

Appropriate Assessment screening for the Newborough Forest Design Plan; comments from TSG and MFSG.

Introduction

Specialist staff within CCWs Terrestrial Science and Marine & Freshwater Science Groups have been asked to provide a scientific assessment of the Newborough Forest FDP and associated documentation submitted in support of an Appropriate Assessment. Our headline conclusion is that the FDP should explicitly address the SAC features and prescribe measures to restore those currently in unfavourable condition. The geomorphology and hydrology of the site underpins the whole biological system beneath the Forest and on the currently open Warren. The plantation of pines has acted to truncate and constrict the natural movement of sand both away from the shore and parallel to it. This fundamentally impedes the natural succession and development of habitats and impacts particularly on the specialised species that require a mosaic of changing habitats with areas of bare dry sand, new slacks and a gradual development of flower rich grassland. The plantation has also resulted in fundamental changes in the hydrology of the site, most notably water table depression, with adverse consequences for the humid dune slack feature in particular, and dependent species/species assemblages.

The specialists within TSG and MFSG are in unanimous agreement that the forest design plan as constituted fails in taking forward the measures necessary to ensure that Newborough Warren will return to favourable conservation status.

We consider that the proposals fail to deliver the requirement of the Habitats Directive to maintain and enhance the site and also fail to take forward the requirements of the NERC Act.

We consider that if these proposals are adopted it could open the opportunity of challenge and potential infraction proceedings against the Welsh Assembly Government. It is highly unlikely that the specialists in TSG and MFSG would in any way be able to provide a defensible case against such proceedings.

The comments from individual named specialists and the SAC Management Plan are attached for information in an appendix. A summary of the pertinent issues for the SAC Features raised by specialist staff in relation to the SAC management plan follows.

1. Embryonic shifting dunes

FC agrees that this feature is in Unfavourable condition but the FDP proposal to remove 25ha of forest from the beach front is inadequate and will not restore the feature to favourable condition. It also promotes the planting and development of dense screening behind the felling zone for five years prior to the removal of these trees. As such, any benefit arising from the felling will be delayed and minimal in landward extent. The proposed zones for felling do not take the predicted sea level rise changes along these beaches into account, which would take back any shore line by up to 100m in the next 70 years. A felling zone of at least 500m around the entire

shoreline perimeter is needed to create the conditions needed to restore the embryonic dunes to favourable condition.

2. Shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”)

FC appears to agree that this feature is in Unfavourable condition by stating that it will be restored by the proposal cited above. As in 1, a felling zone of at least 500m around the entire shoreline perimeter would be more likely to create the conditions needed to restore the shifting dunes to favourable condition.

3. Fixed dunes with herbaceous vegetation (“grey dunes”)

In Unfavourable condition due in part to the truncation of the natural zonation by the conifer plantation, the FDP states that, in addition to the removal of 25ha (1. above), the thinning of 87ha adjacent to the warren “will allow the development of fixed dunes amongst the forest” which will be managed by grazing. The proposed thinning timetable is over an extended period of 25 years; felling should be undertaken on a much shorter timescale if there is to be any benefit to the feature condition. It also refers to 122ha of forest managed as open space with no forest cover although it is unclear where this is from the map- the total area of ‘white’ areas on the map plus the clearfell strips do not approach the size of the ‘natural reserve’ (70ha), or the thinning area (87ha). Grey dunes should not support tree cover and the condition will remain Unfavourable unless woodland blocks are removed rather than thinned. To enhance the areas of mobile, open sand, some clearfell zones should be located in the area around the rocky outcrops in the south western part of the Forest. An overall proportion of 10 to 30% bare sand would be beneficial for sand dune invertebrates across the site.

4. Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)

The CCW MP suggests that this feature is in Favourable condition at Newborough Warren (Listed as Unfavourable at Tywyn Aberffraw). However, if condition is “related to lowered water tables and the development of scrub”, it suggests that clear-felling will help improve it further (see 5. below).

5. Humid dune slacks

Currently in Unfavourable condition, the FDP suggest that the heavy thinning of 87ha adjacent to the Warren should help to raise the water table. Contemporary CCW-funded research has concluded that thinning will not produce the desired effect, and that more substantial clear felling will be required.

8. Petalwort *Petalophyllum ralfsii*

The MP states that the Unfavourable condition of petalwort within the forest could be addressed by infilling drains connected to remnant open slacks. The FDP “does not specifically address actions at this scale” but we would expect this to be done. The clear-felling of a band of conifers adjacent to the Warren (5. above) may help to promote better slack conditions for petalwort on the Warren which should include bare open embryonic slacks.

9. Shore dock (*Rumex rupestris*)

The FDP states that the area with shore dock “is designated as open space and all vegetation will be managed”. To improve its current status, the open space should be

enlarged to aid hydrological recovery, and linked to other open spaces. This would enable the dock to spread into more natural embryonic slack sites

11-21. Intertidal and marine features

These have been commented on by Gabe Wyn – see appendix. The main concerns here are for any impact from direct damage by vehicular access on beaches, the effect of forestry plantations on the natural processes of intertidal sediment movement, and the possible impact of nutrient release and soil erosion in the event of any tree operations. The first point is easily addressed by proper working methods, the second is addressed in points 1- 3 above. The fourth does not appear to have been considered by FC. There is also some confusion as to the numbering and naming of features within part 7 of the form.

In summary, as a minimum to move towards restoring SAC features to Favourable Condition, we advise that:

- a. A felling zone of 500m is undertaken around the coastal perimeter of Newborough Forest, from the Cefni Estuary (SH395658) to Newborough Warren (SH409631). There should be no planting of a protective screen as this will have a negative impact upon both embryonic shifting dunes and shifting dunes SAC features;
- b. Clear-felling, rather than thinning, should be undertaken in the 87ha block adjacent to the warren as an initial measure to enable partial hydrological recovery of the system. We advise that further modelling is undertaken based on the approach developed by CCWs consultants to assess the actual extent of clear-fell required to bring the hydrological regime of the site to within the target range required for humid dune slacks in favourable condition. The re-aligned forest edge should be scalloped and thinned to allow a more ‘natural’ line against the dunes.
- c. Ditches within the vicinity of forest slacks supporting petalwort should be infilled to raise the water table and trees removed from the surrounding area;
- d. The size of the open area supporting shore dock should be enlarged and linked to additional open spaces in an attempt to expand the population.

Other aspects of the FDP will have an impact upon SSSI features:

Natural reserve

This area on the north western side of the forest is proposed for management towards broad leaved woodland and ultimately to create Atlantic Dune Woodland SAC habitat type. This does not occur in the UK and so should not be the aim of a ‘natural’ reserve, especially when the site is currently SAC dune habitat in Unfavourable Condition. The area would be better returned to dune grassland to attain a natural zonation from fixed dune through to saltmarsh on the estuary edge. If woodland cover

has to be maintained here, then the naturalness of the system should be maintained by allowing natural regeneration and not planting.

Invertebrate Features

The attached notes from Mike Howe outline the importance of mobile and open sand conditions for the invertebrates which contribute SSSI features to the site (sand dune invertebrate assemblage, medicinal leech, *Hirudo medicinalis*, sandhill rustic *Luperina nickerlii* and the vernal bee, *Colletes cunicularius*). Not only do these require large enough areas of bare and open sand, they require the associated dune grassland plant species for forage and food linked in a large enough mosaic. Any open areas maintained within the forested areas should be linked together and to the open warren and frontal dune areas, to allow movement around the site.

Non- SSSI features

Red squirrels have been introduced in recent years to the Forest. During the process of modifying the forest cover to restore the SAC and SSSI features, it should be feasible to maintain the continuity of cover and tree species type to support the red squirrel population as it expands out of the forest and into the rest of Anglesey. FC should produce a red squirrel management plan (similar to that being produced in Clocaenog) which sets out how the LISS areas will be managed to ensure that favourable conditions for red squirrels will be maintained in the Forest. Tree planting elsewhere and where appropriate, the encouragement of natural regeneration of woodland to link up the red squirrel populations on Anglesey should be undertaken once it is clear that eradication of grey squirrels from the island will be possible.

Collated by Liz Howe, Species Team Leader and Mike Howe, Invertebrate Ecologist
11th December 2008

Appendix.

Relevant extracts from the CCW SAC Management Plan.

1. The **embryonic shifting dunes** at Y Twyni o Abermenai i Aberffraw / Abermenai to Aberffraw Dunes SAC are in an **unfavourable condition** largely due to failure to meet the target for the range of zones within the vegetation structure (a CSM mandatory attribute), i.e. the intact zonation between embryonic dunes through yellow dune to fixed dune grassland along 95% of the frontage. This is **primarily due to the afforestation** of unit 20 (001901). The main action required to restore the feature to favourable conservation status is the restoration of the natural zonation to fixed dune grassland. **Removal of conifer plantation** near the shore and its restoration to mobile dune and fixed dune grassland **is necessary**.
2. The **shifting dunes along the shoreline with *Ammophila arenaria* (“white dunes”)** at Y Twyni o Abermenai i Aberffraw / Abermenai to Aberffraw Dunes SAC in 2005 are in an **unfavourable condition** largely due to failure to meet the target for the range of zones within the vegetation structure (a CSM mandatory attribute), i.e. the intact zonation between embryonic dunes through yellow dune to fixed dune grassland along 95% of the frontage. This is **primarily due to the afforestation** of unit 20 (001901).

The area of shifting dunes has contracted dramatically over the past half century, and is now centred in a narrow band about 100- 200m wide behind the embryonic dunes, with smaller outliers at the landward edge of some slacks where dune ridges maintain some mobility. There is particularly good representation of this feature at Tywyn Aberffraw, including some inland examples, whereas at Newborough Warren **the feature is compromised by the conifer plantation**, which has truncated the normal zonation from yellow dune to fixed dune grassland in Unit 20. The main action required to restore the feature to favourable conservation status is the restoration of the natural zonation to fixed dune grassland. **Removal of conifer plantation** near the shore and its restoration to mobile dune and fixed dune grassland **is necessary**.

3. The fixed **dunes with herbaceous vegetation (“grey dunes”)** at Y Twyni o Abermenai i Aberffraw / Abermenai to Aberffraw Dunes SAC in 2005 are in an **unfavourable condition** due in part to the truncation of the natural zonation by the **conifer plantation** at Newborough and to the preponderance of grassy conditions in the fixed dune – lichen heath vegetation on Morfa Dinlle.
4. The **dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)** at Y Twyni o Abermenai I Aberffraw / Abermenai to Aberffraw Dunes SAC in 2005 are in an **unfavourable condition**. The monitoring results (Creer 2006) show that the dunes with *Salix repens* vegetation at Tywyn Aberffraw is in an unfavourable condition and the dunes with *Salix repens* vegetation at Newborough Warren is in a favourable condition. However, for the feature to be considered in a favourable condition at Abermenai to Aberffraw Dunes

SAC, each of the SSSIs possessing the feature would have to fulfil the requirements of the performance indicators (see Table 27). Thus, the overall condition of the dunes with *Salix repens* vegetation at Abermenai to Aberffraw Dunes SAC is unfavourable. The cause of this condition is not entirely clear, but would appear to be related to lowered water tables and the development of scrub in at least some cases. Restored water table should also assist the management of this feature in its correct representation in the zonation and succession of the dune systems.

5. The **humid dune slacks** at Y Twyni o Abermenai I Aberffraw / Abermenai to Aberffraw Dunes SAC in 2005 are in an **unfavourable condition**. From the monitoring results obtained (Creer 2006), it can be concluded that the humid dune slack vegetation at Tywyn Aberffraw and Newborough Warren is in an unfavourable condition. The feature does not occur at Morfa Dinlle as this site is underlain by shingle ridges. This is attributed to **general lowering of the water table** at both sub-sites and consequential succession to dryer vegetation. Where **afforestation** has led to increased evapotranspiration and interception of rainwater, resulting in a lowered water table, **woodland management (including clearance)** should seek to maximise the water yield.
6. The **petalwort *Petalophyllum ralfsii*** at Y Twyni o Abermenai i Aberffraw / Abermenai to Aberffraw Dunes SAC in 2005 is in an **unfavourable declining** condition. Although monitoring indicates that its status at Tywyn Aberffraw is within the limits set, its abundance and distribution on the Newborough dunes fails to achieve the target level and appears to be declining. There is some indication that this may be due to drying out and possible changes in ground chemistry (Rumsey 2005). At Newborough, drains within the forest (north to the Cefni) militate against the survival of this species in remnant open slacks. Consideration should be given to their infilling.
7. The **shore dock (*Rumex rupestris*)** at Y Twyni o Abermenai i Aberffraw / Abermenai to Aberffraw Dunes SAC in 2005 is in unfavourable declining condition. The entire feature occurs within the Newborough Forest (management unit 20). Management requirements include maintenance of open conditions, scarification or poaching of the ground to permit germination etc. This will require scrub and canopy clearance, maintenance of grazing, protection of water supply and quality, and periodic clearance of the fire pool. However, the genetic threat to the species remains, both due to possible genetic bottleneck (a low population point resulting in loss of genetic diversity) coupled with isolation from the usual mechanism of gene flow and seed dispersal in coastal waters. The restoration of access to the sea from the present locations, notwithstanding sea-level rise, seems improbable in the short to medium term (given the apparent permanence of forest cover) and may require manipulation of the gene pool and/or translocation of a population to a more appropriate location.

Comments from TSG and MFSG specialists

Comments by Peter Rhind, Coastal Ecologist :

Forest Design Plan Appropriate Assessment

Embryonic Dunes and Shifting Dunes along the Shoreline with *Ammophila arenaria*

The SAC plans calls for zonation from beach to fixed dune should be intact over at least 95% of coastal frontage. The FDP response to remove 25ha of forests in 5 years time to allow for the planting of trees behind these areas to protect existing forest from salt spray and windblow seems to be an excessively protracted response. I'd have thought for this buffer zone to be effective the forest margin should be well removed from the effects of salt spray. However, it's not clear whether this proposal will actually achieve intact zonation between embryonic dunes through yellow dune to fixed dune grassland along 95% of the frontage. Ideally we need to be trying to achieve this along the entire coastal margin.

Fixed Dunes with herbaceous vegetation (Grey Dunes)

The FDP response to reduced to 250 and 400 stems per ha over 87ha of forest adjacent to the Warren will not resolve the problem of truncated natural zonation *per se*. Ideally there needs to be as near natural gradation from grassland to woodland as possible, and possibly allowing for the development of a shrubland zone.

Dunes with *Salix repens ssp. Argentea* and Humid Dune Slacks

In addition to reducing the numbers of stems per ha, I think we should be aiming to also have a treeless buffer zone.

I think it's fair to say that the Abermenai to Aberffraw Dunes SAC will never be in favourable condition as long as there is a significant stand of alien conifers on the site. Having now looked in detail at the coastal frontage, I suggest that for any buffer zone to be effective in terms of providing a naturally dynamic profile with a full range from active fore dunes through to semi-fixed and fixed dunes, will **have to be in the order of about 500 m**. However, according the Professor Ken Pye, the shoreline here will be receding by about 100 m over the next 70 years or so, and so any buffer zone calculation will also need to take this into account.

Comments from Mike Howe, Invertebrate Ecologist:

Newborough Forest Design Plan 2008

This FC proposal is unacceptable, with the only real dune conservation gain arising from the removal of 25ha of conifers in blocks 9 and 10. This is supposed to benefit the Embryonic Shifting Dunes and Shifting White Dunes SAC feature, but the trees, many of which are dead in block 9 anyway, will only be removed after 5 years of growth of a planted screen of salt-tolerant and windblow trees! Hardly helping to deliver shifting dunes.

The FDP also proposes to help to restore the Grey Dunes SAC feature to favourable condition by thinning trees from 400 to 250 stems per ha, with some grazing. Again, a very inappropriate suggestion.

The other major proposal is to develop a Natural Reserve in block 12, where broadleaved species, particularly hazel, will be planted to encourage red squirrels! This area is perhaps the best candidate to clear-fell and restore to dune habitat from a public perspective as it is the remotest part of the forest and the least visited?

The Invertebrates of Newborough Warren – Ynys Llanddwyn SSSI

To date, 198 species which are restricted to (Grade 1 & 2) or strongly associated with (Grade 3) coastal sand dunes have been recorded from Newborough Warren – Ynys Llanddwyn SSSI (Table 1. A full list of the 213 Grade 1 to 3 dune invertebrates recorded from Newborough Warren SSSI (198 species) and Tywyn Aberffraw SSSI (140 species) can be supplied if required), with beetles, flies, true bugs and aculeate bees and wasps being particularly well represented (Table 2). These are associated with a range of dune habitats (Tables 3 & 4), with 70% requiring bare sand at some stage in their life cycle. Other important habitats include the Strandline & associated Beach Flora, the Marram Zone, Dune Slacks and Dune Grassland.

60% of the 198 species have been recorded on the SSSI since 2000 (Table 5), but for a significant number of species associated with bare sand (26%; Table 7) and dune slacks (54%; Table 6) there are no post-1990 records. Both these habitats have declined significantly in both quality and quantity over the last 30 to 40 years. Anecdotal information suggests that many species are less abundant now than previously, e.g. *Colletes cunicularius*, *Aphodius plagiatus*, and recent targeted searches for *Amara convexiuscula*, *Anthicus bimaculatus*, *Gronops lunatus* and *Phytosus balticus* have failed to find the species (Dick Loxton, pers. comm.). Aculeate populations appear to be small and very localised at the moment (per. obs.).

Bare sand is at a premium on the SSSI and is now mostly confined to the frontal dunes between the Forest and Abermenai Point. Saye (2003) calculated a measure of 6.96ha of bare sand, equating to just 0.6% of the SSSI. Howe et al (in prep) suggests that a more appropriate threshold for invertebrates will range between 10 to 30% bare sand.

Whilst attempts should be made to re-mobilize the NNR, the FDP provides an opportunity to increase dune habitats for invertebrates. Tree removal should be promoted in blocks 1, 3, 5 and 6 and the Natural Reserve should be just that – remove the trees completely and restore to open dune habitats. Open areas around Canada Pool and 8-pool should be maximised, with a corridor opened up between the 8-pool and Cefni Saltmarsh (in the FDP this is to be replanted).

References:

- Howe, M.A., Knight, G.T. & Clee, C. in prep. The importance of coastal sand dunes for the terrestrial invertebrates in Wales and the UK, with particular reference to aculeate bees, wasps and ants.
- Saye, S.E. 2003. *Morphology and sedimentology of coastal sand dune systems in England and Wales*. PhD, University of London.

Table 1. The number of Grade 1 to 3 dune invertebrate species recorded from Newborough Warren SSSI and Tywyn Aberffraw SSSI. The combined species total for the two sites is 215.

	NEWBOROUGH WARREN	TYWYN ABERFFRAW	TOTAL
GRADE 1	26	23	31
GRADE 2	62	41	66
GRADE 3	110	76	118
TOTAL	198	140	215

Table 2. Taxonomic breakdown of Grade 1 to 3 dune invertebrate species recorded from Newborough Warren SSSI.

	GRADE 1 SPP	GRADE 2 SPP	GRADE 3 SPP	TOTAL
MOLLUSCA (snails)	0	0	1	1
DICTYOPTERA (cockroaches)	0	0	1	1
HEMIPTERA (true bugs)	2	5	13	20
NEUROPTERA (lacewings)	1	0	0	1
COLEOPTERA (beetles)	11	29	42	82
LEPIDOPTERA (moths)	3	3	4	10
DIPTERA (true flies)	7	11	14	32
HYMENOPTERA (bees, wasps & ants)	2	9	26	37
ISOPODA (woodlice)	0	1	0	1
ARANEAE (spiders)	0	4	9	13
TOTAL	26	62	110	198

Table 3. The dune habitats used by Grade 1 to 3 dune invertebrate species recorded from Newborough Warren SSSI.

HABITAT	GRADE 1 SPP	GRADE 2 SPP	GRADE 3 SPP	TOTAL
STRANDLINE & BEACH FLORA	4	6	10	20
MARRAM ZONE	5	4	5	14
BARE & SPARSELY-VEGETATED SAND	9	24	47	80
DUNE SLACKS	1	12	15	28
DUNE GRASSLAND	4	5	16	25
DUNE SCRUB	1	1	4	6
ACULEATE NESTS	0	1	6	7
DUNE FUNGI	0	2	0	2
DUNG & CARRION	1	4	4	9
Unknown Habitat Association	1	3	3	7
TOTAL	26	62	110	198

Table 4. The dune habitats used by Grade 1 to 3 dune invertebrate species recorded from Newborough Warren SSSI. Bare sand is an amalgam of the following habitats: strandline & beach flora, marram zone, bare & sparsely-vegetated sand, pioneer dune slacks and aculeate nests.

HABITAT	GRADE 1 SPP	GRADE 2 SPP	GRADE 3 SPP	TOTAL
BARE SAND	19	41	79	139
MATURE DUNE SLACKS	0	6	4	10
DUNE GRASSLAND	4	5	16	25
DUNE SCRUB	1	1	4	6
DUNE FUNGI	0	2	0	2
DUNG & CARRION	1	4	4	9
Unknown Habitat Association	1	3	3	7
TOTAL	26	62	110	198

Table 5. Date of last record for each of the 195 Grade 1 to 3 dune invertebrate species recorded from Newborough Warren SSSI, with dates group into 10-year date classes.

	GRADE 1 SPP	GRADE 2 SPP	GRADE 3 SPP	TOTAL	% TOTAL	CUMULATIVE %
1951-1960	0	2	3	5	2.5	2.5
1961-1970	0	4	4	8	4.0	6.6
1971-1980	3	5	4	12	6.1	12.6
1981-1990	4	11	17	32	16.2	28.8
1991-2000	7	6	10	23	11.6	40.4
2001-2008	12	34	72	118	59.6	100
TOTAL	26	62	110	198	100	

Table 6. Date of last record for each of the 195 Grade 1 to 3 dune invertebrate species recorded from Newborough Warren SSSI according to their preferred habitat.

HABITAT	1951-60	1961-70	1971-80	1981-90	1991-2000	2001-08	TOTAL	% pre-1990
STRANDLINE & BEACH FLORA	2	0	3	2	1	12	20	35
MARRAM ZONE	0	0	1	2	1	10	14	21.4
BARE & SPARSELY-VEGETATED SAND	1	2	5	10	10	52	80	22.5
DUNE SLACKS	1	4	0	10	3	10	28	53.6
DUNE GRASSLAND	0	1	1	3	4	16	25	20
DUNE SCRUB	0	0	1	0	2	3	6	16.7
ACULEATE NESTS	0	0	0	0	1	6	7	-
DUNE FUNGI	0	0	0	0	0	2	2	-
DUNG & CARRION	0	0	1	2	1	5	9	33.3
Unknown Habitat Association	1	1	0	3	0	2	7	-
TOTAL	5	8	12	32	23	118	198	28.8

Table 7. Date of last record for each of the 195 Grade 1 to 3 dune invertebrate species recorded from Newborough Warren SSSI according to their preferred amalgamated habitat.

HABITAT	1951-60	1961-70	1971-80	1981-90	1991-2000	2001-08	TOTAL	% pre-1990
BARE SAND	4	4	9	19	15	88	139	25.9
MATURE DUNE SLACK	0	2	0	5	1	2	10	70
DUNE GRASSLAND	0	1	1	3	4	16	25	-
DUNE SCRUB	0	0	1	0	2	3	6	20
DUNE FUNGI	0	0	0	0	0	2	2	-
DUNG & CARRION	0	0	1	2	1	5	9	33.3
Unknown Habitat Association	1	1	0	3	0	2	7	-
TOTAL	5	8	12	32	23	118	198	28.8

Comments from Peter Jones, Peatland Ecologist / Hydrologist:

NEWBOROUGH FOREST DESIGN PLAN

These comments are confined to a consideration of hydrological issues and their bearing on the condition of the humid dune slacks feature.

General

There is no assessment of whether the size or location of the proposed low density woodland area adjacent to the SAC is actually conducive to the development of hydrological regimes suitable for the humid dune slacks feature. The proposal is a step in the right direction, but how much of a step this represents is not assessed, nor whether it now needs to form part of a phased program of forest boundary retreat from the open dunescape.

Appropriate Assessment

Section 9 under humid dune slacks describes the use of ‘heavy thinning’ – it is assumed this relates to the proposed lowland density woodland area? Heavy thinning is later revealed (under the Excel Felling & Planting Narrative) as equating to at most 50% of the current tree density. This does not seem commensurate with a lay persons understanding of ‘heavy thinning’ and given the result of the recent hydrological modelling work (see below) seems insufficient as a hydrological recovery measure.

A groundwater model for the entire dune system (both forested and unafforested) has recently (2008) been developed by Dr’s Adam Taylor and Rob Low working under contract to CCW (North Region) through the HQ Hydrology Advice Framework Agreement. The outputs of the model show a good fit with observed water table behaviour and demonstrate that felling and thinning have resulted in increases in water table elevation within the afforested area, but that this effect quickly disappears beyond the forest edge. This indicates that felling and thinning will have a desirable impact, but only if pursued over a much larger area than has so far been attempted. CCW’s nominated offer for the project, John Ratcliffe, has examined the report in greater detail and concludes from this that “clearfell delivers a response in the groundwater, whereas gradual thinning does not, probably because the trees respond

with increased foliage, it increases surface roughness and turbulence, a ground layer and understorey develops a replacement canopy etc etc". Given that this new model appears to have sufficient predictive 'power' to give it credibility, a valuable next step would be to use it to model the hydrological consequences of the proposed low density area and progressive increases in its size and geometry. The apparent absence of any such approach in support of the FDP undermines the veracity of the Appropriate Assessment.

Design Brief.

- The objective (under environmental) that the plan should start to move the SAC towards FCS is a welcome albeit imprecise statement of intent. The contribution of this phase of the FDP to delivery FCS
- Statutory and non-statutory considerations should be clearly separated and deserve different weightings.
- The criteria identified under each of the sub-headings should be ranked in order of significance. This is standard risk assessment practice, which has not been followed here.

Consultation Report

The role of this report in terms of the Appropriate Assessment of the FDP is ambiguous. The report does not appear to have established fixed reference points to the consultation in terms of options which might or would not be possible because of obvious adverse impacts on the SAC. Question 7.4 in particular (p. 91) explicitly rules out a proposition (that blocks > 5 ha will be clear felled) which would have contributed directly to attainment of FCS. The counter proposition (that blocks > 5 ha would be clear felled) is not presented. Overall then, this consultation does not appear to have been balanced; nor does it reflect FC's responsibilities for N2K sites as an Assembly sponsored body.

Comments from Liz Halliwell, Mammal Ecologist:

A rather bland statement is made about ensuring continuation of suitable habitat conditions for red squirrels, but no detail is given on how this will be achieved. Eg, what are their objectives for red squirrels, how will they ensure suitable habitat is available over the long term with connectivity maintained through the forest, which areas in the forest are important for red squirrels.

Coupe 7 - the felling plan narrative states that coupe 7 will be 50% conifers and 50% BLs. This seems a high proportion of BLs, and why has this coupe been chosen? Also, this composition isn't reflected on the future species plan.

In a couple of places they state that one of the objectives is management for or awareness of EPS - which EPS and how do they intend to this (different EPS will have different requirements).

I suppose at the end of the day we will need to look at the forest as a whole and identify what would be required to maintain red squirrels. ARSP won't want any losses, but it should be possible to accommodate a certain amount...?

Comments from Jim Latham, Woodland Ecologist:

A few hasty comments below on the 'LISS'. Examination of this is restricted to the perspective of management of the forest for biodiversity.

- The general approach set out in the summary paragraph about LISS and structure and diversity seem fine for this type of forest (i.e. recent plantation on non-PAWS site).
- The 'principles' say "always replant rather than allow for natural reneration". This seems completely wrong, and I would suggest that a general presumption for natural regeneration would be appropriate, especially in coupe 12, the 'natural reserve'.
- Preferred species. Why not include ash?
- Natural reserve.

Avoid mentioning 'Atlantic Dune Woodland', which is a specific Natura habitat not currently considered to be present in the UK.

Why PLANT here? If it's a natural reserve natural regeneration is far more appropriate. And why plant sycamore (not a *bad* tree, but in no need of encouragement), and birch and willow which are very likely to regenerate naturally?

- LISS objectives. Overall seem ok.

Comments from Rod Jones, Senior Coastal Scientist:

COMMENTS ON “NEWBOROUGH WARREN FOREST DESIGN PLAN AND AA SCOPING DOCUMENT”

In respect of this document and accompanying documentation provided by Forestry Commission Wales I would make the following observations:-

There is a lack of information and analysis underpinning their scoping document which makes it is very difficult to comment on the science behind their case. That said it is **very unlikely** that they will ever be able to demonstrate that the current proposed forest design plan will be compliant with the Habitats Directive for the following reasons:-

1. The sand dune geomorphological system underpins the biological system and is intimately linked with it. The plantation of pines, which covers a significant proportion of the dune system, modifies the way the dune system behaves.
2. CCW has looked at management requirements of the Welsh dune resource needed to restore them to favourable condition and have concluded that there is an urgent need to expand the area of bare sand which is a key habitat for invertebrates. Its creation is also vital in ensuring that habitat succession can take place. Our invertebrate specialists have concluded that there is a need for

- 10% - 20% bare sand on dune systems and CCW are looking to recreate such mobile habitat wherever possible.
3. CCW should advise that, as an **absolute minimum**, 10 to 20% of the plantation should be restored to mobile sands which equates to an area of approximately 70 – 140 ha.
 4. Examination of old maps and photographs has shown that the area adjacent to the rock ridge was historically an important area of mobile sand and represents a key area in which to reinstate mobility as far as possible. The presence of the interface between the rock ridge and sand increases the chance of it being self sustaining.
 5. The nature of the habitat regulations means that parts of the plantation represent a key area for restoring mobile sand dunes. This is because much of the other suitable areas outside the plantation comprise designated features. In particular the relatively small area of fixed dune grassland area is classed as a priority habitat and decisions which involve destroying areas of this priority habitat to recreate mobile dunes may have to go to the EU for approval. It is likely that the UK government would have great difficulty in convincing the EU of the need to destroy priority habitat when a forest plantation on the dunes which could deliver the same habitat was not been utilised.
 6. A requirement of the Habitats Directive is to maintain and **enhance**. In this context there is also a duty laid on the Forestry Commission through the NERC ACT. The forest design plan as currently set out fails to adequately deliver these responsibilities. (The NERC act states “every public body must, in exercising its functions, have regard, so far as is consistent with the proper exercise of those functions, to the purpose of conserving biodiversity” and “Conserving biodiversity includes, in relation to a living organism or type of habitat, restoring or enhancing a population or habitat.”)

CCW also considers that in the longer term the coast will realign landward under sea level rise. As such CCW consider that there needs to be significant space in which the adjustments of the coast can take place totally unhindered by the forest plantation. This also relates to the GCR status of the site and needs to be considered in relation to any future work.

Comments from Gabe Wyn, Intertidal Team Leader:

A few comments on the Newborough forest design from an intertidal point of view.

1. The 'Appropriate Assessment'

Having cleared up the fact that this document is NOT an AA under the habs regs but a scoping test of likely effects I am still worried that it is an assessment of the current management regime rather than of the Forest Plan under consultation.

Section 7 of the form covers the features in each SAC. Feature 17 should be the same as feature 13 ie Mudflats and sand flats not covered by seawater at low tide. Feature 19 should read Sandbanks which are slightly covered by seawater all the time.

Section 9 seems out of context as it talks about conservation status of the feature now and not about how the forest plan will effect the features. It may be that the plan will help bring features into FCS but this isn't the reason for filling in the form.

Estuaries (11) in Anglesey Salt marsh SAC is not a minor SAC feature and needs to be considered in the light of the plan.

Mudflats (13) needs fleshing out here.

All of the Menai and Conwy Bay feature responses say the same thing, and they might be right but they also need to take into account the operational phase of the plan and how this might effect the features eg. driving on the foreshore, release of nutrients due to felling, I don't know much about what environmental impacts forestry operations have, but this needs exploring.

It's hard to comment on the design plan brief as it's so brief! There's no real mention of the foreshore, hopefully the plan will allow the beach to evolve more naturally. There's no mention of shoring up any breaches in the dunes (as has happened in the past). It would be good to know the FC position on this as part of the plan.