Submission Form for Comments and Feedback

Environmental Quality Report: Biodiversity of the Howard Sand Plains SOC; and Recommendations

Submissions close: ***Monday 25 May 2015, 5pm***

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GENERAL COMMENTS (typed below:

I have carried out research into restoration and rehabilitation of native vegetation communities since 1987, including supervision of research into Utricularia rehabilitation on the Howard Sand Sheet. Restoration of a diverse vegetation community requires a high level of sophistication in environmental management, knowledge and technology. Restoring particular threatened species into a highly disturbed community is even more challenging. For example restoration of jarrah forest after bauxite mining in Southwestern Australia has required decades of research, 50 - 100 major research studies and a highly sophisticated environmental management team to systematically apply the research findings. Restoration of sandplain vegetation around Eneabba is more similar to the Howard Sand Sheet vegetation. This has involved challenges with seed supply, topsoil management, soil texture and hydrology. Subtle differences in soil texture detrimentally affected survival of the dominant Banksia species. Again substantial research support and sophisticated environmental management has been required to achieve a level of restoration of the vegetation community.

A few communities are relatively easy to restore, for example fore dune communities which have severe disturbance adapted species and lack sand profile development. The Howard Sand Sheet is not such a community, it has diverse vegetation communities which are adapted to variation in hydrology and soil structure. Thus the rehabilitation of the general Howard Sand Sheet communities will require a high level of sophistication in environmental management, knowledge and technology.

Sand and gravel are low value commodities unlike bauxite and mineral sands and thus it is unlikely that sand and gravel extraction could support

the costs associated with the environmental management, knowledge and technology needed.
Research carried out by CDU honours student Yeresha Herath in 2014 has found that the diversity and abundance of Utricularia species is affected by water depth and relates to soil surface characteristics. Establishment of Dapsilanthus is important to stabilise the sand surface. When intact soil cores were collected and carefully placed under different water depths there was a high density and abundance of Utricularia under 1 cm or 5 cm of water but none if submerged under 20 cm of water.
If the topsoil was respread under operational procedures, or was direct returned and dumped onto the rehabilitation area, then establishment of Utricularia was low compared to Utricularia presence in the same vegetation type that was unmined. Thus we do not have a current protocol which has been shown to generally restore Utricularia diversity after sand extraction. Procedures such as double stripping of topsoil, careful landform design, improved timing of topsoil stripping and direct return of topsoil would likely improve Utricularia restoration but this would depend on a marked increase in sophistication of environmental management in the sand extraction industry. It would also require substantial research support and it is not clear how this would be funded. Furthermore although this would improve rehabilitation of Utricularia and other sand sheet species, it may not be sufficient to restore biodiversity or to restore the most threatened species.
It is extremely challenging to restore a threatened and restricted plant species. The reason they are restricted is that they are sensitive to and require specific environmental parameters to be met. For example issues for restoration of Tetratheca juncea after coal mining included the seed biology of the plant, the structure of the community and a requirement for a particular pollinator. Considerable background research was undertaken.
For the threatened and restricted Utricularia species we could expect hydrology, soil texture, soil fauna, soil nutrient and disturbance regimes to be key environmental parameters. The species use traps on the roots to capture protists and other soil micro fauna. The abundance and movement of these organisms to the roots could be affected by slight changes in soil texture.
Slight differences in duration of water flow and water levels can differentiate between species. Water flow and levels will be affected by the slope of the sandsheet but also by connectivity to surrounding woodland or other communities.
Utricularia consume fauna as an adaptation to low nutrient levels and this enables them to have a competitive advantage. Increases to nutrient levels due to changes in the surrounding community, or due to increases in nutrients due to run off, may increase the competitive advantage of other species and detrimentally affect Utricularia, with the most sensitive species being affected first. Additional nutrients due to regional development, horticulture and lawns can increase weed invasion over broader areas, which could increase competition and could increase fire impacts.
The habitat requirements of sensitive threatened Utricularia species are not understood so we can not restore them. Nor do we understand the role of surrounding communities in maintaining requirements such as water flow and pollinators. Therefore to provide confidence for preservation of threatened Utricularia species a substantial buffer area of sandsheet and neighbouring communities is needed. Enhancing restoration after sand extraction would assist in preserving the broader suite of sandsheet species but protection is needed for the potential habitat of the threatened species. Until eye better understand the habitat requirements of these Utricularia then options providing a substantial buffer around potential habitat should be chosen, and option 1
or 2 provide the best surety of such a buffer.