Field Assessment Tool for Deep Peat

This methodology is designed to be undertaken at a site which has already been subject to desk based survey (and / or National Assessment). Where an area of deep peat (more than 50cm depth) needs to be assessed in order to decide what is the most appropriate management to deliver greatest ecosystem service benefit. It should also help decide which sites should be prioritised.

The surveyor should have undertaken training in the application of this tool and the interpretation of the score.

Tools you will require:
- Peat depth probe
- Pruning saw
- Clinometer
- Peat core sampler
- Map of the area

Assessing a site

The unit being assessed should be a single polygon on the FC soil map or occasionally a group of polygons or a part of a large complicated polygon. If you are mainly concerned with a particular felling coupe, try to include in the assessment any parts of the deep peat polygon outside the coupe.

If there is no FC or other suitable soil map for the site, you will need to try to identify the boundary of each area of deep peat you assess. This is best tackled by walking the rides, edges, etc. and probing the peat depth as you go along. A slope map highlighting the flat and gently sloping areas like the one below is quite a good predictor of where to expect deep peat (i.e. where the slope angle is less than 10% or 6°).
Probe the peat depth in enough places to get what seems a reasonable average for the polygon. Likewise measure the slope angle in enough places to get a reasonable average for the polygon.

**Soil Type score:** indicator of the biodiversity benefits of restoration. Score thus:

**Peat depth score:** indicator of the amount of peat carbon per unit area.

Double the average peat depth in metres:

**Area score:** indicator of the water and carbon sink benefits of restoring the site.

Divide the deep peat area in hectares by 5:

**Maximum area score is 12**

**Slope score:** indicator of feasibility, ease and cost of restoration.

The score is simply the slope expressed as a percentage:

**Combining these scores**

**Overall score = Soil type score + Peat depth score + Area score – Slope score**
Checking for peat cracking

Any sites where the peat is severely cracked may be unrestorable. Check for cracking as follows:
Select about three places in different furrows where growth of the adjacent trees is average or better. In each place, use a pruning saw to cut through the mat of litter, roots, etc. in the plough furrow. Cut a rectangle just wider than the base of the furrow, as shown. Lift away the mat of litter and roots, exposing the underlying peat. First look for cracks running along the furrow base. Then feel with your fingers for any cracks in the peat. If you find cracks, record how wide they are at this level and dig down to see how deep they go and how wide they are further down. Bear in mind that if the site was ploughed with a tine plough, the tine slot may still be present. This would be straight, narrow and central, unlike shrinkage cracks, which are more irregular, often wider and can be anywhere in the furrow.
If there is severe cracking a score of -10 can be applied to the total.

Checking the peat aeration depth

Do this mid-way between furrows at three places representing the range of growth of the trees. Use a pruning saw to cut down into the ground along the four edges of a 40 cm x 40 cm square. Lift away the root/litter mat. Quickly record the depth from the surface down to the boundary between black (oxygenated) peat and brown, smelly (anaerobic) peat. You may have to dig down a bit to reach the anaerobic peat. When exposed to air, anaerobic peat turns black within minutes so don’t delay in measuring the depth! Anaerobic peat has a distinctive bad smell of hydrogen sulphide, a bit like rotten eggs.

Peat aeration depth fluctuates over the year as the water table fluctuates. Cracking of the peat is a sign that it has been deeply dried and aerated in the past, most likely during a drought year within the lifetime of the forest.

A soil core sampler (resembling a steel walking stick) can be used to check peat aeration depth. Take care not to cut your fingers while using this. Take a sample and immediately examine the peat core, scraping off any smeared peat from the surface of the core. Record the depth of the transition from black to brown peat. Check the depth at which you reached anaerobic peat by sniffing for the hydrogen sulphide smell (like rotten eggs). If there is an aeration depth of more than 50cm, a score of -10 can be applied to the total.
Which sites are viable for restoration?
Interpretation of the score requires a level of expertise, which will be achieved through the training course. However, there are some indicators of suitability which can be used.

Hydrological integrity of the site.
Flat sites are advantageous to cost effective restoration, Whereas sites with a slope will be less viable, and sites with a slope exceeding 4% (14°) will be difficult or prohibitively expensive to restore successfully.

Sites where the peat is cracked between the plough furrows will not be candidates for restoration. If there is no peat cracking the site may be viable for restoration.

A further consideration is the condition of the drainage system – drains which are shallow (less than 60cm) will be advantageous, particularly if there is sphagnum present, whereas deep drains with a flow of water will be difficult to block and maintain. Sites which will require a lot of drain blocking will be more expensive to restore than sites where there is a key point which can be blocked within the drainage network. Also, it may be that off-site drainage inhibits the ability to manage water flow onto the site, thus making restoration difficult.

The current depth of the water table is also an important factor; if the water table sits less than 50cm from the surface, the site will be most viable for restoration, whereas if the water table sits more than 100cm below the surface it would be difficult to restore.

Ecological integrity of the site.
The soil type element of the tool gives appropriate weighting for the peatland type and its scarcity in Wales.
If there is remnant bog vegetation on site, or in adjacent rides this will make the site most suitable for restoration. Species such as bramble or Molinia indicate a less viable site. Proximity to Phase 1 peatland habitat would also be advantageous.

Status of the peat
Oxidation occurs when the trees cause aeration of the peat, and this has implications for greenhouse gas storage and viability for restoration. An aeration depth of less than 20cm is advantageous for cost effective restoration, whereas an aeration depth above 50cm will make it difficult to restore.

If a site is on a first rotation it will be more likely to be viable than a site on a second rotation. If the planting year of first rotation is less than 15 years it will be most advantageous to restore, but if it is more than 50 years it may be difficult to restore successfully.

Other considerations.
Access will be a major issue in relation to the cost of any works, would access tracks need to be constructed? Can machinery required for the ditch blocking get onto site? Can the timber be removed from the site?
The final score needs to be considered within the context of the whole forest plan and the multi-functional role the forest plays. Broadly speaking sites which score below 0 are not likely to be viable, or be favourable for restoration and these should be considered for restocking in line with the forest plan. Sites scoring above 15 would be considered viable, and advantageous to restore. Sites with scores falling between 0 and 15 may be viable, but a degree of expert judgement will need to be applied and cost will need to be evaluated against the benefits before deciding whether to restore, convert to other woodland or restock in line with the forest plan.

**Restoration urgency for sites that are viable**

Sites that have already been felled and are not going to be replanted are not urgent because the peat is unlikely to deteriorate much in this state. But these sites must have a plan in place for restoration in the future.

Sites with a tree stand that has not yet closed canopy will still have some of the original peatland vegetation and if destined for restoration, should be felled before they close canopy so that the vegetation can recover easily.

At sites with a closed-canopy tree stand, the peat may deteriorate further and the feasibility of successful restoration may reduce if the level of the water table goes lower than before. This is most likely to happen at sites with a relatively dry climate and is best indicated by the map of mean maximum moisture deficit below. At sites with a moisture deficit of 90 mm or more, there is a risk of peat cracking. If any of these drier sites are destined for peatland restoration, there is some urgency to restore them before the peat becomes damaged beyond repair.

![Mean Maximum Moisture Deficit Map](image)

At sites with a moisture deficit of less than 90 mm, there is no urgency for restoration and the crop might as well be allowed to grow on to normal harvesting age before being felled and the site restored.
What to do with sites not suitable for restoration

In the long run, the peat carbon store is likely to be more significant than the vegetation carbon store. It needs to be at least safeguarded (i.e. prevented from becoming a net GHG source) and if possible returned to a functioning net GHG sink.

Convert to wet woodland through replanting, natural regeneration or successional woodland.
If a site has any wet woodland present, this should be maintained. Where a site may not be deemed restorable due to conifer regeneration but the water table levels are able to be raised, consider wet woodland habitat.

Convert to native woodland habitat through replanting, natural regeneration or successional woodland.
If a site is not viable for restoration due to it not being possible to re-wet the site, consider encouraging sparse tree cover suitable species would be Scots pine on the poorer, more acid peats and willows (Salix caprea and S. cinerea) on the richer sites. Birch is not suitable on the poorer peats because of its tendency to ‘improve’ sites

Convert to other open / wetland habitat.
If a site has potential be an area of heathland or other priority open habitat, but is deemed not to be restorable to mire habitat, then this should be considered.

In all cases, a fully considered management plan which will achieve favourable condition for the desired future habitat is essential. Further advice should be sought from Forest Research to assist in developing plans for future management.

Before felling any trees you may require permission/consent from Natural Resources Wales further information on this can be found in our tree felling booklet.