MILFORD HAVEN WATERWAY
ENVIRONMENTAL SURVEILLANCE GROUP

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STATUS REVIEW AND SURVEILLANCE RECOMMENDATIONS FOR SEAGRASS (*ZOSTERA* SPECIES) IN MILFORD HAVEN WATERWAY

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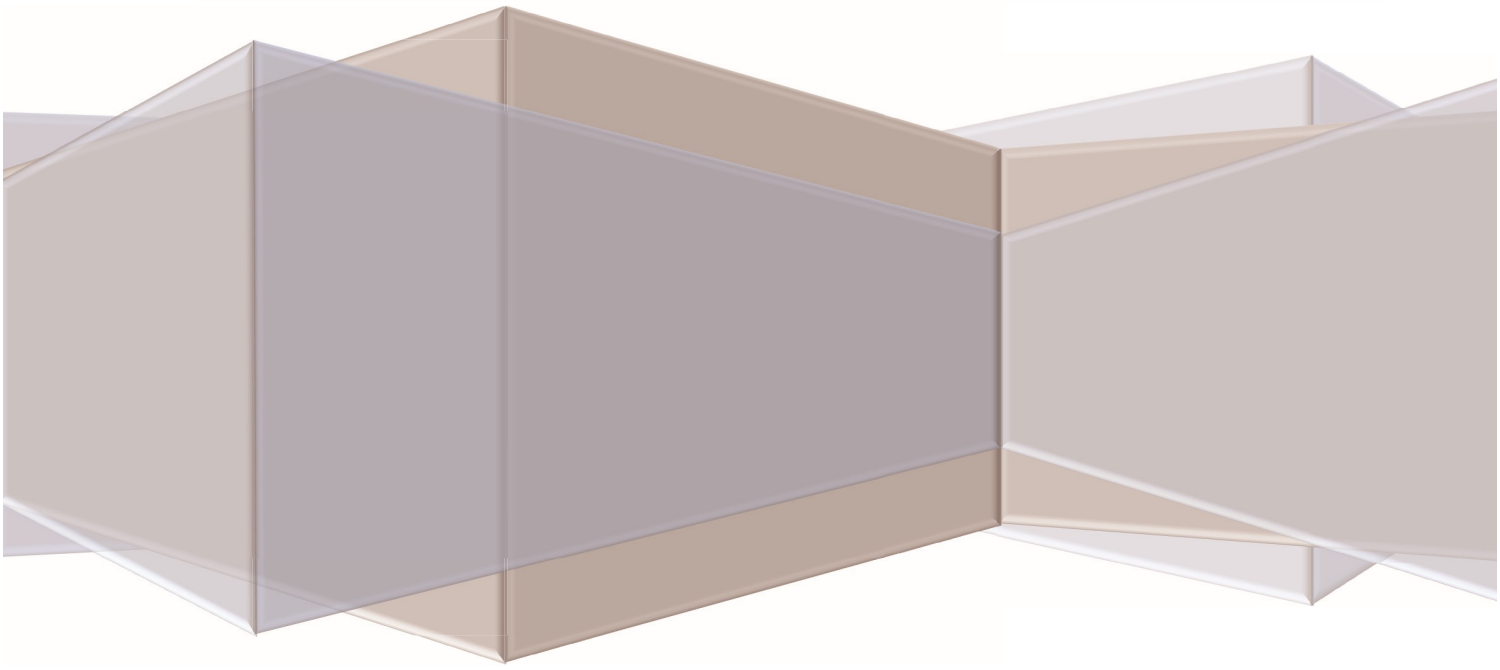

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Executive summary

The Milford Haven Waterway Environmental Surveillance Group (MHWESG) wishes to better understand the extent and status of seagrasses in the Milford Haven waterway (MHW). This is particularly the case since the long-term, rapid surveys of subtidal meadows, specifically those of Littlewick Bay, suggest declining seagrass state. As a result of these suggestions of potentially declining subtidal seagrass in MHW and concern about population changes in bird species that utilise seagrass, the MHWESG commissioned Swansea University to assess the long-term change and health of seagrasses in MHW using available historical data and determine the ecosystem value of this key habitat. Swansea University (in collaboration with Project Seagrass) were able to support further detailed assessments of the *Zostera noltii* meadows in the haven (in 2016) to supplement available information (only available until 2014). Swansea University were also asked to provide recommendations for further research aimed at filling knowledge gaps in our understanding of these systems and for future surveillance.

There are two scientifically recognised species of seagrass in the MHW; eelgrass (*Zostera marina*) and dwarf eelgrass (*Zostera noltii*). Seagrass in the MHW is extensive, principally due to the shelter of the waterway from prevailing weather, the large areas of soft-bottom intertidal habitat available for colonisation, and the availability of nutrients necessary for seagrass growth. Evidence of its current and historic presence extends from the mouth of the MHW close to Dale, along the shallow edges of the main waterway, into the bays of Angle, Sandy Haven, the Pembroke River, and at places such as Landshipping.

The data available from MHW finds seagrass to currently cover a total area of 181 ha. The majority of this (158 ha) is intertidal *Zostera noltii*, whilst 23ha is subtidal *Zostera marina*. The largest intertidal *Z. noltii* meadow lies in the Pembroke River; it covers an area of over 97 ha and is possibly the largest seagrass meadow in Wales (if found to be continuous in area). Other large meadows exist in Angle Bay (*Z. noltii*) and Littlewick Bay (*Z. marina*).

All *Zostera noltii* meadows in MHW have shown an increase in area when comparing recent records with earliest available records. *Z. noltii* extent in the MHW has more than doubled between 2007 and 2014. Available Z. *noltii* information indicates this seagrass is probably in a healthy state but condition data is limited. It is unclear why the intertidal meadows have improved in health and extent so markedly since 2007. Historic data on seagrasses in the MHW are limited, however records do exist for three locations (Sandy Haven Pill, Dale and Landshipping) where seagrass was no longer present. In 2017, seagrass was once again recorded in Dale for the first time since the 1950's. Additionally there is good evidence that large areas of intertidal habitat have historically been reclaimed, indicating that potentially there may, previously, have been more extensive seagrass in the MHW.

In contrast to the expanding and largely healthy intertidal *Zostera noltii* meadows, subtidal *Z. marina* meadows are poorly understood and where data exists this indicates these habitats are in a poor and declining state and may be close to reaching a threshold at which point the meadows disappear. Anecdotal evidence on their poor state collected in 2017 adds to this information. Urgent action is required to more fully understand the extent and health of these systems.

The ecosystem services of *Zostera* spp. are mostly well studied, *Z. marina* more so than *Z. noltii.* However, due to the extensive geographic range of these species these services may change with respect to region and locality. Local level data on ecosystem service provision of seagrass in the MHW is extremely limited, with only sporadic species observations data available to ascertain those species utilising seagrass. Some information on ecosystem service provision is available for other sites in Wales, however the majority of this data refers to coastal seagrasses rather than seagrass within estuarine environments.

A series of data gaps were determined based on the findings from the present study, leading to the development of a series of recommendations. The most important of these are:

1) As a priority, initiate an annual programme of assessment and monitoring of subtidal seagrass. This needs to include assessments that provide answers as to the status of the system and its proximity to a fatal threshold, not just its presence or absence.
2) As a priority, since the currently elevated nitrogen levels will likely result in widespread degradation of seagrass populations, there is an urgent need to reduce the levels of nutrients present in the Milford Haven Waterway.
3) Determine environmental thresholds (light, temperature, nutrients) likely to lead to further loss and degradation of seagrass in the MHW.
4) Monitoring of *Zostera noltii* by Natural Resources Wales (and others) needs to consider more than just the Water Framework Directive monitoring methodology and needs to be rapidly reported so it is accessible to the general public. This needs to be part of an integrated MHW wide annual seagrass monitoring programme that links to the assessment of subtidal meadows and those in close proximity (e.g. Skomer Marine Conservation Zone).
5) Conduct research to begin to understand the ecosystem service value of seagrass meadows in the MHW.

Crynodeb gweithredol

Pryder yn bodoli ynghylch statws a maint parhaus morwellt yn Nyfrffordd Aberdaugleddau (NA). Pryder ychwanegol wedi codi yn ddiweddar gan y ddau tymor hir ac arolygon cyflym o ddolydd islanwol, yn enwedig o Fae Littlewick, sy'n dangos dirywiad wladwriaeth morwellt. O ganlyniad i'r awgrymiadau hyn o bosibl yn dirywio morwellt islanwol yn NA a phryder ynghylch newidiadau yn boblogaeth mewn rhywogaethau o adar sy'n defnyddio morwellt, comisiynodd y Grwp Gwyliadwriaeth Amgylcheddol Dyfrffordd Aberdaugleddau (GGADA) Prifysgol Abertawe i asesu newid hirdymor ac iechyd morwellt mewn NA gan ddefnyddio data hanesyddol ar gael ac yn penderfynu ar y gwerth ecosystem y cynefin allweddol hwn. Roedd Prifysgol Abertawe (mewn cydweithrediad â'r Prosiect Seagrass) gallu cefnogi asesiadau manwl pellach o ddolydd yr *Zostera noltii* yn y hafan (yn 2016) i ychwanegu at wybodaeth sydd ar gael (ond ar gael tan 2014). Gofynnwyd Prifysgol Abertawe hefyd yn darparu argymhellion ar gyfer ymchwil pellach wedi'i anelu at lenwi bylchau gwybodaeth yn ein dealltwriaeth o'r systemau hyn ac ar gyfer gwyliadwriaeth yn y dyfodol.

Yn Aberdaugleddau mae dwy rywogaeth a gydnabyddir yn wyddonol o morwellt; wellt y gamlas (*Zostera marina*) a gorwellt y gamlas (*Zostera noltii*). Morwellt yn y NA yn eang, yn bennaf oherwydd y cysgod y ddyfrffordd rhag cyffredinol y tywydd, mae'r ardaloedd mawr o gynefin meddal-gwaelod rhynglanwol ar gael ar gyfer gwladychu ac argaeledd maetholion angenrheidiol ar gyfer twf morwellt. Tystiolaeth o ei bresenoldeb presennol a hanesyddol yn ymestyn o geg y NA agos i Dale, ar hyd ymylon bas y prif ddyfrffordd, mewn i'r baeauOngl, Sandy Haven, yr Afon Penfro, ac mewn lleoedd fel Landshipping.

Mae'r data sydd ar gael yn NA canfod morwellt i cwmpasu ardal cyfanswm o 181 ha ar hyn o bryd. Mae'r rhan fwyaf o hyn (158 ha) yn rhynglanwol *noltii Zostera*, tra bod 23 hectar yn islanwol *Zostera marina*. Mae'r ddôl fwyaf yw'r ddôl *Z. noltii* rhynglanwol ar Afon Penfro, mae hyn yn cwmpasu ardal o dros 97 hectar ac mae'n bosibl y ddôl morwellt mwyaf yng Nghymru (os canfyddir fod yn barhaus yn yr ardal). dolydd mawr eraill yn bodoli ym Bae Ongl(*Z. noltii*) a Bae Littlewick (*Z. marina*).

Mae pob dolydd *Z. noltii* yn Aberdaugleddau wedi dangos cynnydd yn yr ardal (ha) wrth gymharu cofnodion diweddar gyda cofnodion cynharaf sydd ar gael. *Zostera noltii* graddau yn Nyfrffordd Aberdaugleddau wedi mwy na dyblu rhwng 2007 a 2014. Ar gael gwybodaeth yn dangos morwellt mae hyn yn fwy na thebyg mewn cyflwr iach, ond data cyflwr yn gyfyngedig. Nid yw'n eglur pam y dolydd rhynglanwol wedi gwella ym maes iechyd a maint felly sylweddol ers 2007. Mae data hanesyddol ar morwellt yn NA yn gyfyngedig, fodd bynnag cofnodion yn bodoli o dri lleoliad (Sandy Haven Pill, Dale a Landshipping) pan nad yw morwellt yn bresennol. Yn ogystal, ceir tystiolaeth dda bod ardaloedd mawr o gynefin rhynglanwol wedi cael eu hadennill yn hanesyddol, sy'n dangos bod o bosibl bu morwellt yn fwy helaeth yn y NA flaenorol.

Yn wahanol i'r ehangu a dolydd *Zostera noltii* rhynglanwol iach i raddau helaeth, dolydd *Zostera marina* islanwol yn cael eu deall yn wael a lle mae data ar gael mae hyn yn dangos cynefinoedd hyn mewn cyflwr gwael ac yn dirywio a gall fod yn agos at gyrraedd trothwy ac yn y fan y dolydd yn diflannu. Mae angen gweithredu ar frys i ddeall yn well i ba raddau ac iechyd y systemau hyn.

Mae'r gwasanaethau ecosystem o *Zostera spp.* yn cael eu hastudio gan amlaf yn dda, mwy na *Z. marina* felly nag *Z. noltii* (Mtwana Nordlund et al. 2016), fodd bynnag, oherwydd yr amrywiaeth daearyddol helaeth o'r rhywogaethau hyn y gwasanaethau hyn newid o ran rhanbarth ac ardal. Data lefel leol ar ddarparu gwasanaethau ecosystem o morwellt yn y NA yn gyfyngedig dros ben, gyda dim ond data arsylwadau rywogaeth achlysurol ar gael i ganfod rhywogaethau hynny gan ddefnyddio morwellt. Mae rhywfaint o wybodaeth ar ddarpariaeth gwasanaethau ecosystem ar gael ar gyfer safleoedd eraill yng Nghymru, fodd bynnag, mae'r rhan fwyaf o'r data hwn yn cyfeirio at morwellt arfordirol yn hytrach na morwellt mewn amgylcheddau morydol.

Mae cyfres o fylchau data yn benderfynol yn seiliedig ar y canfyddiadau o'r astudiaeth bresennol, gan arwain at ddatblygu cyfres o argymhellion. Y pwysicaf o'r rhain yw:

1) Fel blaenoriaeth, cychwyn rhaglen flynyddol o asesu a monitro morwellt islanwol. Mae angen i hyn gynnwys asesiadau sy'n darparu atebion ynghylch statws y system a'i agosrwydd at drothwy angheuol, nid dim ond ei bresenoldeb neu absenoldeb.
2) Pennu trothwyon amgylcheddol (golau, temp, maetholion) yn debygol o arwain at golli rhagor a diraddio morwellt yn NA.

3) Monitro *Zostera noltii* gan CNC (ac eraill) i ystyried mwy na dim ond y fethodoleg monitro Gyfarwyddeb Fframwaith Dŵr ac mae angen ei hadrodd yn gyflym fel ei fod yn hygyrch i'r cyhoedd yn gyffredinol. Mae angen i hyn fod yn rhan o raglen flynyddol morwellt eang NA integredig monitro sy'n cysylltu at asesu dolydd islanwol a'r rhai mewn proximi agos (e.e. Parth Cadwraeth Morol Sgomer).
4) Cynnal ymchwil i ddechrau deall gwerth gwasanaeth ecosystem o ddolydd morwellt yn Aberdaugleddau