky distillers and farming sectors, conservation agencies, marine related organisations as well as government organisations. The submissions are available from the UKTAG web-site (www.wfduk.org).

UKTAG review of submissions

The UKTAG reviewed the stakeholder responses, identifying:

- Possible amendments to the UKTAG report. This included amendments to standards where there is new scientific evidence and/or improving explanations of methods.
- Issues to be addressed in the UKTAG response document, but that did not change the UKTAG environmental standards report (Phase 1). Here we provided more information on for example, the basis of the standards, how the standards will be used or where issues cannot be dealt with at this time.
- Suggestions for future work by the UKTAG either in enhancing our understanding of the science, or in developing new standards required to support implementation of the Directive. References provided are included in Annex 2.
- Issues that are considered to be outside the scope of the Stakeholder Review and the UKTAG. These issues were provided to UK administrations and agencies.

The UKTAG then collated this report with technical authors and discussed potential changes with the environment and conservation agencies and UK administrations. This report:

- provides an overview of responses to questions;
- addresses comments on each section of the draft UKTAG standards report;
- discusses proposals for future work.

We then amended the draft environmental standards and conditions report.

Summary of the UKTAG response

The table below presents an overview of UKTAG response to the Stakeholder Review. The table headings indicate how the respondents' comments (as indicated by ☼) have been dealt with it.

The key amendments to the *UKTAG report (August 2006) UK Environmental Standards and Conditions (Phase 1)* are:

- the revised nitrogen standard for transitional and coastal waters and supporting method;
- inclusion of the phosphorus standards for lakes in the report, however the UKTAG needs to review the outcomes of the European Intercalibration Exercise before confirming our recommendations to UK administrations;
- improved explanation of the water resource standards for rivers;
- improved explanation of how the morphological conditions for rivers will be used.

Section headings: <i>UKTAG report (August 2006) UK Environmental Standards and Conditions (Phase 1).</i>	Changes to UKTAG report:		Response in this document	Outside scope of stakeholder review <i>(provided to agencies and governments)</i>
	Amend standards	Improve Phase 1 report explanation		
SECTION 1- INTRODUCTION				
• Objective setting framework				☀
• Biology and setting standards		☀ (page 8)		☀
• These standards and protected areas		☀ (page 13)	☀	☀
SECTION 2- SUMMARY OF STANDARDS FOR SURFACE WATERS				
Rivers water quality				
• Dissolved Oxygen			☀	
• Acidification (pH)			☀	
• Ammonia			☀	
• Phosphorus		☀	☀	
Lakes water quality				
• Phosphorus	Being confirmed with the outcomes of Intercalibration	☀ (Table 17 Page 40)	☀	
• Oxygenation			☀	
• Salinity				
• Acidification (pH)			☀	
Coasts and estuaries water quality				
• Oxygenation			☀	
• Nitrogen	Revised standards (pages 48-52)	☀ (pages 48-52)	☀	
Rivers and lakes water resources				
• Water resources		☀ (pages 54, 58, 59)	☀	
Rivers morphology				
• Morphology		☀ (pages 66, 67, 71)	☀	
SECTION 3 - FUTURE DEVELOPMENT				
Future work proposals		☀	☀	☀
ANNEX 1				
Spot sampling and continuous monitoring			☀	
ISSUES RAISED (NOT IN UKTAG REPORT)				
• Investment in monitoring				☀
• Costs to industry				☀
• Compliance assessment				☀

SECTION 2 - OVERVIEW OF RESPONSE TO QUESTIONS

Of the 41 submissions, 24 provided a response directly on the questionnaire provided by the UKTAG. Others provided their comments in separate submissions and these have been included below.

Summarised below are the general comments from respondents. Specific technical issues and the UKTAG response are addressed in Section 3.

Q1. Is the report clear in explaining how we have reviewed and developed the proposed UK environmental standards and conditions?

Generally the feedback identified that the report was clear and understandable and that the reference to existing standards was useful. Other respondents found the report clear but technically challenging in terms of understanding the science and the framework.

Several respondents suggested improving the report and the supporting documentation by simplifying their presentation.

It was recognised that there were a wide variety of methods and techniques. The UKTAG was asked to explain the different approaches and what criteria were used to select the adopted approach. The UKTAG was asked to explain why different water quality parameters were used for different water body types and also to rationalise the units across standards or explain how they relate to each other.

More information on the relationship with ecological elements was requested. In particular, some responses requested more detail on methods of biological monitoring methods.

Q2. Do you think that the approach we have taken, as identified in the report and supporting technical documents?

a) uses the best science currently available? If not, please tell us of any existing information or scientific methods that could improve the proposed approach.

Many respondents thought the report presented best practice and that practical and rational approaches were proposed. Suggestions and additional references were provided.

Some respondents thought that the UKTAG proposals did not sufficiently address the new understanding of the complex relation between ecology and chemistry, and other relationships.

There was general support for the UKTAG approach of not using expensive or difficult assessment methods to underpin the environmental standards. A practical approach to the development of standards using available data was supported. However other respondents viewed this as expediency rather than compliant with the Directive.

Respondents identified that the data underpinning the science was variable as it was drawn largely from the agencies' existing sources. This was viewed as potentially causing difficulties in collating data using it to develop the standards.

In particular, the lack of data to support the establishment of reference conditions was viewed as a problem by the conservation agencies, non-government environment organisations and industry groups. Some respondents felt that more data needs to be collected and the reference conditions reviewed. However, there were mixed views as to whether this needed to be done now or for the next river basin planning cycle.

It was agreed that, where standards were based on expert opinion or international methods and especially for hydromorphology, we need to validate the proposed standards and test in the field. Some said that the proposed standards were adequate for the first cycle whilst others stated that there was not sufficient evidence for the standards to be adopted.

b) identifies the environmental standards and conditions required to achieve the Directive's objectives to achieve Good Ecological Status? (recognising that the standards under other EC Directives will also apply)?

Depending on the proposed standard, there were mixed views on whether the standards were too strict or too lax for protecting environmental conditions associated with High and Good Ecological Status.

Comments were made in support of the standards being representative of ecological status under the Water Framework Directive, whilst other comments suggested that the proposed standards were not sufficiently linked to ecology. One respondent asked why the European Intercalibration Exercise was not providing more information to inform the development of standards.

Some respondents requested that the UKTAG develop a more intricate representation of ecology reflecting biodiversity and the interactions of the natural environment in line with the spirit of the Directive. Others acknowledged that the normative definitions as laid out in Annex V of the Directive required a single-focus approach but requested that interaction should be better explained as further information was collected.

The comment was made that the UKTAG has not developed biological classification methods fully to enable chemical standards to be set and that we need to explain this clearly in the revised report.

Concern was expressed that a common definition of Good Ecological Status across the water categories has not been developed and that, in some cases Good Ecological Status has not been explained in ecological terms. The view was expressed that the UKTAG needed to undertake a consistency check across standards due to use of different methods and interpretation of normative definitions as part of its work on the standards.

Several sectors said that the UK should not adopt the standards without having a reasonable level of certainty. Further information was required on compliance assessment regimes. Others viewed that the standards need to be adopted but enhanced. Conservation agencies expressed the view that the proposed standards may not be sufficiently precautionary in some cases and would require further work during the first cycle of river basin planning.

Q3. What further research and development is required to strengthen the approaches over the first cycle of river basin planning?

Most of submissions identified the need for representative and effective monitoring networks that could support collection of data to verify the links to ecology, identify whether the standards were correct, and provide evidence for the appropriate level of investment in undertaking measures.

Generally it was recognised that through the first river basin planning cycle, it will be important to put in place the kind of fit-for-purpose, strategic R&D that can refine our understanding of biological-environmental relationships in different aquatic habitats.

Respondents advised that this will require a closer relationship between the statutory environmental and conservation agencies, other fund holders for environmental research (including NERC) and the environmental research community.

Specifically, it was suggested that a well-resourced and responsive UK science base in aquatic ecology is needed to underpin implementation of the Water Framework Directive and the Government's commitments towards designated wildlife sites.

In particular, suggestions for further work included:

- improvements in data collection and scientific understanding: these are addressed in Section 3 of this document;
- topics for new standards: our approach is addressed in section 4 of this document;
- clarification of the policy framework: this was outside the scope of the stakeholder review.

Q4. Are there any other issues in relation to the UKTAG's approach to developing UK environmental standards and conditions you wish to comment on?

These were incorporated in the above comments or addressed in sections 3 and 4 of this document.

SECTION 3- DETAILED COMMENTS ON THE UKTAG REPORT

For each section of the draft *UKTAG report (August 2006) UK Environmental Standards and Conditions (Phase 1)*, the following is provided:

- general overview of comments;
- advice on amendments to the UKTAG report, if any;
- detail comments and the response of the UKTAG.

UKTAG Report – Section 1 Introduction

Overview

In addition to the issues raised in Section 2, comments included requests for:

- clarification of the indirect and direct approaches to applying standards. There was mixed support for both models with questions on the implications in terms of monitoring, certainty and how they will be applied under Water Framework Directive;
- more information on the framework for setting objectives under the Water Framework Directive, and on classification and its application across the UK;
- support for the approach to refine and enhance standards and supporting typologies as required;
- some respondents viewed the supporting typologies as too simplistic and need to account for ecology systems. Others regarded the typologies as too complicated to enable an assessment of the implications.

Amendments to the UKTAG report

The introduction of the report was mainly not amended as many of the issues raised fell outside the scope of the stakeholder review and the remit of the UKTAG.

Two sections were amended to:

- explain the relationship between biological methods and standards;
- clarify the relationship between management of protected areas and the Water Framework Directive.

Comments	Response
Include reference to precautionary principle	Report not amended. The Precautionary Principle is embodied in the procedures and approaches set out for developing the proposed standards.

Comments	Response
	<p>In the report this is part of the discussion and process of the use of the 90 per cent principle for water quality in lakes and rivers and of the use of experts for the other standards. It is within the judgment of the balance of evidence.</p> <p>We have decided not to amend the report to refer specifically to the precautionary principle, because it was a general feature of the report that we would not set out all the principles and context under the international and national agreements and principles that the agencies work within. These include those governing sustainable development, the precautionary principle, the national approach to risk assessment, etc.</p>
<p>There was mixed support for the application of Alternative Objectives under the Directive as described in the UKTAG report. Respondents requested advice on the framework for long-term planning on how Alternative Objectives will be applied, and considered as part of the regulatory environment planning.</p>	<p>Outside the scope of the stakeholder review.</p> <p>The framework is explained more fully in:</p> <ul style="list-style-type: none"> • <u>the UKTAG guidance 13c 'Draft principles for an objective setting framework for river basin management planning in accordance with the Water Framework Directive'</u> (refer: www.wfduk.org/tag_guidance) • European CIS guidance on objective setting: http://ec.europa.eu/environment/water/water-framework/objectives.html
<p>How will agencies apply <nutrient standards> in practice for good ecological quality - if standard is not passed, but biology is good.</p>	<p>Outside the scope of the stakeholder review.</p> <p>The UK administrations and agencies (and other Member States) are considering an approach that is in line with the requirements of the Water Framework Directive and the way eutrophication is dealt with under other Directives and legislation.</p> <p>Where the standard is failed but the biology is good, the UKTAG recommends that environment agencies should continue to monitor the biology to ensure it remains good and not impose expensive or controversial action to achieve the chemical standards where we are not confident of failure, whilst continuing to operate established policies to prevent deterioration ¹ with respect to chemical quality.</p> <p>If the phenomenon of good biology and failed standards is widespread and statistically significant it would imply a need to review the standards as this would contradict the science that set the standards.</p>
<p>The UKTAG has not considered biology as part of setting the standards and that the UKTAG were continuing the old approach.</p>	<p>Report amended: explanation included page 8.</p> <p>The UK agencies have been developing biological methods and associated standards alongside environmental standards describing the ecology. This has focused on identifying the relationship between biology and human pressures.</p>

¹ This is explained more fully in TAG Guidance: *UKTAG (2006) WP 13e) Prevent Deterioration of Status*.

Comments	Response
	<p>The environmental standards for physico-chemical and hydromorphology elements have been published under the UKTAG stakeholder review. These have been checked against the emerging biological methods where possible. For example – phosphorous for rivers has been checked against biological and chemical data on sites across the UK. Similarly, we are checking our proposals against the European Intercalibration exercise which focuses on biology.</p> <p>During 2006/07 research reports outlining the biological methods will become available.</p> <p>If biological monitoring over the first river basin planning cycle shows that the environmental standards are failing to protect the biology, the reasons will be investigated and the standards adjusted accordingly.</p>
<p>The report does not consider the complexity of ecological relationships and therefore does not meet the requirements of the Directive. It defines single physico-chemical parameter- biological relationships rather than taking on board concepts like biodiversity (i.e. water body classifications based on single pressure response relationships).</p>	<p>Report not amended.</p> <p>The complexity of the water environment is fully recognised by the UK environment agencies, and where possible this should be reflected in water body classification systems. However, our understanding of community or functional responses to environmental pressures is not sufficiently developed to allow their inclusion into classification systems under Water Framework Directive.</p> <p>Additionally the guidance for operational monitoring regimes encourages the use of single pressure response relationships in water body classification. Therefore, in order to meet the challenging timetable, the one to one pressure response relationships have been developed for classification.</p> <p>This approach is justified and appropriate as there are many well documented single pressure response relationships that have been described in the scientific literature, that have been used in the UK environment agencies classification over the years, and as the basis for action to improve the environment.</p>
<p>Comments on the indirect and direct approach to application of standards:</p> <ul style="list-style-type: none"> • More information on the framework and its application across the UK. The standards need to be linked to compliance test. • If on the pressure gradient, highly precautionary compliance test; if not on boundary, a less precautionary test; also influence by management approach. • Is the indirect model valid use of standards and compliant with the 	<p>Report not amended.</p> <p>The UKTAG report has set out the framework under which the standards will be applied. Both models can be applied under the Directive as part of the objective setting process and the Programmes of Measures.</p> <p>Compliance assessment approaches for each of the standards are being considered including the level of confidence required to impose or promote various types of action under Programme of Measures. The standards themselves involve a level of certainty that the biology would be harmed by the failure of the standard. Where suitable we have addressed this under each standard.</p>

Comments	Response
<p>Water Framework Directive?</p> <ul style="list-style-type: none"> • Indirect model- more expensive in monitoring terms. • Support indirect model as more valid to address biological complexities. 	<p>If the past is a guide, the UKTAG would advise that the indirect model is used for nutrients and the direct model is used elsewhere. Severe action would not be promoted unless there is confidence that the standard is failed and confidence that action will succeed.</p> <p>Procedures for using the standards are a matter for each country, taking into account different policy and legislative requirements.</p> <p>With respect to the costs of the two approaches: the indirect model regime requiring biological and chemical monitoring may well be more expensive in terms of the short-term cost of monitoring rather than doing just chemistry or biology (or neither). But this needs to be seen in terms of the cost of investing in unnecessary action (and the wasted opportunities of using these funds elsewhere).</p>
<p>More detail would also be valuable on page 12 showing how water quality parameters have been determined in relation to ecological health.</p>	<p>Report not amended.</p> <p>Page 12 provides an overview of the process of assessing the link between the ecological conditions of sites across the UK. Given the diversity of methods, this is best discussed under each standard.</p>
<p>Clarify the relationship between the Water Framework Directive <standards> and designated wildlife site and relevant legislation. Will these standards achieve habitat objectives requirements? Are these standards more or less strict?</p>	<p>Report amended: explanation included page 13.</p> <p>The procedures associated with protected areas identified under other European water legislation are outside the scope of this report.</p> <p>Ecological status for water bodies under the Water Framework Directive needs to be interpreted separately from those standards and objectives set under the relevant source legislation for protected areas. Article 4(1c) of the Water Framework Directive, states that member states are required to achieve compliance with those standards and objectives specified in the community legislation under which the individual protected areas have been established. Where a water body has more than one objective, the most stringent applies.</p> <p>For example, the Habitats Directive contains a number of obligations for Special Areas of Conservation and Special Protected Areas (which make up the Natura 2000 network). The aim of these obligations is to achieve “the favourable conservation status” of such sites, for example, by requiring that appropriate steps be taken to avoid the deterioration of the habitats that they host.</p> <p>Ideally, favourable conservation status (and on individual sites, favourable condition) would always equate to High Ecological Status as defined by the Water Framework Directive normative definitions, but some types of habitat are so degraded that restoration of designated sites to this</p>

Comments	Response
	<p>class is not practical or reasonable. In these cases, restoration effort will be targeted to achieve something lower than High Ecological Status.</p> <p>In addition, there will be instances where the standards required to achieve Good Ecological Status or other environmental objectives may provide a higher level of protection than the Habitat Directives. This may affect the spatial area that is covered or reflect that the Water Framework Directive applies to a wider range of pressures. This will need to be assessed by the conservation agencies on a site specific basis.</p> <p>It should be noted that UK conservation agencies also have responsibility for designating, and setting objectives for nationally designated wildlife sites such as Sites of Special Scientific Interest (SSSIs). Although these do not have protected areas status under the Water Framework Directive, the proposed UKTAG standards are distinct from those used in the assessment of the condition of SSSIs for national reporting. The relationship between SSSI favourable condition and high and good ecological status is the same as that outlined above for Habitats Directive sites.</p>
<p>More information on compliance assessment for each of the standards as well as the level of confidence would be useful. It is critical guidance for industry and river basin planners is provided.</p>	<p>Outside the scope of the stakeholder review.</p> <p>Defra and the devolved administrations are considering the approach for the application of the standards. The approach to the implementation and adoption of the proposals might vary for each country within the UK, depending on present and proposed legislation, and on policy in each country.</p>
<p>Which standards and intercalibration parameters will be available in the first River Basin Management Plan? Disappointment that hydromorphological parameters will not be intercalibrated under the first cycle.</p>	<p>Report amended: Section 3 presents future work.</p> <p>Section 3 of the UKTAG report presents those standards anticipated to be developed for the first river basin plan.</p> <p>By the end of 2006, all Member States will be able to identify what parameters are being intercalibrated. The UK is supporting the Geographic Intercalibration Groups and providing national methods and data. For some parameters, there has been little suitable data collected in member states. As a result, intercalibration of national methods is not possible. There is agreement across Member States to continue the intercalibration exercise for those elements not agreed by June 2007 to ensure we have these parameters for the second cycle.</p> <p>Further information on intercalibration can be obtained from European web-site: http://ec.europa.eu/environment/water/water-framework/objectives.html</p>
<p>Mixed views were stated with respect to supported text on no deterioration and general reference to capacity for change-for example:</p>	<p>Outside the scope of the stakeholder review.</p> <p>The environment agencies have existing policy for preventing deterioration under other directives and other</p>

Comments	Response
<ul style="list-style-type: none"> Disagree with UK agencies allowing deterioration in class. clarify policy with respect to no deterioration. must ensure capacity for change enables that new sustainable activities can occur. rather than defining capacity for change, should be defining level of protection. how will Article 4(7) under the Directive be applied. 	<p>legislation. The working assumption is that the environment agencies will continue to control developments and growth in a way that manages the risk of deterioration of status and ensures that sustainable uses of the environment can continue and develop. They will assess the effectiveness of these efforts through the classification of water bodies, and by calculating the impacts of changes in terms of movement within classes.</p> <p>This is explained more fully in TAG Guidance: <i>UKTAG (2006) WP 13e) Prevent Deterioration of Status</i>. This guidance cross-references to the requirements of the Water Framework Directive.</p>
<p>Revision of the standards: Generally revising the standards was supported, once detail data had been collected. There was mixed views as to whether the standards should be amended during the first cycle of river basin planning or the focus should be on collecting data from monitoring networks. This was particularly a request where expert advice has been used to develop the standards</p>	<p>Report not amended.</p> <p>Once the standards have been adopted by UK governments, they will be put in place for the first river basin planning cycle. During the cycle, data collection and scientific verification will proceed to improve the understanding of the links with the ecology.</p> <p>This approach will provide confidence for stakeholders in terms of understanding how the Directive will be implemented. Of course, if new environmental data are identified that inform rivers basin planning at a catchment or local scales this would be considered.</p>
<p>Several respondents suggested improving the report and the supporting documentation by simplifying the presentation of the supporting reports.</p>	<p>Report not amended.</p> <p>Unfortunately, the UKTAG was unable to review the structure of how the supporting information was presented. The structure reflects the myriad of groups and means adopted (in-house work, external contracts, etc) to develop the standards.</p>
<p>It was recognised that there was a wide variety of methods and techniques. The UKTAG was requested to explain the different approaches and what criteria were used to select the adopted approach. We were asked to explain why different water quality parameters were used for different water body types and also to rationalise the units across standards or explain how they relate to each other.</p>	<p>Report not amended- refer following sections.</p> <p>The UKTAG have tried to address this issue and have either amended the report or provided an explanation in this document. The parameters and units used reflect those which have been historically used to manage rivers, lakes, coastal and transitional waters. If we were to rationalise these all into single unit, we would lose access to the environmental data which has previously been collected. However, we hope to standardised systems over the next river basin planning cycle, where possible.</p>

UKTAG Report – Section 2

UKTAG Report – Water Quality Standards – Rivers

Overview

Taken as a whole, the respondents gave a thorough examination of the method and identified a range of key issues:

- a number of respondents supported the work and welcomed it as a practical approach.
- some respondents supported the typology underpinning the standards but some stakeholders thought it should have more detailed characteristics and complexity.
- several organisations felt that the standards were not sufficiently precautionary for protecting the ecology whilst others view the proposed standards for lakes and rivers as being too strict.
- the UK conservation agencies recognised that the methods used were the best available given current knowledge and datasets. They disagreed with the definitions of where the boundary lay for the high-good ecological status boundary and whether it was sufficiently precautionary.
- there was support for assessing acidification as acid neutralising capacity (versus the current approach of using pH), although one respondent viewed it as an unnecessary and expensive exercise in terms of data collection and monitoring.
- there was concern as to whether the levels for Dissolved Oxygen and Biochemical Oxygen Demand were sufficiently precautionary to protect fish and a request for clarification of the relationship between the Water Framework Directive and the Freshwater Fish Directive.

Amendments to the UKTAG report

The standards as presented in the January 2006 report have not been amended.

Comments	Response
<p>Comments received supported the typology underpinning the standards but some stakeholders expressed views that it could be more detailed. These included:</p> <ul style="list-style-type: none"> • EU FAME project shows system is inadequate for describing fish community status (does not address paleogeographical issues). • There is insufficient discrimination between river typologies – Scotland. Typological issues (phosphorus) – too much 	<p>Report not amended.</p> <p>A range of typologies have been developed to underpin implementation of the Water Framework Directive to take account of the varying sensitivities to the pressures that affect UK rivers. It is believed that the alkalinity and altitude explain a considerable level of the natural variability that is found in UK rivers.</p> <p>Particular concerns were raised about the failure to include factors which described landform, geology and river substrate. It is believed that geology and aspects of landform are accounted for in the existing approach, and no national digitised datasets describing river substrate are available. Other factors such as slope could have been introduced;</p>

Comments	Response
<p>aggregation may prevent setting more appropriate standards for each type.</p>	<p>however, this would have introduced additional types, and it was agreed that in the first instance an uncomplicated approach should be taken to typology development. This decision was taken in consultation with stakeholder groups to ensure that an easily understood and transparent system was developed for the first river basin.</p> <p>If through the first river basin plan it becomes evident that over or under protection has occurred due to constraints imposed by the typology the existing framework will be reviewed, and the need to introduce additional types and variables will be considered.</p> <p>Particular concerns were raised about the implications of the typology for regulating pressures on spate rivers that can dry out during periods of dry weather. However, due to the restricted set of water quality pressures that generally affect such rivers it is believed that this will not lead to unwanted impacts on this river type.</p>
<u>Dissolved Oxygen (DO) and Biochemical Oxygen Demand (BOD) standards</u>	
<p>Reference conditions for dissolved oxygen as stated in the report recognised the limitations of RIVPACS. The methods are best available, given this.</p>	<p>Report not amended.</p> <p>It has been recognised for some time that the RIVPACS reference dataset includes data from sites which are impacted to such an extent that they should be removed.</p> <p>Work undertaken to develop the new standards has removed these sites from the predictive reference data set, and it is now believed that the sites included in the network better reflect reference conditions. In addition to this screening, the European Intercalibration exercise has also defined a set of reference conditions, and if UK ecological type boundaries differ from those developed from the process, the UK type class boundary values will be moved.</p>
<p>The high-good class boundaries definition defines: Loss of taxa/families, (and may contain more than 1 species) does not match the definitions of the Water Framework Directive. Not supported as least precautionary end of definitions. Need to review for river type.</p>	<p>Report not amended.</p> <p>The UK environment agencies believe that the ecological boundary values that underpin the regulatory standards, are consistent with the conditions described in the normative definitions. UK ecological boundary values are presently being compared with an agreed set of class boundary values through Intercalibration, and if this identifies that there is a need for standard realignment, this will take place.</p>

Comments	Response
<p>The reference values for river BOD, dissolved oxygen and ammonia were derived from analysis for the RIVPACS sites.</p> <p>This product is not compliant with the approach being used to establish reference conditions within Intercalibration (i.e. basing reference criteria on the REFCOND guidance).</p> <p>The correct procedure is to:</p> <ul style="list-style-type: none"> • check that RIVPACS sites fulfilled the REFCOND criteria; • devise appropriate High/Good and Good/Moderate boundaries; • calculate the chemical standards from the environment agencies monitoring data; • sites not at reference conditions are removed from the database and alternatives selected. 	<p>Report not amended.</p> <p>The agencies fully acknowledge that the RIVPACS sites are not all at reference condition. This has been reflected for a long time in the agencies' classification schemes whereby a site has to achieve its RIVPACS predicted index value or higher in order to fall into the highest status category. In other words, on average, sites currently in the highest status category are better than the average condition of the RIVPACS reference sites, as measured by their biological index results.</p> <p>The adjustment applied in developing the standards was intended to ensure that those river types where the RIVPACS reference sites were definitely below reference were not perceived to be of better condition than is actually the case, due to unduly low RIVPACS predictions based on predominantly good condition RIVPACS sites. Conversely, for river types where the predictions are made up from reference condition RIVPACS sites, they may be wrongly downgraded and the adjustment also took account of this.</p> <p>Removal of all the non-reference sites from the RIVPACS dataset is not a realistic option as for some river types this would leave insufficient data to estimate reference values of the biological indices and replacement sites are not available for many river types which have few or no examples of reference condition sites in the UK.</p> <p>The work being undertaken for intercalibration whereby reference values are based solely on sites which are truly reference can only successfully be applied for river types where true reference conditions exist. This represents a limited range of river types. The way the UKTAG adjusted EQI values to reflect the quality of sites making up RIVPACS predictions is not incompatible with the Water Framework Directive in that Annex II, section 1.3 (iii) states that "biological reference conditions may be either spatially based or based on modelling, or may be derived using a combination of these methods. Where it is not possible to use these methods, Member States may use expert judgement to establish such conditions."</p>
<p>Little attempt has been made to illustrate the reference sites and to show examples of good or high condition sites.</p> <p>Caution underling premise in the supporting paper (Duncan et al, 2006) as</p> <ul style="list-style-type: none"> • the phosphorus loading limits selected do not necessarily reflect a similar tolerance in all groups of diatoms as tolerance may be modified by other factors. • fluctuating environmental 	<p>Report not amended.</p> <p>The UKTAG recognises the concern. A better understanding of the reference conditions for diatoms is desirable and it is intended that this will form part of future work. That said, with our current understanding of the response of diatoms communities to stresses, the UKTAG considers that the boundary values which have been derived represent robust interpretations of normative definitions.</p> <p>Currently the agencies lack sufficient compiled data to consider in detail the issue of the effects on climate change on river diatom communities, but these comments are noted and the massive increase in diatom surveys which will take</p>

Comments	Response
<p>conditions can enable a range of organisms with differing requirements to coexist in approximately stable populations in what are otherwise suboptimal conditions.</p> <ul style="list-style-type: none"> • diatoms with differing nutrient use and growth rates at different temperatures can coexist in fluctuating temperatures. • change in average temperature (as could be experienced with global warming) could significantly alter a diatom population structure. 	<p>place with implementation of the Water Framework Directive should allow these issues to be explored in future.</p>
<p>English Nature and Countryside Council for Wales expressed that the method for equating dissolved oxygen and Biochemical Oxygen Demand (BOD) with ammonia levels resulted in less stringent values and is of concern.</p>	<p>Report not amended</p> <p>The Good/Moderate water quality standards identified in the UKTAG report have been set as attainment values for water bodies that are currently less than good. For water bodies that are currently at good status or better, water quality will be protected by the UK environment agencies' no deterioration policies.</p> <p>Where deterioration in water quality is observed the environment agencies will have a sliding of scale of regulatory action, ranging from issuing advice to low risk water users, to setting strict permits for activities in high risk areas.</p> <p>The details of this approach are being considered by UK agencies.</p> <p>If experience during the first river basin plan indicates that these standards do not support the relevant objective status classes, then they will be reviewed and if appropriate modified.</p>
<p>There were mixed views of the adequacy for underpinning datasets for dissolved oxygen and BOD and general water quality sampling regimes, including:</p> <ul style="list-style-type: none"> • the environmental standards have been developed by identifying the most sensitive biological element to a particular pressure, and where possible deriving the standards from matched biological and environmental data sets. • insufficient data has been included. <p>A review must be undertaken which demonstrates that macroinvertebrates are the most sensitive biotic group to ammonia and oxygen stress. Where they are not, the standards for BOD, dissolved oxygen and ammonia should be adjusted to ensure that fish are</p>	<p>Report not amended.</p> <p>Whilst it is recognised that fish show sensitivity to the standard set of pressures such as dissolved oxygen, BOD and ammonia, matched data sets from across the UK are limited.</p> <p>Therefore, environment agencies chose to use macro-invertebrates to set standards for these pressures.</p> <p>Additionally, migratory fish stocks which dominate in rivers that are most sensitive to these pressures can change in abundance due to factors that impact on them outwith the freshwater water body where they spend part of their life.</p> <p>It is intended that data gathered through the first river basin plan will allow validation of the standards, and it will also be possible to review biological sensitivities to ensure that the appropriate biological element have been selected.</p>

Comments	Response
<p>protected.</p> <p>Proposed BOD and dissolved oxygen standards do not support less stringent standards (for fish protection).</p> <p>We are concerned that the standards for BOD and ammonia proposed are lower than those currently used. The argument that figures may be rounded to one decimal place should not be applied to ammonia as small increases in ammonia concentrations can cause significant impacts on aquatic biota. If national standards must reflect Water Framework Directive standards (page10, para 3) this implies a widespread lowering of standards for oxygen and ammonia. If this is the case, there should be more detailed analysis presented to justify this change.</p> <p>The definition of rivers based on Freshwater Fisheries Directive inadequate because lowland rivers hold valuable stocks of fish other than salmonids that are sensitive to reduced dissolved oxygen. Failure to incorporate flow issues leads to risk of local deoxygenation and fish kills with some proposed abstraction regimes during the summer low flows and high temperatures. The implications of water abstractions on BOD especially at the time of minimum flows and maximum temperatures in the summer should be explicitly taken into consideration either here or in the section on abstractions and flow. Clarify interactions between Freshwater Fish and Water Framework directives.</p>	<p>Report not amended.</p> <p>Firstly, as the proposed standards are broadly similar to the existing Freshwater Fish Directive standards for dissolved oxygen, BOD and ammonia, they will provide the necessary level of protection to salmonid and cyprinid fish communities.</p> <p>The standards for the Freshwater Fish Directive will continue to be applied until its repeal. Thereafter the same level of protection must be provided.</p> <p>Attempts were made to match pressure metrics from the European 5 Framework funded FAME project with physico-chemical data sets; however, this revealed that there were insufficient matches, and those that existed were restricted in their geographical coverage.</p> <p>The use of fish in setting standards is compromised as the abundance of migratory species can be affected by pressures outside the water body. That said the importance of fish as indicators of environmental health is well recognised, and the data gathered from monitoring in the first river basin plan will be used to review the standards used during that period.</p> <p>The proposed values have been derived from the actual needs of macro-invertebrates, and the slightly laxer dissolved oxygen standards in lowland high alkalinity rivers reflects the needs of the biota that naturally inhabits these rivers.</p> <p>Where a river is typed as a lowland high alkalinity river and it is designated as salmonid water under the Freshwater Fish Directive, then the tighter upland low alkalinity standards are applied.</p> <p>In the developing these new environmental standards, the UK environment agencies have sought to strike a balance between environmental protection and effective regulation. It is believed that the approach of applying the low alkalinity upland standards to high alkalinity low rivers when they have been designated as Salmonid waters under the Freshwater Fish Directive will go a considerable way to address the issues outlined.</p> <p>If however, experience during the first river basin plan indicates that sensitive non-salmonid populations are not being protected in high alkalinity lowland water, then the approach will be reviewed in the lead up to the second river basin plan.</p>
<p>Dissolved oxygen is correlated with temperature as well as diurnal changes.</p> <p>The standards need to account for these.</p>	<p>Report not amended.</p> <p>The effect of temperature on freshwater biota is clearly understood by the UK environment agencies, as is its inter-relationship with oxygen conditions. At present temperature</p>

Comments	Response
	<p>conditions are regulated through the Freshwater Fish Directive standards. The UKTAG is presently reviewing these for all water categories to see how they can be best applied under Water Framework Directive and may have a proposal in the next phase of standards.</p> <p>The biological sampling undertaken by the environment agencies integrates the effects of the diurnal variations in dissolved oxygen conditions, so whilst dawn sampling would pick up the periods in the river with the lowest oxygen conditions, it is also the case that any problems arising from this would be reflected in the macro-invertebrate communities.</p> <p>Similarly the way in which these chemical standards were devised is based on an association between summary statistics of chemistry and biology. Even if chemical sampling is only done in office hours they function effectively as standards because both the biology and the chemical summary statistics are correlated with diurnal effects and the probability of peak events.</p>
<p>Values of per cent saturation for DO are given with compliance set as a 10-percentile, these need to be related to the sampling regime, particularly in lowland and tidal rivers.</p>	<p>Report not amended.</p> <p>The UKTAG agrees with this statement.</p>
<p>Do not agree with dissolved oxygen standards expressed as per cent saturation. Oxygen solubility is correlated to temperature. Therefore, water of X per cent saturation will contain less oxygen in the summer than winter. What is critical to aquatic organisms (especially at elevated temperatures) is the absolute oxygen concentration, rather than the relative percentage. Suggest values from the Freshwater Fish Directive (or similar) were adopted, in mg/l.</p>	<p>Report not amended.</p> <p>The value of absolute measures of oxygen is recognised; however, the environment agencies have more commonly reported dissolved oxygen values as per cent saturation in freshwater quality assessments. Converting the proposed per cent saturation values at a range of temperatures found in UK rivers to mg/l illustrates that the new standards confer a slightly higher level of protection than the existing standards from the Freshwater Fish Directive.</p> <p>The table below provides the conversion for dissolved oxygen in mg/l converted from dissolved oxygen per cent saturation (assuming 1 atmosphere pressure).</p> <p>Direct comparisons are not possible with the data that is available. However, as the 10th percentile values presented in the table below are more stringent than the 5th percentile described in the Freshwater Fish Directive, it was concluded that even in the warmest conditions likely to be found in UK rivers, the new standards are at least as protective as the previous standards.</p> <p>In the experience of the environment agencies it is not the case that the decision-making processes for improving and protecting environmental waters is affected by the different types of standard. The standards include a measure of caution and the differences are small compared with the statistical errors of monitoring.</p>

Comments	Response
Need to review standards between rivers and transitional and coastal waters to ensure consistency, especially for oxygenation.	<p>Report not amended.</p> <p>The table below illustrates that there is broad agreement between the river and the transitional water oxygenation standards when water temperatures in UK estuaries would be expected to be at their highest towards the end of the summer. The main exception to this is the slightly tighter standards that are required for the Lowland High Alkalinity river type at the G/M boundary. This is not unexpected as the oxygen standards for it are designed to protect the typical conditions of the type rather than the conditions that are found at the tidal limit. As it is only slightly more protective, it should not have any major implications for management and not pose any downstream effects to estuaries and their management.</p> <p>Future work will need to support comparing data from estuaries and associated rivers to improve our understanding of faunal requirements in this inter-phase habitat.</p> <p>Finally we suggest this is a minor issue in the context of the statistical uncertainties in using data to take decisions.</p>

Table: Conversion for dissolved oxygen in mg/l from dissolved oxygen per cent saturation (assuming 1 atmosphere pressure).

type of river	% sat	water temperature (C)				
		5	10	15	20	25
		dissolved oxygen (mg/l)				
	100	12.8	11.3	10.1	9.1	8.3
	95	12.1	10.7	9.6	8.6	7.8
	90	11.5	10.2	9.1	8.2	7.4
	85	10.9	9.6	8.6	7.7	7.0
Upland Low Alkalinity- H/G	80	10.2	9.0	8.1	7.3	6.6
Upland Low Alkalinity- G/M	75	9.6	8.5	7.6	6.8	6.2
Lowland High Alkalinity- H/G	70	8.9	7.9	7.1	6.4	5.8
	65	8.3	7.3	6.6	5.9	5.4
Lowland High Alkalinity- G/M	60	7.7	6.8	6.1	5.5	5.0
	55	7.0	6.2	5.5	5.0	4.5
	50	6.4	5.6	5.0	4.5	4.1
	45	5.7	5.1	4.5	4.1	3.7
	40	5.1	4.5	4.0	3.6	3.3

Acidification

<p>General preference to use Acid Neutralising Capacity (ANC) for assessing acidification including:</p> <ul style="list-style-type: none"> Agree that pH, unless continuously monitored, is an inadequate descriptor of acidification pressure, and that Acid Neutralising Capacity (ANC) is preferable. Do not agree with continued use of existing pH standards as adequately protective of GES. Consideration should be given to 	<p>Report not amended.</p> <p>Various attempts were made to develop new standards that will protect rivers from acidification pressures. However, each attempt was frustrated by the restricted matched data sets and the lack of ANC data from across the UK.</p> <p>Consequently it was agreed that we should retain the existing standards (i.e. pH) for the first river basin plan, and that over this period steps would be taken to collect suitable data to allow the development of new ANC standards.</p>
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Comments	Response
applying the proposed environmental standards for lakes (which do make use of ANC) to rivers. This approach would give a steer for future work, and act as a driver for monitoring programmes to collect ANC data.	
Not clear why different requirements for Scotland pH.	<p>Report not amended.</p> <p>During implementation of the Freshwater Fish Directive, it was recognised that salmonid populations with qualities that broadly equate to the putative good status were found in rivers where pH fell to around pH 5.2, consequently it was agreed that a lower standard should be applied in Scotland. It is thought that a certain level of tolerance to the pressures that arise from acidification may develop in fish populations that are routinely exposed to this pressure.</p>
Better use of Acid Waters Monitoring Network data to set interim standards for acidification.	<p>Report not amended.</p> <p>The ANC standard development programme will draw on existing data sets, and where appropriate utilise new data.</p> <p>(Note: for lakes, ENSIS-ECRC played an active role in advising the UK TAG on an appropriate standard for good ecological status for lake acidity and have recommended that an ANC of 20 micro-equivalents/l is an appropriate "good-moderate boundary". This is consistent with current Defra AEQ emissions policy which seeks to restore or maintain water quality to this level or above.)</p>
The standards for ammonia are based on total ammonia. No standard is given for un-ionised ammonia which is the toxic form (to fish and invertebrates).	<p>Report not amended.</p> <p>There is considerable debate on the environmental factors which influence the toxicity of ammonia. The environment agencies find fish and invertebrate populations in rivers where lab based toxicity tests suggest that wide scale mortalities should occur. Consequently it is believed that there are a series of environmental factors which ameliorate the toxicity of ammonia. Thus the environment agencies have confidence in expressing ammonia standards in total ammonia concentrations.</p> <p>The standards for unionised ammonia in the Freshwater Fish Directive will continue to be applied until its repeal. After this the same degree of protection must be maintained.</p> <p>Experience has shown that it is common that the standards for total ammonia are tighter than those for free ammonia conditions, it is believed that pH in the water is buffered at the fish gill. Otherwise we are at a loss to explain why fish thrive so well where the standard is failed.</p>
Fish should be a Biological Quality Element for ammonia. Support higher standards for lowland rivers supporting salmonids.	<p>Report not amended.</p> <p>The UK environment agencies presently lack suitable fish related data sets for developing ammonia standards that will</p>

Comments	Response
	<p>protect freshwater fish. We plan to undertake a comparative analysis of fish and macro-invertebrate requirements, as data becomes available during the first river basin plan. If it proves necessary, to revise the standards this will be done.</p> <p>Strong salmonid populations in the rivers that are most sensitive to ammonia loading and consequently a number of ameliorating factors reduce actual toxicity under real conditions.</p>
Nutrient conditions - diatom analysis (phosphorus standards)	
<p><i>Definition of reference conditions</i> - Problems with assessing deviations from reference conditions for high and good ecological status results in over-estimate the phosphorus concentrations for high ecological status. Soluble phosphorus is an extremely scarce resource in natural freshwaters, of the order of a few microgrammes per litre. Resultant effect is to under-estimate the impact of environmental stressors.</p> <p><i>Interpreting GES/HES:</i> wide range possible based on method, the interpretation is at the least environmentally protective end.</p> <p>Equating biological status with phosphorus levels is difficult as insufficient data on sites within each types, and low frequency distribution, results in a standard that is not adequately protective.</p> <p>The supporting UKTAG technical paper on the diatom analysis did not cover: other algae that most frequently cause visual algal problems; growth rates; and total standing biomass. Difficult to research but international experimental studies have led to standards considerably lower than those proposed by the UKTAG.</p> <p>The UKTAG standards and Favourable Condition standards for protected areas compared rivers for rivers with low natural nutrient level. In future, there may need to tighten of some standards as the UKTAG high ecological status standards to be more compatible with Favourable Condition.</p> <p>In Northern Ireland, the proposed standard is too high (not strict enough).</p>	<p>Report not amended.</p> <p>Pressure response relationships are characterised by varying levels of variability. In developing the river phosphorus standards, the UK environment agencies took the high/good and good/moderate ecological boundary values that were derived by the DAREs method and then identified the nutrient values that would be required to protect them.</p> <p>It has been agreed that the standards will be reviewed using the data that has been collected during the first river basin plan, to account for any sources of variability in the standard setting process.</p> <p>A study commissioned by Intereg funded NS-SHARE project in Ireland reviews the suitability of non-diatom algae in river classification and concluded that diatoms were the most effective biological predictor of nutrient enrichment. Filamentous algae did respond to this pressure, and SEPA have used them in a suite of determinants in the most recent UWWTD sensitive area review. However, there are no data sets from across the UK, the distribution and abundance of filamentous algae can be affected by recent hydrological conditions, and the DAREs team were building on well established relationships in the TDI project.</p> <p>Concerns were raised that the proposed river nutrient standards were not in line with the values proposed by the conservation agencies to protect Special Area of Conservation (SAC) rivers. It is recognised in the Water Framework Directive that different standards may be applied to a single water body, e.g. the nutrient standards proposed by the environment agencies apply to all rivers across the UK; however, if a water body is designated as an SAC, and it has been established that it needs more stringent standards than the Water Framework Directive, then these will apply within the framework of policy developed for SACs.</p> <p>The UK environment agencies have based percentile selection on the combined effects of the pollutant mode of action, and their understanding of the risks associated with over and under regulation, and the ultimate impact of standards on river water quality.</p>

Comments	Response
<p>Literature shows algal growth rates increase up to a soluble P of 60ugP/L. The River Bush which is suffering from excess weed growth and eutrophication has soluble phosphorus standard of only 60 ug P/L which is saturating. So a standard of 110 ugP/L offers no protection.</p>	<p>With respect to the River Bush example: there are presently signs of nutrient enrichment in some parts of the catchment for which the phosphorus standard of 110ug/l would provide some protection. The point is, of course, that the standards have been derived from a large dataset from which there will inevitably be exceptions. However, greater protection should be provided by the forthcoming macrophyte and phytobenthos standards as macrophyte and diatom monitoring in the catchment would indicate enrichment.</p>
<p>Why is total phosphorus used for lakes and Soluble Reactive Phosphorus for rivers?</p>	<p>Report not amended.</p> <p>Total phosphorus is used in lakes as measuring the soluble fraction of phosphorus is not an appropriate assessment of the state of enrichment. In lakes the majority of the bioavailable phosphorus is incorporated into phytoplankton and therefore can only be measured in a total phosphorus analysis.</p> <p>In the majority of rivers there are few phytoplankton present and thus the soluble fraction of phosphorus is a reliable measure of enrichment. As rivers are very shallow in comparison to lakes, the total phosphorus in rivers would include resuspended sediment material. This is unlikely to be bioavailable and while it may represent a fraction of the phosphorus load transported, it is not a useful measure of the nutrient enrichment of the water fraction. Thus the most useful measurement to assess the enrichment state of rivers is the soluble component.</p>
<p>The phosphorus standard is unacceptable because it is not based on REFCOND compliant procedures of reference site selection. Sites used for defining diatom assemblages are reviewed using the REFCOND criteria to identify those sites which do not meet the criteria and do not use to calculate reference conditions [review alternative options]</p>	<p>Report not amended.</p> <p>As per our response on this issue for oxygenation, BOD and ammonia above, the UKTAG recognises that reference conditions for diatoms require further consideration but it is unlikely that genuine reference condition sites exist for many river types in the UK. It is likely that there will always be some uncertainty connected with this, but we consider that the diatom class boundaries used represent robust interpretations of the normative definitions.</p>
<p>The standard for good status has been tightened by a factor of 2 for type 1n and 2n (low alkalinity under 50 mg/l Calcium carbonate). These standards are very conservative in relation to the standards set out in the Birds and Habitats regulations for England and Wales. Early assessments indicate that in order to approach the proposed phosphorus standards very tight phosphorus limits well below the 1mg/l required for large works under the Urban Waste Water Treatment Directive would be required at an increasing number of sewerage works.</p>	<p>Outside the scope of the stakeholder review.</p> <p>The standards have been derived from analyses of diatom communities and an interpretation of their status classes as defined in the normative definitions of the Water Framework Directive. They are independent of any previous analyses.</p>
<p>Scatter plots of the relationship between phosphorus concentration and an</p>	<p>Report not amended.</p>

Comments	Response
<p>environmental quality index (EQI) have not been provided in the supporting UKTAG technical paper on the diatom analysis, but have been available to those on the UK TAG Rivers Task Team. It is noticeable in the scatter plots for Types 3 and 4 (particularly for Type 3), that an EQI is reached below which phosphorus levels appear to become independent of EQI and that this occurs around 150 µg/l. Whilst there may be within-type variations in biological response (for instance, between clay and chalk rivers within Type 3), this pattern is in line with what we know of the concentration range within which inter-specific competition for phosphorus between algal species is likely. The implication is that, above around 150 µg/l SRP phosphorus availability is playing no further part in shaping the composition of the diatom community. Standards set around this type of concentration therefore place a cost on industry while providing little ecological protection to the river ecosystem.</p>	<p>Within the biological methods project which is analysing Diatoms response (known as the DARES project) setting environmental standards for lowland rivers has been challenging due to the lack of true reference conditions in this habitat. Sampling is being undertaken in the latter stages of the project which it is hoped will address this issue.</p> <p>In selecting phosphorus values in the UKTAG report, the environment agencies have sought to strike a balance between environmental protection, and setting values which impose unnecessarily tight conditions on water users.</p> <p>If the information that is presently being collected, or if the new data that is gathered through the first river basin plan indicates that the standards are not protective of ecological conditions they will be revised.</p>
<p>Standards for designated wildlife rivers: clarify Table 11: Three different types of value are presented: 'natural' values, guideline standard values, and 'threshold' values; 'natural' phosphorus levels cited do not represent true natural (reference) conditions, which would be levels considerably lower than this; 'guideline standards' for Special Area of Conservation (SAC) rivers use a framework of 18 river types, differentiated by catchment geology and river size. Specific values apply to each of the 18 types – Table 11 summarises this information by including the differences between geological types as ranges of phosphorus values. The lower value in each range is therefore the specific standard for some river types, whilst the highest value will be the standard for other river types; The so-called 'threshold' phosphorus values are not standards to protect the ecology of the river, and are therefore of no relevance to the derivation of standards to support good or high ecological status.</p>	<p>Report not amended.</p> <p>It is recognised that there are difficulties in making direct comparisons between standards that have been developed through different processes and for different purposes. This issue is recognised in the report, and the comparisons are only presented for illustrative purposes.</p>
<p><u>Table 11.</u> How is the true class known? Page 30, paragraph 3. Is the classification of phosphorus regarded now as suitable for regulatory purposes?</p>	<p>Report not amended.</p> <p>These values are derived from known risk of misclassification derived from error terms about the measurements used to derive class. They don't imply that</p>

Comments	Response
	the true class of any particular site is known, only that confidence limits can be applied to the measurement of the biology or chemistry.
<p>Clarify explanation for river nutrients if you use a graph, like a box and whisker graph. Approach does not account for sites with "less than good" biological quality with same range.</p> <p>Options: a) logistic regression on both good and less than good datasets with percentile of site at border; or b) you select sites with a biological quality at the border between good and not good and that you take a certain percentile of the concentrations found at these sites. If this approach, need to ensure that one takes a low percentile, e.g. 10 per cent.</p>	<p>Report not amended.</p> <p>It is recognised that there are number of ways to develop environmental standards from the data that is held by the UK environment agencies. Through the standard development process, a comparison was made between the results presented in the report, and those derived from regression analysis, and this demonstrated that both approaches produced similar results.</p> <p>In reaching a final decision on the standards the environment agencies have sought to strike a balance between environmental protection, and setting values which impose unnecessarily tight conditions on water users. Any analysis is confounded by high levels of variability in data sets. This issue will be addressed through the first river basin plan as the agencies gather a large matched data set describing the biological and chemical condition of rivers.</p>
<p>Nitrogen: is the UKTAG developing Nitrogen standards? Suggest used nitrates as function of upstream ammonia levels where no monitoring or where diffuse sources.</p>	<p>Report not amended.</p> <p>There is presently insufficient clear information on the role of nitrogen compounds in freshwater nutrient enrichment, consequently it was deemed inappropriate to develop standards for this pressure. However, our understanding of its role is improving, and if the standards review at the end of the first river basin plan suggests that nitrogen standards are required then we shall seek to develop them.</p>
<p>No recent research on the measurement of biodiversity has been addressed; we can go far beyond the use of RIVPACS and produce data that is analysable statistically. The triangulation of the physico-chemical measurements proposed against measured biodiversity quality would achieve a real definition of "good ecological status". Refer to Feest (2006) to see how RIVPACS data could be further used to achieve this.</p>	<p>Report not amended.</p> <p>The UK environment agencies are presently improving the functionality of RIVPACS to ensure that it meets the requirements of the Water Framework Directive, and they also have obligations to protect biodiversity. There are clear benefits to the environment agencies of delivering multiple objectives from a single activity, and opportunities will be taken to further the delivery of biodiversity objectives through improvements that are made to RIVPACS.</p>
<p>Further R&D required on benefits to water quality of liming catchments to raise ph/calcium levels of upland rivers. Reducing acidification pressures on freshwater habitats is best treated at source by reducing the release of acidifying compounds into the atmosphere, and by modifying land-use practices which contribute to the acidifying process.</p>	<p>Report not amended.</p> <p>Noted. Studies on the effects of liming have shown that recovery populations may be different be different may be different from the original fauna. Additional problems arise in catchments, as this process is likely to result in damage to acidophillous plant communities which dominate these areas.</p>
<p>Page 19 para 2. On what basis was 'good' biological quantity defined?</p>	<p>Report not amended.</p> <p>Good biological status identified by identifying points on pressure/response axis which correspond to the high/good and good moderate boundaries which we inferred from the class status normative definitions which are described in Annex V of the Water Framework Directive.</p>

UKTAG Report – Water Quality Standards – Lakes

Summary

Taken as a whole, the respondents gave a thorough examination of the method and identified a range of key issues:

- generally there was support for the site-specific approach. It was recognised that the explanation in the UKTAG report did not fully explain the models and approaches.
- phosphorus standards were viewed as not precautionary enough by non-government organisations and for Northern Ireland.

Amendments to the UKTAG report

The UKTAG has recommended that at this time, the report provides the best evidence as to possible standards for use under the Water Framework Directive. We recognise though that the European Intercalibration process is continuing and is providing additional information. We will consider outcomes of this approach to identify whether we can improve the approach outlined in the UKTAG environmental standards report.

We will provide an update into the next phase of UK standards to be released in early 2007 and for this reason recommend that phosphorus standards for lakes are not considered in the forthcoming consultation by UK administrations on the first tranche of standards and conditions.

To clarify the approach, we have included reference values into Table 17 in the UKTAG report.

Comments	Response
Generally no comment on typology.	Report not amended.
Fish related organisations identified that there were at least four main fish types in lakes in the UK and oversimplification will possibly cause deterioration in the fisheries to the extent that adopting the simple salmonid/cyprinid split will lead to loss of species, in direct contravention of the Habitats Directive.	<p>A range of typologies have been developed to underpin Water Framework Directive implementation to take account of the varying sensitivities to the pressures that affect UK lakes. It is believed that the alkalinity and altitude and the split between salmonids and cyprinids explain a considerable level of the natural variability that is found in UK lakes.</p> <p>Other factors could have been introduced; however, this would have introduced additional types, and it was agreed that in the first instance an uncomplicated approach should be taken to typology development. This decision was taken in consultation with stakeholder groups to ensure that an easily understood and transparent system was developed for the first river basin planning cycle.</p> <p>If through the first river basin plan it becomes evident that over or under protection has occurred due to constraints imposed by the typology the existing framework will be reviewed, and the need to introduce additional types and variables will be considered.</p>

Comments	Response
<u>Oxygen Conditions</u>	
Reference conditions: implicitly define an ecologically relevant reference fish community. – not certain how applied to individual lakes, when consider 'expected' reference conditions taking into historic geographical distribution of fish (and not the status of the current fish community).	<p>Report not amended.</p> <p>In the context of the environmental standards for oxygen we propose to divide lakes into 2 broad types, those that support salmonid fish in reference state and those that would not.</p>
<p>Standards are Freshwater Fish Directive, derived from the scientific literature, and therefore will safeguard elements. But standards may not protect other taxa.</p> <p>Future work: need to review oxygen conditions in lakes to ensure protection of other taxa besides fish.</p>	<p>Report not amended.</p> <p>The UKTAG believes the standards to be sufficiently protective.</p> <p>Over the cycle, we will collect more data from monitoring programmes and improve our biological methods. If through the first river basin plan it becomes evident that other species require different protection, we will amend our approach.</p>
Monitoring for this parameter is variable and dependent on weather. It needs to occur when oxygen conditions in the hypolimnion are lowest (not necessarily July – August/annual). Use of a mean rather than adopting the worst case scenario may be insufficiently precautionary.	<p>Report not amended.</p> <p>Ideally continuous monitoring would be used to assess dissolved oxygen. This is not practical and as a consequence we propose to combine results from a minimum of 3 years. If over the first river basin plan it becomes evident that results are too variable we will amend our approach</p>
Standards as mg/l much harder to achieve in warm shallow lakes versus standard expressed as per cent AS.	<p>Report not amended.</p> <p>From our limited data we have no evidence for this as mixing in these lakes is generally sufficient to maintain oxygen saturation.</p>
<u>Acidification</u>	
<p>The standards and the use of Acid Neutralising Capacity (ANC) was generally supported as the relationship between ANC changes and effects on fish are recognised.</p> <p>Respondents identified that the taxa used may not be the most sensitive to change and may need future work to confirm this.</p>	<p>Report not amended.</p> <p>We believe the standards to be sufficiently protective. Over the cycle, we will collect more data from monitoring programmes and improve our biological methods.</p> <p>If through the first river basin plan it becomes evident that other species require different protection, we will amend our approach.</p>
<u>Phosphorus</u>	
<p>Clarify explanation for model and how set for reference conditions-refer submission for detail.</p> <p>Not clear how method (land use-phosphorus model under development in Scotland) will integrate with the approach presented for environmental standards?</p>	<p>Report amended (pages 39, 40) to reflect reference values in Table 17 and include reference to Scottish land –use model.</p> <p>Further detailed explanations will be made available when the UKTAG finalises its recommendations on the phosphorus standard for lakes</p> <p>For information on the models proposed for use in Scotland, please refer: Ferrier, R.C., Malcolm, A., McAlister, E.,</p>

Comments	Response
	Edwards, A., and Morrice, J., (1996). <i>Hindcasting of in-loch phosphorus concentrations based on Land Cover Classification</i> . Report for Scotland and Northern Ireland Forum for Environmental Research, Edinburgh.
What kind of concentrations are presented: individual observations, summer average or year average?	<p>Report not amended.</p> <p>Standards are based on annual average (stated in opening paragraph on p37 of the UKTAG report).</p>
Agree that a site-specific approach is more appropriate than setting type-specific standards. Agree that it is consistent with CIS guidance and is a reasonable approach in the absence of biological data which can be linked to normative definitions.	<p>Report not amended.</p> <p>We appreciate this advice.</p>
<p>Table 17 describes existing phosphorus standards in lakes considered by the conservation agencies as relevant to the ranges of conservation interests associated with what the Habitats Directive call Favourable Conservation Status.</p> <p>The standards for Habitats Directive should be taken from the Common Standards Monitoring Guidance for Standing Waters (JNCC, 2005), which covers the work of all the UK conservation agencies and applies to SSSIs as well as SACs. Although the guidance presents a range of type-specific targets for phosphorus, a lake-specific approach is recommended within that framework.</p>	<p>Report not amended.</p> <p>We appreciate this advice. The agencies will need to consider their approach to Protected Areas.</p>
Reference conditions: there are few data with respect to phosphorus for lakes. Modelling approaches are supported but are dependent on reference sites. We will need future work to link to biology.	<p>Report not amended.</p> <p>We acknowledge the limited number of reference sites, but believe that modeling is the only practical way of establishing reference conditions.</p>
Application of standards: adoption of median value of this distribution of site specific values is an insufficiently precautionary approach, particularly given the proposed use of the indirect model in applying standards.	<p>Report not amended.</p> <p>The use of the median has been agreed as a general approach during the intercalibration process of other relevant ecological metrics. Therefore the UKTAG approach matches that of our European colleagues.</p>
Indirect Model is not precautionary enough for management of phosphorus in shallow lakes. Predicting the exact position of such thresholds is impossible and recovering a plant-dominated clear water state is costly and technically difficult. Biological responses can be delayed and hence the indirect	<p>Report not amended.</p> <p>In some lake types, such as very shallow lakes, there are complex biological relationships controlling the response to elevated levels of phosphorus. This makes setting an appropriate phosphorus standard difficult, even at the site specific level.</p>

Comments	Response
<p>model may result in inappropriate controls. The Habitats Directive standards displayed for comparison are applied according to the direct model.</p>	<p>The UKTAG set a standard that should protect the majority of lakes. UKTAG recommends where the phosphorus standard is failed without reasonable confidence we would not propose to take action unless we were also confident that other sensitive biological elements were worse than good status.</p> <p>In making such an assessment, the environment agencies would take into account more than one sensitive biological element such as the status of the phytoplankton as well as macrophytes or phytobenthos. In looking at these two quality elements, we are confident that ecological impacts will be detected. By doing this, action is targeted where there is a problem.</p> <p>The UKTAG acknowledges that in many lakes there are delays in biological responses. Thus when making such judgments we would also consider trends in phosphorus. Where there is evidence of a recent change in phosphorus or a trend of increasing phosphorus this would be taken into account in judging our actions. Finally we acknowledge the need for different levels of precaution for lakes of high conservation value. Such sites would be protected areas and would need to meet the criteria already established under the Habitats Directive.</p>
<p>The work done on phosphorus standards for lakes presents ranges, as well as medians, for lake types (Table 17). Standards for phosphorus in lakes have been generated with a national model (pages 35 and 36). This appears to be the best option available. However, in relation to the type medians, it is not necessarily always the case that very shallow lakes can tolerate higher concentrations of phosphorus. As the entire water column is within the photic zone, this may lead to increased growth of filamentous algae and phytoplankton, particularly if flushing rate is low and few phosphorus binding sites remain within the sediment. In addition, increased turbidity resulting from wind-generated disturbance of sediments may be expected. In particular, very shallow, low alkalinity lakes may be at risk. It is also noted, that for all lake types, there is a degree of overlap between ranges of values presented for High and Good status, and between different types within the same status.</p>	<p>Report not amended.</p> <p>The UKTAG notes the comments but cannot respond until it also considers the outcomes from Intercalibration.</p> <p>We plan to also review the phosphorus standards using macrophyte taxonomic composition in addition to phytoplankton and this may address some of your concerns.</p>

Comments	Response
Northern Ireland: it is likely phosphorus standards would seem to be around 40 ugP/L, which is a lot less than current concentrations occurring in Loughs Neagh and Erne.	<p>Report not amended.</p> <p>We note this comment. We recognise that Lough Erne and Neagh are unique and special consideration may need to apply to managing these water bodies.</p>
Nitrogen standards required but there is not sufficient data on lakes to set as yet.	<p>Report not amended</p> <p>We agree. There is presently insufficiently clear information on the role of nitrogen compounds in freshwater nutrient enrichment.</p> <p>However, our understanding of its role is improving, and if the standards review at the end of the first river basin plan suggests that nitrogen standards are required then we shall seek to develop them.</p>

UKTAG Report – Water Quality Standards – Transitional and Coastal Waters

Overview

- the Countryside Council for Wales and English Nature identified that definitions of High-Good and Good-Moderate boundaries were consistent with the normative definitions under the Directive and that the standards were broadly protective. They identified that the approach identified in the UKTAG report informs risk assessments of protected areas under the Habitats Directive.
- there was mixed support recognising that the standards were not based on observed ecological change but rather were aligned with eutrophication assessments under Water Framework Directive with OSPAR common procedures. Some viewed this pragmatic and sensible given lack of data whilst others felt that it did not match the Directive's requirements. There was recognition that this may need to change when there is improved understanding.
- generally respondents supported the use of Fundamental Intermittent Standards as proposed in the report but viewed that agencies may need to consider additional approaches to protecting spawning grounds and other special areas. They also requested whether this could be extended to other standards in estuaries.
- respondents asked for clarification on how the standards were derived, finding the supporting report inadequate. They also identified that different units adopted for marine waters and rivers were confusing and made it hard to interpret the loadings from rivers into the marine environment.
- specific question related to why the standards were derived from off-shore values and whether this sufficiently accounted for estuaries in terms of salinity values. There were also questions raised with respect to the derivation of the standards.
- further information on the implications of adopting the Nitrogen and Dissolved Oxygen standards was also requested.
- many respondents requested that UKTAG establish standards for phosphorus in transitional and coastal waters, some reflecting that it was critical they be developed for use in the first river basin plan whilst others viewed that it will be important to collect data and develop phosphorus standards for next cycle.
- generally, respondents expressed concerned at the 'the paucity of information in transitional and coastal waters essential for the development of robust standards' and identified that it was critical that monitoring regimes under the Directive addressed the gap in knowledge.

Amendments to the UKTAG report

Based on the above comments, and additional work by the UKTAG, the standards for nitrogen have been revised to account for:

- salinity gradient for off-shore, coastal and estuarine waters;
- appropriate background reference values across the Great Britain and Irish waters.

The UKTAG report therefore provides a revised simple suite which contains single (salinity normalised) values for UK offshore, coastal and transitional waters:

- reference (H/G) values (or high class boundary)
- threshold (G/M) values (or good class boundary).

These are still aligned with OSPAR because it is important that implementation of the Water Framework Directive recognises the good work to date under this international framework. The revised approach and supporting method is set out in Devlin M, & Painting S (2006) *Nitrogen thresholds for UK waters – offshore, coastal and transitional waters*. These standards align Water Framework Directive, OSPAR and Urban Waste Water Treatment and Nitrate Directives.

Comments	Response
<u>General comments</u>	
<p>Mixed support for standard and its extension.</p> <ul style="list-style-type: none"> • Fish assumed the most sensitive biological quality element to oxygen - pragmatic approach. • Standards broadly protective. • Support Fundamental Intermittent approaches for episodic events. • Not based on observed ecological change but alignment with eutrophication assessments under the Water Framework Directive with OSPAR common procedures. May need to change if improve understanding. • May need more protective standards in transitional waters (e.g. nursery grounds, etc). 	<p>Report not amended.</p> <p>We welcome these views.</p> <p>The complexity of the marine environment is fully recognised. To date, the UK agencies have not established the same level of knowledge that operates in the riverine environment. It is anticipated that this be developed over the first river basin planning cycle.</p> <p>However OSPAR has enabled good progress in the understanding of nutrient and other pressures on the marine environment. It is pragmatic to fully recognise this as part of the implementation of the Water Framework Directive.</p> <p>As part of operational systems and classification systems, we will consider the requirements for protection of more sensitive areas. This is best undertaken through site assessment rather than a UK definition of standard. We will develop requirements as operational guidance for agency staff. The UKTAG Marine Task Team includes representatives from the UK environment and conservation agencies as well as CEFAS and FRS. All parties are involved in the agreement of standards and in developing a co-ordinated monitoring strategy.</p>
<u>Oxygenation</u>	
Ensure consistency between oxygen standards between rivers and transitional waters.	Refer to response under 'rivers water quality', page 20 of this document.

Comments	Response
<p>Page 43, Oxygen activity: explain how assessment of oxygen standards should account for different solubility of oxygen in waters of differing salinity (ionic strength); need to calibrate methods of analysis according to salinity if to be compared with the standards in the Figure on page 44; vs. methods that determine the mass per unit volume of oxygen, rather than activity, in figure for standard class boundaries</p>	<p>Report not amended.</p> <p>The solubility of oxygen in water is function of both temperature and salinity.</p> <p>If water temperature rises the per cent saturation of a water body will increase even though there has been no change in dissolved oxygen content (as mass per unit volume (w/v)). This could give a misleading impression with a reported high per cent saturation being largely a function of elevated temperature which itself is causing thermal stress on biota.</p> <p>For this reason it was thought more appropriate to use w/v (mg/l) rather than per cent saturation in the derivation of standards.</p> <p>Increasing salinity also reduces the solubility of oxygen in water. For example, at 15°C, 100 per cent saturation is represented by 10.08 mg/l in freshwater but 8.13 mg/l in full sea water (35 psu).</p> <p>Again it was though appropriate to reflect this particularly in definition of the highest standard which led to the salinity related thresholds.</p> <p>The DO parameter measured depends on the analytical method. Wet titration (Winkler) measures w/v whilst electrodes are measuring per cent saturation. The two can be readily transformed provided salinity and temperature are also known. It is however important to use the UNESCO algorithm which handles salinity correctly.</p>
<p>Clarification is required as to whether this 6 hour assessment period should be interpreted as any flood or ebb tide (which may be longer or shorter than 6 hours depending on the water body in question) or whether it represents any 6 hour period irrespective of tidal state. The tidal state can have a very marked influence on dissolved oxygen concentrations, particularly in highly turbid estuaries such as the Severn Estuary where there is a natural depletion of oxygen in the water column on Spring tides compared to Neaps.</p>	<p>Report not amended.</p> <p>The rationale was that UKTAG does not want standards to fail in any 6 hour period with no mitigating circumstances (except if it was a very small extent).</p>
<p>Standards proposed for marine waters have been mostly derived using “expert judgment” – need to validate and undertake the appropriate R&D.</p>	<p>Report not amended.</p> <p>Standards have been based on good scientific evidence from literature and expert consultation. The agencies will validate the standards alongside biological monitoring results from 2007. If monitoring over the first river basin planning cycle shows that the environmental standards are failing to protect the biology, the reasons will be researched and the standards adjusted accordingly.</p>

Comments	Response
<p>Dissolved Oxygen Standard.</p> <ul style="list-style-type: none"> • Further clarification of how the standards will be calculated and applied. • Which data will be used to assess compliance? Will it be annual data? In which circumstances might data over a long time period be used? • Will data be combined for a number of different sampling locations and/or depths within a water body? • How will monitoring locations be determined in relation to known point sources? What size of mixing zone around an activity might be permitted? How will sampling be timed in relation to tidal state? 	<p>Report not amended.</p> <p>Questions regarding compliance assessment are outside the scope of the stakeholder review.</p> <p>The UKTAG advises that where possible data from continuous monitors should be used to support monitoring. This gives the most confident estimate of the 5-percentile over a year. Status is evaluated on annual data for the percentile standards.</p> <p>Longer time series (6 years) are required to assess intermittent standards. Data will be assessed at sites in a water body and related to the salinity regime.</p> <p>Sites are located to reflect the general water quality in the water body. Sites will be located outside the approved mixing zone associated with a permitted activity. Sampling should take place over the whole tidal cycle.</p>
<p>Further work:</p> <ul style="list-style-type: none"> • identify sensitive areas and determine oxygen requirements. • temperature standards link with impacts on oxygen conditions. 	<p>Report not amended.</p> <p>The UKTAG agrees that further work will be required to apply the correct oxygen requirements for sensitive areas.</p> <p>Temperature standards are under development as part of the next phase of standards development and should consider the link with oxygen conditions.</p>
<p>Dissolved Inorganic Nitrogen (DIN) – Transitional and Coastal Waters</p>	
<p>Development of method – further explanation required.</p> <p>Example comments:</p> <ul style="list-style-type: none"> • Why different values assigned to classes for dissolved inorganic nitrogen for different bodies of sea (page 47). Particular lack of data on nutrient thresholds across the range of salinity in transitional waters. • Baseline level of DIN at the margin of the continental shelf. Is there evidence that to show it is truly representative of the background level, and that the +50 per cent parameter with variable salinity is appropriate to define excessive input? Is it the best approach for the UK given the variable background N levels that occur in UK waters? • As a threshold it is appropriate for offshore waters of the Celtic and Irish seas, but may not be appropriate for waters of the 	<p>Report amended: method revised and standards amended (Page 47-52)</p> <p>The UKTAG acknowledges these views and has revised the report accordingly. A better method taking into account is documented in the supporting paper: Devlin M, & Painting S (2006) <i>Nitrogen thresholds for UK waters – offshore, coastal and transitional waters</i>.</p> <p>Essentially, we have considered the differences across the off-shore areas of UK and ROI waters and identified that it is more representative to adopt averaged single values for nitrogen concentration for fully saline waters for the UK.</p> <p>From the available information, we were able to undertake a regression analysis using data at both the fully saline and freshwater end members at a 50 per cent elevation above natural background levels. This work suggested that the reference and threshold could be sensibly set at 13.2 μM and 20μM at salinity of 32 and at 20μM and 30μM at salinity of 25. Thresholds at other salinity values could then be calculated from the regression line.</p> <p>Benefits of this approach are that</p> <p>(i) it provides a better rational evidence-based approach</p>

Comments	Response
North Sea and west of Scotland.	<p>to setting a freshwater nitrogen value where there is no, or only very minor, anthropogenic alteration.</p> <p>(ii) there was little material difference between the high salinity numbers especially when considering the variability of data generated at the lower salinities representative of most coastal and transitional waters.</p> <p>(iii) it provides nitrogen values that relate better to transitional waters, coastal waters and off-shore.</p>
<p>The standards are a screening tool, with any breaches triggering a second (ecological) assessment to determine the actual status of the water body.</p> <p>Need systematic ecological monitoring programme to provide robust evidence that a water body is not less than good.</p>	<p>Report not amended.</p> <p>We agree that the report indicates the good-moderate boundary acts as a threshold. The UKTAG advises further investigation before undertaking any action, if agencies are uncertain of failure. UK governments and agencies are also evaluating how this process may work with respect to classification under the Directive.</p> <p>The UKTAG recognises that improved data and evidence will be required to support classification within this and future planning cycles.</p>
Further work on implications assessment for transitional and coastal waters.	<p>Report not amended.</p> <p>We agree, unfortunately data presently available is limited.</p>
Definition of High/Good and Good/Moderate boundaries are derived using expert judgement with various assumptions on the phosphorus limit in the river and an N:P ratio. Not possible to comment on the representation of “cleaner estuaries”, although the use of an N:P ratio of 51:1 rather than 16:1 (the redfield ratio of N:P in marine phytoplankton) makes a substantial difference to the freshwater nitrogen.	<p>Report and supporting papers amended.</p> <p>Subsequent revisions to the supporting technical papers are now using the background nitrogen to phosphorus ratio of 16:1 and elevating by 50 per cent for inshore waters thus producing a working ratio of 24:1.</p>
Phosphorus- transitional and coastal waters	
<p>Support for development of phosphorus standards:</p> <ul style="list-style-type: none"> • more holistic eutrophication assessments. • adopt method for nitrogen standards for phosphorus as OSPAR background concentrations are available for fully saline environments. • Wales: potential importance of phosphorous in controlling productivity in some Welsh coastal water (refer Redfield Ratio, Milford Haven) which is phosphorous limited. • Freshwater versus estuaries: 100µg/l limit on phosphorus for the H/G boundary is inconsistent with the 30-50 µg/l P in rivers. 	<p>Report not amended.</p> <p>Phosphorus standards for estuaries are at an early stage of development and may be available for the second round of River Basin Management Plans. Standards for phosphorus in coastal waters are not available at present but we shall review the science for future River Basin Management Plans.</p> <p>This will need to account matching thresholds with those developed in freshwater rivers.</p>

UKTAG Report – Water resources – Rivers and Lakes

General comments:

- A number of respondents supported the work, and welcomed it as a practical approach. Others viewed that more ecological evidence was required to support the development of the standards and we will need to continue to develop the standards and approach.
- There were divergent views as to whether the standards for rivers and lakes were precautionary enough. Some stakeholders identified that reference conditions were correct and identified the standards as reasonably protective of both High and Good Ecological Status, providing greater protection under lower flow conditions, in more sensitive river types and at more sensitive times of the year. Others expressed the need to ensure sensitive areas (e.g. fish spawning grounds) and juvenile populations were protected.
- There was general concern from non-government organisations and environment groups that advice of ecological experts was not fully taken on board within the approach. For example, this was reflected in the need to state how hands-off flows and/or compensation flows are addressed as part of the standards, where agencies viewed this as operational guidance.
- There was general concern in England and Wales regarding the link to its Catchment Abstraction Management Strategies (CAMS) and the Resource Assessment Methodology (known as RAM). Respondents questioned whether flow targets are set on the basis of associated chemical and morphological conditions in the river in CAMs are also supportive of Good Ecological Status. It was viewed that the UKTAG proposals as identified in Tables 29, 30 address this, but existing RAM framework does not.

Amendments to the UKTAG Report

The UKTAG report was amended to improve explanations:

- the relationship of the UKTAG standards to those adopted in England and Wales under CAMs;
- on how the seasonal standards were derived;
- that hands-off flow are an operational matter for environment agencies;
- that statistics and standards presented in the report are based on annual averages.

Issues not addressed in the UKTAG report (as requested by respondents)

Hands-off Flows:

Operational guidance on how the environment agencies control abstractions in the context of the flow standards have not been included in the UKTAG report as it is outside the scope of the stakeholder review. Hands-off flows is the mechanism that the environment agencies use to define procedures to investigate and deal with local conditions and meet the requirements of their legislative frameworks.

Operational guidance has been in place in the Environment Agency for 40 years but is only now being introduced into Scotland and Northern Ireland. Operational guidance includes conditions that may be applied to Abstraction Licences such as the quantity of water that may be abstracted and the use of Hands Off Flows that may stop or restrict abstraction. The legislative framework may differ between administrations.

Why have we not used more detailed seasonal standards?

The experts sought a more complex regime of flow restrictions with a higher degree of variation throughout the year. There was lack of existing field data to support a more complex regime of water resource standards being imposed.

As a result the UKTAG simplified the grouping of the standards for each type into two seasons where restrictions on abstractions would be applied (as in Table 30). This will enable agencies to collect field data over the first river basin plan to confirm whether a more complex regime is warranted.

Comments	Response
<p>Mixed views on whether standards are protective and good and high status:</p> <ul style="list-style-type: none"> viewed as reasonably protective. provides greater protection under lower flow conditions, in more sensitive river types and at more sensitive times of the year. Reference conditions and proposed typology is appropriate as a framework for defining water resource standards. Standards are not precautionary enough. The proposed flow standards supports the use of deviations from naturalised flows as also used for assessing Favourable Conditions for designated wildlife sites. 	<p>Report not amended.</p> <p>The range of views presented on the standards indicates that an appropriate balance has been drawn between insufficient and too precautionary standards. As noted in the general comments more ecological evidence is required to the standards.</p> <p>Biological methods have and are continuing to be developed that will demonstrate sensitivity to hydrological pressures. As data is collected over the first river basin planning cycle, this will provide empirical evidence of the ecological – hydrological relationships. This will be used to inform any future revision of the standard and also support intercalibration across Member States in future phases.</p>
<p>Does typology (page 50) reflect regional differences? How will they be managed? Specific comments</p>	<p>Report not amended.</p>

Comments	Response
<p>include for example:</p> <ul style="list-style-type: none"> • Need river resource typologies for Scottish spate rivers – waters at good status when run dry. • Northern Ireland situation is not fully addressed: e.g. Typology (pages 51 and 52). In relation to lakes and lochs, both of the main lakes in Northern Ireland, Lough Neagh and Lough Erne, have special features and circumstances which require consideration. 	<p>Details of the typology are contained in the supporting technical document: SNIFFER WFD48 reports (located on the UKTAG website). This indicates how the macrophyte communities have been analysed against a number of catchment physical parameters. The physical parameters will reflect regional differences.</p> <p>It is considered that rivers that naturally run dry (such as Scottish spate rivers) do not require a separate typology, but may require 'operational guidance' in the application of standards.</p> <p>The complex typology of lakes is not very appropriate for water resource management, as inflows and outflows are usually more sensitive to flow change from natural. Lakes that are very large in relation to their catchment may require more detailed investigation. Therefore Environment Heritage Service is considering how special features of Lough Neagh and Lough Erne should be addressed in local operational guidance.</p>
<p>QN95 could be interpreted as either the average natural 95 percentile flow over the whole gauged flow record (where this exists) or the natural 95 percentile flow for the driest year of record.</p>	<p>Report amended to clarify statistic in foot-note (1) page 57).</p> <p>QN95 is the 95 percentile for normally 10 years of flow records. This value will usually be higher than the Qn95 for the driest year, and therefore provides more protection than using data from driest years.</p>
<p>Clarify what levels of abstraction are actually being proposed. The supporting technical documents propose assessment of permitted abstraction as a proportion of daily flow. This should be adhered to.</p> <p>The ES report "defined in terms of percent of flow on the day of abstraction"; WF48 report where 15 per cent of the flow is permitted.</p>	<p>Report not amended.</p> <p>Use of 'flow on the day' is not practicable for regulatory purposes, and 'operational guidance' from the Regulatory Agencies will cover how abstraction is managed through regulatory permits to achieve a correspondence with the flow standards. Regulatory permits require quantities to be associated with them for compliance purposes.</p>
<p>Clarify the basis of the standards quoted, e.g. the per cent reduction in river flow is not explained.</p>	<p>Report not amended.</p> <p>Flow standards are quoted as a percentage change from the natural flow (refer Table 27 in the UKTAG report). The actual change from natural flow has been reported in River Basin Characterisation flow pressures and CAMS in England and Wales and this has been continued as standard water resources practice.</p>
<p>Mixed views whether report was stating that standards were based on the current approach undertaken in England and Wales known as Catchment Abstraction Management Strategies (CAMS) or Resource Assessment Methodology (RAMs).</p>	<p>Report not amended.</p> <p>The consultants who prepared the Water Framework Directive 48 report reviewed methods adopted internationally. They recommended two possible approaches for use in the UK:</p> <ul style="list-style-type: none"> • the CAMS approach for 'restrictive management' for run of river abstractions; • a South African approach for 'active management' of regulated rivers, such as reservoir releases.

Comments	Response
	<p>The UKTAG report covers 'restrictive management' as more suitable management approach for the UK water environment. Not surprisingly, this is a similar approach as adopted by the CAMS methodology used by the Environment Agency. Therefore the UKTAG standards are similar to CAMS but underpinning typology is different to that currently used under CAMs.</p>
<p>Flow targets need to be set on the basis of associated chemical and morphological conditions in the river that are also supportive of good ecological status. The UKTAG standards (Tables 29, 30) address this, but existing RAM framework does not.</p>	<p>Report not amended.</p> <p>Flow standards for GES are not set on the basis of chemical and morphological conditions as these elements are considered separately for their own standards. RAM also does not set flow standards to account for chemical or morphological pressure.</p>
<p>The standards for high and good status and underlying approach are not supported by some responses. Similarly CAMs does not sufficiently protect:</p> <ul style="list-style-type: none"> river flows for environmental sensitive reaches. More appropriate to use site dependent approaches. requires stricter approach for salmonid spawning and nursery areas. allowable abstraction rate (10 per cent below Q95) is too high and will impact on juvenile fish population. 	<p>Report not amended.</p> <p>Only the flow standard for High Ecological Status (minimal change from natural) must be defined for the Directive and has been defined as less than 5 per cent change from natural flow regime.</p> <p>Under the Directive, flow regimes need to support good status. It is considered the flow standards presented support Good Ecological Status.</p> <p>Where scientific evidence is available for the support of designated species, these can be taken into consideration for the requirements for Protected Areas and/or in operational guidance.</p> <p>The report contains proposed flow standards to protect salmonid spawning and nursery areas. At this stage it is considered there is insufficient evidence to support stricter standards. Further work during the river basin planning cycle will assess whether these proposals actually have the protection intended.</p>
<p>Clarify how the standards will be calculated and applied:</p> <ul style="list-style-type: none"> General concern from conservation agencies, environment groups and industry that the Water Framework Directive standards (like CAMS) must not override local application of standards and consideration of catchment issues. A site specific approach will enable to accurate assessment of the impact of abstraction on the ecology prior to a licence increase or major change in abstraction regimes. A more sophisticated environmental flow procedure 	<p>Report not amended.</p> <p>Comments relating compliance assessment regimes are outside the scope of the stakeholder review.</p> <p>Flow standards provide support for achieving Good Ecological Status.</p> <p>These standards will be applied by regional/local regulatory staff in line with operational guidance issued by each agency.</p> <p>This allows for site and catchment considerations to be considered. Site specific investigations may be required where an abstraction may have an environmental impact, or where there is evidence that particular ecology elements may require higher standards in Protected Areas.</p> <p>Where scientific evidence is not available, a balance is</p>

Comments	Response
<p>should be used where there is significant disagreement of where potentially damaging abstraction is proposed. If not: simple read-off table should be adopted.</p> <ul style="list-style-type: none"> If major investment, need more detailed site assessment methods considering relevant parameters, water depth, etc. 	<p>required between risk and precaution. This is a matter for operational guidance from the regulatory agencies – though where there may be disagreement over the impact of abstractions, further work may be required to resolve the disagreements at a local level.</p> <p>Major abstraction proposals will normally be accompanied by an Environmental Impact Assessment or an Environmental Statement as part of the regulatory process.</p>
<p>How are fish accounted for the UKTAG approach to management of water resources, especially given the effect of seasonal low-flows?</p>	<p>Report not amended.</p> <p>Low flows are natural events that may occur at any time of the year. The use of Hands off Flows' to constrain abstraction protects low flows and flow variability from abstraction impacts.</p> <p>Further scientific work is required on the distribution of fish species and the relationship with flow and the environment.</p>
<p>Hands-off flows/Low flows: why have these not been included in the report as requested by expert opinion.</p> <p>The experts consulted proposed that 'hands-off' flow restrictions be applied below Q95. These expert standards were rejected by the project team on the basis that they were excessively precautionary and not practical. (page 51 of draft report). No further evidence was presented in rejecting expert opinion.</p> <p>The proposed levels of permitted abstraction under low-flow and drought conditions must be reviewed and tightened.</p> <p>Standards for protecting against abstraction impact under extreme low flow scenarios require greater clarity. Suggest the UKTAG alternative approach as adopted by English Nature.</p>	<p>Report not amended.</p> <p>It is considered the proposal that abstraction should not exceed 25 per cent of QN98 will protect very low flows.</p> <p>Extreme low flows are natural events from which the ecology recovers.</p> <p>The flow statistics for very low flows are often unreliable for a number of reasons, particularly as a result of actions that are taken during drought periods.</p> <p>The use of Hands off Flows is an operational matter for the environment agencies, and the details of application may vary between the country regions across the UK. Therefore this was not considered to be part of the science of flow standards.</p> <p>Therefore expert advice was not ignored but will be considered at the most appropriate level of application to ensure that legislative and regional differences can be accommodated.</p>
<p>Standards for Drinking Water Protected Areas: Article 7 of the Directive requires protection of drinking water abstraction sources which has water quality as well as quantity (water resources) implications. Should we expect additional standards targeted at drinking sources and related protection zones in a separate</p>	<p>Report not amended.</p> <p>Drinking Water Protected Areas are primarily for protecting water quality.</p> <p>Operational guidance from the regulatory agencies on abstraction licenses will consider drinking water sources in relation to the flow standards.</p>

Comments	Response
document? We would advocate that standards aimed at meeting the Water Framework Directive Article 7 requirements are captured in the next revision to this document or a process for doing so noted and subsequently delivered.	We anticipate that future reports will consider the implications of Drinking Water Protected Areas as part of the emerging standards and classification methods for groundwater.
A quantitative assessment of the implications of the proposals comparable with that provided for some of the water quality standards.	Outside the scope of the stakeholder review.
<p>Discussion on catchments with artificially increased flows was viewed as simplistic:</p> <ul style="list-style-type: none"> Addresses only abstraction rights and does not address the problems that might occur to fish (and other forms of life) in the recipient river if the increased flows occur at inappropriate times (i.e. just after spawning and in the early stages of fry development) when the fish are at increased risk of being swept away with resulting year class failure. This issue ought to be covered by defining a period when transfers should be limited or prohibited. This problem is equally pertinent to lowland as well as upland streams but the timing depends of the species being protected. Is this an even-handed approach compared to the catchment from which the abstraction is taken? 	<p>Report not amended.</p> <p>Artificially increased flows may arise from a number of situations.</p> <p>Flows may be increased because of the import and discharge of water through STW's as a result of inter-catchment transfer of Public Water Supply. Flows may be augmented at low flows to support abstraction during periods of low flows.</p> <p>Inter-catchment transfer of water for Public Water Supply purposes have taken place for more than 100 years. In many cases the ecology has adapted to the change in flows.</p> <p>The additional water is unlikely to have any significant impact on high flows and the risk of washing out spawning or early stages of fry.</p> <p>The level of augmentation of low flows is a subject that requires further investigation.</p>
<p>There is no framework for management of regulated Rivers and non-natural flow regimes.</p> <p>Please clarify whether (i) systems are Heavily Modified Water Bodies (HMWB); and (ii) if not, provide proposed standards for flows that exceed the naturalised mean flow and protect natural flood events.</p>	<p>Report amended: reference to Good Ecological Potential may equate to Moderate Ecological Potential deleted.</p> <p>HMWBs are not covered by the flow standards in this report. The use to which the water is put in HMWBs will have significant impacts on considering ecological potential for these bodies.</p> <p>The suggestion that Good Ecological Potential may equate to Moderate Ecological Status was a very tentative suggestion. This was therefore deleted from the report due to the level of confusion it caused. Future work will provide guidance on Good Ecological Potential.</p>
<p>Future work:</p> <ul style="list-style-type: none"> Development of link to ecological systems. Assess abstraction from a water course at a time of low flow actually causes any impact, 	<p>Report not amended.</p> <p>The link between ecological systems and flow standards is poorly understood.</p> <p>The UK agencies have been developing biological methods</p>

Comments	Response
<p>given that it happens naturally.</p> <ul style="list-style-type: none"> • Include hydro-ecological data from within agencies and external organisations from site investigations into dataset. • Define importance of littoral or draw-down communities to ecological status and how these might be affected by changes in water levels. 	<p>and associated standards alongside environmental standards describing the ecology. This has focused on identifying the relationship between the biology and human pressures such as flow regime changes. During 2006/07 research reports outlining the biological methods will become available.</p> <p>As Water Framework Directive monitoring programmes are in place across the UK, this will collect data to enhance the evidence base. We note the suggestion to use external data and incorporate this into the agencies' datasets.</p> <p>Further work on lakes and reservoirs (HMWBs) that experience significant changes in water level and the impact on littoral communities etc will provide additional information to confirm whether the standards are correct.</p>

UKTAG Report – Rivers Morphology

Overview

- A number of respondents supported the work, and welcomed it as a valuable contribution to understanding the links between morphology and ecology.
- There was widespread concern that the morphology standards were not based on evidence. While they were supported by some and questioned by others, no suitable alternative methods of regulation were suggested although valuable suggestions were made on how to augment the method.
- There was general concern that the description of the method was unclear, lacking in detail and was incomplete.
- While the UKTAG proposals were strictly aimed at regulation to prevent deterioration, some respondents thought that these would be used in setting objectives for restoration and others thought that these would be inappropriate for use as the method for targeting restoration.

Amendments to the UKTAG report

The UKTAG report was amended to:

- explain the context in which the approach will be used to regulate new proposals to alter morphology.
- identify that operational guidelines will be developed to protect those high status sites with special features not incorporated within the decision-support that require protection.
- reference the report on the initial field trial of the morphological condition limits in the UK.

Amendments to MImAS and Technical Report

Minor amendments were made to the MImAS tool and technical report as follows:

- two eco-geomorphic attributes relating to floodplain condition were removed after testing had shown they were redundant.
- an eco-geomorphic attribute (Floodplain connectivity) was moved from the bank zone to the channel zone under the sub zone termed 'Connectivity' (previously termed 'longitudinal connectivity').
- after reviewing the feedback from the technical panel, some assessments were raised from ecological sensitivity values were changed from 'sensitive' to 'highly sensitive'. This was done where more than one expert had indicated that this attribute should be considered highly sensitive.

- the single Activity limits presented in Table 15 were slightly amended after further testing of MImAS revealed some minor technical errors in the worksheets.
- clarification of a method to calculate activity footprints for riparian vegetation was added to the final technical report.

Comments	Response
There is a lack of empirical evidence and data demonstrating the link between morphology and ecological data. The report does not demonstrate that the proposed standards are required to deliver good ecological status. Therefore, the proposed thresholds of 5 per cent and 15 per cent are not based on evidence but are arbitrary and subjective. No explanation is given as to how these values were arrived at. The application of these standards is not justified and is likely to be prohibitively expensive. The standards need better justification. There is some doubt that the method will produce numbers that have ecological meaning.	<p>Report not amended.</p> <p>The purpose of our proposals for morphology is specifically to avoid deterioration in ecological status by regulating new proposals to modify morphology. The morphological conditions limits (MCLs) were set at a level of change that in the opinion of the developers might put ecological status at risk. However, trials undertaken this year have shown that they match expert opinion on the level of the change.</p> <p>The proposal as set out in the report is to use these thresholds to identify those proposals to modify morphology that pose the greatest risk to ecological status and that should therefore be subject to further environmental assessment. It is our intention that some types of proposal (e.g. weirs and major culverts) will always be subjected to regulation and in these cases more detailed assessment will be required. In addition, proposals to modify sensitive reaches (e.g. known fish spawning areas) will always be subject to further assessment. The MCLs will not be used to decide whether a proposal should be rejected; the decision will be made on the basis of the environmental assessment.</p> <p>UK agencies will collect and analyse empirical evidence to assess how well the MCLs work and build a better evidence base. The MCLs have been subject to expert peer review and initial trials of the method have been undertaken.</p>
English Nature are arranging to test the system by applying it to two river Sites of Special Scientific Interest on which they are piloting the development of strategic river restoration plans.	<p>Report not amended.</p> <p>We welcome this initiative and will work with English Nature on this project.</p>
There is no mention of general approaches to river restoration or conservation (e.g. "string of beads approach). Consideration needs to be given as to whether different approaches are needed for assessing no deterioration and for identifying morphological measures (to be included in Programmes of Measures). The need to supplement quantitative standards with a risk-based approach is most marked in assessing morphology. It is suggested that the method could also be used to assess the impacts of past engineering works leading to	<p>Report not amended.</p> <p>The purpose of our proposal for morphology is specifically to meet our obligation to avoid deterioration in ecological status. The proposal does not deal with river restoration.</p> <p>While the tool may help in identifying such measures (or areas where such measures may be appropriate) existing data and local knowledge may be better suited for this purpose for the first River Basin Management Plans.</p>

Comments	Response
possible proposals for restoration works to be included in the River Basin Management Plan.	
The explanation of the decision-support framework for river morphology is unclear, does not give sufficient detail and is incomplete. The use of multiples of 500m to assess activities with a footprint of more than 500m is not clearly described and its impact is unclear.	<p>Report not amended.</p> <p>We accept these views. We are working to clarify operational guidance to support the tool.</p>
The adoption of 500m reaches seems inadequate for fish that migrate over large distances. If a percentage threshold method is used then it should be based on the length of a water body, not on a short and arbitrary length such as 500m. The use of 500m for assessment needs to be justified and could be a subject for debate.	<p>Report not amended.</p> <p>500m was chosen because it seemed fair and equitable to screen all proposals on an area of standard size which fits with current datasets, such as River Habitat Survey (RHS). Most proposals are also less than 500m in extent. Proposals that are more than 500m in extent would normally be subject to full assessment because of their scale. The potential impact of a proposal on ecological status at the water body scale will be considered as part of the more detailed assessment of the high risk proposals.</p> <p>The issues that are likely to affect fish (such as longitudinal and lateral connectivity and condition of spawning grounds) will be taken into account during the assessment.</p>
It is not clear how the system will take account of siltation and the choking of spawning gravels. The current proposal is confined to engineering impacts on the corridor alone and does not pay sufficient attention to other activities (e.g. agriculture and riparian management) or to flood plain wetlands.	<p>Report not amended.</p> <p>The purpose of our proposals for morphology is specifically to avoid deterioration in ecological status by regulating new proposals to modify morphology. This system examines pressures and likely impacts at the local scale in the first instance. We recognise that at present it does not adequately address broader scale pressures such as land management.</p> <p>However the tool does use the condition of substrate as a key attribute in its risk assessment. The tool also allows for the consideration of modification of upstream sediment regime as a pressure as part of a risk assessment. No standard procedure has yet been developed for this purpose.</p>
The substantial literature on the requirements of salmonid and coarse fish spawning gravels has not been reflected in the standards.	<p>Report not amended.</p> <p>The tool is not designed specifically to deal with one species, or one life stage of one species. It attempts to capture impacts across a range of species and river types, and as such may not always be sensitive to this particular impact. Therefore, where agencies are dealing with a particularly sensitive area, such as known fish spawning grounds, we will take account of additional information, such as the literature referred to.</p>
The whole framework should be tied to an established methodology such as HABSCORE. The relationship between River Habitat Survey (RHS) and MImAS needs investigation. Salmonid habitat maps could be adopted (as used in Ireland) to inform decision-making.	<p>Report not amended.</p> <p>Noted. The UKTAG will always use the best information available. We are already planning to investigate the link between RHS and MImAS. MImAS is not intended to be a tool used in isolation, and the suggested use of salmonid habitat maps as an additional safeguard in the regulatory process is welcomed.</p>

Comments	Response
<p>Riverine ecologists should be included in the development of this module. It is suggested that a more intensive process of engagement with a broader range of experts be undertaken to attempt to establish a set of standards that will be of the greatest use in the first round of river basin plans.</p>	<p>Report not amended.</p> <p>Experienced river ecologists, with backgrounds in the field of fish, invertebrates, and macrophytes, and geomorphologists from the research community were involved in the development of this module. Ecologists will be leading the further testing and validation of this approach. The UKTAG had thought that it might be useful to engage a broader range of experts as suggested. However, our experience so far is that ecological experts are reluctant to suggest standards due to the lack of supporting ecological data. So instead, we have decided that it would be better to review the existing science base in 2006 and to begin to gather the empirical evidence.</p>
<p>There is a general failure to link the various components – water quality, hydrology and morphology – together.</p>	<p>Report not amended.</p> <p>The proposed tools to assess river water quality, hydrology and morphology were necessarily developed independently. This is partly because existing systems used across the UK are independent and have different regulatory and legislative settings. However, the UKTAG accepts that these elements are intimately linked and where we understand the links we will manage them together.</p>
<p>The intended use of Morphological Condition Limits (MCLs) as a screening tool implies that change beyond the MCL will be permitted subject to the outcome of detailed assessment. However, smaller levels of change below the MCL will be permitted without detailed assessment and this may be inappropriate in sensitive situations. Due to the large uncertainty in the relationship between morphology and ecology, MCLs should not be used in isolation and should only be used as guidelines to inform decisions in the first RBP.</p>	<p>Report amended to include a description of how MCLs will be used (Page 66-67).</p> <p>The use of MCLs as a screening tool does mean that change beyond the MCL will be permitted subject to the outcome of the detailed assessment. Change below the threshold will be permitted without detailed assessment unless there is some other reason for assessing the proposal (e.g. conservation targets). Agencies also intend that all applications will be required to follow best practice and meet flood management criteria.</p>
<p>There is concern that morphological change could be permitted on high status water bodies. This seems to undermine the requirement for no deterioration (and the no net loss principle in PPS9). There was concern about the use of a single variable when high status is a collective property. In addition, it was stated that 5 per cent alteration was not negligible change.</p>	<p>Report amended to recognise that operational guidelines will be developed to protect those high status sites with special features not incorporated within the supporting decision-tool that require protection (Page 67).</p> <p>Where agencies know that the situation is ecologically sensitive they will undertake a full assessment. The UKTAG recognises that there is some concern that by proposing a 5 per cent MCL for high, that some of the highest quality sites might be damaged. On the other hand if we propose (say) a 1 per cent MCL for high, very few sites would be protected. The 5 per cent MCL also reads across to European guidance on level of allowable change.</p> <p>Therefore the UKTAG has identified that operational guidelines will be developed to protect those high status sites with special features not incorporated within the supporting decision-tool that require protection.</p>

Comments	Response
It is desirable that the method should be as simple as possible and proportionate to the proposal. A simpler methodology would be desirable for small-scale or temporary works. The method is too complex to be operationally useful or inexpensive. This job can be done far more simply and much more in the spirit of the Directive by defining quality scenarios for whole systems.	<p>Report not amended.</p> <p>An initial trial application of the method suggests that the method is easy and cost-efficient to apply. The application of the method is supported by the use of a simple computer-based spreadsheet. The method is proportionate in that it will identify those proposals that are thought to put ecological status at risk. The use of scenarios for whole systems is quite an exciting way to develop broad direction for management and is being used in planning and policy development. However, it is difficult to see how this could be incorporated into a regulatory regime in time for the first river basin plan.</p>
The impact of the standards on business is likely to be significant, and this must be taken into consideration if the standards cannot be set with any degree of scientific confidence.	<p>Report not amended.</p> <p>The standards will only be used to identify those proposals that we consider pose a risk to ecological status and will require further assessment. Decisions will be based on the outcome of a limited environmental assessment and not on the breach of an MCL.</p>
No details are given of how a more detailed assessment would be carried out, and who would be responsible for doing it.	<p>Report not amended.</p> <p>The UKTAG has not yet developed a standard protocol for this. However it is our intention that this would be a limited environmental assessment to describe to what extent the proposal might affect ecological status and what might be done to mitigate this. It is worth noting that many such proposals already require a full or limited environmental assessment. The developer is normally responsible for undertaking the assessment to the satisfaction of the regulatory body.</p>
The report implies that the method would only be used by the regulator, but it may be useful for operators to have access to it.	<p>Report not amended.</p> <p>There is no intention to restrict the availability of the method to the regulator.</p>
The “generic engineering activities” do not take proper account of activities undertaken for navigation.	<p>Report not amended.</p> <p>The UKTAG will add any further activities that are required to take account of navigation on rivers as part of ongoing development of the tool.</p>
We are concerned by the statement that the method “must consider the full range of engineering activities that.....will be licensed under forthcoming legislation” and are not aware of any specific proposals.	<p>Report not amended.</p> <p>There are no specific proposals at the time of writing in England, Wales and Northern Ireland. The Water Environment (Controlled Activities) (Scotland) Regulations were introduced in Scotland in 2005. These regulations cover inland (freshwater) engineering operations in inland rivers and lochs.</p>
Are weightings attached to the variables in the scoring system?	<p>Report not amended.</p> <p>The scoring system applies weightings in several ways. Firstly, engineering activities are weighted differently to reflect the fact that some activities will have a zone of impact beyond the physical extent of the engineering. For example localised hard bank protection works will have an impact on sediment erosion, transport and deposition that is likely to extend some</p>

Comments	Response
	distance downstream from the works. The impacts of other activities will likely be more localised. Secondly, weighting occurs to account for the fact that the response of a river to any given engineering activity will differ from one area to the next based on the sensitivity of the channel to change. This sensitivity weighting is expressed through the channel typology.
The process makes little or no attempt to gauge river typology or the current deviation from river typology.	<p>Report not amended.</p> <p>If this comment relates to the ability to confidently identify different channel types, the intention is to use a GIS-based approach to type channels initially, with an option for field validation where necessary.</p>
There is much known about species and habitat relationships and it is nonsense to imply the degree of ignorance that you do. To think that you will produce some formula that links morphological change in a simple way to functioning of the system is disingenuous. The only basis you can adopt is that all morphological change will be damaging and then to decide some judgmental principle concerning the percentage of a reach that can be acceptably modified. This will be a political not a scientific decision. Admission of that will be acceptable. To claim rational grounds will not.	<p>Report not amended.</p> <p>The UKTAG has stated that the MCLs are arbitrary and aim to protect a water body from further deterioration; we have not claimed that they are based on evidence. We agree that much is known about species and habitat relationships and already use that knowledge in river management and will use it in the management of morphology. However, this knowledge has not been developed or organised in such a way that it would support a simple and general approach to managing morphology.</p>
Your case study assessments look reasonable from a geomorphological point of view but a look at the map confirms that the first is far from a high quality site. It is surrounded by exotic conifers and farmland.	<p>Report not amended.</p> <p>This system examines pressures and likely impacts at the local scale in the first instance. The UKTAG recognises that at present it does not adequately address broader scale pressures such as land management.</p>

UKTAG Report – Annex 1: Spot sampling and continuous monitoring

Overview

- A few respondents identified specific comments on proposals for monitoring and how error was managed.

Amendments to the UKTAG report

- The UKTAG report was not amended.

Comments	Response
Potential for analytical error remains, if a) high and low level analyses are undertaken in the same lab b) contamination occurs in samples, but not in the analytical standards c) analysts are not sufficiently familiar with sites to rerun analyses which appear dubious.	<p>Report not amended.</p> <p>The UKTAG agrees that care is needed to control the risks of error in chemical analysis even if it is usually the case that statistical sampling uncertainty is the bigger factor in using the data to take decision.</p>
Page 73: do not support that not using office hour sampling regimes could result in errors in setting ES; Provides comments on setting 95-percentile consent and estimated mean water quality.	<p>Report not amended.</p> <p>The UKTAG disagrees. Our approach uses a statistical association between summary statistics and biology. It would be preferable if all chemical data could be representative with respect to the 7 day week and 24 hour day but the statistical association still stands despite this weakness. Had we collected data out of office hours the benefit of this would have been offset by the fact that overall sampling frequencies, or sampling sites, would have had to been cut to pay for the extra effort.</p> <p>This approach has been proven through the decisions on big improvements in water quality over the past 15 years.</p>
Page 72: clarify statement: “The use of spot samples is an approach based on risk and cost-effectiveness that works because water quality standards can be and are set as summary statistics that are correlated with the events that are much rarer than implied by the summary statistic“.	<p>Report not amended.</p> <p>The analysis of water quality data shows that there is a useful consistency in the shapes of the statistical distributions of water quality data. For example there are fairly stable relationships between the mean, the 95-percentile, and higher percentiles of water chemistry.</p> <p>Most types of actions that aim to improve the mean (or percentile) also have a parallel effect on the rest of the distribution including the higher percentiles. This facility has been exploited in planning big improvements in river water quality over the past 20 years especially for continuous discharges of treated waste water.</p> <p>Nonetheless it is possible to imagine actions or locations where this would not work and agencies need to watch out for these.</p>

SECTION 4 - REQUEST FOR ADDITIONAL WORK

Respondents requested additional work on:

- improving the standards presented in the report or asking how specific biological quality elements are managed (addressed in Section 3 of this document)
- new standards and conditions.

This section clarifies the UKTAG response on this issue and is cross-referenced to the revised and final *UKTAG report (August 2006) UK Environmental Standards and Conditions (Phase 1)*.

Future Work

Where the work detailed below is identified for future development in the first cycle of River Basin Management Plans we intend that it will be consulted on in 2007. We have started projects in the following areas:

- lake morphology
- marine morphology
- water resources (i.e. compensation flow and freshets, freshwater flow into estuaries)
- temperature
- groundwater classification framework
- specific pollutants

The UKTAG will review outcomes later in the year to define whether additional standards are required.

Respondents' requests

Comments	Response
<p>Suspended solids</p> <ul style="list-style-type: none"> • Sediments (smothering effects) • Turbidity <p>(this excludes discussion of pollutants in sediments, which is managed separately)</p>	<p>The UKTAG has considered its position on water quality standards for suspended solids, and whether it is possible to develop standards for the Water Framework Directive. This considers the existing framework for management.</p> <p>For freshwaters</p> <p>The Freshwater Fish Directive sets a Guideline Standard for Suspended Solids (rather than an Imperative Standard). It takes the form of an annual mean of 25 mg/l. It is the Imperative Standards that have attracted action and investment by water companies under the Freshwater Fish Directive.</p> <p>It has also been the view that the action on the Freshwater Fish Directive, and other Directives, leads to progressive improvements for Guideline standards. This includes investment in sewerage services and improvements under the Urban Waste Water Treatment Directive. This reduces levels of suspended solids.</p> <p>We take the view the guideline standards in Freshwater Fish Directive will not move directly into the definition of Good Ecological Status such that an annual mean greater than 25 mg/l leads to a declaration that status is Not Good. But when and wherever Good Ecological Status (or other objectives under the</p>

Comments	Response
	<p>Water Framework Directive) are at risk (for example as indicated by ecological data) we shall be obliged to determine the causes, and act on them in the manner required by the Water Framework Directive. So high suspended solids will figure as a reason, for example, that ecological quality is Not Good.</p> <p>The Freshwater Fish Directive remains in force until it is repealed in 2013. Therefore we anticipate that monitoring will continue until this date, whereupon a review of monitoring requirements will be carried out.</p> <p>Managing incidents of sediment release</p> <p>The type of standard set in the Freshwater Fish Directive, an annual mean, is not the most appropriate for tackling pollution caused by occasional events such as run-off from land. We shall need a different approach that is closer to how we manage similar incidents. If this includes a water quality standard, a 95-percentile, or a more extreme statistic would be than the annual mean. Management and monitoring might then be targeted at events likely to cause risks and prevent incidents.</p> <p>For damage caused by sediments washed from farmland we see the case being made up from a checklist of items of say:</p> <ul style="list-style-type: none"> (a) A propensity for damage beyond natural response to the weather predicted from GIS layers of, for example, land use, rainfall characteristics, soil type and type of water body – this might lead to targeted monitoring; (b) A record of incidents or near misses and evidence from these in terms of photographs and measurements of impact; (c) Calculations that indicate the probability of future events; (d) Compliance with any standards suggested for this purpose. <p>In time the role of (d) could become more important than (b) and (c).</p> <p>Given a pattern of response across (a) to (d) action might be framed as activities of pollution prevention leading to a series of measures of increasing severity.</p> <p>For coastal and transitional waters</p> <p>To date, the management is focused on prevention of impacts from activities. This will be carried forward as part of mitigation measures under the Directive.</p> <p>Whilst transparency is recognised as a parameter under the Water Framework Directive, the naturally variable state in the environment (in both a spatial and temporal continuum), does not lend itself to setting a standard that can be regulated and monitored. Similar to the discussion for freshwater above, where we find biology as reflected by Good Ecological Status (or other objectives under the Water Framework Directive) is at risk from increased sediment or suspended solids, we shall be obliged to determine the causes, and act on them in the manner required by the Water Framework Directive. So high suspended solids will potentially figure as a reason, for example, that ecological quality</p>

Comments	Response
Nitrogen in rivers and lakes, especially loading from rivers into transitional waters	<p>is not meeting its objectives in specific water bodies.</p> <p>There is presently insufficiently clear information on the role of nitrogen compounds in freshwater nutrient enrichment, consequently it was deemed inappropriate to develop standards for this pressure.</p> <p>However, our understanding of its role is improving, and if the standards review at the end of the first river basin plan suggests that nitrogen standards are required then we shall seek to develop them.</p>
Phosphorus in transitional and coastal waters	Phosphorus standards for estuaries are at an early stage of development and may be available for the second round of River Basin Management Plans. Standards for phosphorus in coastal waters are not available at present but we shall review the science for future sets of River Basin Management Plans.
Specific Pollutants Mentioned in particular: Oestrogenic compounds (and management of effects on fish), pesticides and toxic materials	The UKTAG is progressing work in this area and it will be considered as part of future reports.
<u>Other questions</u>	
Alien species as indicator of ecological health	The UKTAG is considering the role of alien species as part of the development of biological methods and classification. We consider this work to be separate to the work on standards.
Account for climate change in the environmental standards and conditions	The standards as provided account for current datasets that are available. We anticipate that by the end of the cycle, we hope to understand key trends such as climate change and include them if required into the standards.
Diffuse pollution – practical and holistic management approaches in rural and urban environment	UK agencies and administrations are considering their approaches to management of diffuse pollution. This is outside the remit of the UKTAG.
Alternative management options for pollutants: Developing affordable and sustainable technologies to achieve PHS limits; Developing product substitution options for PHS used in domestic products.	UK agencies and administrations are considering their approaches to management of pollutants. This is outside the remit of the UKTAG.

ANNEX 1 - LIST OF RESPONDENTS

Submission	Organisation
1	Individual
2	Dr Feest, University of Bristol
4	National Farmers Union Cymru
5	WRc
6	Institute for Inland Water Management and Wastewater Treatment (Netherlands)
7	South West Rivers Association (<i>representing 18 individual river/fisheries associations in South West England</i>)
9	School of Biological Sciences, University of Liverpool
12	Institute of Fisheries Management
13	Non Ferrous Alliance (<i>representing Aluminium Federation, Anglo American plc, British Non-Ferrous Metals Federation, Cobalt Development Institute, Inco Europe Ltd, International Molybdenum Association, Johnson Matthey plc, Lead Development Association International, Nickel Institute, Rio Tinto plc, Zinc Information Centre.</i>)
14	British Marine Federation
15	United Utilities
16	Federation of Scottish Aquaculture Producers
17	Scotch Whisky Association
18	Countryside Council for Wales
19	Department of Agriculture and Rural Development, Northern Ireland
20	British Trout
21	Mersey Basin Campaign
22	Scottish Hydro Electric
23	National Farmers Union Scotland
24	English Nature (<i>now Natural England: English Nature (EN), the Landscape, Access and Recreation division of the Countryside Agency (LAR), and the Rural Development Service (RDS)</i>)
25	The Malt Distillers Association of Scotland
26	Wessex Water
27	Scottish Natural Heritage
28	Institute of Fisheries Management
29	Alcan Smelting and Power UK
30	British Waterways
31	Water UK
32	Ofwat
33	LINKs (<i>representing: Wildlife and Countryside Link, Scottish Environment Link, Northern Ireland Environment Link, Wales Environment Link, World Wildlife Fund</i>)
34	Council For Nature Conservation and The Countryside
35	Consumer Council for Water
36	The Wildlife Trusts
37	RSPB Scotland
38	Fisheries and Angling Conservation Trust (FACT) (<i>representing Anglers' Conservation Association (ACA), Angling Trades Association (ATA), Commercial Coarse Fisheries Association (CCFA), National Association of Fisheries and Angling Consultatives (NAFAC), National Federation of Anglers (NFA), National Federation of Sea Anglers (NFA), Salmon and Trout Association (SandTA), Specialist Anglers Alliance (SAA), Association of Stillwater Game Fishery Managers (ASGFM), Atlantic Salmon Trust (AST)</i>)
39	The UK Major Ports Group Ltd (<i>representing: Associated British Ports, Belfast Harbour Commissioners, The Bristol Port Company, Forth Ports Plc, Hutchison Ports (UK) Limited, The Mersey Docks and Harbour Company, P&O Ports, Port of London Authority, PD Teesport (formally known as Tees and Hartlepool Port Authority Limited) and the British Ports Association</i>)
40	Scottish Water
41	National Farmers' Union

ANNEX 2 - REFERENCES PROVIDED BY RESPONDENTS

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