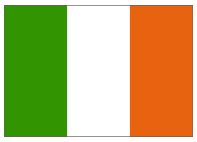

WFD Surface Water Lakes Risk Assessment Methodology

GUIDANCE ON THRESHOLDS AND METHODOLOGY TO BE APPLIED IN IRELAND'S RIVER BASIN DISTRICTS

Paper by the Working Group on Characterisation and Risk Assessment

Surface water guidance document

This is a guidance paper on the application of a proposed **Surface Lake Impact Data Risk Assessment** methodology. It documents the principles to be adopted by River Basin Districts and authorities responsible for implementing the Water Framework Directive in Ireland. This is a working draft describing a method that will evolve as it is trialled, and will be amended accordingly.

REVISION CONTROL TABLE

Status	Approved by National Technical Coordination Group	WFD Requirement	Relevant EU Reporting sheets	Date
Final	12th November 2004	Impacts and Pressures	LW_1 - Lakes Risk Assessment_Impact Data LW_2 - Lakes Risk Assessment_Surface Diffuse	November 2004

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Acronyms

EPA	Environmental Protection Agency
CFB	Central Fisheries Board
LA	Local Authority
NPWS	National Parks and Wildlife Service
SAC	Special Areas of Conservation
WB	Water body
WFD	Water Framework Directive

1. Introduction

The purpose of this document is to provide guidance on the

- identification of lakes to be reported under the Water Framework Directive
- use of assessment of lakes using impact data derived from national monitoring programmes and
- predictive impact from surface diffuse pressure.

This risk assessment is undertaken in accordance with the requirements under Article 5 of the Water Framework Directive. Member states are required to undertake '*a review of the impact of human activity on the status of surface waters and on ground waters*'. The assessment must determine the likelihood of surface waters failing to meet the Directive's environmental objectives.

The United Kingdom Technical Advisory Group's (UK TAG) guidance document 7f on "*The use of existing environmental monitoring data and other information for Risk Assessment of Lakes (Task 7f) (V2, 2 July 03)*" was reviewed in the development of the Irish Surface Water Lake Impact Data Risk assessment methodology. Boundary Thresholds proposed for application in Ireland have been derived from Irish historical monitoring data and are lake type specific.

For Impact Data the Irish methodology involves the compilation of a database of impact (monitoring) data derived from national programmes undertaken annually by the EPA, CFB, Regional Fisheries Boards and Local Authorities. Quality of data varies depending on frequency and history of sampling. In addition, the sensitivity of Lake waterbodies varies depending upon their designation under the European Communities (Quality of Salmonid Waters) Regulations, being utilised for water abstraction and/or located within a Special Area of Conservation. Lake history in terms of historic loss of fish species, trend in chlorophyll a and mean total phosphorous concentrations or observed significant algal growth was also considered as part of the risk assessment process and the conservative approach is adopted in the Irish risk assessment methodology.

The Risk Assessment Working Group in Ireland has agreed to the adoption of a four-category risk classification scheme:

1a	At significant risk
1b	Probably at significant risk
2a	Probably not at significant risk
2b	Not at significant risk

Example

A lake waterbody has a moderate alkalinity and a measured mean chlorophyll a concentration of 30ug /l. the boundary threshold chlorophyll a value for this type of lake is 21ug/l hence this lake is classed as 1a or "at significant risk". By contrast a lake which complies with its respective boundary threshold value but for which historic evidence shows an increasing trend or actual physical impact (loss of fish species or algal bloom) would be categorised as either 1a "at significant risk" or 1b "probably at significant risk" depending on the trend , magnitude of impact or sensitivity of the lake.

Surface diffuse assessment is a qualitative assessment based on the surface diffuse risk assessment SD_1 developed for river water bodies. The assessment is based on the percentage area of the lake catchment waterbodies categorised as at risk from diffuse agricultural pollution.

2. Aims and scope

- The document indicates the lakes which are to be reported under the WFD.
- The document outlines the way in which measured impact data and information has been utilised to assign a risk category to Irish lakes.
- The document outlines the way in which diffuse agricultural assessment pressure has been utilised to assign a risk category to Irish lakes.
- This guidance document deals with eutrophication elements only, morphological and diffuse elements are dealt with under separate guidance documents.

3. Water Framework Directive Lakes

As stated above, the aim of this assessment is to determine the lake water bodies in Ireland that are at risk or not at risk both on the basis of impact data and on the predicted impact of diffuse pressures relating to eutrophication.

The Water Framework Directive requires reporting of lake risk status for the following lakes

- Lakes of 50 Hectares and greater
- Protected Areas lakes (SAC lakes)
- Water Abstraction Lakes

A large number of lakes ranging from greater than 50 hectares to less than 1 hectare are located in **Special Areas of Conservation (SACs)** have been designated under the EU Habitats Directive. For the purpose of the WFD lakes which are situated geographically within an SAC are regarded as Protected Areas lakes provided the SAC is listed as containing any of the Lake Habitat categories

- Oligitrophic Lakes _3110
- Oligotrophic lakes_3130
- Hard_Oligo_Meso_ Lakes_3140
- Naturally_Euthrophic_Lakes_3150
- Naturally dystrophic lakes an ponds 3160

Lakes below 5 Hectares in size are excluded from the reporting requirements except where Lakes which are true for the EU habitat code “dystrophic lakes_3160” but which are < 5 hectares in size have been excluded from the final reporting.

A list of SACs associated with each EU Annex I lake habitat is provided in the Tables attached in Appendix I.

4. Impact Risk Assessment of Lakes

4.1 Datasets

In Ireland impact data is available only for the following parameters (see Table 1).

- Mean Total Phosphorous in ug/l
- Chlorophyll a Mean value in mg/l
- Chlorophyll a Max value in mg/l

As a result the assessment is based on impact data only as good data is not available in relation to the hydrology and turnover of Irish Lakes which would allow critical P loads to be calculated reliably to assess predictive diffuse impact pressure.

Table 1 – Impact data available for risk assessment

Quality Element		Metric	Pressure
Phytoplankton	Biomass	Annual mean chlorophyll a concentration Annual maximum chlorophyll a concentration	Nutrients
Supporting Chemistry		Annual mean total phosphorus concentration	Nutrients

4.2 Available Impact Data

Impact data is available for a total of 499 lakes. This data has been obtained from the

- Environmental Protection Agency (EPA) monitoring programmes on Irish Lakes including data provided by the ERTDI Research Projects.
- Central Fisheries Board (CFB) and Regional Fisheries Boards monitoring data on Irish Lakes.
- Local Authority monitoring data on Irish Lakes

Data collected nationally from the Central Fisheries Board, Regional Fisheries Boards, the Local Authorities and the Regional EPA Laboratories has been screened for use by the EPA. The impact assessment is based on the screened dataset provided by the EPA.

4.3 Screened data

All data sets collected by the EPA were screened out and selected for use for each lake as follows:

- Where a minimum of ten samples have been taken annually the Mean Chlorophyll a data has been used.
- Where a minimum of ten samples have been taken annually the Mean Total P data has been used.
- Where less than ten samples per annum have been taken only Max Chlorophyll a data has been used. Max Total P data has not been used.

4.4 Thresholds

Type specific boundary conditions were established based on datasets available to the EPA. The boundary conditions were established with respect to the alkalinity of the lake waterbodies reflecting the alkalinity ranges for lake Typology. Table 2 provides type specific lakes.

Table 2 – Type Specific Lakes

Type Specific Lakes	
Alkalinity	Range (mg/l CaCO3)
Low	20 mg
Moderate	>20-100 mg
High	>100 mg

Boundary conditions for Mean and Max Chlorophyll a were established for each specific lake type in accordance with Table 3.

Boundary conditions for Mean Total Phosphorous were established for each specific lake type in accordance with Table 4.

Where alkalinity data was not available for lakes boundary conditions for Mean and Max Chlorophyll a and Mean Total Phosphorous were established as follows:

- For Mean and Max Chlorophyll a the lakes are regarded as moderate alkalinity lakes, which category has the lowest boundary values and thus reflects the precautionary principle.
- For Mean Total P the boundary value for lakes has been set at 20ug/l derived from the National Phosphorous Regulations value for lakes. Boundary conditions are shown in Table 3.

Table 3 – Chlorophyll a Type Specific Boundary Conditions

Boundary Conditions Chlorophyll a							
Risk	Alkalinity						
Category	Low		Mod.		High		Nature of Data
	Mean	Max	Mean	Max	Mean	Max	
2b	<=8	<=25	<=8	<=21	<=8	<=25	Long Term or Single Annual mean data or Long Term or Single monthly summer/autumn data or long term single sample summer data
2a	<=8	<=25	<=8	<=21	<=8	<=25	Single growing season data
1b	>8	>25	>8	>21	>8	>25	Single sample growing season data
1a	>8	>25	>8	>21	>8	>25	Long Term or Single Annual mean data or Long Term or Single monthly summer/autumn data or long term single sample summer data

Table 4 – Chlorophyll a Type Specific Boundary Conditions

Boundary Conditions Mean Total Phosphorous				
Risk	Alkalinity			
Category	Low	Mod.	High	Nature of Data
	Mean TP	Mean TP	Mean TP	
2b	<=30	<=22	<=20	Long Term or Single Annual mean data or Long Term or Single monthly summer/autumn data or long term single sample summer data
2a	<=30	<=22	<=20	Single growing season data
1b	>30	>22	>20	Single sample growing season data
1a	>30	>22	>20	Long Term or Single Annual mean data or Long Term or Single monthly summer/autumn data or long term single sample summer data

Table 5 – Chlorophyll a and Mean Total P Non -Type Specific Boundary Conditions

Risk category	Mean Chl a	Max Chl a	Mean TP	Nature of Data
2b	<=8	<=21	<=20	Long Term or Single Annual mean data or Long Term or Single monthly summer/autumn data or long term single sample summer data
2a	<=8	<=21	<=20	Single growing season data
1b	>8	>21	>20	Single sample growing season data
1a	>8	>21	>20	Long Term or Single Annual mean data or Long Term or Single monthly summer/autumn data or long term single sample summer data

4.5 Risk assessment Approach

Risk assessment has been undertaken on all lakes for which impact data is available and has been screened by the EPA based on the boundary condition as set out in tables 3, 4 and 5 above.

4.6 Data preference

The following data preference has been utilised in assigning the risk category to lake water bodies.

- Where available, Mean Chlorophyll a data has been used as the primary basis for assigning risk category.
- Were mean data is not available Max Chlorophyll a data has been utilised to assign risk category with lower confidence.
- Where no max or Mean Chlorophyll a data is available then Mean Total P data has been utilised.

4.7 Use of Multiple Year Data

Data availability varies considerably throughout the country. Some lakes have been monitored for prolonged periods of years and have a long historic record period whereas other lakes will have data available only for recent years depending on whether they were part of routine surveillance monitoring or specific operational monitoring programmes. In assigning the "risk" category to lakes the following approach has been taken.

Consideration has been given to multiple year data as follows:

- Based on the precautionary principle the highest risk category of lakes in the period 2001 – 2003 has been used.
- Where only Max Chlorophyll a data is available long term multiple year data is also assessed where available based on long term trend. Higher confidence has been placed on this data on the basis of expert judgement.
- Where Mean Chlorophyll a data and mean TP data are available on a long term multiple year bases this data is also assessed based on long term trend data.

4.8 Receptor Sensitivity

Impact data was also assessed in terms of the sensitivity of the lake type to pollutants and the requirements of specific legislative instruments. In particular lakes which were

- Designated under the EU Freshwater Fish Directive (78/659/EEC),
- Indicated as Water abstraction lakes
- indicated as being EU Habitats Directive (92/43/EEC) Annex I Sensitive Lake Habitats
- indicated as containing Fish Species requiring more stringent water quality standards

were regarded as sensitive lakes for the purpose of assessment.

The EU Freshwater Fish Directive (78/659/EEC) was adopted on 18 July 1978, to protect those fresh water bodies identified by Member States as waters suitable for sustaining fish populations. The Directive will be repealed in 2013 by the EC Water Framework Directive. Lough Corrib in the Western River Basin District is the only lake designated in Ireland under the Freshwater Fish Directive[1].

[1] European Communities (Quality of Salmonid Waters) Regulations, 1988

Water abstraction lakes where the abstraction is greater than 10 m^3/day or 50 population equivalent are required to be reported under the WFD.

Special Areas of Conservation (SACs) have been designated under the EU Habitats Directive. Lakes for reporting under the WFD were identified under Annex I of the Directive which lists five lake habitats with high/moderate sensitivity to phosphate as per Table 6:

Table 6 – Sensitive EU Habitats Directive Annex I Lakes

EU Habitat Code	EU Annex I Habitat	Sensitivity
3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)	High
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	High
3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	High
3150	Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation	moderate
3160	Natural dystrophic lakes and ponds	high

Fish Species:

Six fish species have been given priority protection under the EU Habitats Directive and a number of Special Areas of Conservation have already been designated for brook Lamprey. Preliminary listing of sites for Atlantic Salmon (Salmo Salar) for SAC designation has already taken place[2].

In addition the loss of certain fish species such as Arctic Char (Salvalinus alpinus)[3,4,5] which are rare, have been used as indicators of the status of Irish lakes.

4.9 Expert Judgement

Expert judgement has been used in a final risk assessment of all lakes for which impact data is available. Expert Judgement was carried out by a Peer Review Group comprising

- Environmental Protection Agency (EPA)
- Central Fisheries Board

[2] O'Keefe and Dromey, Designation of Sites for Fish under the EU Habitats Directive, Biology and Environment Proceedings of the Royal Irish Academy. Vol.104B, No. 3, 103-105 (2004)
[3] Irelands Most Threatened and Rare Freshwater Fish: An International Perspective on Fish Conservation, peter S. Maitland, Biology and Environment: Proceedings of the Royal Irish Academy. Vol 104B, No. 3, 5-16 (2004)
[4] Evidence for the recent extinctions of two Arctic Charr Salvelinus alpinus (L) populations in the West of Ireland, F. Igoe et al, Aquatic Conservation: Marine and Freshwater Ecosystems 11: 77 – 92 (2001) DOI: 10.1002/aqc.431
[5] Freshwater Fish Conservation in the Irish republic: A review of Pressures and Legislation Impacting on Conservation Efforts, m. Fitzsimons and Fran Igoe, Biology and Environment: Proceedings of the Royal Irish Academy. Vol 104B, No. 3, 17 -32 (2004)

- National Parks and Wildlife Service (NPWS)
- Office of Public Works

acting in unison. Expert Judgement is based on long term trend data, in depth knowledge of particular lake water bodies and their designations, impact on fish species and more recent information relating to lake ecology (observations of increased algal blooms and growth in littoral areas for example).

Expert Judgement was used in the following manner:

- The full risk assessment of all lakes using impact data and the boundary conditions set in tables 3, 4 and 5 were screened and confirmed .
- Where only Max Chlorophyll a data is available long term multiple year data is also assessed where possible. The risk category has been confirmed or altered based on long term trend data and field observations.
- Where Mean Chlorophyll a data and mean TP data are available on a long term multiple year bases this data is also assessed where possible.
- Where known impacts on lakes within Special Areas of Conservation had been noted the lake waterbody was assigned a higher risk status.
- Where loss of sensitive fish species, such as Arctic Charr, had occurred the lake waterbody was assigned a higher risk status.
- The presence of Alien Species in a lake waterbody was taken into consideration where such species may mask the true nutrient dynamics that would otherwise place such waterbodies at higher risk status.

5. Surface Diffuse Risk Assessment of Lakes

5.1 Data sets

Diffuse Risk assessment of Irish lakes is based on assessment of the percentage catchment area of the lake categorised as 1a, 1b, 2a, and 2b as determined by the Surface Diffuse Risk Assessment SD1 (General Diffuse) developed for surface river water bodies.

The UK-TAG and SEPA guidance documents were examined for applicability to available data sets for Irish Lakes. Significant difference exists between data sets available in the UK, Scotland and Northern Ireland compared to the Republic of Ireland.

UK_TAG recommended that lake risk assessments be based on pressures and impacts for the following pressures:

- Eutrophication (phosphorus),
- Acidification,
- Hydrological,
- Morphological.

This assessment refers only to surface diffuse agricultural pressure and predicted impact on Irish lakes. Acidification is assessed under separate Surface Diffuse risk assessment. Hydrological is assessed separately under Abstraction and Impoundment Risk Assessment. Morphological is assessed separately under Morphological Risk Assessment.

5.2 Data Limitation

Limited data is available with respect to the turnover time of Irish Lakes due principally to a lack of detailed lake depth data and lake hydrology and turnover time. Hence it is not possible to develop critical Phosphorous loads for the large number of Irish lakes to be assessed. It is possible to use the Surface Diffuse Risk Assessment of the river waterbodies as a surrogate for diffuse agricultural pressure to provide an assessment of the risk to lakes from diffuse nutrient loads in the lake catchments.

The main assessment considered under this document is the Eutrophication Pressure from surface diffuse sources.

5.3 Threshold

The percentage of area of surface water bodies in each risk category 1a, 1b, 2a and 2b within each lake catchment area is used to assess the predicted impact of diffuse agricultural pressure on the lake.

Table 7 Surface Diffuse Risk Assessment

Risk	1a	1b	2a	2b
Lakes Diffuse Risk Category	Area of lake catchment comprising river water bodies at risk from SD1 >= 50%	Area of lake catchment comprising river water bodies at risk from SD1 >30% and < 50%	Area of lake catchment comprising river water bodies at risk from SD1 > 30% and >5%	Area of lake catchment comprising river water bodies at risk from SD1 <=5%
Low Confidence	1b		2a	2b

The method is to be regarded as Low Confidence and hence lakes falling into the 1a and 1 b category should be reported as 1b – probably at significant risk, lakes falling into the 2a and

2b category should be reported as 2a – probably not at significant risk and 2b – not at significant risk.

6. Overall limitations and considerations

1) Any lakes for which monitoring data is not available will not be considered for impact assessment.
2) In the initial characterisation phase it is not possible to identify precisely which lakes within SACs are associated with the above Habitats types, hence all lakes within the SAC are initially considered as WFD lakes. Further refinement through the process of Further Characterisation will identify specific Annex I Habitat lakes.
Some SACs will not have any lake waterbodies greater than 5 hectares. In these cases a representative number of lakes within the SAC have been selected.

7. GIS Methodolgy – preparation of datasets and application of thresholds

7.1 Lake Impact Data Risk Assessment and GIS.

It is necessary to link the impact data risk assessment to the GIS system.

The Lakes Typology data set was used as the basis for linking the Lakes Impact data risk assessment into the GIS.

A database of all available impact data was compiled initially by the EPA from data supplied by the EPA regional Laboratories, CFB, Regional Fisheries Boards and Local Authorities. This database was validated and cleaned of erroneous information.

Risk assessment was undertaken on the validated data for each lake for which data was available in accordance with the impact risk assessment methodology.

EPA, CFB and Local Authority lake monitoring data sets generally contain the "old form" of the National Grid coordinates and the Lake name commonly used for water quality reporting purposes (such as those used in the National Lake Water Quality EPA Reports). These must be linked to the Lake Typology data set to facilitate input to the GIS and reporting.

Matching lake names were used to assign the SEG_CD to the lake monitoring data where possible. Note that some lake names occur multiple times in some counties. Also many Lake Typology data set lakes have no associated lake names. Where lake names could not be matched expert judgement was used to identify lake locations based on knowledge of the location of the lakes on the OSI 1:50,000 maps. Coordinates were obtained from the OSI map and used to geo locate the lakes on the Lake Typology GIS map. SEG_CD were then assigned to these lakes.

GIS files were then created based on the SEG_CD codes and the risk assessment assigned to these lakes.

7.2 Lakes Diffuse Impact Assessment

Step 1 – Identify Lake waterbodies to be reported

Risk assessment is carried out on the following Lakes

Lakes > 50 hectares

Water Abstraction Lakes with abstractions > 10 m^3/d (50 PE)

Protected Areas Lakes

- In SACs containing lakes >5 hectares report only those lakes
- In SACs which do not contain lakes >5 Ha select representative smaller lakes

Step 2 - Develop Catchment Area of Lakes

Large Lakes – Use the nested and unnested river waterbodies to identify the relevant catchment area of lakes.

Water Abstraction Lakes – Use catchment area already defined as part of the water abstraction risk assessment.

Small lakes – Identify lakes within SACs (Protected Areas). Use nested and unnested river waterbodies to identify the lake catchment area. (Note: Most small lakes are contained entirely within a single river waterbody which may also be the catchment area of the lake depending on lake location. Since the SD1 Diffuse risk assessment applies to the entire area of each surface river water body then for these lakes the river Waterbody can be used as the catchment for the purpose of the assessment).

Step 3 – Determine percentage of catchment at 1a, 1b, 2a and 2b

Use Lake catchments to split the SD1 Surface Diffuse risk assessment and determine the percentage of lake catchment at 1a,1 b, 2a and 2b.as per Table 1

The method is to be regarded as Low Confidence and hence lakes falling into the 1a and 1 b category should be reported as 1b – probably at significant risk, lakes falling into the 2a and 2b category should be reported as 2a– probably not at significant risk and 2b – not at significant risk.

Table 1 Surface Diffuse Risk Assessment

Risk	1a	1b	2a	2b
Lakes Diffuse Risk Category	Area of lake catchment comprising river water bodies at risk from SD1 >= 50%	Area of lake catchment comprising river water bodies at risk from SD1 >30% and < 50%	Area of lake catchment comprising river water bodies at risk from SD1 > 30% and >5%	Area of lake catchment comprising river water bodies at risk from SD1 <=5%
Low Confidence	1b			

Step 4 - Use available Impact Data

Where Impact data risk assessment is available for lakes use this to qualify the diffuse risk assessment result and assign the risk category as per the impact data risk assessment.

Appendix I

List of Special Areas of Conservation and associated qualifying Interest/Habitat Codes

Site Code	SAC Name	Habitat/ Species Code	Qualifying Interest - Habitat/Species
001228	Aughrusbeg Machair and Lake	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000014	Ballyallia Lake	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
001975	Ballyhoorisky Point to Fanad Head	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001975	Ballyhoorisky Point to Fanad Head	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000696	Ballyteige Burrow	1150	Coastal lagoons
002118	Barnahallia Lough	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001922	Bellacorick Bog Complex	3160	Natural dystrophic lakes and ponds
002032	Boleybrack Mountain	3160	Natural dystrophic lakes and ponds
000093	Caha Mountains	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
000093	Caha Mountains	3160	Natural dystrophic lakes and ponds
001021	Carrowmore Point to Spanish Point and Islands	1150	Coastal lagoons
001482	Clew Bay Complex	1150	Coastal lagoons
002047	Cloghernagore Bog and Glenveagh National Park	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001342	Cloonee and Inchiquin Loughs, Uragh Wood	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001952	Comeragh Mountains	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
002034	Connemara Bog Complex	1150	Coastal lagoons
002034	Connemara Bog Complex	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
002034	Connemara Bog Complex	3160	Natural dystrophic lakes and ponds
000252	Coole-Garryland Complex	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
000584	Cuilcagh-Anierin Uplands	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
000584	Cuilcagh-Anierin Uplands	3160	Natural dystrophic lakes and ponds
000032	Dromore Woods and Loughs	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
002187	Drongawn Lough	1150	Coastal lagoons
000138	Durnesh Lough	1150	Coastal lagoons
001926	East Burren Complex	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000607	Errit Lough	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
002189	Farranamanagh Lough	1150	Coastal lagoons
000268	Galway Bay Complex	1150	Coastal lagoons
000142	Gannivegil Bog	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001879	Glanmore Bog	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

Site Code	SAC Name	Habitat/ Species Code	Qualifying Interest - Habitat/Species
001919	Glenade Lough	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
000500	Glenamoy Bog Complex	3160	Natural dystrophic lakes and ponds
001141	Gweedore Bay and Islands	1150	Coastal lagoons
001141	Gweedore Bay and Islands	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000278	Inishbofin and Inishshark	1150	Coastal lagoons
001275	Inisheer Island	1150	Coastal lagoons
000213	Inishmore Island	1150	Coastal lagoons
001061	Kilkeran Lake and Castlefreke Dunes	1150	Coastal lagoons
002111	Kilkieran Bay and Islands	1150	Coastal lagoons
000365	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000365	Killarney National Park, Macgillycuddy's Reeks and Caragh River Catchment	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
001786	Kilroosky Lough Cluster	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
001151	Kindrum Lough	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000704	Lady's Island Lake	1150	Coastal lagoons
002176	Leannan River	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000158	Lough Akibbon and Gartan Lough	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001673	Lough Arrow	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
002120	Lough Bane and Lough Glass	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
001529	Lough Cahasy, Lough Baun and Roonah Lough	1150	Coastal lagoons
001774	Lough Carra/Mask Complex	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001774	Lough Carra/Mask Complex	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000297	Lough Corrib	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000297	Lough Corrib	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000163	Lough Eske and Ardnamona Wood	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001818	Lough Forbes Complex	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
001976	Lough Gill	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
000633	Lough Hoe Bog	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
002121	Lough Lene	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000428	Lough Melvin	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
002119	Lough Nageeron	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000165	Lough Nillan Bog (Carrickatlieve)	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

Site Code	SAC Name	Habitat/ Species Code	Qualifying Interest - Habitat/Species
000007	Lough Oughter and Associated Loughs	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
000688	Lough Owel	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000304	Lough Rea	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000440	Lough Ree	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
002287	Lough Swilly	1150	Coastal lagoons
000370	Lough Yganavan and Lough Nambrackdarrig	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
002165	Lower River Shannon	1150	Coastal lagoons
002008	Maumturk Mountains	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000375	Mount Brandon	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
000470	Mullet / Blacksod Bay Complex	3150	Natural euthrophic lakes with Magnopotamion or Hydrocharition-type vegetation
001932	Mweelrea/Sheeffry/Erriff Complex	1150	Coastal lagoons
001932	Mweelrea/Sheeffry/Erriff Complex	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001932	Mweelrea/Sheeffry/Erriff Complex	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
001932	Mweelrea/Sheeffry/Erriff Complex	3160	Natural dystrophic lakes and ponds
001309	Omey Island Machair	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000534	Owenduff/Nephin Complex	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000534	Owenduff/Nephin Complex	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
000534	Owenduff/Nephin Complex	3160	Natural dystrophic lakes and ponds
002006	Ox Mountains Bogs	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
002006	Ox Mountains Bogs	3160	Natural dystrophic lakes and ponds
002301	River Finn	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001312	Ross Lake and Woods	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
001311	Rusheenduff Lough	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
002283	Rutland Island and Sound	1150	Coastal lagoons
000708	Screen Hills	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
000185	Sessiagh Lough	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
002074	Slyne Head Peninsula	1150	Coastal lagoons
002074	Slyne Head Peninsula	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
002074	Slyne Head Peninsula	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000709	Tacumshin Lake	1150	Coastal lagoons
000636	Templehouse and Cloonacleigha Loughs	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
001195	Termon Strand	1150	Coastal lagoons
002031	The Twelve Bens/Garraun Complex	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)

Site Code	SAC Name	Habitat/ Species Code	Qualifying Interest - Habitat/Species
002259	Tory Island Coast	1150	Coastal lagoons
002070	Tralee Bay and Magheree Peninsula, West to Cloghane	1150	Coastal lagoons
000194	Tranarossan and Melmore Lough	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
002130	Tully Lough	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001571	Urlaur Lakes	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
000197	West of Ardara/Maas Road	3110	Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae)
001810	White Lough, Ben Loughs and Lough Doo	3140	Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.
002122	Wicklow Mountains	3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea
002122	Wicklow Mountains	3160	Natural dystrophic lakes and ponds