MILFORD HAVEN SALTMARH SURVEY: VOLUME 1.

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SEPARATELY SUPPLIED

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	Photocopies of field data sheets for 2002 permanent quadrats	

EXECUTIVE SUMMARY

Following the Sea Empress oil spill of February 1996 and the subsequent ecological damage assessment survey conducted in 1996 and 1997 by the Centre for Ecology and Hydrology (CEH), a follow-up study was commissioned to repeat the CEH work six years after the incident. Seventyeight of the original 82 permanent quadrats established in1996 were relocated, the saltmarsh vegetation studied and comparisons made with the original results. The saltmarshes at Crabhall, Sandyhaven, Milford Haven, Pembroke River, Martin's Haven and Angle Bay were re-surveyed and mapped; the NVC units recognized were compared with those obtained for the same areas in 1996 and 1997 and also with the results of the original comprehensive survey conducted in1982 as part of the Inventory of British saltmarshes.

The conclusion is reached that the saltmarsh vegetation of the Haven is no longer influenced by the effects of the oil spillage.

The National Vegetation Classification (NVC) survey was extended to cover all areas of saltmarsh east of the Cleddau Bridge to the tidal limits of the arms of the Estuary. Separate maps and area statements were prepared for the Eastern and Western Cleddau, Daugleddau, the Carew and Cresswell Rivers and for Cosheston Pill.

A total of 287ha of saltmarsh was mapped on the Waterway together with 43ha of associated vegetation, mostly forms of saline-freshwater transition. Twentyfive NVC communities were represented with 30 units recognized at the level of subcommunity; in addition, two recognized variants of subcommunities and two newly defined associations were described and mapped.

The area of saltmarsh encountered was substantially less than that mapped in1982. Virtually all of the decrease can be attributed to a reduction in the area supporting *Spartina anglica* saltmarsh. Evidence is produced for a measure of succession whereby middle marsh communities are expanding into low marsh zones and areas of the middle-upper marsh transition are sequentially developing at the expense of middle marsh vegetation i.e. the system appears to be in a maturing phase.

The baseline for study of future changes has been expanded through the establishment of 38 new permanent quadrats on sections of the Waterway east of the Cleddau Bridge.

In addition to the NVC maps, the locations of 14 species of interest are mapped; also mapped are the sections of the shoreline where the active erosion of saltmarsh vegetation was noted.

Following sections dealing with field survey, data processing and presentation and with map production, the central section of the report presents an overview of the vegetation communities described. Details of the changes in saltmarsh communities are presented with a separate section dealing with the analysis of changes occurring in the permanent quadrats established in1996. Each species of interest is discussed with the discovery of *Alopecurus bulbosus*, a new record for Pembrokeshire, highlighted.

The report concludes with a brief section containing recommendations for future work followed by five appendices presenting the NVC quadrat data array, similar information for both old and new permanent quadrats, a list of grid references for these quadrats, the photographic record and the field work timetable.

An addendum to the report places the diversity of the saltmarshes of the Waterway into the wider local context through the production of a map showing the total number of saltmarsh communities and, separately, the number of types of associated transitional vegetation on the basis of individual 10km squares in Pembrokeshire, Carmarthenshire and Swansea.

The series of maps are separately bound and constitute Volume 2 of the report.

CRYNODEB GWEITHREDOL

Wedi i'r Sea Empress golli olew ym mis Chwefror 1996 ac i'r Ganolfan ar gyfer Ecoleg a Hydroleg (CEH) wneud arolwg yn 1996 ac 1997 i asesu'r difrod ecolegol yn sgîl hynny, cafodd astudiaeth bellach ei chomisiynu i ail-adrodd gwaith CEH chwe mlynedd wedi'r digwyddiad. Cafodd saithdeg wyth o'r 82 cwadrat parhaol gwreiddiol sefydlwyd yn 1996 eu hail-leoli, cafodd llystyfiant y morfa ei astudio a gwnaethpwyd cymariaethau gyda'r canlyniadau gwreiddiol. Gwnaethpwyd arolwg arall o'r morfeydd yn Crabhall, Sandyhaven, Aberdaugleddau, Afon Penfro, Martin's Haven a Bae Angle a chawsant eu mapio ; cafodd yr unedau DLlC gafodd eu hadnabod eu cymharu gyda'r rhai a gafwyd ar gyfer yr un ardaloedd yn 1996 ac 1997 a hefyd gyda chanlyniadau'r arolwg cynhwysfawr gwreiddiol a wnaethpwyd yn 1982 fel rhan o'r Rhestr o forfeydd Prydain.

Deuir i'r canlyniad nad yw llystyfiant morfa'r Haven bellach yn cael ei ddylanwadu gan effeithiau colli'r olew.

Cafodd yr arolwg Dosbarthiad Llystyfiant Cenedlaethol (DLlC) ei ymestyn i ymdrin â'r holl ardaloedd o forfa i'r dwyrain o Bont Cleddau hyd at ffiniau pellaf llanw breichiau'r Aber. Cafodd mapiau a datganiadau ardal ar wahân eu paratoi ar gyfer Dwyrain a Gorllewin y Cleddau, Daugleddau, Afonydd Carew a Cresswell ac ar gyfer Cosheston Pill.

Cafodd cyfanswm o 287ha o forfa ei fapio ar y Ddyfrffordd ynghyd â 43ha o lystyfiant cysylltiol, y rhan fwyaf yn ffurfiau trawsnewid dwr halenog-croyw. Cafodd dauddeg pump o gymunedau DLlC eu cynrychioli gyda 30 o unedau wedi'u hadnabod ar lefel isgymuned ; yn ychwanegol at hyn, bu i ddau amrywiolyn o isgymunedau oedd wedi'u hadnabod a dau o gydgymunedau oedd newydd eu diffinio gael eu disgrifio a'u mapio.

Roedd yr ardal o forfa y daethpwyd ar ei thraws lawer yn llai na'r ardal gafodd ei mapio yn 1982. Mae'r lleihad i'w briodoleddu bron yn gyfangwbl i leihad yn yr ardal sy'n cynnal y morfa *Spartina anglic.* Ceir tystiolaeth o ddilyniant i ryw raddau ble y mae cymunedau canol y morfa yn ehangu i gylchfaoedd isel y morfa ac ardaloedd o drawsnewid morfa canol-uwch yn datblygu yn ddilyniannol o'r bron ar draul llystyfiant canol y morfa h.y. mae'r system i'w gweld yn y cyfnod aeddfed.

Mae man cychwyn ar gyfer astudiaeth o newidiadau yn y dyfodol wedi cael ei ehangu trwy sefydlu 38 o gwadratau newydd parhaol ar rannau o'r Ddyfrffordd i'r dwyrain o Bont Cleddau.

Yn ychwanegol at y mapiau DLlC, mae lleoliadau 14 rhywogaeth o ddiddordeb wedi'u mapio ; mae rhannau o'r traeth wedi'u mapio hefyd lle y sylwyd fod yna erydiad llystyfiant morfa ar hyn o bryd.

Yn dilyn adrannau sy'n ymdrin ag arolwg maes, cynhyrchu a chyflwyno data a chyda chynhyrchu mapiau, mae corff yr adroddiad yn cyflwyno arolwg cyffredinol o'r cymunedau llystyfiant a ddisgrifir. Cyflwynir manylion ynglyn â newidiadau mewn cymunedau morfa a cheir adran ar wahân yn ymdrin â dadansoddiad o'r newidiadau sy'n digwydd yn y cwadratau parhaol sefydlwyd yn 1996. Ceir trafodaeth ar bob

rhywogaeth o ddiddordeb a thynnir sylw at ddarganfod *Alopercuus bulbosus,* record newydd i Sir Benfro.

Mae'r adroddiad yn cloi gydag adran fer s'yn cyflwyno argymhellion ar gyfer gwaith yn y dyfodol. Yna ceir pum atodiad yn cyflwyno araeau data cwadratau'r DLlC, gwybodaeth debyg ar gyfer yr hen gwadratau yn ogystal â'r rhai newydd, parhaol, rhestr o gyfeiriadau grid ar gyfer y cwadratau yma, y cofnod ffotogaffig ynghyd ag amserlen y gwaith maes.

Mae atodiad i'r adroddiad yn rhoi amrywiaeth morfeydd y Ddyfrffordd yn y cyd-destun ehangach lleol a hynny trwy gynhyrchu map yn dangos cyfanswm nifer y cymunedau morfa ac, ar wahân, y nifer o fathau o lystyfiant trawsnewidiol cysylltiol, ar sail y sgwariau unigol 10 cm yn Sir Benfro, Sir Gaerfyrddin ac Abertawe.

Mae'r gyfres o fapiau wedi cael eu rhwymo ar wahân ac yn ffurfio Cyfrol 2 yr adroddiad.