Hydrogeology of Wales: Quaternary aquifers - Newborough Warren

From Earthwise
Jump to navigation Jump to search

This page is part of a category of pages that provides an updated review of the occurrence of groundwater throughout Wales.

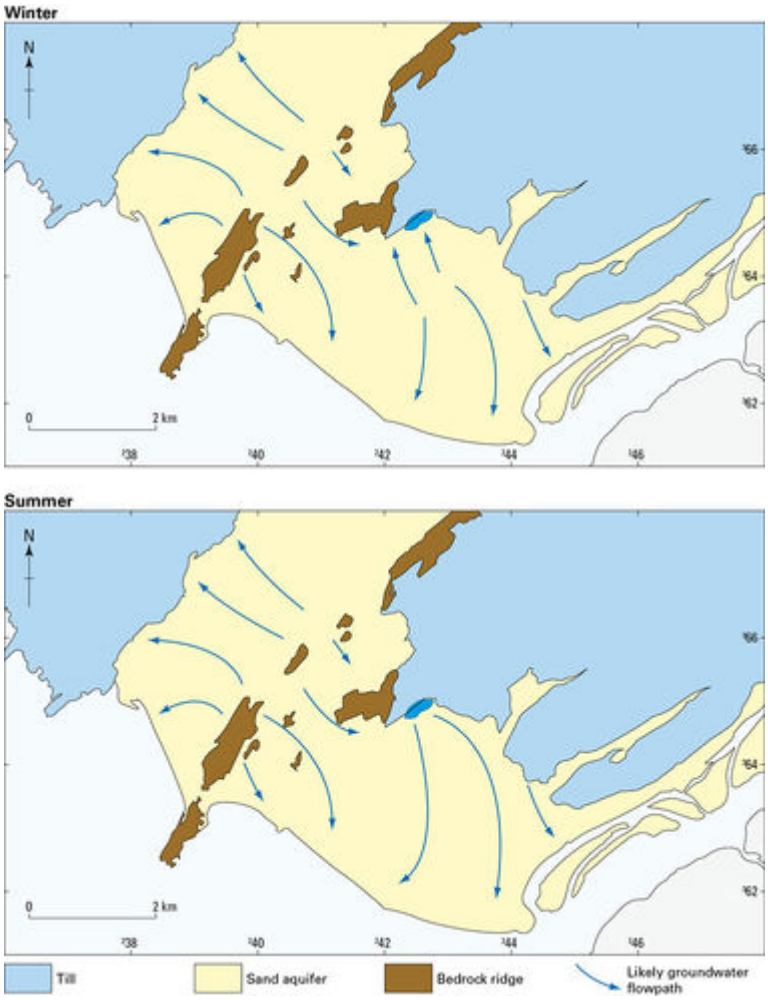
Author(s): N S Robins and J Davies, British Geological Survey
Contributor(s): D A Jones, Natural Resources Wales and G Farr, British Geological Survey

Installing an automatic weather station at Newborough Warren, Anglesey. P802433.

Newborough Warren (**Plate P802433**) is located on the south-west coast of Anglesey [SH 423 636] and is part of the Abermenai to Aberffraw Dunes Special Area of Conservation (SAC). Afforestation of 700 ha of the dune system between 1947 and 1965 assisted the stabilisation of a large swathe of the dunes, running 2 km inland from the shoreline. Since this time, the water table in the warren has declined. There is anecdotal evidence that winter standing water is now a rare occurrence in dune-slacks within or adjacent to the forest, though long-term data reveal no significant change in rainfall between the 1950s and 1990s for Anglesey. **Ranwell (1959**) reported extensive winter flooding (including areas within and adjacent to the present forest) during 1950–51, and noted that some areas may remain under water for 3 to 4 months in high-rainfall winters.

The conceptual groundwater flow model for the dune area (**Figure P859286**) includes a rock ridge running from south-west to north-east through the dunes, that creates a groundwater divide (**Stratford et al. (2007**). The piezometric surface is draped over the rock ridge, with groundwater flowing off its flanks into the sand. The watershed lying to the south of a small pond is not a static fixture and is perceived to be in that position only under wet (winter) conditions, and to migrate northwards towards the pond during dryer (summer) conditions (**Davy et al., 2010**). In this way the pond feeds the groundwater system in summer but gains from groundwater in the winter. This is caused by the pond acting as a near fixed head whereas the dune water table elevation fluctuates above and below that head. In addition, the foreshore around the warren must be considered a part of the groundwater flow system. Groundwater discharge above low water mark across the surface of

the till is the active drainage area for the system.



Conceptual seasonal patterns of groundwater flow at Newborough Warren–upper winter, lower summer (blue–till; yellow–sand aquifer; brown bedrock ridge; blue arrows indicate likely groundwater flowpaths). P859286.

Anecdotal evidence indicates that the water level in the pond varied over the last 60 years as the retaining structure has been modified although accurate levels have not been recorded. Grazing patterns have also changed the vegetation on the open dune-land, and consequent recharge potential, following the dramatic decline in rabbit population in the 1950s due to myxomatosis and since 1986, the reintroduction of sheep, cattle, ponies and rabbits cropping the grass.

The dune-slacks at Newborough Warren regularly flooded during the winter in the period prior to planting the northern sector of the dunes, but since the mid 1950s flooding is increasingly rare. The perception that the trees are drawing the water table down beneath the afforested dunes is difficult to prove, given the other variables that may have influenced the water table during the same period (**Stratford et al., 2007**). Although some of the trees are now reaching maturity and their water demand is probably starting to reduce, in places new stands have been planted as trees have been felled and most old stands have been thinned, so changing the overall water demand. Regrowth, development of understorey and increased canopy roughness as age classes diverge, promise increasing water demand in the future. Assessment of all these variables in the light of experience derived from other coastal dunes suggests that the trees are likely to contribute to the observed groundwater level changes beneath the dune-slacks during winter months. However, it is unlikely that removal of all or part of the woodland would cause a reversion to the pre-afforestation land

cover and ecosystems due to other changes in the dynamics of the dunes. The complex interaction between groundwater and vegetation at Newborough highlights the difficulty of managing groundwater-dependent ecosystems and habitats.

Hydrogeology of Wales - contents

- Hydrogeology of Wales

Navigation menu

Personal tools

- Not logged in
- Talk
- Contributions
- Log in
- Request account

Namespaces

- Page
- Discussion

□

Variants

Views

- Read
- View source
- View history
- PDF Export

□

More

Search

Search Go

Navigation

- Main page
- Recent changes
- Random page
- Help about MediaWiki

Tools

- What links here
- Related changes

- Special pages
- Permanent link
- Page information
- Cite this page
- Browse properties

- This page was last modified on 18 February 2016, at 09:39.

- Privacy policy
- About Earthwise
- Disclaimers
-
-