River Basin Management Plans

Water Framework Directive Reporting Guidance – Marine Surface Waters

Technical Supporting Document

Monitoring Saline Lagoons in Northern Ireland under the Water Framework Directive.

December 2015

An Agency within the Department of the Environment
www.doeni.gov.uk

INVESTORS IN PEOPLE

NIEA Northern Ireland Environment Agency
www.doeni.gov.uk/niea

1. Introduction

Saline lagoons are areas of shallow, coastal water that are wholly or partially separated from the adjacent sea or estuary. Saline lagoons occur both naturally and artificially; natural lagoons occur where a sand or shingle barrier to the sea is formed while artificial lagoons are often created when engineering works cut off part of an estuary or the sea from direct tidal influence and/or restricts tidal movement. Seawater may enter these systems either via a restricted channel, by percolation through the sand/shingle barrier, or by waves overtopping the barrier during high tides.

Freshwater input occurs from rainfall, from small rivers or streams or from groundwater supply.

Salinities in coastal lagoons vary according to the degree of inputs and outputs of both saline and fresh waters and can range from almost fresh to brackish to fully saline and hyper-saline. Saline lagoons often support highly specialised plant and animal species that are able to tolerate the variable conditions that characterise these systems; saline lagoons are also often an important habitat for waterfowl and waders. This makes them important habitats in terms of conservation and maintaining biodiversity.

This report provides a summary of saline lagoons and their monitoring requirements in Northern Ireland particularly within the context of the Water Framework Directive (WFD).

2. Saline Lagoons in Northern Ireland

Saline lagoons occur both naturally and artificially and vary both in size and form. Natural lagoons occur where a sand or shingle barrier to the sea is formed and seawater may percolate through this. Artificial lagoons are often created when engineering works cut off part of an estuary or the sea from direct tidal influence and/or restricts tidal movement.

Some 30 saline lagoons have been identified in Northern Ireland (Figure 1); only three systems are considered natural. All of these occur within the Strangford Lough area and include a brackish wetland at Rathgorman, a series of pools on Granagh Island and a series of salt pans and creeks at The Dorn.

The remaining saline lagoons in Northern Ireland are man-made features that have come about as a result of coastal structural works such as road and railway embankments and shoreline stabilisation. Although the majority of lagoons in Northern Ireland are man-made, they may still support specialist communities and thus have a conservation value.

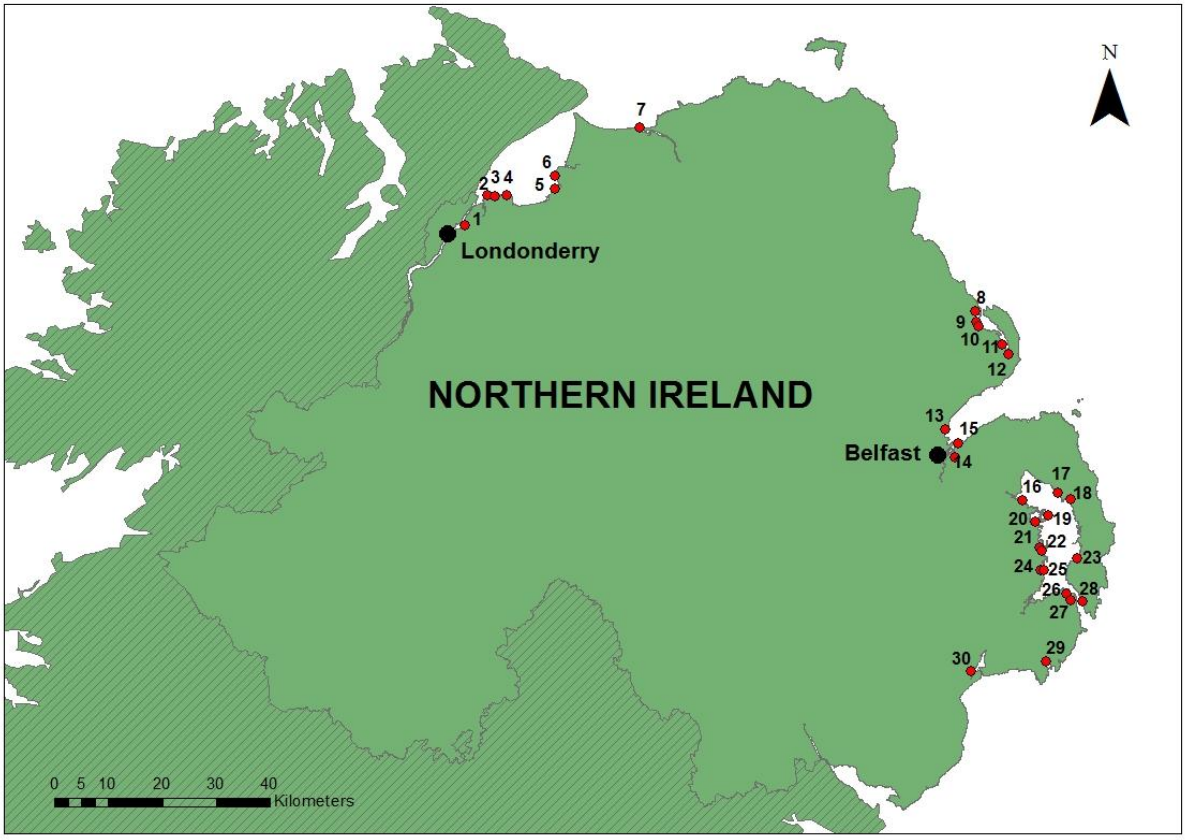

Figure 1. Map of saline lagoons in Northern Ireland. 1: Gransha. 2: Black Brae. 3: DonnyBrewer. 4: Longfield. 5: Ballykelly. 6: Myroe. 7: Ballyaghran. 8: Larne. 9: Glynn A. 10: Glynn B. 11: Oldmill. 12: Ballycarry. 13: Whitehouse. 14: Victoria Park. 15: Belfast Harbour Lagoons. 16: Castle Espie. 17: Annes Point. 18: Rosemount. 19: Mahee Point. 20: Cadew Point. 21: Quarterland. 22: Rathgorman. 23:The Dorn. 24: East Down Yacht Club A. 25: East Down Yacht Club B. 26: Castleward. 27: Blackcauseway. 28: Granagh. 29: Strand Lough. 30: Dundrum South.

The UK Technical Advisory Group on the Water Framework Directive guidance on typology for coastal and transitional waters identified two types of saline lagoons within the UK and Republic of Ireland (UKTAG, 2003a); these included transitional lagoons (TW6) and coastal lagoons (CW10). Both types of lagoon are described as small water bodies (>0.5 km^2) in coastal locations scattered throughout the UK and Republic of Ireland. They are typified by very shallow waters with no single channel to the open sea; sea water enters these systems

directly during high tides and through seepage. Transitional lagoons are significantly affected by freshwater inputs from diffuse sources or small streams such that oligohaline (0.5 – 5.0 psu) to polyhaline (18.0-30.0) conditions prevail; salinities in coastal lagoons are typically euhaline (30-40) (UKTAG, 2003a). Based on this typology, all saline lagoons in Northern Ireland have been classed as transitional lagoons (TW6). None of these systems, however, meet the minimum size threshold of >0.5km^2 to be regarded as a discrete water body under the WFD (Table 1).

Table 1. Saline lagoons in Northern Ireland.

Lagoon	Size (km^2)	Natural / Man-made	Conservation Area	Qualifying Feature
Gransha	0.041	Man-made		
Black Brae	0.095	Man-made	ASSI/SPA	
Donnybrewer	0.092	Man-made	ASSI/SPA	Lough Foyle ASSI
Longfield	0.088	Man-made	ASSI/SPA	Lough Foyle ASSI
Ballykelly	0.038	Man-made	ASSI/SPA	
Myroe/Ballymacran	0.090	Man-made	ASSI/SPA	Lough Foyle ASSI
Ballyaghran	0.012	Man-made	ASSI/SAC	
Larne	0.100	Man-made		
Glynn A	0.064	Man-made	ASSI/SPA	Larne Lough ASSI
Glynn B	0.028	Man-made		
Oldmill	0.052	Man-made	ASSI/SPA	
Ballycarry	0.084	Man-made	ASSI/SPA	
Whitehouse	0.120	Man-made	ASSI/SPA	
Victoria Park	0.058	Man-made	ASSI/SPA	
Belfast Harbour Lagoon	0.210	Man-made	ASSI/SPA	
Castle Espie	0.055	Man-made		
Mahee Point	0.006	Man-made	ASSI/SPA/SAC	
Cadew Point	0.015	Man-made	ASSI/SPA/SAC	
Quarterland	0.009	Man-made	ASSI/SPA/SAC	
East Down Yacht Club A	0.001	Man-made		
East Down Yacht Club B	0.007	Man-made	ASSI/SPA/SAC	
Rathgorman	0.002	Natural	ASSI/SPA/SAC	
Castleward	0.003	Man-made	ASSI/SPA/SAC	
Blackcauseway	0.003	Man-made	ASSI/SPA/SAC	
Granagh A	0.001	Natural	ASSI/SPA/SAC	
Dorn	0.346	Natural	ASSI/SPA/SAC	Strangford Lough Part 3 ASSI Strangford Lough SAC
Rosemount	0.040	Man-made	ASSI/SPA/SAC	
Anne's Point	0.038	Man-made	ASSI/SPA/SAC	
Strand Lough	0.051	Man-made	ASSI	Killough Bay and Strand Lough ASSI
Dundrum South	0.021	Man-made	ASSI/SAC	

UKTAG guidance on the identification of small surface water bodies (UKTAG, 2003b) suggests that where a transitional water is not identified as a discrete water body on the basis of the relevant size threshold, it may still be identified as a separate water body if one or more of the following criteria are applicable:

- Where the surface water is used, or intended to be used, for the abstraction of water intended for human consumption providing more than an average of 10 m^3/day or serving more than 50 persons (Drinking Water Protected Area).

- The achievement of any standards and objectives for a Special Protection Area (SPA) under the Birds Directive or a Special Area of Conservation (SAC) under the Habitats Directive depend on the maintenance or improvement of the status of the surface water.

- The achievement of the standards and objectives for an Area of Special Scientific Interest (ASSI) depend on the maintenance or improvement of the status of the surface water.

- It is determined within the river basin management planning process that the maintenance or improvement of the status of the surface water is important to the achievement of national or international biodiversity targets and the surface water is thus of ecological significance within the river basin district;

- The surface water is of such significance in the river basin district that (a) impacts, or risks of impacts, on it are liable to result in a failure to achieve the objectives for a body, or bodies of water in the river basin district, and (b) the competent authority deems the identification of the surface water as a discrete water body the most effective way of highlighting and managing the risks.

- The surface water is selected for identification as a water body within the river basin management planning process to provide an overview of the general condition of small surface waters within the river basin district.

- The surface water is a Protected Area designated as:

    - a nutrient-sensitive area under the Urban Waste Water Treatment Directive or the Nitrates Directive;

    - a bathing water under the Bathing Waters Directive; or

    - an area for the protection of economically significant aquatic species under the Shellfish Waters Directive or the Freshwater Fish Waters Directive,

and the competent authority deems that the identification of the small surface water as a water body will assist in the achievement of the objectives for the Protected Area.

While none of the saline lagoons in Northern Ireland meet the WFD water body size limit of 0.5 km^2, lagoons are identified as a priority habitat within the Northern Ireland Biodiversity Strategy; they are also listed as a priority (Annex 1) habitat under the Habitats Directive.

The vast majority of lagoons in Northern Ireland fall within designated conservation areas (ASSIs, SPAs, SACs) and six lagoons are identified as features of interest for which a site has been declared for conservation purposes (Table 1). The Northern Ireland Action Plan for Saline Lagoons states that the development of River Basin Management Plans under the WFD should address the conservation of sites designated for their saline lagoon interest

The Northern Ireland Water Framework Directive monitoring plans for transitional and coastal waters identified one lagoon from each River Basin District (RBD) to be included in the operational monitoring programme; these included Ballyaghran, Myroe, and Whitehouse (EHS, 2006). Only one system (Myroe) represents a saline lagoon feature of conservation designation interest. Following the UKTAG (2003b) guidance, the six lagoons identified as conservation features of interest could be classed as surface water bodies under the WFD.

3. Monitoring saline lagoons

Under the WFD, coastal saline lagoons that are identified as discrete water bodies require monitoring and assessment, and reporting on their ecological status. The conditions and habitat that characterise saline lagoons, however, are naturally very variable, both in space and time, and it is this variability that enables specialist species (species tolerant to these fluctuating conditions) to utilise these environments. Because saline lagoons are highly variable systems, they are difficult to monitor in terms of the requirements of the WFD; not all conventional monitoring and assessment methods used in coastal and/or transitional waters can be applied.

For example, lagoons are naturally eutrophic systems and phytoplankton blooms are a common occurrence; their isolation from the adjacent coastal or transitional water also limits their value as a nursery area for estuarine-associated fishes. Monitoring phytoplankton or fish fauna in saline lagoons and certain physico-chemical parameters such as nutrients, dissolved oxygen, pH, temperature, and turbidity is considered to be of little value (Bamber, 2010). Furthermore, the variable and unpredictable environmental conditions, and the associated biological communities of saline lagoons makes the establishment of reference conditions difficult (Bamber, 2010). Water Framework Directive compliant monitoring of saline lagoons would be difficult to achieve.

River Basin Management Plans under the WFD, however, should address the conservation of sites designated for their saline lagoon interest (Northern Ireland Action Plan for Saline Lagoons). All lagoons that are identified as features of conservation interest have conservation objectives and management plans associated with them and the competent authority (NIEA) is required to monitor these systems in relation to these objectives. Such condition assessment monitoring follows Common Standards Monitoring (CSM) guidelines (JNCC, 2004). Common Standards Monitoring Guidance for lagoons has identified several attributes that can be used to monitor the condition or conservation status of saline lagoons (JNCC, 2004). Four attributes are considered mandatory and these include:

- Extent of basin with a target of no reduction in extent from an established baseline.

- The presence and nature of the isolating barrier with a target of no change from an established baseline.

- Salinity regime; the average, maxima and minima seasonal (winter and summer) salinity should not deviate significantly from an established baseline (average salinity would be expected to lie within the range 15-40).

- Biotope composition; the variety of biotopes present should be maintained, allowing for succession and cyclical change.

Additional, non compulsory attributes include:

- Extent of sub-feature or representative or notable biotopes.
- Extent of water
- Distribution of biotopes
- Species composition of representative or notable biotopes
- Species population measures (population structure, abundance)
- Water depth

Condition assessment monitoring for the six saline lagoons was undertaken in 2006 and 2007. Four lagoons were assessed as in 'favourable' condition while two systems in Lough Foyle ASSI were regarded as 'unfavourable' (Table 2).

Table 2. Condition assessment monitoring results for Northern Ireland saline lagoons.

ASSI/SAC	**Lagoon**	**Condition**	
		2006	**2007**
Lough Foyle ASSI	Donnybrewer	Unfavourable	Unfavourable
Lough Foyle ASSI	Longfield	Unfavourable	Unfavourable
Lough Foyle ASSI	Myroe/Ballymacran	Favourable	Favourable
Larne Lough ASSI	Glynn A	Favourable	Favourable
Strangford Lough (Part 3) ASSI Strangford Lough SAC	The Dorn	Favourable	
Killough and Strand Lough ASSI	Strand Lough	Favourable	Favourable

Condition assessment monitoring of saline lagoons is undertaken in relation to the conservation and management objectives of these systems and NIEA has identified the actions that need to be taken to achieve them. These conservation objectives are also included in River Basin Management Plans,

particularly for Protected Areas designated under other European legislation (e.g. SACs and SPAs).

Given the difficulty in applying WFD compliant monitoring methods to saline lagoons, the monitoring and assessment of these systems in Northern Ireland, if identified as discrete water bodies under the WFD, should be based condition assessment monitoring for conservation purposes. A similar preliminary approach has been adopted by the Environment Agency for assessing saline lagoons in England and Wales under the WFD.

4. Summary and recommendations

- Saline lagoons are variable habitats and often support specialist plant and animal communities;
- Northern Ireland has 30 saline lagoons, most of which are man-made.
- Saline lagoons are a priority habitat both nationally and internationally.
- Saline lagoons in Northern Ireland are transitional waters (TW6).
- All saline lagoons in Northern Ireland are small (<0.5km^2) systems (below the WFD minimum size threshold for monitoring).
- Six saline lagoons are identified as features of conservation interest for designated ASSIs/SACs and could be regarded as discrete water bodies under the WFD.
- WFD compliant monitoring is difficult to apply in saline lagoons.
- Lagoon features of interest are monitored for conservation purposes according to CSM guidelines.
- Lagoon features of interest have conservation objectives and management plans associated with them.
- Monitoring and assessment of saline lagoons for the WFD should be based on condition assessment monitoring for conservation purposes.

5. References

Bamber, R. N. 2010. *Coastal saline lagoons and the Water Framework Directive*. Natural England Commissioned Report 039. 42 pp.

Environment and Heritage Service (EHS), 2006. *Aquatic Monitoring Strategy 2006-07 and Water Framework Directive Monitoring Plans*. Environment and Heritage Service. 59 pp.

Joint Nature Conservation Committee (JNCC), 2004. *Common Standards Monitoring Guidance for Lagoons*. Joint Nature Conservation Committee. 38 pp.

UK Technical Advisory Group on the Water Framewotk Directive (UKTAG), 2003a. *Guidance on Typology for Coastal & Transitional Waters of the UK and Republic of Ireland*. UKTAG. 12 pp.

UK Technical Advisory Group on the Water Framewotk Directive (UKTAG), 2003b. *Guidance on the identification of small surface water bodies*. UKTAG. 13 pp.