Y Twynio Abermenai i Aberffraw/Abermenai to Aberffraw Dunes SAC/SCI/cSAC (UK0020021): A review of the Newborough Review of Science in respect of work proposals for 2013.

Introduction

This short review considers sources of relevant available evidence, including information from contracted independent professional scientists (e.g. Pye 2013) in addition to the advice of Welsh Government's (WG) nature conservation advisory agency the Countryside Council for Wales (CCW) and Forestry Commission Wales (FCW) [both now, from 1 April 2013, within the new Natural Resources Wales (NRW) body], as well as a mix of site-specific (e.g. Ranwell 1958, 1959 & 1960) and more general ecological UK dune science research, generated in the main from discussions held between WG and involved parties since 2009 under the Newborough Review of Science.

The purpose of the review is to establish if submissions made by NRW (as CCW) and the Newborough Forest Partnership (NFP) as part of the Newborough Review of Science raise any specific objections to the selective felling and hydrological monitoring works proposed for winter 2013. It attempts to be impartial and objective in its findings and conclusions. Key documents scrutinised include: (i) historical Newborough documents on WG's internal 'IShare' electronic file system, (ii) WG's 'Newborough science file', distilled from (i), (iii) the FCW Newborough Forest Management Plan 2010-2015, (iv) CCW's Core Management Plan (CCW 2008) and Prof. Pye's recent CCW contract science study (Pye 2013).

The following document despite the stated objective of providing an impartial and non-partisan review of information fails in almost every respect to achieve this aim. It is clearly far from objective and fails to review CCW's claims with a critical eye and has by and large ignored and/or failed to check the information provided to the Science Review that criticised CCW's position. There is no clear review or rebuttal of information that was provided in support of opposition to CCW's views.

Background

From direct observation and field research it has become widely recognised in recent decades that over-stabilisation ('fossilisation'), as an unintended consequence of the success, in part, of earlier erosion countermeasures (peaking in the mid-1980s) having slowed or frozen natural formational processes, as well as progressive natural consolidation, poses a major long-term threat to the continuity of existence of early-seral stage European Community (EC) Habitats Directive (92/43/EEC) (HD) priority dune vegetation communities and the survival of their associated specialised species dependent on open sand for all or part of their life cycles (Howe *et al.* 2012).
i.e. there isn't enough open sand in dune systems mostly because of natural successional development of the characteristic plant communities. However the action proposed but unspecified in this document fails to apply remedial action to the actual Annex 1 habitat of the SAC where this problem is supposed to exist and ignores the UK standards for sand dune management, the CSM standards.
The JNCC 2nd UK report (2007) on the conservation status of H2120 '*Ammophila* shifting white dunes' habitats concluded that the total UK area (based on remote

sensing data) relative to baseline reference was unfavourable due to dune stabilisation, though the report for H2110 'embryonic dunes' concluded the area (extent) of that habitat remained favourable.
This conservation status assessment should trigger some serious questions about either the quality of the remote sensing data or dynamic processes in UK dune systems. If embryonic dune area is favourable what has happened to the associated shifting dunes 2120 that develop from those embryonic dunes? They are colonized by *Ammophila* generating new shifting dunes 2120. On the landward side of shifting dunes transformation to fixed dune habitat can only occur where reduced wind dynamics allow. Have there been significant changes to aeolian processes in UK dune systems? The conservation status conclusions regarding shifting dune area & range needs to be queried since the supposed loss has been attributed to dune stabilisation; colonization of shifting dune habitat by plants that are characteristic of fixed dune habitat.

Following on from the Review of Science NRW (as CCW) has advised WG that for the SAC to move towards FCS and comply with Article 6.1 of the HD conifers need to be removed from a limited area in order to re-establish a more intact and naturally active fore-dune zonation and to lessen hydrological impacts on groundwater levels affecting wet-slack vegetation in the system.
Neither the claim of unfavourable conservation status nor the need for additional zonation or hydrological impact by the forest on the humid dune slacks has ever been substantiated and CCW's statements have never been reviewed with a critical eye by either this author or an independent and appropriately qualified arbitration panel as required by the Science Review.
Appendix I lists the Annex I & II Features at Abermenai to Aberffraw Dunes SAC as submitted to Europe on the Natura 2000 standard data form.

Above background statement is of a general nature and has little relevance to Newborough. It fails to note the important fact that the mobile dunes at Newborough are in favourable conservation status: SAC designation SDF defines them as grade A, 'excellent conservation status' and CCW's 2005 habitat condition assessments defined them as in 'favourable condition' indicating that that status remained uncompromised. Their area and range have been maintained and embryonic dunes are forming along sections of the Cefni estuary and elsewhere on Traeth Llanddwyn & the Warren/Abermenai Point frontage [Pye report, 2012]. CCW/NRW's claims regarding a requirement for more zonation and hydrological impacts by the forest on humid dune slacks have never been substantiated.

CCW's advice that there is a need to create additional zonation is not supported by either the actual conservation status of the mobile dunes of the Newborough site nor the specific requirements of the Directive or CSM standards regarding zonation or bare sand/mobility requirements.

Precedents

Concern about and recognition of the problem of dune inactivity is confined not just to the UK in Europe. Precedents exist for major positive management intervention work focussed on rejuvenating mobile dune habitats in other European Members States (MS), for example the recent large-scale remobilisation in the Netherlands of

HD dune systems that had become dominated by semi-natural phanerophytic woody vegetation of a type corresponding more closely to Annex I Atlantic Dune Woodland (ADW) than does conifer plantation, involving extensive and whole-scale removal of mature scrub and proto-woodland communities.

The Dutch clearance of semi-natural scrub to create bare sand has little relevance to the Newborough situation. The 'scrub', much of which may well have been *Salix repens* one of the characteristic plants of the Annex 1 dune habitats, is a rather different scenario from what is present at Newborough a mature woodland that is a non-qualifying habitat within the SAC. In effect the Dutch were restoring existing Annex 1 dune habitat to favourable conservation status. This is not what is proposed at Newborough the clearfelling of woodland to create additional, new areas of dune habitat; an attempt to turn the clock back to a pre-Directive era before the 1940s.

The scientific evidence base for the successful delivery of desired outcomes for works of this kind is developing. In 2012 WG funded work at Kenfig Dunes NNR (SAC) in Glamorgan to convert a few hectares of priority fixed grey dune habitat (2130) to mobile dune (2130 2120 I think). Although appearing a 'sacrificial' conversion of one European priority type for another the work was justified by WG because the increase in 2130 at Kenfig post-SAC notification meant conversion would not reduce Annex I habitat areas below the area given at notification. The work is now being monitored.

The Directive is explicit that conservation management should never sacrifice one Annex 1 habitat for another. At Kenfig that key principle has been ignored. The argument that the net effect would still match the SDF document designation area of fixed 'grey dunes' despite the destruction because post SAC designation grey dune area had increased naturally is nonsense and counter to the key principles of the Directive. The Directive requirement is that habitat area & range should be maintained or increasing naturally. At Kenfig, having increased naturally that increase in Annex 1 grey dune habitat area has then been destroyed by supposed mobility/conservation measures. The SDF designation area & range is the baseline state and the Directive requirement is that any natural increase in dune habitat area should be conserved not destroyed intentionally.

Overview

SAC Features Monitoring & Favourable Condition Status

In the last SAC monitoring round (2005) CCW reported the condition of the Abermenai to Aberffraw Dunes SAC features 1-5 (Appendix 1) to all be unfavourable. For each feature a summary of the conservation objectives, performance indicators and operational limits for factors affecting the feature is contained in the CCW core site management plan (CCW 2008). The conservation status for the features and their management requirements in light of the assessment are summarised in section 5 of the management plan.

This statement is incorrect. CCW's 2005 survey reports actually reported that all Annex 1 dune habitats with the exception of humid slacks [2190] were in favourable condition meeting all the habitat assessment targets; targets that in significant ways were set at higher thresholds than required by the CSM standards. Having found each

of the Annex 1 dune habitats to be in favourable condition CCW then resorted to a misinterpretation of the CSM zonation target to arrive at a conclusion of 'unfavourable conservation status.'

The humid slack surveys were compromised by poor methodology and use of targets that set higher standards than those required by the CSM standards. The actual condition of humid slacks was therefore unclear. A detailed critique of the survey methods applied in the humid slacks was presented in the Science Review but appears not to have been reviewed by the author.

For SAC feature 1, embryonic shifting dunes (2110), the feature failed largely because the target for the full range of intact zones, i.e. from embryo- to yellow- to fixed dune-types, within the vegetation structure (a Common Standards Monitoring (CSM) mandatory attribute) along 95% of the site frontage was not met, primarily because of afforestation of management unit 20 (CCW database no. 001901), i.e. Newborough Forest. The identified main action to achieve FCS was the removal of the conifer plantation near the shore in order to restore the natural dune zonation.

For the same reason the conservation status of SAC feature 2, shifting Marram 'white dunes' (2120), was also determined as unfavourable.

SAC feature 3, 'fixed grey dunes' (2130) was similarly unfavourable because of the truncation of the natural zonation due to the conifer plantation.

The condition status of SAC feature 4, 'dunes with creeping willow' (2170), was favourable at Newborough, but unfavourable for the SAC as a whole.

The condition of SAC feature 5, 'humid dune slacks' (2190), was also unfavourable, due to operational limits for water table targets not being met.

One of the problems with humid slack assessment in the Warren has been a lack of dipwell data - there was no data available from 1997 - 2006. Environment Agency/CEH research has also concluded that hydrological requirements for humid slack habitat are complex and poorly understood and that changes to humid slack habitat can occur without any significant change to the hydrological conditions. How CCW have set meaningful water table targets and operational limits for those targets is a mystery. No such target failures were reported in the 2005 habitat condition assessments and water table targets were never cited as a reason for concluding unfavourable conservation status.

Other measures of habitat condition, e.g. positive indicators of floristic composition, were found to generally be satisfactory, but for the SAC overall the condition of the primary Annex 1 features was assessed as unfavourable. Excerpts from certain Review of Science papers on the WG science pack appear to directly contradict these findings and, confusingly, assert that the Annex I habitats are and have been in 'favourable condition' since the site was notified. There is an absence of supporting information explaining the origins of this material.

The author has obviously ignored or failed to check submissions to the Science Review. All the information supporting the 'favourable condition' statements was

presented at the Science Review and based exclusively on CCW's own 2005 survey reports not external or independent assessments. The CCW reports themselves, of course, also provide the information. The author could also have sought clarification from the independent participants in the Review if he'd found supporting information difficult to access.

The CCW monitoring methodology follows the Joint Nature Conservation Council (JNCC) Common Standards Monitoring (CSM) framework and guidelines. WG recognises that as part of the Review of Science the NFP (? – un-dated and un-authored excerpt from paper in science pack) provided a very detailed critique of certain aspects of the monitoring methodology. However, this review does not further consider the points raised in respect of methodological detail as the WG science file does not contain the pertinent scientific information, e.g. original field data and maps from the SAC monitoring reports, on which to base a response, for example information on the selection and location of monitoring points and on the issue of sample size variation for recording different attributes. From information contained in the CCW SAC core management plan and summary documents it would appear that the monitoring protocol, including the selection and measurements of attributes (performance indicators) and target setting, followed standard recommendations for sand dune habitats in line with JNCC CSM guidelines.

CCW's 2005 surveys altered CSM targets and guidelines significantly raising thresholds for achieving a favourable condition assessment. Since despite the raising of thresholds to meet favourable condition status the habitats, with the exception of humid slacks, were all reported to have met the targets to be considered in favourable condition this was not pursued at length in the Review. However, with the humid slack surveys there were considerable problems both in methodology and assessment targets set which did not correspond to those of the CSM standards. There were significantly higher thresholds used for the habitat to be considered in favourable condition. They even changed the criteria for differentiating the two slack types, Salix dominated and humid slacks. The survey methods and distribution of sample plots were also unsound. All of the survey information that this critique is based on is available in CCW's 2005 survey reports so why this was unavailable to the author is a mystery. Again clarification of any unclear critique of CCW's surveys could have been sought if the author had bothered.

CCW did not follow the CSM targets and guidelines as the author states but made significant alterations to both targets and guidelines. The humid slack survey methodology also failed to follow sound scientific practice and habitat monitoring methods. Details of why this was the case were presented at the Science Review and should have been available to the author.

Proposed Works

As a primary intervention the proposed selective clearance work is considered proportionate in respect of its planned extent, location and scale, relative to natural dune habitat placement within the dune ecosystem, and the overall representation of specific habitat elements, i.e. the proposal is quite modest and small-scale relative to the size of the plantation.

The size of the proposed felling relative to the forest area is irrelevant. It is not the extent of the undefined proposed felling that is the problem it is the failure to provide robust conservation, scientific and/or Directive justification for the intervention and information about where it is. The beach-forest margin is the key site asset and where the most visitors wish to go: somewhere sheltered from sun, wind and rain AND where the seascapes, coast, Llanddwyn island and the Cefni estuary can be appreciated in even the poorest weather. The area to be felled is a key shelter area that shelters visitors from freezing winter wind and rain and provides shade in the summer. The proposals seriously degrade a key asset that supports tourism, a key component of the islands struggling economy.

The shore frontage is where embryo dune communities would occur naturally and the plan does not propose creating mobile dune habitat outwith the natural biogeographical position of the habitat within the context of the overall site. The location in forest zone 1 (west) is optimum because it occupies part of the shore where fore-dunes would naturally be expected to form. Furthermore, small pockets of open sandy areas, providing ideal starting conditions, already exist within the matrix of the conifer plantation.

This statement makes little sense since there is already a well developed foredune ridge of mobile dunes (shifting dunes with *Ammophila* 2120) immediately in front of the proposed clearfelling area. Furthermore there is little chance of embryonic dunes forming in front of the proposed clearfell zone because that section of Traeth Penrhos is eroding and the sand being mobilized to the NE along the beach to where embryonic dunes are naturally forming at present.

Concerning the issue of potential interactions between artificially afforested dunes and groundwater levels it is a scientific fact that conifer plantations established on sand dunes can modify and depress, i.e. lower, the characteristically shallowly domed water-table profile under dune systems by directly intercepting rainfall (affecting aquifer re-charge rates and volumes) and by increasing evapotranspirational losses of water via tree leaves (Ranwell & Boar 1986). Centre for Ecology and Hydrology (CEH) scientists have flagged up concerns in this respect at Newborough, as have Stratford *et al.* (2006). Dipwell data from Newborough demonstrate a clear trend of falling water levels between 2006 & 2011 (Pye 2013), who stated that '*tree growth within Newborough Forest may have contributed to this trend*', while being careful to stress that the evidence was not absolutely clear-cut because of changes in rainfall in recent decades and an increasing temperature trend perhaps also influencing water levels. Drawdown effects can occur around a zone of interference proximate to plantation edges and CEH has highlighted the Warren-plantation boundary zone as being the part of the site where slacks are most likely to be affected. The magnitude of the effect is uncertain and more research is needed. Concerning the potential interplay between free sand movement and trees, it has been shown that the wind-shadowing effect of conifer plantations can reduce wind strength for distances of up to 25 times their height (Sturgess & Atkinson 1993). Plantations can also deflect wind (Pye 2013). CEH have advised that wind-direction at Newborough could also be affected locally by the plantation.

The Stratford et al., 2006, review of hydrological research and data actually concluded that CCW's argument that trees had impacted the slacks, especially the humid slacks, had not been substantiated. The following is the report conclusion:

3.4 Conclusion

Although many studies of Newborough Warren have been undertaken, it is not felt that they adequately address all the issues relating to the issue of the falling water table. The main concerns, in our view, are that:

- Many of the studies have started off from the view point that the trees are causing a lowering of the water table and are hence setting out to prove this rather than standing back and considering all the causal factors.
- Transpiration has been overestimated for both the forest and the dune vegetation. Interception has been overestimated for the forest vegetation.
- The effects of soil moisture deficit have not adequately been accounted for.
- The groundwater model could only be made to work by using unrealistic values for recharge, suggesting an underlying problem with the conceptual model.

For these reasons it is not felt that any questions relating to the effect of the forest on the water table can be adequately answered by the reviewed reports.

The *Salix* dominated slack and fixed dune habitat types close to the forest [CCW habitat maps] were both assessed to be in favourable condition [CCW 2005 habitat assessments]. Humid slacks only occur 300m or more from the forest edge so proximity impacts on humid slack hydrology are unlikely. The case for more general hydrological impact on the wider Warren mosaic of dune habitats has not been substantiated. The wind shadow effects referred to also help conserve moisture in the wind sheltered area by significantly reducing wind speed, the dominant control on evapotranspiration. The reduced wind speed close to the forest edge is irrelevant with regard to sand mobility since all the habitat types are 'fixed' dune habitats with low target levels of bare sand. However the shelter effect will certainly have a positive impact on moisture retention in the dune habitat close to the forest.

Thus there is little scientific doubt that plantations can interfere in various ways with the natural functioning of dune systems, though the science is highly complicated by the variability of other compounding environmental factors, and it is important to retain scientific objectivity, to refrain from assumptions and not rush to judgement, as demonstrated at Whiteford Dunes NNR, Gower, where conifer blocks had been assumed to be the main factor responsible for (and do likely contribute to) the drying out the Fen Orchid slacks, but recent CEH research has shown that the primary cause is the loss in a storm event of the beach front sand-wedge which acted like a dam slowing freshwater egress from the system.

Atlantic Dune Woodland – Concepts and Definitions.

Much purported Atlantic Dune Woodland (ADW) in Wales represents nascent forms, comprising various types of phanerophyte-dominated scrub communities, some in effect representing natural plagioclimax scrub-types, developing on fixed dunes and wet slacks in response to seral (successional) processes often accelerated by reduced grazing pressure. The composition of these communities is incredibly variable and none of them are adequately described, if at all, in the National Vegetation Classification (NVC) system.

At the Liverpool Hope University dune scrub and woodland conference in September 2012, EC environment division representatives stated that although the primary

concept of ADW is a semi-natural one, the Commission accepted a broad definition of woody vegetation types qualifying as ADW and, depending on local ecological contexts, was prepared to include, in some cases, even long-established conifer plantations. The point was made in respect of artificially established conifer plantations proximate to natural/semi-natural ADW containing native coniferous elements, a situation arising only in some MS, e.g. French Aquitanian Atlantic-dune woodlands, which have mixes of Pines, e.g. *Pinus pinaster* and broadleaves, e.g. *Quercus ilex* and *Q.suber*, as well as interesting sub-canopy and scrub-layer components, including such species as *Arbutus unedo* (Strawberry Tree), *Rubia peregrina* & *Ruscus aculeatus*. After much deliberation conference concluded the answer to the question of 'what is ADW?' was 'woody vegetation on Atlantic dunes'.

It is debatable that 'true', i.e. in the strictly natural sense of the HD, ADW occurs anywhere in Britain. Treating the tree as an honorary native the most persuasive candidate in Wales is perhaps the Sycamore woodland (originally planted) at Stackpole. Compositional descriptions of imagined UK ADW appropriate for N2K sites should not be criticised for excluding non-native trees.

Concerning the feasibility of creating ADW by the gradual modification of content and structure of the existing plantation at Newborough the FCW Forest Management Plan (Appendix 4) states that ADW is not known to have occurred at Newborough in the distant past. The 'vision statement' for the site in CCW's management plan (CCW 2008) mentions the possibility of 'encouraging' dune woodland development on inland parts of the fixed dunes with the implicit aim of attaining a complete sea to woodland zonation. From what is known of the system's history and development the past extent of bare blown sand must have precluded woodland development of any kind. This makes the problem of deciding on an ecologically appropriate composition for anthropogenically, or more naturally directed, manufactured type or types all the more difficult.

Irrespective, however, of the esoteric issue of whether or not the conifer plantation at Newborough could, should or does conform to ADW in this broad sense, a key issue in respect of the HD is whether the plantation was categorised as a qualifying Annex I ADW at notification (following its addition post-'SAC moderation' review). Section 3.1 (ecological information) of the Natura 2000 standard data form submitted to Europe for the site does not list or recognise ADW as a habitat type present on the site and nor is it listed as a qualifying habitat for the SAC on the JNCC SAC website. Since priority has to be given to Annex I habitats (and Annex II species) for which the site was designated then even if it could be successfully argued that the plantation is, in some highly eccentric ecological sense, a type of ADW, then the condition and quality of the notified Annex I & II features must take precedent (WG legal advice – see below), notwithstanding the requirement for measures to take into consideration the ecological needs of all Annex I & II habitats/species on the site, not merely those for which the site was designated.

Interestingly, an untitled 'habitat map' on the WG science file appended to the N2K data form shows in dark green patches of 'forest' and in light green 'woodland' set within the conifer plantation (centred N of Cerrig-duon) and, confusingly, both 'forest' and 'woodland' are listed as 'Annex I habitat types' in the legend on the map. The coniferous woodland component was allocated under s.4.1 as an element of

'general site character' on the N2K standard data form, as pointed out by NRW (then CCW) during the Science Review process, and appears under this category on the SAC summary data for the site on the JNCC UK website. Occupying c.39% of the SAC the plantation area is currently slightly larger than the area of all Annex I habitats combined (c.38%).

CCW's statements that ADW does not exist at Newborough are irrelevant since no one has ever suggested that it did. All that has ever been suggested was that it would be worth investigating the practicality of a long term modification of Newborough Forest to meet the habitat definition of ADW. This suggestion was made for several reasons - an improvement in bio-diversity and if sensibly applied supporting the development of habitat useful to red squirrels and also meeting a UK BAP target to create five areas of ADW since none exist in the UK. This could have met the public and local community's wish to retain their forest, enhanced the tourism asset the forest represents and also improved bio-diversity. A potential 'win/win' scenario that has been squandered by current NRW forest management actions: planting large number of North American cedar and also birch an especially invasive species that in the long term threatens to invade the existing open dune habitat.

CCW's patronizing statement that they might consider the modification of forest to ADW on inland areas of 'fixed dunes' fails to acknowledge that the so-called fixed dunes are nothing of the kind. The areas referred to by CCW are 'conifer woodland', a non-qualifying habitat within the SAC, and defined as such by the SAC designation document, the Natura 2000 SDF.

Annex II Species

***Rumex rupestris* Shore Dock**

This European endemic, GB Red Data Book (Endangered) maritime dock (also Wildlife & Countryside Act (1981) schedule 8 listed), occurring on sandy or rocky shores, the lower slopes of sea-cliffs, cliff ledges, strandlines, bases of flushed cliffs and sometimes even in standing water in dune slacks, unusually has a requirement for a constant supply of freshwater in an inherently halophytic habitat. The known populations at Newborough are remote from the areas where work is being proposed, but consideration could be given to taking advantage of any opportunities arising from having machinery on site for potential positive habitat management work. The CCW management plan 'seeks to support viable populations' of the species. It would be interesting to know if salt water incursion is an actual, or potential threat, (trees can promote this on dune systems by inverting the naturally domed water table) and if so if it is limiting the extent of suitable habitat.

***Petalophyllum ralfsii* Petalwort**

The FCW Newborough Forest Management Plan hints at the possible presence of this species within the forest, but the wording of statements is unclear, creating uncertainty, e.g. 'not generally in the forest' (Table 2.2) and 'does not generally occur within the forest' (section 2.3.3.a.). Either it does or it does not, and it would be

important to avoid inadvertent damage and disturbance to *P.ralfsii* habitats during felling operations, or as part of the hydrological monitoring proposals.

Great Crested Newts (GCNs)

It is unclear from the reviewed documents whether GCNs occur in the forest, but the same caveats regarding disturbance from works applies to the possibility of GCNs using habitat elements in the forest as places of rest or shelter.

Is there a regulatory requirement to remobilise the designated early seral habitat features at Newborough?

Based on an interpretation of the intent of the Habitats Directive NRW has argued that because the conservation status of the site at designation was identified as being unfavourable and the need for restoration (alluded to under s.4.3 on the N2K data form) was stated at that time, then an obligation exists, as enshrined in Articles 2-4 & 6 of the Directive.

This is nonsense. The SDF designation document for the SAC states that the conservation status of the Annex 1 habitats at designation were either grade A - excellent conservation status or grade B - good conservation status. Where this claimed unfavourable conservation status comes from is a mystery. The author should have checked the actual SDF form for the SAC rather than relying on what NRW told him. The legal advice is flawed because it starts from an incorrect premise. No one would have argued about a need for appropriate action if the habitats were genuinely in need of being 'restored to favourable conservation status.'

The problems 'alluded' to in the Vulnerability section of the SDF were not statements of a need for restoration of favourable conservation status. How could they be? The SDF states the habitats are in grade A (excellent) or B (good) conservation status not unfavourable. The Vulnerability statement is CCW alluding to unsubstantiated conservation issues. CCW's views have still not been examined by informed, well qualified independent experts - an appropriately constituted arbitration panel.

Recent WG legal advice sought to clarify the issue (dated 28 February 2013) clearly recognises that the presence of the conifer plantation at Newborough '*is encroaching on efforts to advance the existing designated features of the SAC to favourable conservation status (FCS)*' and that '*the clearing of forestry could improve the conservation status of the Annex I habitats for which this site was designated'*. The advice also confirms the legal obligation on Member States (MS) to restore FCS to sites not at FCS when listed. The advice goes on to state that '*if a MS is obliged to propose the classification of habitats in an unfavourable conservation status, it is only logical to assume that it will set a restoration target for these habitats so as to ensure their sustainability'*.

You do not 'advance the existing designated features of the SAC to favourable conservation status' by creating more of the habitat; increasing their area and range within the SAC. The Habitats Directive legal requirement is that the Annex 1 habitats' area and range should be 'maintained or increase naturally'. There is no legal remit or justification for landscape engineering to create more dune habitat.

The supposed unfavourable conservation status has been challenged and the information and evidence supporting this challenge never refuted. None of the actual legal requirements of the Habitats Directive have ever been challenged by those who oppose CCW's plans. The argument is about the true conservation status of the dune habitats. CCW's claim of unfavourable conservation status is not supported by their own habitat assessments and they had to resort to a misinterpretation of a CSM target to arrive at their unfavourable conservation status conclusion.

While recognising that the plantation is not without biodiversity value and that other significant non-HD nature conservation/biodiversity features (e.g. Red Squirrels, fungi, Ravens etc.) can be taken into consideration when formulating habitat recovery options, such measures should not be '*at the expense of the designated features achieving their conservation objectives, e.g. FCS'*. In equivalent vein, economic, social and cultural requirements, together with regional and local characteristics, can all be taken into consideration, but importantly '*proposed measures cannot be based purely on these considerations, but on a balanced* [my emphasis] *position which seeks to achieve FCS for the site'*. WG legal advice also states that *'the extent of the site and of the percentage of the habitats within that site listed with the Commission represent the current level to which the habitat should be restored and not to its pre-1950s position'*, while making it clear that where Annex I & II features are not in FCS an obligation does indeed exist for MS to restore those features to FCS. The point regarding the relative proportions (percentages) of habitats as opposed to absolute area values is an interesting one. Since the people of Anglesey and the local community at Newborough have never been informed or consulted about the proposed clearfelling plans, the well advanced scheme has failed in every aspect to fulfil the legal requirements of Art. 2(3) of the Directive and the Århus Convention. There is no 'balance', the public at large and the local community have been ignored.

The legal advice has also misunderstood what is and what is not habitat that must be kept or restored to favourable conservation status. The forest is not habitat that is in need of being restored partially or otherwise to any pre-1950s condition. It is designated in the SDF Natura 2000 legal document as 'conifer woodland' - a non-qualifying habitat within the SAC. The habitat to be conserved and protected is the habitat designated as sand dune habitat: 55% of the SAC according to the SDF

In summary, WG legal advice indicates the phased approach (as proposed), rather than large-scale clearance, is compliant with the requirements of the Habitats Directive as long as it is proportionate and necessary for the attainment of the aim of restoring FCS and appropriate in terms of the means used, which it would appear to be.
This reference to a phased approach makes it clear that the undefined and undisclosed clearfelling proposals for the winter 2013 are only the first phase of a more extensive but unspecified clearfelling plan none of which has been justified by this report or CCW's earlier arguments and information. Once again the local community and public at large have been ignored and excluded from the decision-making process.

Monitoring and Related Issues

Monitoring is crucial for interpreting and understanding the response of systems to change, natural or enforced. The importance of running a scientific monitoring

programme in parallel with the work, and not just as an inconvenient add-on or afterthought, cannot be overstated. Both proposals should be monitored by detailed, scientifically designed (with careful siting and selection of controls and replicates) programmes, developed alongside work planning. Work planning should define all links in the activity chain, including how to deal with excavated material, equipment/machinery on-site storage, access routes etc. All activities should be described and recorded. An added value from monitoring schemes is using knowledge gained to guide, inform and refine any future management interventions at Newborough, or on similar dune sites elsewhere. Meteorological data are important in this regard and the possibility of utilising data from the on-site Environmental Change Network Met station facility should be investigated. Experimental design for monitoring should ensure potential compounding effects with other factors are excluded as far as possible and ideally absolutely. For example, the Newborough Forest Management Plan includes drain blocking proposals (to try and encourage winter flooding of slack with the plantation and hydrological connections with Llyn Rhos Ddu) currently planned for the W side of the forest away from warren boundary, but monitoring needs to take account of such potential interactions in order to separate out possible compounding factors, such as the influence of natural streams and ditches on water-table levels.

A significant issue and one raised by several stakeholders is the question of the temporal persistence of artificially created mobile dune habitat, i.e. the longevity of gain in extent. How long will remobilised sand remain mobile? This is both an ecological and an economic, i.e. cost-benefit, issue. Permanency of effect is a problem for all forms of habitat management in general. Monitoring should provide enlightenment on this issue as different claims have been made based on over-generalised research findings extrapolated from seemingly identical sites, which may or may not hold true as site characteristics are often unique. For example, it is usually assumed that open sand communities are short-lived. Many undoubtedly are, but anecdotal evidence from other dune systems in Wales suggests some deeply channelled blow-out features aligned perpendicularly to the shoreline on spit dune systems (created in part from erosion initiated in the period 1940-60) and backed by high dune slopes with steep angles of repose can persist for decades, i.e. seemingly almost indefinitely on human timescales. There is likely to be a range of longevity time spans for artificially created and topographically different dune-scapes on different sites. Similarities between systems can be superficial and differences subtle.

Stakeholders must realise that although the weight of scientific evidence points to a high probability of a successful outcome justifying evidence can never be absolutely irrefutable. Even with careful advance planning, execution and scientific objectivity in respect of predicted effect, because of the complexity of interacting and compounding environmental variables, especially climatic factors, e.g. weather conditions in the period over and after the event, operating on what is an inherently dynamic ecosystem, there can never be absolute certainty of precise outcomes in time and space, and that unpredicted results might possibly arise. Such risks are here considered to be very low, but no matter how rigorous the science base they can never be zero. In this sense it has to be accepted that to an unknown degree any intervention work is experimental in nature, but will ultimately serve to test what is achievable and what is effective.

On accreting shorelines embryonic and mobile fore-dunes form gradually in an orderly, progressive sequence in response to natural factors operating under spatio-temporally mediated geomorphological processes, and can develop rapidly, for example at Ynys-las NNR the development of a new spit-point dune (entirely comprising habitats conforming to HD 2110 & 2120 categories) has taken <10 years attaining on its eastern side a maximum elevation of c.20ft. The dune is ringed by embryo dunes supporting typical strandline pioneering species, such as *Cakile maritima, Elytrigia juncea, Honckenya peploides* & *Salsola kali. Eryngium maritimum* Sea Holly has recently colonised.

The challenge of replicating dune forms by direct intervention is one of either creating readymade profiled landforms *in situ* or setting their development in train by allowing natural process to do the work. In reality on pre-established systems a combination of both approaches occurs as formed sand mounds will be reworked. Interventions already carried out elsewhere on N2K dune sites in Wales, e.g. Kenfig, in effect have utilised both, i.e. de-vegetating dunes pre-formed by natural processes in anticipation of resuscitating natural processes operating before dunes had become stabilised but after they had formed.

The potential for introducing or transferring pathogenic or problem invasive non-native species, including microorganisms (e.g. *Phytophthora* spp., *Hymenoscyphus pseudoalbidus* (*Chalara fraxinea*) & *Chytridiomyces*), to or around the site during works means biosecurity should be a major work planning consideration. Machinery is notorious for introducing plant seeds, particularly when contractors have been on jobs in other parts of the country. At Ynys-las dunes NNR (part of Dyfi SAC) construction of the new visitor centre in the 1997-98 created large areas of bare sandy ground and sand heaps on which the non-natives *Solanum physalifolium* Green Nightshade (native of S. America) and the grass *Bromopsis inermis* ssp. *inermis* Hungarian Brome (native of E. Europe) appeared. By sheer good fortune rather than intelligent planning the grass has remained confined to one sand mound and is declining, but may equally well have become a serious problem for management.

Conclusions

Other than a concern expressing that the works may signal the commencement of forest clearance by stealth and comment reflecting on the need for a comprehensive and better understanding of the scientific complexity surrounding many of the key issues, especially site hydrology, no specific objections to the works (as proposed) have been identified.

Recent (February 2013) WG legal advice has concluded that the proposed phased clearance is in compliance with the requirements of the Habitats Directive. It is important to emphasise that the proposed works will not be undertaken at the expense of other Annex I & II Habitats Directive features present on the site, and works are aimed at restoring FCS of priority habitats for which the SAC was notified as made explicit under Article 6(1) of the Directive.
In other words none of the planned work is on the actual Annex 1 habitats of the site that are supposed to be in unfavourable conservation status and in need of action to restore their conservation status. The work is an attempt to create additional areas of dune habitat. This is not a requirement of the Habitats Directive as made absolutely

clear in the 'Concept of a Conservation Status Baseline' report [JNCC, 2002]. Another document the author and legal advisors to WG seem to have failed to consider. Since the claims of unfavourable conservation status have never been substantiated the whole project is unjustified.

As noted earlier the legal advice received by WG is irrelevant since it starts from a false premise that the dune habitats, especially the mobile dune habitats, are in an unfavourable conservation status.

The importance of embryonic and shifting dune habitats is recognised in section 4.2 (Quality and importance) of the Natura 2000 standard data form, where it receives special mention as being considered rare since its total extent in the UK is estimated at less than 1000ha. The phased proposal would serve to restore the natural dynamism of the targeted area and create open dune habitat where it would naturally have occurred, maintaining the condition and extent of the natural open dune Annex I habitat components.

The FCW Newborough Forest Management Plan 2010-2015 discusses the proposed works (including hydrological monitoring) in principle and in detail, e.g. options for felling zones, without raising specific objections, while stressing FCW (NRW) support ultimately depends on the decision of WG's post-science review arbitration panel. The FCW management plan recognises that FCS is not currently being met, that the forest is constraining coastal processes from operating freely and that the work will restore natural zonation between foreshore and frontage dunes, all issues flagged by CCW at notification in section 4.3 (Vulnerability) on the N2K datasheet
Objections were raised at the inclusion of proposed felling plans that were dependent on the outcome of the Science Review. The proposals were only included at CCW's insistence and the caviat later added by FCW because of the expressed objections. It was made clear that the public considered the FCW underplanting plans and plans to leave zones 3 & 4 'unmanaged' as clear indication of CCW's ultimate plan to only leave zone 5 unfelled; zones 3 & 4 to be destroyed by malign neglect following the felling of zone 1.
The proposals suggested by Pye (2013) for the creation of artificial cuts in trial areas in parabolic frontal dunes on Traeth Llanddwyn on the Warren itself, coupled with selective de-vegetation to encourage sand movement, could, if accepted, eventually also be effective in increasing the area of mobile sand.

Such actions would destroy sections of foredune Annex 1 mobile dune habitat, threaten fixed dune habitat behind the foredune ridge and almost certainly lead to contravention of CSM bare sand targets for various dune habitats.

There is every expectation of success and no scientific dispute over the likelihood of success. Available science points to a strong consensus that the proposed intervention will have the desired effect. CEH confirm the proposed locations are likely to provide benefits to the dune system in term of both wind-speed and hydrology.

Why has this highly pertinent CEH advice not been made public and available to independent participants in the Science Review? It is also clear from this document that WG, NRW, private sector consultants (Pye Associates) and CEH are all aware of the details of the proposed felling plans but the public have been kept in the dark. This

is a serious contravention of the requirements of Art.2(3) of the Directive and the Århus Convention.

It is WG's view that the proposals are measured and balanced, i.e. proportionate, and focussed on specific outcomes in respect of restoring FCS, advancing scientific knowledge and resolving issues around hydrological impacts.

Recommendation

WG, NFP, NRW and all involved stakeholders and partners support the two work proposals for 2013.

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Appendix I. Annex I & II Features at Abermenai to Aberffraw Dunes SAC as submitted to Europe on Natura 2000 standard data form (dated 27 July 2011). Habitats and species in **bold** are primary reasons for site selection.

Annex I Habitats	**Code**	**Extent (%)**
Embryonic shifting dunes	2110	1.5
Shifting dunes along the shoreline with *Ammophila arenaria* Marram Grass ('White dunes')	2120	4.2
Fixed dunes with herbaceous vegetation ('Grey dunes')	2130	21.1
Dunes with *Salix repens* ssp. *argentea* Creeping Willow (*Salicion arenariae*)	2170	6.8
Humid Dune Slacks	2190	2.4
Atlantic decalcified fixed dunes (*Calluno – Ulicetea*)	?	0 (0.05)
Natural eutrophic lakes etc.	3150	1.6
Transition mires and quaking bogs		0.3
Annex II Species		
Populations of *Petalophyllum ralfsii* Petalwort	1395	
Populations of *Rumex rupestris* Shore Dock	1441	
Populations of *Triturus vulgaris* Great Crested Newt		