

Annex 1. Replies from the Panel to selected stakeholder comments that was received in the hearing process of the first draft of the international evaluation report

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SELECTED COMMENTS FROM THE STAKEHOLDERS (page no. refer to Annex 2)	REPLIES BY THE INTERNATIONAL PANEL	SECTIONS MODIFIED
Danish Agriculture and Food Council (DAFC) (Landbrug & Fødevarer)		
Ch. 1 (A) How can strong changes between RBMP2 and RBMP3 be reconciled with small uncertainty reported in RBMP2 – p.2	The uncertainty reported was the uncertainty on the models and a fair estimate. It did not account for additional uncertainty stemming from lumping water bodies in too crude classes. It is not clear how well this was communicated, but it does not have strong consequences for RBMP3	none
Ch.1 (B). Have reference values been updated after the discovery of an analytical error – p.2	The Panel has investigated this. Reference conditions have not been recalculated. The way this was treated has been added to the report in section 1.4.6, including the Panel's assessment of the process	section 1.4.6 (new section)
Ch.1 (C). does adjustment of G/M boundary to intercalibration lead to adjustments for inner waters, otherwise EQR would differ – p.2	There is no scientific reason to adjust G/M boundaries for inner waters, as these were not affected by the boundary and initial conditions in the Baltic that influenced the reference values in open waters. EQRs can be water type specific and need not be the same across all water bodies. This is now explained in the text.	section 1.4.5 (end of section)
Ch.2 (A). why are responses of Chl-a and Kd to nutrients "reasonably accurate", and what does that mean exactly? – p.3	As explained in the text, it can be expected that Chl-a and Kd have short-term variability that is not perfectly modelled. The Panel has asked and received comparisons at seasonal scale, which were in general satisfactory. In particular, as stressed in the report, the ability of the models to predict the level of eutrophication correctly in very diverse water bodies with very different levels of nutrient input, was quite impressive	none
Ch.2 (B). how to reconcile large changes between RBMP2 and RBMP3 with low levels of reported uncertainty – p.3	The overall uncertainty in RBMP2 on MAI, was mostly caused by the type classification rather than the intrinsic model uncertainty. The crude classification was - correctly - pointed out by stakeholders as a weakness of the approach, and changes to this aspect were requested by the 2017 International Panel. This request was granted, thanks to large efforts of researchers and Ministries. The Panel assesses these changes as a significant improvement. It is impossible to achieve a significant improvement without changing things. Stakeholders who requested such improvements should not complain that they change things, as long as the changes are for the better.	none
Ch.2 (B). Are uncertainties estimated better this time? – p.3	Definitely yes, as stated in the report	none
Ch.2 (B). Are uncertainties higher at water body level than at model level? p.3	In RBMP3, where most variables are water body specific, the difference should be small	none
Ch.2 (C). Does the Panel still agree with downweighing Kd as suggested in 2017? - p.3	A section 1.4.8 has been added to the report, detailing the Panel's position	section 1.4.8 (new section)
Ch.3 (A). Errors in the status load calculation for two water bodies – p.3/4	It was outside the Panel's scope and abilities to check all calculations on all water bodies. A general remark on errors and how to cope with them, if unfortunately they occur, has been added to the text.	section 3.4.1
Ch.3 (B). Time has been lost. Emphasis on wetlands and landscape changes – p.4	The Panel is delighted to read this confirmation of shared concern. As for wetlands and similar approaches, more emphasis has been added to the report in chapter 5 (seasonality) and chapter 3.	section 3.4.3 / section 5.4.3
Ch.4 (A). Is there a map of contribution of neighbouring countries to the load in all water bodies? – p.4	Such map does exist. It was not incorporated into the Panel's report because it did not serve a particular purpose in the report. Danish water bodies have different degrees of 'openness', in the sense that they are to a varying degree influenced by Baltic water and by nutrient contributions from these waters. The Panel has used the term 'open waters' in a relative sense. To the degree that	section 4.3 section 1.4.3

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	semi-open fjords are also influenced by Baltic waters, statements on 'open waters' also apply at least partly to these water bodies. Minor change to clarify that has been added to Ch.4 and Ch.1.	
Ch.4 (B). Is it irrelevant to discuss possible future changes to WFD – p.5	The Panel still advises based on existing, rather than possible or expected law. Text is clarified on this subject	section 4.4.3
Ch.5. Does the Panel agree that stormwater overflows should be monitored and reported more intensively – p.5	The section on stormwater overflows in Ch.5 has been extended and amended to better express the Panel's view	section 5.4.2
Ch.6. Reiterating points from SEGES – p.5/6	We refer to the reply to SEGES' remarks	none
Ch.7 (A). Should other stressors not be addressed at the same time – p.6	The Panel has extended and clarified the text in Ch.7 to better discuss this point of sequence versus simultaneous treatment.	section 7.4.3
Ch.7 (B). Should some restoration measures (e.g. sand capping) be taken immediately to fasten ecosystem response? – p.6	Sand capping is an expensive method, both in monetary value and energy expenditure, and will likely be restricted to small local interventions. The same applies to mussel culture, which in addition should be carefully studied because of the danger of accumulation of (pseudo)faeces on the sediment with ensuing high oxygen demand and potential P release. In general, the Panel warns against using these measures to hide symptoms before the underlying eutrophication problems are solved. Having said that, there is no reason not to consider how these approaches could be used for enhanced ecosystem restoration once conditions are sufficiently improved.	no change in Ch. 7 but see section 3.4.3
Ch.7 (C). Are restoration measures needed because N reduction alone will not suffice? – p.6	The Panel has explicitly stated that reduction of some other stressors may be needed in addition to effective measures for nutrient reduction. The Panel has no opinion about removal of stone reefs.	none

The Danish society for Nature Conservation (Danmarks Naturfredningsforening)

Ch.3. DN cannot share the Panels optimism for the RBMP3 – p.8	The Panel agrees on the essentials, but reserves the right to be more optimistic than the stakeholder	none (but see extended section 3.4.3)
Ch.3. Flaws in models of N-leaching? – p.8	The Panel has not analysed the models for N-leaching from the fields in detail. However, in general terms the need for more data and knowledge on the effectiveness of measures has received high emphasis in the Panel's report	none
Ch.8. No deterioration demand in the Water Framework Directive as well as other directive obligations. p.9/10	Text inserted to explain the non-deterioration objective.	section 8.2.1
Ch. 8. Fitness check reference – p.10	Reference inserted and the argument adjusted to some extent.	Section 8.2.2
Ch.8 (and ch.3) Claim that the overall trend for the state of coastal waters has moved from moderate towards bad during the last RBMP	We have explained in chapter 8 the interrelation between the question raised and the use of exemptions	Section 8.5.4

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period, and that should be taken into account in considering exemptions – p.10		
Ch.9. General remarks on the conclusions – p.10	The Panel assesses this section as a concise statement of DN's position in the societal debate, to which it does not need to comment	none

Bæredygtigt Landbrug

Not all conclusions from sections in chapter conclusions. Example section 2.4.4 – p.12	True. Chapter conclusions extended to cover this section	section 2.5
Ch.1. Year 1900 discussion – p.12	Section rewritten to clarify the Panel's position	section 1.4.7
Ch. 1-2. Eelgrass. Importance of wasting disease. Need for restoration – p.12/13	Panel is aware of the wasting disease but does not think this influences the current discussion much. Position on time sequence for measures against 'other pressures' clarified in Ch. 7	section 7.4.3
Ch. 5. Seasonality – p.13	Panel has clarified its view on measures targeting summer loads especially. Few technical measures are available, but the discussion now includes wetlands as promising initiatives. Some accounting favouring N retention in summer is advocated	sections 5.4.3, 5.4.4 and 5.5
Ch. 6. Measures to limit stormwater overflow – p.14	Panel has made some additional remarks on stormwater overflow measures	section 5.4.2
Ch. 6. Diffuse source vs. point source measures – p.14	The Panel has not studied the relative role of point versus diffuse sources in every individual water body. Conclusions depend on what has been reported in the studies that were available to the Panel. Note that more detailed results may become available in Phase III of the project	none
Ch. 6. Phosphorus - relative role of orthophosphate and complex bound phosphate – p.14	The Panel has not reviewed any studies or models distinguishing the role of complex bound phosphorus from brink erosion.	none
Ch. 6. Discussion of figures 6.1-6.3 – p.15	The Panel cannot follow the discussion of figs 6.1-6.3 in this contribution. DIP in summer is shown to be very high due to release from the sediment, and is thus very far from being limiting (DIP is the second figure)	none
Quote from Prof. Timmerman – p.15	Without context, this quote is difficult to react to	none
Economic assessment – p.15	The Panel has not made an economic assessment of possible measures, as the emphasis of its task was on evaluating the marine models. In Chapter 8, the importance of social and economic assessment in relation to exemptions is discussed	none

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Green Transition Denmark (Rådet for Grøn Omstilling)		
Ch.1-2. G/M target setting: only 50 per cent chance of reaching GES. – p.16	It is our conclusion that using the averaging approach instead of one-out-all-out or other stricter approaches when evaluating need for nitrogen reduction is justified at this stage, given the uncertainties in the calculations. We totally agree that the goal is GES according to evaluation of the actual state in the coastal waters. The measures are a means towards this goal and not a goal in themselves. Increased precision in calculations of needed reductions and efficiency of measures probably will be needed in forthcoming RBMPs, hence the importance attached to proper monitoring of results of measures.	none
Ch. 6. Phosphorus efforts matter and are important to implement now. Also in agriculture (examples given) – p.17/18	Our intention was not to play down the major problems associated with the excess phosphorus that is typical for regions with intensive animal husbandry. We have noted large quantities of manure still spread on the soils of Jutland. Thus, we agree that there are many reasons to increase phosphorus recycling and curb losses. Our discussion in Chapter 6 has primarily focused on the current problems in the coastal water bodies where we observe that the acute problem primarily is the extremely high nitrogen concentrations, but that also some credit can be accounted for when phosphorus losses are minimized. We have added a few considerations on phosphorus measures in chapter 5 and 6.	section 5.4.3 section 6.4.1
Ch. 7. Also important to act now on some other stressors: Essential to stop bottom trawling in areas where eelgrass must recover. Eelgrass recovery is in some areas a Sisyphean task if we continue bottom trawling – p.18	This point has been made in Ch.7. Text has been expanded compared to draft version. Note, however, that we warn against starting restoration efforts before basic water quality is sufficiently restored.	section 3.4.3 section 7.4.3
Ch. 8 (and Ch.3). Existing measures insufficient: the voluntary schemes (kollektive virkemidler) - i.e. wetting of land and afforestation – introduced in recent Danish RBMPs will not have sufficient effect – p.18/19	It is a matter of public societal debate what measures will be sufficient and proportionate. We have extended the text on existing measures and their effects in Ch. 3, and we have inserted some text in the relation between RBMP and the use of exemptions in Ch. 8.	section 3.4.3 section 8.5.4
SEGES Innovation		
Small catchments at N Sea coast – p.20	It was outside the Panel's scope and abilities to check all calculations on all water bodies. A general remark on how to handle these cases has been added to Ch. 3	section 3.4.1
Ch.1-2. Eelgrass depth limit as indicator for angiosperms in shallow water bodies: G/M boundary is not truncated to water body maximum depth in either assessment or models – p.20/21	The Panel agrees with the observation that it is inconsistent not to use Kd's corresponding to truncated eelgrass depth limit G/M boundaries in shallow water bodies. In our assessment it will change N-MAls only in very few water bodies. A new section of text has been added on this problem.	section 2.4.3 (and related change in section 2.5)
Ch.1. Is eelgrass depth limit (and not eelgrass cover) sufficient as indicator for WFD – p.21	The true indicator is rooted angiosperm depth limit, and this has been formally accepted by the European Commission. This has been added to the text in Ch.1.	section 1.4.8

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Section 1.4.4 validity of new reference conditions – p.21	The time lag in P load of the Baltic, although very relevant for current-day measures and for evaluating the realism of G/M boundary values, is not relevant for calculating reference conditions. Neither are the interests of Danish farmers, as there are no modern Danish farmers in the reference conditions. This, of course, does not dismiss the present-day importance of the interests of farmers in any sense!	none
Ch.1. Year 1900 discussion – p.21	This section in the report has been rewritten to clarify the Panel's position.	section 1.4.7
Ch.1 Other method for estimating Chl-a reference. = double regression – p.22	The Panel has commented on that approach in a response to COWI/NIRAS. The Panel is not in favour of using a double-step regression approach, as it amplifies uncertainty compared to the direct relations between load and indicators.	none
Ch. 2. In 3 of 4 examples investigated by SEGES, the MECH-models do not explain the ecological situation/response very well – p.22/23	<p>Our trust in that the dynamic mechanistic models provides reasonably accurate responses to nutrient input change is not only based on the comparison to observations, but also on an assessment of the model formulations and parametrizations. The model formulations of the DHI model system are not unique, but based on long-term development and knowledge within the international scientific community and used in models world-wide.</p> <p>We have not investigated how large deviations there are in the calibration parameters between the model implementations. However, it should be noted that there is only one set of calibrated parameters for each model implementation, which means that, for example, all water bodies in Limfjorden are modelled with exactly the same model and parameters. Hence, there is no separate calibration between the Skive Fjord and Hjarbæk Fjord, and with the same set of parameters the model is capable of simulating nutrient concentrations and Chl-a/kD across a rather wide range of eutrophication states throughout Limfjorden. The latter lends some credibility to that calibration is rather good and nutrient levels and Chl-a/kD should respond relatively accurate to nutrient supply change.</p> <p>It is quite difficult for us to evaluate single fjord peculiarities, because a detailed knowledge about the local dynamics is necessary to make a proper assessment on what is exactly going right or wrong. For Hjarbæk Fjord, it is indeed a correct observation that oxygen concentrations in the deep is frequently overestimated – in particular during early summer. However, we also notice in the observations that low O₂ concentrations are interrupted by higher values (more similar to modelled concentrations) which leads to the speculation that intrusions of dense water with higher oxygen concentrations occur during the summer season. Lack of oxygen depletion would eliminate the part of phosphate release associated with iron-oxide particles reduction and potentially make less P available during late summer. However, the comparison between modelled and observed phosphate concentrations does not show a consistent underestimation in the model results. But if phosphate is too low, nitrogen limitation may be overestimated in this fjord by the model, which in principle should result in an overestimated N-MAI. The long-term data indicates that winter concentrations of both nitrogen and phosphorus decreased quite much since the 1980s and that the fjord transitioned from hypertrophic to P-limitation in spring and N-limitation in summer in the last decade.</p> <p>Concerning Mariager Fjord, we agree that it is difficult to see the summer nutrient concentrations in the graphs at the DHI web-site and it is easily missed that N-limitation does not occur (also missed in Gertz et al., 2022, <i>Nutrient limitation in Danish Coastal Waters</i> where summer nitrogen limitation is indicated). We agree that Mariager Fjord is in a hypertrophic state from mid-summer and primary</p>	section 2.4.2 (minor changes)

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	<p>production is limited by some other factor than nutrient availability. The model results are N-limited (or some years co-limited by N and P), so the factor causing hypertrophy is apparently not captured. The implication from this is that the modelled sensitivity of e.g. Chl-a to N- and/or P-load reductions could be overestimated, but it does not mean that the system will not reach nutrient limitation when concentrations decrease (as for example for Hjarbæk Fjord discussed above). Given that need for reduction of nitrogen (NFR) already is about 58 per cent compared to baseline, we do not think the stronger sensitivity to N-reduction (and potential overestimate of N-MAI) is a major issue.</p> <p>Ringkøbing Fjord is indeed an interesting case of top-down control of the phytoplankton biomass and illustrates nicely the limitations of Chl-a as sole indicator of eutrophication in some cases. It is difficult for us to assess how DHI calibrated the model to reproduce both nutrients and, at least summer, Chl-a reasonably well, but a guess could be that the effect of benthic filtration feeders were replaced by zooplankton grazing. It may well be that more refined work is needed to validate the NFR for this area. Nevertheless, it is clear that the nutrient status of Ringkøbing Fjord has not changed by the introduction of benthic filtration feeders and the system remains in a highly eutrophic state and any disturbance to the benthic community will result in return of massive blooms. In summary, the cases discussed by SEGES show some deviations between model and observations, but none of these deviations would lead to large deviations in the calculated N-MAIs. We therefore maintain our appreciation that the models are fit for purpose.</p>	
Ch.2. Surrogate model removes important information from complex ecosystems and with that a high risk of not including important processes. For example, this method will exclude proper use of seasonality. – p.23	The surrogate model uses the sensitivities computed with the models, so in that respect it includes all processes and dynamics included the MECH and STAT models themselves. What can be critical, and is discussed to some extent in the report, are cases far from the G/M boundary where the sensitivity of Chl-a/kD to load change may be underestimated using the 30% load reduction scenarios. Further, we propose that some of the assumptions made could be validated by examining a mechanistic simulation using the final MAIs/NFRs.	none
Ch.3. Status load, 3-year methodology – p.23	The panel agrees that when using the 3-year average the sensitivity of the status load to abnormal years are higher than the piece-wise regression approach. However, for both methods, the uncertainty of the estimate is easily quantifiable.	None (but text clarified a bit in section 3.1)
Ch.4. Time lag of P in Baltic (agriculture is paying for that in the N-MAIs) – p.23	this time lag is well known to the Panel. In fact, one Panel member has strongly contributed to the estimation of this time scale. The Panel reminds that exactly this type of phenomena is meant when discussing 'natural conditions' preventing the rapid return to target conditions, in Ch. 8 of the report. We feel that we have thoroughly taken this into account.	none
Ch.5. Seasonality discussion – p.23	Part of this section has been rewritten. SEGES has misinterpreted the position of the Panel, where it is stated that it is difficult to find measures that reduce N <i>only</i> in summer. The possible use of wetlands as 'seasonal' measures has now received more attention, as the Panel felt that the possibilities offered by wetland construction were insufficiently stressed in the draft version. In the rewritten text, the Panel advises more clearly on how seasonally variable measures such as wetlands can be reconciled with year-round reduction targets	section 5.4.3 (and related changes in 5.4.4 and 5.5)
Ch.5. No basis for arguing that N loads will ever be so low as to give spring limitation – p.24	Reference was made to coastal waters, where this is the case. The point has been rephrased (in Ch. 6) to avoid controversy	section 6.4.2

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Ch.5. Possibilities to do something with seasonality, e.g. using wetlands, drainage etc.. – p..24	The Panel is sceptical of measures involving management of drainage, as already expressed in the draft text. However, possibilities involving wetlands, although not truly 'seasonal measures' have now been better emphasized in Ch. 5	section 5.4.3
Ch.6. Strategy of reducing N and P simultaneously – p.24	Our intention was not to play down the major problems associated with the excess phosphorus that is typical for regions with intensive animal husbandry and we have noted large quantities of manure still spread on the soils of Jutland. Thus, we agree that there are many reasons to increase phosphorus recycling and curb losses. Our discussion in Chapter 6 has primarily focused on the current problems in the coastal water bodies where we observe that the acute problem primarily is the extremely high nitrogen concentrations, but that also some credit can be accounted for when phosphorus losses are minimized. We have added a few considerations on phosphorus measures in chapter 5 and 6.	section 5.4.3 section 6.4.1
Limfjordsrådet		
Ch. 5,6,7. The importance of local initiatives and engagement in elaborating the local causes of pollution and devising solutions – p.26	The Panel thanks the Limfjord Council for its positive and future-oriented approach and its careful consideration of feasible solutions. The report has been amended in chapters 5 and 6 to highlight the Panel's position on providing both strong guidance and openness to local initiatives	section 6.4.1 section 5.4.3 section 5.4.4
Ocean Institute (Tænketanken Hav)		
Ch. 7. Too formal approach to other stressors – p.27	By mentioning which stressors are primarily regulated by which directives, the Panel did not want to dismiss them as irrelevant to the present discussion. However, a formal approach can be useful in determining how to tackle the different stressors. Text has been amended to make this clearer	section 3.4.3 section 7.3 section 7.4.1
Ch. 8: Position of Ocean Institute on exemptions – p.28	The Panel has restricted itself to sketching the legal options. Whether these should be taken, is the subject of political debate, in which Ocean Institute has taken position	none
Danish Sports Fishing Association (Danmarks Sportsfiskerforbund)		
Ch. 6 DSFA does not believe there is scope for progress in N/P combined measures – p.31	This interpretation differs from the Panel's position	none
Ch. 8. DSFA does not see room for exemptions, based on poor performance in RBMP1 and RBMP2 – p.33	This is DSFA's position in the societal debate, to which the Panel does not comment. We have inserted text on the relation between RBMP and the use of exemptions in chapter 8.	section 8.5.4

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<p>Fair Spildevand</p>		none
<p>Total comment p.34/38</p>	<p>The Panel strongly disagrees with the claims that there is no scientific evidence that curbing nutrient inputs to Danish coastal waters leads to improved water quality. Actually, the sensitivity studies of the scientifically well-founded models used in preparation of the RBMP is one of these proofs in itself. The Panel has considerable difficulty following the unstructured reasoning in the comments. However, the Panel identified a clear misconception in that the regulation of inorganic nutrient concentrations in the world ocean, as pioneered by Redfield (1933), can be transferred to coastal systems. The global ocean balance evolves in deep ocean on timescales of the order of 1000s of years, while the shallow Danish coastal systems have short residence times, are regulated by other processes, such as benthic-pelagic interaction, and strongly forced by external drivers. One common factor, though, is that also in the coastal systems, plankton uptake is of the order of Redfield ratio. There is no contradiction between Redfield's observations of the composition of inorganic nutrients in the world ocean and Liebig's law. The Panel has the impression that, with Liebig's law, the stakeholder rejects the entire concept of nutrient limitation of phytoplankton. That is impossible and contradictory to Redfield theory, as it would lead to the absurd conclusion that phytoplankton grow at full speed and incorporate nitrogen in 7:1 proportion to phosphorus, even in conditions where no nitrogen at all would be available for uptake.</p> <p>The Panel has the impression that Fair Spildevand claims that nutrient concentrations in Danish waters are not monitored or taken into account when constructing the models. That is not true. Extensive datasets from monitoring have been collected over many years and are publicly available. They played a crucial role in calibrating and validating the models used in RBMP2 and RBMP3. Fair Spildevand seems to suggest that low nitrate concentrations in summer are a clear indicator that waters do not suffer eutrophication. However, these concentrations are low because nutrients are taken up by large populations of phytoplankton. The build-up of organic matter subsequently causes strong oxygen demand when phytoplankton decomposes. There is ample evidence that heavy eutrophication and severe water quality problems can go hand in hand with low summer nitrate concentrations. Using winter concentrations as a measure of what will be taken up and incorporated in organic matter during the coming growing season is a much more useful first-order approach. Fair Spildevand is entirely correct when stating that nutrient loads must be scaled to the size, flushing regime and other characteristics of a water body. It makes a difference if one adds a ton of nitrogen to a bathtub or to an ocean. The Panel assures the stakeholder that this obvious relation is carefully taken into account in the models and that this is not a cause for concern.</p> <p>In summary, the Panel sees no merit in Fair Spildevand's attempt at overthrowing the fundamental principles of nutrient regulation in coastal waters. There is ample evidence that it makes perfect sense to regulate and reduce the nutrient load from diffuse and point sources, including the N-load, to restore the ecological balance in coastal and inner water bodies.</p>	

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University of Aarhus: Danish Centre for Environment and Energy		
Ch.3. Reference to N-model referred to in the text? – p.39	It is clarified in the text	section 3.4.2
new sources of bias in the data – p.39	The panel has added a section in Ch.1 on the necessity to build scientific consensus on data bases <i>before</i> extensive model calculations are performed	section 1.4.6
Research topics proposed by DCE – p.39	These topics are - at slightly more general level - already covered in the Panel's recommendations	none
DTU, DHI, AU: Coastal modelling group		
Mention historical basis for reference conditions, following CIS guidance #5 – p.40	Added to the text	section 1.1
Suggestion to revise the intercalibration with Sweden/ criticism of guidance #30 – p.40	The Panel differs of opinion with the researchers on this point. The Panel's position is clarified in section 1.5 (conclusions and recommendations)	section 1.5