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Crymlyn Bog Management Plan

HABITAT MANAGEMENT AND BUILDING RESILIENCE
LUCA BURGESS (2315074)

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Table of Contents

1	<i>Introduction</i>	1
2	<i>Site Overview</i>	2
3	<i>Methodology</i>	4
4	<i>Habitat Description and Evaluation</i>	6
4.1	Fen Habitat	7
4.2	Scrub/Woodland.....	8
4.3	Other Features	9
5	<i>Management Objectives</i>	11
5.1	Objective 1: Prevent spread of Himalayan balsam	11
5.2	Objective 2: Increase boardwalk length.....	11
5.3	Objective 3: Control fen habitat succession	11
6	<i>Management Prescriptions</i>	12
6.1	Objective 1: Prevent spread of Himalayan balsam	12
6.2	Objective 2: Increase boardwalk length.....	13
6.3	Objective 3: Control fen habitat succession	14
7	<i>10-Year Management Plan</i>	15
8	<i>Conclusion</i>	17
9	<i>Reference List</i>	18

Figure 1: Site overview map of Crymlyn Bog National Nature Reserve, showing surrounding land use and infrastructure (Natural Resources Wales, 2016). Airbus Defence & Space and Getmapping. Reproduced by permission of Welsh Government (Rural Payments Wales).	2
Figure 2: Location of the study boardwalk within Crymlyn Bog, indicating the survey route used in this study (Natural Resources Wales, 2016).	4
Figure 3: Phase 1 habitat map of the Crymlyn Bog boardwalk survey area, showing habitat classifications according to JNCC guidelines (Author's own, 2026; base map © Google, 2026).	6
Figure 4: Fen habitat at Crymlyn Bog showing extensive tussock-forming grasses and sedges adjacent to bog boardwalk (Author's own, 2026).	7
Figure 5: Transition between fen and adjacent wet woodland at Crymlyn Bog (Author's own, 2026).	8

Figure 6: Pond feature within Crymlyn Bog showing standing water and emergent vegetation (Author's own, 2026).	9
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1 Introduction

The UK is one of the most nature-depleted countries globally and continues to experience significant biodiversity loss. Long-term monitoring indicates substantial declines in plant biodiversity since 1970, including reductions in both flowering plant species and bryophytes (O'Reilly, 2023). Habitat management is essential in reversing these trends by maintaining and restoring ecosystems that support biodiversity (Brondízio et al., 2019). Effective management plans should not only prioritise ecological outcomes, such as conserving native species and enhancing climate resilience, but also recognise cultural and economic value of landscapes while enabling sustainable human use (Lawton, 2010). However, there is no universal approach to habitat management, and strategies must be tailored to site-specific conditions, including habitat type, hydrology, species composition and surrounding land use.

The aim of this report is to develop a site-specific habitat management plan for Crymlyn Bog, a Site of Special Scientific Interest (SSI) located in Swansea, South Wales. The report will assess the ecological characteristics of the site, identify key conservation priorities and create management actions to protect and enhance biodiversity while supporting appropriate levels of access and use.

2 Site Overview



Figure 1: Site overview map of Crymlyn Bog National Nature Reserve, showing surrounding land use and infrastructure (Natural Resources Wales, 2016). Airbus Defence & Space and Getmapping. Reproduced by permission of Welsh Government (Rural Payments Wales).

Crymlyn Bog is in Swansea, South Wales, approximately 2 miles east of Swansea city centre and just beyond Kilvey Hill (OS Grid Reference: SS 694 947). The site covers an area of roughly 279.9-hectares, making it the largest lowland fen in Wales (Natural Resources Wales, 2003). It is mostly bordered by the Tennant Canal to the south and Crymlyn Quarry Wood to the north, while the surrounding land uses include a mixture of active industry, infrastructure and agriculture.

The site is designated as a Site of Special Scientific Interest (SSSI) due to its rare plant communities and wetland habitats (Natural Resources Wales, 2003). Key habitat types present include lowland topogenous fen, transition mires and quaking bogs, swamp and tall-herb fen, wet woodland, alluvial forest and areas of open water.

Crymlyn Bog is primarily managed by Natural Resources Wales and is considered to be of high ecological importance due to its support of specialised and rare wetland species. Notable species at the site include slender cotton-grass, marsh fern and the fen raft spider, which is a nationally threatened species (Gjerlov et al., 2014).

In addition to its biodiversity value, the site provides important ecosystem services, particularly through its wetland habitats. These include carbon storage, flood mitigation and water regulation. The site is also used by people for recreation, scientific study and conservation activities. Public access is provided through several walking routes, including the “Bog Walk” (Natural Resources Wales, 2016), and the site occasionally hosts community events such as greenwood carving.

Despite its ecological significance, Crymlyn Bog faces several management challenges. These include historic drainage, pollution from surrounding land uses, and the absence of traditional grazing, all of which have contributed to ecological degradation in parts of the site. As a result, active habitat management is required to restore and maintain the ecological integrity of the site.

3 Methodology

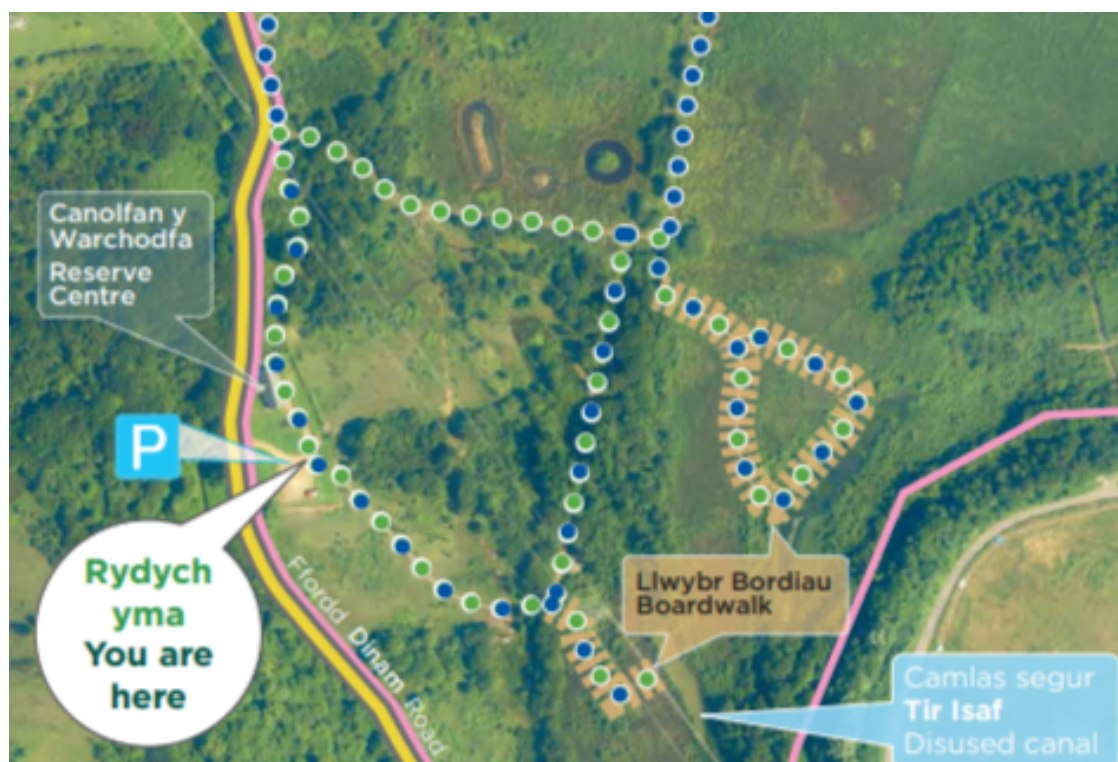


Figure 2: Location of the study boardwalk within Crymlyn Bog, indicating the survey route used in this study (Natural Resources Wales, 2016).

A site survey of Crymlyn Bog was conducted on 13th and 19th March 2026. A Phase 1 habitat survey was undertaken along the bog boardwalk, as this method provides a standardised approach to classifying habitats in sites with habitat mosaics. This standardisation enables repeatability and supports future monitoring of habitat change. Field notes and photographs were recorded to document vegetation communities, habitat structure and existing management features. Habitats were identified using visual assessment and field observations and classified according to standard Phase 1 habitat codes (Joint Nature Conservation Committee, 2010).

The survey data were to a digitised habitat in QGIS, where habitat polygons were outlined based on field observations and sketched field maps. This process enabled accurate representation of habitat distribution which allowed for spatial analysis of habitat borders across the site.

Some areas of the bog were inaccessible due to waterlogged conditions and dense vegetation; therefore, observations were limited to areas accessible from the bog boardwalk. While this allowed for more detailed and consistent mapping of accessible areas, it may reduce the scope of the survey, as habitats further were not sampled.

Although an adjacent ballon walk was present, the study area was restricted to the main boardwalk to maintain a clear survey boundary and ensure consistency in surveying. Expanding the survey area may have reduced the level of detail in the management plan and reduced future monitoring repeatability.

4 Habitat Description and Evaluation

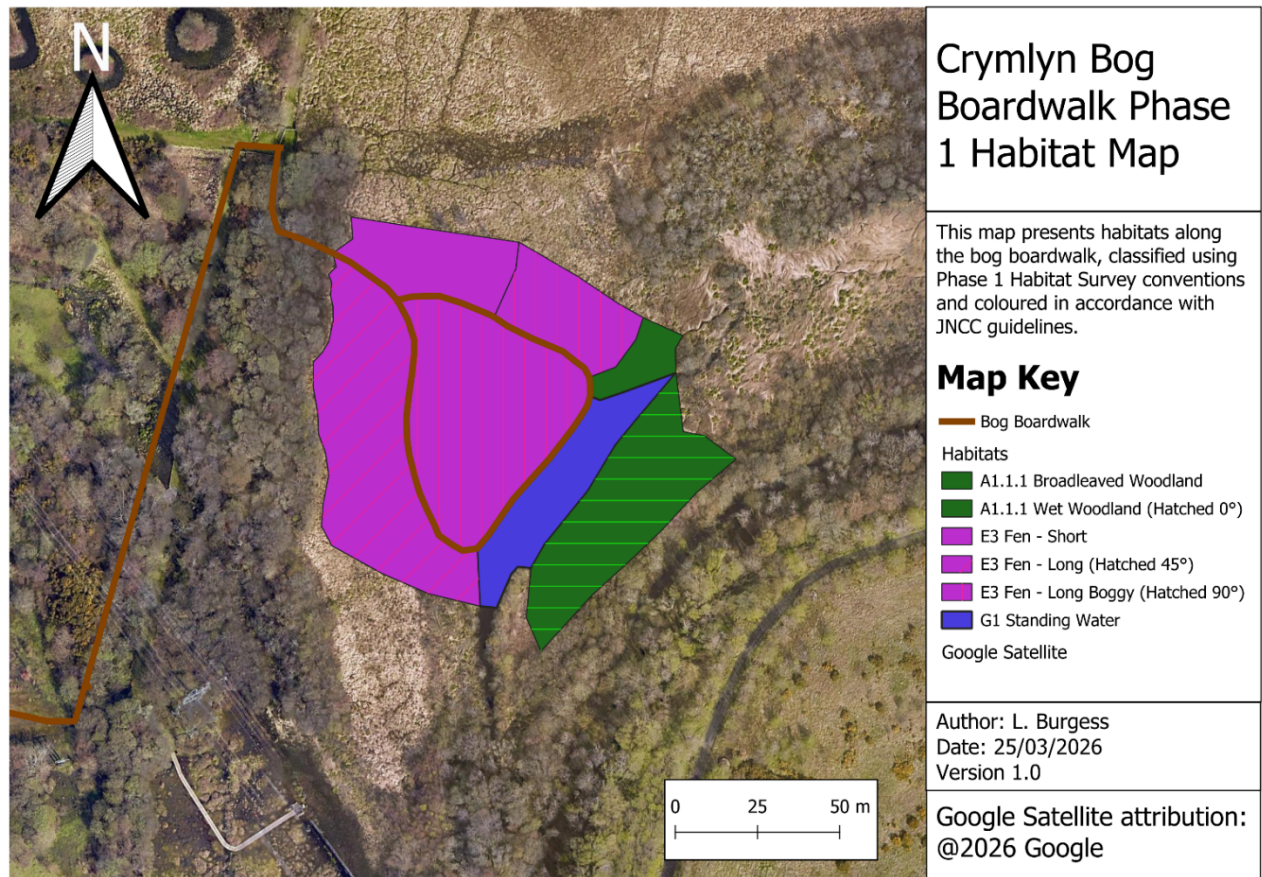


Figure 3: Phase 1 habitat map of the Crymlyn Bog boardwalk survey area, showing habitat classifications according to JNCC guidelines (Author's own, 2026; base map © Google, 2026).

4.1 Fen Habitat



Figure 4: Fen habitat at Crymlyn Bog showing extensive tussock-forming grasses and sedges adjacent to bog boardwalk (Author's own, 2026).

The dominant habitat observed along the boardwalk was fen, characterised by waterlogged soils and dense tussock-forming grasses and sedges. The vegetation structure was highly diverse, with distinct raised tussocks mixed with water-filled hollows. This variation is typical of lowland fen systems and plays an important role in increasing habitat diversity by creating a range of moisture conditions across areas.

The tussocks appeared elevated above the surrounding waterlogged ground, providing drier habitats, while the hollows retained standing water. This pattern suggests limited drainage, causing organic matter to accumulate and influence vegetation structure. The presence of standing water throughout the site suggests there's a high-water table, likely influenced by groundwater inputs, which is characteristic of minerotrophic fen systems (Wang et al., 2019).

A substantial litter layer of dead vegetation was noted across large areas of the site. This accumulation suggests low decomposition rates, likely due to anaerobic soil conditions associated with waterlogged environments (Tolunay et al., 2024). Additionally, the litter build up may indicate lack of active site management, such as cutting, which would remove the dead litter layer, allowing for open vegetation structure. This absence of management can increase dominance of certain species such as Himalayan balsam which is an invasive species.

Spatial variation in vegetation height and moisture conditions was evident along the boardwalk. At the beginning of the walk, the fen appeared shorter and drier, with less standing water and more compact vegetation. Further along the walk, the fen became noticeably wetter and taller, with more extensive areas of standing water. This change likely reflects different topographies across the site, with lower-lying areas retaining more water.

4.2 Scrub/Woodland



Figure 5: Transition between fen and adjacent wet woodland at Crymlyn Bog (Author's own, 2026).

Areas of wet woodland were observed next to the fen habitats, primarily consisting of dense stands of deciduous trees. At ground level, there was standing water indicating persistent waterlogged soil conditions. The predominant species were birch and willow. The dominance of these species is expected at waterlogged conditions, as both are well adapted to wet soils, making them adapted to wetland environments such as ones noted along the walk (Milner et al., 2024).

The woodland areas exhibited a relatively dense and closed canopy structure. This resulted in reduced light exposure at ground level, which likely limited the development of ground flora. In combination with the waterlogged conditions, this led to reduced ground flora density, with species mostly restricted to ones tolerant of both low light and high-water levels.

There was evidence of scrub encroachment, with young saplings present within the fen habitat, which suggests that succession was taking place. Without active management such as scrub clearance, these areas may develop more into woodland due to the tendency of fen ecosystems to undergo successional changes in response to environmental conditions (Schrautzer et al., 2013). This succession could reduce the area of fen habitat, potentially reducing populations of species dependent on fen habitats.

4.3 Other Features



Figure 6: Pond feature within Crymlyn Bog showing standing water and emergent vegetation (Author's own, 2026).

A small pond was observed at the top of the boardwalk, which had standing open water surrounded by marginal vegetation. Emergent plant species such as reeds, rushes and sedges were present at the pond, forming a defined marginal zone. These species are adapted to fluctuating water levels, with them playing a key role in maintaining biodiversity, as they provide a habitat for aquatic and semi-aquatic organisms. On top of that, they provide ecological benefits such as stabilising sediments and improving water quality (Follett & Nepf, 2012).

The water was dark which suggests it was rich with organic compounds, which is commonly found in wetland fen systems. This is often due to organic material building up before decomposing, which releases humic substances into the water (Zavarzina et al., 2021). The ponds and surrounding wetland features add to the complexity and habitat mosaics on the site, with them potentially hosting a range of wetland species such as invertebrates, amphibians and birds.

Besides the natural features, there was also a well-constructed boardwalk, which shows some level of human management, with the main purpose of it being increased access. It serves to minimise damage caused by trampling on fragile wetland vegetation, which are known to be vulnerable to disturbance. Therefore, the boardwalk helps preserve the condition of the surrounding habitat whilst facilitating public access.

Hardly any insects, bird or amphibian species were spotted during the assessment. This may be due to the assessment taking place during early spring, when animal species haven't fully come out of hibernation.

5 Management Objectives

The aim of the management plan is to act on good site management practice including enhancing biodiversity at the site, increasing its climate resilience, protecting native species and continuing to allow human recreational and scientific use at the site. These management objectives have been informed by the site assessment, secondary data and habitat management best practice.

5.1 Objective 1: Prevent spread of Himalayan balsam

Himalayan balsam requires active management due to its invasive nature. The species exhibits rapid growth which reduces light availability, suppressing growth of native plant species. Also, its high nectar production can alter pollinator behaviour, as it draws insects away from native species which further increases its spread (Tanner & Gange, 2020). If left unmanaged, it can negatively impact ecosystem functioning and native species, which goes against broad management objectives of conserving native species and maintaining ecological integrity.

5.2 Objective 2: Increase boardwalk length

Increasing the boardwalk length is a key management objective as it would improve access to currently inaccessible areas of the site. Boardwalks are widely used in wetland and coastal sites to minimise trampling from visitors, which can damage vegetation and degrade habitats (Ferreira, 2023). By directing foot traffic away from waterlogged areas, boardwalks help to protect vegetation structure and maintain habitat integrity. Also, extending the boardwalk would reduce safety risks for visitors and researchers, as deep bog conditions can be a potential hazard. As Crymlyn Bog is an SSSI, improved access would support further monitoring and research on the site, which enables better long-term management of the site.

5.3 Objective 3: Control fen habitat succession

Controlling and managing fen habitat succession is a management objective because there is a risk that the current fen on the site will succeed into woodland. This would reduce biodiversity and the climate resilience of the site because well managed fen is an effective carbon sink (Peacock et al., 2019).

6 Management Prescriptions

6.1 Objective 1: Prevent spread of Himalayan balsam

Himalayan balsam was not observed during site visits. However, it is confirmed to be present within Crymlyn Bog, with dense stands reported across the wider site (Natural Resources Wales, 2023). As a result, there is a high risk of it spreading to the boardwalk area, particularly given the species' preference for damp habitats and its ability to spread rapidly via seed dispersal (Jones, 2022). To prevent it spreading into the boardwalk site, there needs to be focus on early detection, rapid removal and long-term control to reduce spread.

Management actions

Implement a programme of regular monitoring and manual control along the boardwalk and adjacent fen habitats. Where balsam is found, it should be removed immediately to prevent further spread.

Timing and frequency

Monitoring and control should take place throughout the growing season (March-August). Surveys should be conducted monthly, increasing to fortnightly between May and July to ensure that no plants reach the flowering or seed-setting stage. Preventing seed production is essential, as seeds can remain viable in the soil for up to 3 years (Jones, 2022).

Method

Plants should be hand-pulled or cut below the first stem node to prevent regrowth. Removal should be undertaken when plants are sufficiently developed (approximately 50cm tall) to allow effective extraction of the root system. Control should prioritise early-season removal to minimise labour requirements and reduce the likelihood of plants reaching maturity.

Monitoring

Monitoring should be conducted annually to assess:

- Presence and abundance of Himalayan balsam
- Evidence of flowering or seed production
- Effectiveness of control measures

Management should continue for at least 3-5 years to account for the persistence of the soil seed bank and the risk of reinvasion from surrounding areas.

6.2 Objective 2: Increase boardwalk length

Currently, the boardwalk is only 350m long, looping around a fen dominated habitat. This limits access to the rest of the site as a boardwalk is needed both for visitor safety and habitat protection. With an increased boardwalk length, an increased area of the site could be accessible, allowing for greater monitoring and research use.

Management actions

Mirror the existing loop on the right-hand side of the boardwalk to the left hand, with reasonable adjustments made for woodland presence. This would double the size of the walk and create access for a part of the site which wasn't previously available.

Timing and frequency

Expansion will happen outside of the summer months, when a site is typically most ecologically active to avoid habitat and wildlife disruption.

Method

The exact same method for building the existing boardwalk will be used to build the expanded section. This includes the same materials, design and engineering due to the massive success of the current boardwalk. Builders will be hired to ensure a high-quality construction process.

Monitoring

Once the boardwalk extension has been constructed, it will be checked for quality control to make sure that its safe for visitors to use. Then after one year, its performance will be assessed to measure its success. The final step would be to add the new walk on the information board at the start of the site.

6.3 Objective 3: Control fen habitat succession

The site assessment suggests that parts of the fen are not actively managed. This was inferred from signs of dead leaf litter and sparse saplings growing. Without thorough management, the fen could turn into wet woodland, as has happened on other parts of the site, which would reduce the climate resilience and biodiversity value of the site.

Management actions

Taking as much care not to damage the fen, remove the dead litter from the fen and remove saplings and trees which are growing.

Timing and frequency

The fen management will take place during the autumn and winter to minimise disturbance during the peak summer months. Site managers will work on the chosen area full time, 35 hours a week, Monday-Friday, finishing once the management objective has been achieved.

Method

Site managers will try to avoid, where practical, damage to the fen from stepping on it and attempt to avoid getting stuck in the bog. The equipment used will be a rake, garden waste bag, garden gloves and heavy-duty walking boots. Dead life litter will be disposed of in the garden waste bag and taken to the Tir John recycling site to reprocess.

Monitoring

A site assessment will take place annually to assess the rate of succession and monitor the existing condition of the fen. The management actions taken previously will be reviewed and adjusted according to their performance.

7 10-Year Management Plan

A 10-year management plan has been developed to enact the management prescriptions and meet the stated objectives. The plan is divided into three key phases: initial planning (Years 1-2), implementation (Years 3-7) and monitoring and review (Years 8-10).

During the initial planning stage, baseline surveys will be conducted to assess the extent of Himalayan balsam across the site. Detailed mapping will inform highest priority areas for removal. Meanwhile, a suitable route for a boardwalk extension will be mapped, with the aim of minimising disturbance to the surrounding habitats. Lastly, a structured checklist for fen management will be developed, with it including guidance on maintaining hydrology and controlling vegetation.

The implementation phase will involve the removal of Himalayan Balsam if found, mainly by manual pulling prior to seeds setting to prevent further spread. Boardwalk construction will be carried out in stages to improve site accessibility while minimising trampling damage on vulnerable areas. Management of fen succession will involve selective removal of scrub and when deemed necessary, cutting of dominant vegetation.

This final phase is monitoring and evaluation. Annual surveys will assess balsam presence, vegetation composition and boardwalk impact. The effectiveness of the management actions will be analysed, with adjustments being made if suitable. This adaptive approach allows for responsive management to changing environmental conditions and climate change, while meeting the long-term goals of enhancing biodiversity and supporting public use.

Table 1: Ten-year management plan outlining actions, timing, frequency and purpose for achieving site management objectives at Crymlyn Bog.

Year(s)	Objective	Action	Timing	Frequency	Purpose
1-10	Control Himalayan Balsam	Survey and map distribution	May-June	Annual	Early detection and monitoring of spread
1-10	Control Himalayan Balsam	Manual removal before seed set	June-July	Annual	Prevent seed dispersal and establishment
1-10	Control Himalayan Balsam	Follow-up monitoring	Aug-Sept	Annual	Assess effectiveness of control
1	Increase boardwalk	Condition assessment	Spring	Phased	Identify priority areas for extension
2-5	Increase boardwalk	Boardwalk extension works	Spring-Summer	Phased	Improve access and reduce trampling
5-10	Increase boardwalk	Maintenance and repairs	Spring	Every 2-3 years	Ensure long-term usability
1-10	Control succession	Vegetation condition monitoring	Summer	Annual	Detect scrub encroachment
2-10	Control succession	Selective scrub removal	Winter	Every 2-3 years	Maintain open fen habitat
3-10	Control succession	Trial cutting/grazing	Summer	Seasonal	Improve structural density

8 Conclusion

This management plan for Crymlyn Bog aimed to enhance biodiversity, improve climate resilience, protect native species and support continued public access. Site assessment findings informed the development of management prescriptions guided by clear management objectives. The objectives focused on controlling Himalayan balsam, extending the boardwalk length to improve accessibility and preventing fen habitat succession to maintain open wetland conditions. In combination, these measures aim to balance ecological health with sustainable human use of the site. A 10-year management plan was written to provide a timeline for implementation to ensure that actions are realistic and achievable. However, due to the dynamic nature of wetland ecosystems, ongoing monitoring will be essential to assess the effectiveness of the prescriptions. This enables adaptive management, helping the site to respond to potential environmental change and continue to meet its social and ecological functions in the future.

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