

Northern Ireland Habitat Action Plan
Seagrass Beds
Final Draft – April 2003

1. Current Status

1.1 Physical and biological status

- 1.1.1 Seagrass beds occur on shallow, sheltered intertidal and subtidal sediments and in Northern Ireland are largely confined to sea loughs. Five seagrass species are found around Britain and Ireland; three species of eelgrass (namely *Zostera marina*, *Z. angustifolia* and *Z. noltii*) and two species of tassel weed (*Ruppia maritima* and *R. cirrhosa*) which can partly replace *Zostera* species in seagrass beds in certain circumstances.
- 1.1.2 Seagrasses form a unique group of plants in that they are the only angiosperms (flowering plants) that can truly be called marine, with approximately 60 species found worldwide (Den Hartog, 1970).
- 1.1.3 *Ruppia* spp. are not as common in Northern Ireland as *Zostera* spp. and records from the intertidal area are mainly occasional plants of *Ruppia maritima* rather than “beds”. Examination of the records from the Northern Ireland Lake Survey (Wolfe-Murphy *et al.*, 1992) indicate “beds” of *R. maritima* are more frequent in saline lagoons. *R. cirrhosa* is confined to saline lagoons in Northern Ireland. Both *Ruppia* spp. will therefore be largely covered by another plan – the Northern Ireland Saline Lagoon Habitat Action Plan.
- 1.1.4 There is some taxonomic confusion concerning *Zostera* spp., though, traditionally, in Britain and Ireland, three species have been recognised. Although it is clear that *Z. noltii* is a separate species, there is disagreement whether *Z. marina* and *Z. angustifolia* are different species or ecotypes. In continental Europe and elsewhere, *Z. angustifolia* is considered a narrow leaved annual form of *Z. marina* (Den Hartog, 1972; Keddy and Patriquin, 1978; Van Lent and Werschuure, 1994). For the purposes of the Action Plan *Z. angustifolia* is considered as a separate species. However, the taxonomic status of *Z. angustifolia* has significant implications for the management and conservation of these species.
- 1.1.5 *Zostera* spp. exhibit different life histories. *Z. marina* is essentially subtidal in Northern Ireland (though elsewhere in its range it can be intertidal) and is a perennial species. Recruitment is normally from seed and through clonal growth although little is known about the relative contributions of each to survival and bed expansion.
- 1.1.6 There have, in the past, been reports of a perennial intertidal form of *Z. marina* on Strangford Lough (Lynn, 1936), though this is not now considered present. *Z. angustifolia* is found in the intertidal and is an annual plant. The plants die back in the late autumn/early winter, re-growing again from seed in the early spring.
- 1.1.7 *Z. noltii* is an intertidal perennial plant. Recruitment is by seed and clonal growth, though as for *Z. marina*, little is known about the relative contributions of each to survival and bed expansion.

- 1.1.8 Seagrass beds are considered to be highly productive and support a wide range of flora and fauna as well as being a refuge and nursery area for a range of fish species. They provide a diversity of microhabitats, especially compared to macroalgal species. They form an important food resource for overwintering herbivorous wildfowl. This is especially the case in the intertidal zone where they form an important component in the diet of species such as Mute swans *Cygnus olor* and Whooper swans *Cygnus cygnus*, Light-bellied Brent geese *Branta bernicla hrota* and Wigeon *Anas penelope*.
- 1.1.9 *Z. marina* beds have been recorded in both the Northern Ireland Sublittoral (Erwin *et al.* 1986) and Littoral (Wilkinson *et al.* 1988) Surveys and also the Northern Ireland Lake Survey, showing the wide range of habitats/salinities in which this species is found in. *Z. marina* is not restricted to estuaries e.g. it occurs around the Skerries, a group of islands off the north Antrim coast.
- 1.1.10 In Northern Ireland, the most extensive research on *Zostera* spp. distribution has been carried out on Strangford Lough. The distribution of intertidal *Zostera* spp. in the northern half of the Lough, where the majority of *Zostera* spp. occur, has been mapped and covers approximately 850 hectares (Preston, Portig *et al.*, 1999; Preston, Portig *et al.*, 2000; Preston, Portig *et al.*, 2001). Intertidal *Zostera* spp. cover is generally more patchy in the southern half of the Lough. The most extensive area of intertidal *Zostera* spp. is on the northern sandflats of the Lough covering approximately 470 hectares. This therefore represents over half the total area covered by intertidal *Zostera* spp. on the Lough.
- 1.1.11 The distribution of intertidal *Zostera* spp. on Lough Foyle was mapped by the RSPB in the mid 1990s (D. Allen & M. Tickner, *pers comm.*). The principal species that occurs is *Z. noltii*, though *Z. angustifolia* is present but considered uncommon. The area covered by *Zostera* spp. was approximately 1000 ha and the distribution appears to be similar to that in Strangford Lough in that it predominates on the upper half of the shore. *Zostera* spp. are reported to have expanded on Lough Foyle during the 1990's (D. Allen & M. Tickner, *pers comm.*).
- 1.1.12 The distribution of seagrasses in other sea Loughs around Northern Ireland is not well studied and no details of accurate distribution are known. Though seagrasses have been present in Belfast Lough, Larne Lough, Killough Harbour, Dundrum Bay and Carlingford Lough in the past, there are no recent records of their distributions at these locations.
- 1.1.13 The general ecology, sensitivity, conservation and management requirements of *Zostera* spp. have been documented as part of the UK Marine SAC project (Davison and Hughes, 1998) and as part of the action plan process at a UK level (Davison, 1997).

1.2 Links with other action plans

- 1.2.1 This seagrass habitat action plan identifies specific targets and actions required to deliver Northern Ireland's contribution to the UK action plan, published in 1995. (UK Biodiversity Group, 1995)

- 1.2.2 As seagrass beds occur on a range of substrates and in a range of situations, the overlap of this habitat action plan with the habitat action plans for saline lagoons, saltmarsh and mudflats must always be taken into account when delivery of this action plan for seagrass beds is being considered.
- 1.2.3 As seagrass beds are nursery grounds for some fish species, the habitat action plan may have implications for ‘Commercial marine fish’ – a grouped species action plan for the UK.
- 1.2.4 No proposed Northern Ireland priority species are linked with this habitat action plan. However, the habitat and its associated species are an important element of the over-wintering feeding of some bird species e.g. Light-bellied Brent geese and Wigeon, both of which are on the provisional Northern Ireland Species of Conservation Concern (SoCC) list.

2. Current factors affecting the habitat

- 2.1 Disease. A wasting disease caused widespread loss of *Z. marina* across the UK in the 1930s and “wasting disease” symptoms can still be observed on *Z. marina* in Strangford Lough. However, Lynn (1936) stated that *Z. noltii* on Strangford Lough was apparently not affected by the wasting disease at that time. Whether “wasting” disease is having an impact on *Zostera* spp. at the moment is not clear.
- 2.2 Indirect physical disturbance. *Zostera* spp. rely on relatively stable sediments. Thus seagrasses are vulnerable to changes in the sedimentary regime and the construction of seawalls, causeways etc, have the potential to change these processes. Loss of intertidal seagrass habitat can occur due to land reclamation not only through direct loss of habitat but also due to the additional impact of changes in the sedimentary regime.
- 2.3 Direct physical disturbance. This can include, for example, moorings, dredging and propeller scars. The severity and frequency of disturbance is a factor. Where this disturbance is repeated due to constant dragging of a mooring chain, repeated driving over a particular area of an intertidal bed or shellfish gathering, damage to seagrass beds can be permanent or recovery slow.
- 2.4 Natural events. The most likely natural occurrence are exceptional storm events that can cause erosion of seagrass beds and lead to large scale losses i.e. (Wyer, Boorman *et al.*, 1977; Den Hartog, 1987). Instances of storm damage may increase as a result of climate change (2.9).
- 2.5 Grazing. *Zostera* spp. are utilised by herbivorous wildfowl during the winter months. The effect of this grazing activity can have a severe impact on the biomass of intertidal *Zostera* spp. with biomass reduced to 20% of peak biomass (Portig, Mathers *et al.* 1994) on Strangford Lough. However, these impacts show a large degree of variation from site to site and winter to winter (Madsen 1988; Percival 1991; Portig, Mathers *et al.* 1994). The impact of this grazing on biomass achieved the next year is variable.

- 2.6** Increased turbidity. A range of factors can influence the light regime experienced by seagrasses, especially in the subtidal. Therefore, factors affecting light attenuation of water will influence not only the depth limit of seagrasses but whether they can survive in a particular area. The impact of eutrophication may be indirect due to the increase of other marine primary producers, resulting in a poorer light regime and, thus, growth, and can lead to the complete loss of the seagrass bed. This is primarily due to the poor competitiveness of *Zostera* spp. in high nutrient environments due to the high respiratory demands of its rhizome system. The activity of the lugworm *Arenicola marina* has been cited as the cause for the decline of *Z. noltii* in the Dutch Wadden sea. With an increased density of this polychaete worm, the sediment turnover reached a level where the continual coverage of shoots with sediment caused widespread reduction (Philippart, 1994). Another polychaete, the ragworm *Hediste diversicolor* has also been cited as a factor for the failure in transplants of *Z. noltii* due to the burrowing activities of the worm (Hughes, 2000).
- 2.7** Pollution. Seagrasses are considered relatively insensitive to oil pollution, though the impact depends on a number of factors - the type of oil, degree of weathering and the nature of the habitat. Intertidal beds are considered more vulnerable to this source of pollution than subtidal beds and impacts may be greater on the flora and fauna associated with seagrasses in subtidal beds. Herbicides clearly have the potential to affect seagrasses and have been reported as being implicated in the decline of *Z. noltii* in the German Wadden Sea (Bester, 2000) though these were not directly applied and resulted from general runoff from the hinterland. More direct application of herbicides in the control of alien species have the potential to cause damage.
- 2.8** Alien species. Two species are cause for concern at present. Cordgrass *Spartina anglica* colonises the upper part of mudflats and is considered a threat to the upper limit of *Zostera* spp. This may be a direct effect of *Zostera* spp. replacement (Percival, Sutherland *et al.*, 1998) or the indirect effects of altered currents and sedimentation patterns (Butcher, 1941). Japweed *Sargassum muticum* is a more recent alien introduction to Strangford Lough (Davison, 1996). It is a subtidal species and there is the potential for competition for space between *S. muticum* and subtidal *Zostera* spp. As *S. muticum* tends to be a 'space-filler', it may be a greater threat to *Zostera* spp. where beds have been denuded and colonisation by *Sargassum* prevents re-colonisation by *Zostera* spp. (Davison, 1996).
- 2.9** Climate change. Summary predictions for temperature and sea level rise as a result of global warming have been modelled by the MONARCH project (Harrison, Berry *et al.* 2001). The prediction of increased summer temperatures, may lead to an increased level of desiccation in the intertidal area, restricting the distribution of the intertidal species. *Z. angustifolia* may be more vulnerable than *Z. noltii*. The prediction of milder winters may be beneficial to *Zostera* spp. since the incidence of loss due to severe winter frost or ice events will decrease and growth periods will be extended. The decline of overall storminess predicted, is more than likely to be offset by the increased incidence of extreme events that have been implicated in large scale losses of seagrasses.
- 2.10** Sea level changes. Sea level rise as a result of predicted global warming, is likely to have a number of effects. The lower limit of *Zostera* spp. in the sub-tidal is likely to be restricted. Whether this is accompanied by an increase in the upper limit will

depend on a number of factors e.g. suitable habitat is available above the bed for colonisation. In Northern Ireland, “the likely coastal squeeze due to the persistence of engineered shorelines in our estuaries means that sediment is likely to be lost in redistribution over existing intertidal areas and (the redistributed sediments) are unlikely to be sufficient to help existing upper tidal zone marshes keep pace with rising sea levels” (Harrison, Berry *et al.*, 2001). This redistribution of sediments will affect the distribution of *Zostera* spp. and a continued rise in sea level is likely to lead to greater instability of sediments reducing the potential suitable habitat in the intertidal area.

3. Current Action

3.1 Legal Status

- 3.1.1 Statutory site designation plays an important part in the conservation of this habitat and many of the best examples have been designated as Areas of Special Scientific Interest (ASSIs), candidate Special Areas of Conservation (cSACs), Special Protection Areas (SPAs), Ramsar sites and National Nature Reserves (NNRs).
- 3.1.2 Under the *Nature Conservation and Amenity Lands (Northern Ireland) Order 1985*, significant areas of seagrass beds are protected as ASSIs which are identified and declared by the Department of the Environment (DOE) through Environment and Heritage Service (EHS). These designated areas represent approximately 1,500 ha (around 90%) of the total intertidal seagrass beds area.
- 3.1.3 Although seagrass beds are not listed as an Annex I habitat under the European Community (EC) Habitats Directive they are a recognised component of *Coastal Lagoons* and *Submerged sandbanks covered by seawater all of the time*. They are also a characteristic feature of the Annex I habitats *Large shallow inlets and bays*, *Estuaries* and *Mudflats and sandflats not covered by the tide at low water*.

3.2 Management, research and guidance

- 3.2.1 Long term, continual monitoring of seagrass beds has, to date, not been carried out in Northern Ireland. Monitoring in Northern Ireland has generally been in the form of ‘snap shot’ surveys.
- 3.2.2 Research by The Queen’s University of Belfast on *Zostera* spp. population ecology in Strangford Lough, has shown significant fluctuations in *Zostera* distribution (Portig *et al.*, 1994; Portig, 1997). These changes are still occurring, the northern sandflats of the Lough having shown significant changes in biomass between 1992 and 2001 (Portig *et al.*, 1994; Malvarez *et al.*, 2000). However, the bed was only monitored once in 1992 and regularly from 1997. When the change occurred within these periods is not known. Indirect evidence from numbers of geese suggest that this change did not occur gradually but occurred between 1996 and 1997. Peak biomass and seasonal changes in biomass at a limited number of sites has been monitored over a number of years including 1992 – 1994 (Portig, 1997) and 1997 to present and is due to last to 2002 (Malvarez *et al.*, 2000).

- 3.2.3 The extent of intertidal *Zostera* beds on Strangford Lough has been mapped (1999, 2000 and 2001) as part of an intertidal monitoring programme of Strangford Lough cSAC by the The Queen's University of Belfast for EHS.
- 3.2.4 The annual distribution and biomass of *Zostera* spp. and seasonal changes in biomass in the northern sandflats of Strangford Lough has been mapped from 1997 by The Queen's University of Belfast on behalf of the Rivers Agency, in response to the reconstruction of the Newtownards - Comber embankment at the northern end of the Lough.
- 3.2.5 Current research is being carried out into the genetic identity of *Z. angustifolia* by The Queen's University of Belfast.
- 3.2.6 Current research is being carried out into the utilisation of *Zostera* spp. by wildfowl, specifically Light-bellied Brent geese, on Strangford Lough.
- 3.2.7 There have been efforts to control *Spartina* spp. on Strangford Lough, though the indirect effect of spraying of *Spartina* spp. on seagrasses is not known. The scale and location of the spraying is likely to be an important factor.
- 3.2.8 Biological records in Northern Ireland are currently stored at the Ulster Museum, at the Centre for Environmental Data and recording (CEDaR) which was established in 1995 in partnership with EHS and the biological recording community. There are currently over 1.4 million records held by CEDaR and there are developments underway to make these records more accessible through the Internet. This will be achieved through the National Biodiversity Network, a union of organisations that are working together to create an information network of biological data.

4. Action Plan Targets

Until surveys to ascertain the extent, quality and distribution of seagrass beds in Northern Ireland are completed, it is not feasible to provide specific targets.

- 4.1 Maintain the extent of seagrass beds in Northern Ireland waters.
- 4.2 Maintain the quality of seagrass beds in Northern Ireland waters.
- 4.3 Maintain the distribution of seagrass beds in Northern Ireland waters.
- 4.4 Where feasible, restore lost, damaged or degraded seagrass beds.

An interim target for restoration of 1000 hectares has been set for the whole of the UK by 2010. When the Northern Ireland targets have been refined they will reflect both this UK target and the situation in the rest of Ireland.

5 Proposed action with lead agencies

5.1 Policy and Legislation

- 5.1.1 Ensure that development schemes, dredging operations, fishing activities or other activities do not adversely affect the integrity or the conservation interest of intertidal and subtidal seagrass beds.
(ACTION: Planning Service, DARD, Rivers Agency, DETI, (Harbour Authorities), DCAL, DRD).
- 5.1.2 By 2004, review *Planning Policy Statement 2 (PPS2) – Planning and Nature Conservation* taking cognisance of the experience gained in the rest of the UK, the Republic of Ireland and where appropriate, other leading countries in environmentally sensitive planning.
(ACTION: Planning Service, EHS)
- 5.1.3 By 2005, produce Planning Policy Statements (PPSs) on the countryside and the coast to incorporate the conservation of Seagrass beds.
(ACTION: DRD)
- 5.1.4 Ensure that the importance of seagrass beds is recognised and, where appropriate, site protection policies are included in Development Plans and other strategies including Local Biodiversity Action Plans (LBAPs).
(ACTION: Planning Service, EHS, DARD, District Councils)
- 5.1.5 Explore options for using statutory measures, aside from those specifically designed for nature conservation, to protect seagrass beds. Particular consideration should be given to fisheries legislation, and port and harbour regulations.
(ACTION: EHS, DARD, DCAL, DRD).
- 5.1.6 By 2009, ensure that the *Water Framework Directive* (WFD) and the development of River Basin Management Plans address the conservation of sites designated for their seagrass beds interest.
(ACTION: EHS)

5.2 Site Safeguard and Management

- 5.2.1 By 2004, carry out and publish, an up-to-date record of the extent, quality and distribution of seagrass beds in Northern Ireland.
(ACTION: EHS).
- 5.2.2 By 2004, identify seagrass beds that are damaged or degraded.
(ACTION: EHS)
- 5.2.3 By 2006, where feasible, initiate remedial action to restore damaged or degraded seagrass beds to favourable status.
(ACTION: EHS).

- 5.2.4 By 2004, determine the extent and quality of the seagrass beds resource which falls within protected areas and notify further sites, if required, to fill in significant gaps. In particular, ensure that there is adequate representation of the full range of variation in seagrass communities found around Northern Ireland.
(ACTION: EHS)
- 5.2.5 Ensure conservation requirements for seagrass beds are included in the development and implementation of coastal zone management plans and ensure that they are not managed in isolation from other habitats and communities in these areas.
(ACTION: EHS, DOE)
- 5.2.6 By 2006, seek to control high nutrient loads that are adversely affecting, or could affect, important areas of seagrasses through the designation of nitrate vulnerable zones, where the water body is affected by eutrophication (as defined in the EC Directive concerning the protection of water against pollution caused by nitrates from agricultural sources (91/676/EEC) - the Nitrates Directive)).
(ACTION: EHS)
- 5.2.7 By 2006, define water quality objectives for coastal and estuarine waters that meet the requirements of healthy seagrass communities.
(ACTION: EHS).

5.3 Advisory

- 5.3.1 By 2004, publish guidelines on the selection and designation of intertidal ASSIs for their marine biological importance.
(ACTION: EHS)
- 5.3.2 Provide advice to local authorities and others on minimising impacts of plans and operations on seagrass beds.
(ACTION: EHS)

5.4 International

- 5.4.1 Further develop links with the Republic of Ireland and other European and international organisations and programmes to promote the exchange of information and experience in research, management techniques, education and conservation strategies.
(ACTION: EHS)
- 5.4.2 Liaise with research institutes in Europe and elsewhere to exchange data and information on the conservation of seagrass beds and the developing of techniques for transplanting and germination of seagrasses found in Northern Ireland.
(ACTION: EHS).

5.5 Monitoring and Research

- 5.5.1 By 2005, carry out research into the factors, both natural and anthropogenic which adversely affect seagrass beds to understand how these may be avoided or minimised. (ACTION: EHS).
- 5.5.2 By 2005, carry out research into the “natural” variability of seagrasses in space and time so that monitoring parameters/standards can be set. (ACTION: EHS)
- 5.5.3 By 2006, carry out research into the historical variation in extent and distribution of seagrass beds in Northern Ireland. (ACTION: EHS)
- 5.5.4 By 2006, establish standard seagrass monitoring methods and ensure that they are compatible with the UK, the Republic of Ireland and others. (ACTION: EHS).
- 5.5.5 Establish a network of seagrass monitoring stations around Northern Ireland by 2006. This should complement a network for the UK and Republic of Ireland. (ACTION: EHS)
- 5.5.6 Identify the environmental determinants for the re-establishment of seagrass beds by 2006. (ACTION: EHS).
- 5.5.7 Investigate the genetic diversity of *Zostera* spp. in Northern Ireland by 2006. (ACTION: EHS).
- 5.5.8 By 2006, identify the importance of seagrass beds as nursery grounds for fish to inform site designation and management. (ACTION: DARD, EHS).
- 5.5.10 Ensure that all relevant information gathered in surveys is passed to the Centre for Environmental Data and Recording (CEDaR) based at the Ulster Museum and to other relevant centres. Encourage access to, and exchange of these records, by contributing to the National Biodiversity Network www-based catalogue of environmental information. (ACTION: EHS)

5.6 Communications and publicity

- 5.6.1 Promote awareness among coastal users of the conservation importance of seagrass beds and how to avoid impact on these habitats. (ACTION: EHS).

6. Costing

- 6.1 A table showing the global costs for this and other HAPs is available on the EHS/Biodiversity web page.

7. References

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List of useful Acronyms

ASSI	Area of Special Scientific Interest
BTO	British Trust for Ornithology
CAP	Common Agricultural Policy
CEDaR	Centre for Environmental Data and Recording
CMD	Countryside Management Division
CMS	Countryside Management Scheme
DANI	Department of Agriculture for Northern Ireland
DARD	Department of Agriculture and Rural Development
DCAL	Department of Culture, Arts and Leisure
DETI	Department of Enterprise, Trade and Industry
DOE	Department of the Environment
DRD	Department of Rural Development
EC	European Commission
EHS	Environment and Heritage Service
EN	English Nature
ESA	Environmentally Sensitive Area
GFP	Good Farming Practice
JNCC	Joint Nature Conservation Committee
LBAP	Local Biodiversity Action Plan
LFA	Less Favoured Area
MAGNI	Museums and Galleries of Northern Ireland
MARPOL	International Convention for the Prevention of Marine Pollution from Ships
MOSS	Management of Sensitive Sites

NESA	New Environmentally Sensitive Area Scheme
NIBG	Northern Ireland Biodiversity Group
NICS	Northern Ireland Countryside Survey
NNR	National Nature Reserves
NT	National Trust
NVC	National Vegetation Classification
OSPAR	Convention for the Protection of the Marine Environment of the North East Atlantic
RSPB	Royal Society for the Protection of Birds
cSAC	candidate Special Area of Conservation
SAC	Special Area of Conservation
SLNCI	Site of Local Nature Conservation Interest
SNH	Scottish Natural Heritage
SoCC	Species of Conservation Concern
SPA	Special Protection Area
UWT	Ulster Wildlife Trust
WFD	Water Framework Directive
WWT	Wildfowl and Wetlands Trust