

National Parks and Wildlife Service

Conservation Objectives Series

Lough Arrow SAC 001673



An Roinn Tithíochta,
Rialtais Áitiúil agus Oidhreachta
Department of Housing,
Local Government and Heritage

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Introduction

The overall aim of the Habitats Directive is to maintain or restore the favourable conservation status of habitats and species of community interest. These habitats and species are listed in the Habitats and Birds Directives and Special Areas of Conservation and Special Protection Areas are designated to afford protection to the most vulnerable of them. These two designations are collectively known as the Natura 2000 network.

European and national legislation places a collective obligation on Ireland and its citizens to maintain habitats and species in the Natura 2000 network at favourable conservation condition. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

A site-specific conservation objective aims to define favourable conservation condition for a particular habitat or species at that site.

The maintenance of habitats and species within Natura 2000 sites at favourable conservation condition will contribute to the overall maintenance of favourable conservation status of those habitats and species at a national level.

Favourable conservation status of a habitat is achieved when:

- its natural range, and area it covers within that range, are stable or increasing, and
- the specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future, and
- the conservation status of its typical species is favourable.

The favourable conservation status of a species is achieved when:

- population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats, and
- the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and
- there is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

Notes/Guidelines:

1. The targets given in these conservation objectives are based on best available information at the time of writing. As more information becomes available, targets for attributes may change. These will be updated periodically, as necessary.
2. An appropriate assessment based on these conservation objectives will remain valid even if the targets are subsequently updated, providing they were the most recent objectives available when the assessment was carried out. It is essential that the date and version are included when objectives are cited.
3. Assessments cannot consider an attribute in isolation from the others listed for that habitat or species, or for other habitats and species listed for that site. A plan or project with an apparently small impact on one attribute may have a significant impact on another.
4. Please note that the maps included in this document do not necessarily show the entire extent of the habitats and species for which the site is listed. This should be borne in mind when appropriate assessments are being carried out.
5. When using these objectives, it is essential that the relevant backing/supporting documents are consulted, particularly where instructed in the targets or notes for a particular attribute.

Qualifying Interests

** indicates a priority habitat under the Habitats Directive*

001673 Lough Arrow SAC

3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

Please note that this SAC overlaps with Lough Arrow SPA (004050) and is adjacent to Unshin River SAC (001898). See map 2. The conservation objectives for this site should be used in conjunction with those for the overlapping and adjacent sites as appropriate.

Supporting documents, relevant reports & publications

Supporting documents, NPWS reports and publications are available for download from: www.npws.ie/Publications

NPWS Documents

Year :	1992
Title :	Owenmore River Catchment. Proposed Arterial Drainage Environmental Impact Assessment - Botanical and Ornithological Surveys.
Author :	Goodwillie, R.N.; Buckley, P.; Douglas, C.
Series :	Unpublished report
Year :	2007
Title :	Supporting documentation for the Habitats Directive Conservation Status Assessment - backing documents. Article 17 forms and supporting maps
Author :	NPWS
Series :	Unpublished report to NPWS
Year :	2013
Title :	The status of EU protected habitats and species in Ireland. Volume 2. Habitats assessments
Author :	NPWS
Series :	Conservation assessments
Year :	2015
Title :	Habitats Directive Annex I lake habitats: a working interpretation for the purposes of site-specific conservation objectives and Article 17 reporting
Author :	O Connor, Á.
Series :	Unpublished document by NPWS
Year :	2016
Title :	Ireland Red List No. 10: Vascular Plants
Author :	Wyse Jackson, M.; FitzPatrick, Ú.; Cole, E.; Jebb, M.; McFerran, D.; Sheehy Skeffington, M.; Wright, M.
Series :	Ireland Red Lists series, NPWS
Year :	2019
Title :	The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments
Author :	NPWS
Series :	Conservation assessments
Year :	2020
Title :	Marl Lake (Habitat 3140) Survey and Assessment Methods Manual
Author :	Roden, C.; Murphy, P.; Ryan, J.; Doddy, P.
Series :	Irish Wildlife Manuals, No. 125
Year :	2020
Title :	Benthic vegetation in Irish marl lakes: monitoring habitat 3140 condition 2011 to 2018
Author :	Roden, C.; Murphy, P.; Ryan, J.
Series :	Irish Wildlife Manuals, No. 124
Year :	2020
Title :	Benthic vegetation in Irish marl lakes: monitoring habitat 3140 condition 2011 to 2018. Appendix III, Site Reports
Author :	Roden, C.; Murphy, P.; Ryan, J.
Series :	Irish Wildlife Manuals, No. 124

Other References

Year :	1899
Title :	A botanist in the central plain: being notes on field-work in 1897-98
Author :	Praeger, R.L.
Series :	Irish Naturalist, 8(4): 87-103
Year :	1901
Title :	Irish topographical botany
Author :	Praeger, R.L.
Series :	Proceedings of the Royal Irish Academy. Third series, 7: 1-410.
Year :	1982
Title :	Eutrophication of waters. Monitoring assessment and control
Author :	OECD
Series :	OECD, Paris
Year :	1987
Title :	Lough Arrow: water quality and trophic status
Author :	Champ, T.; King, J.J.
Series :	Unpublished report to Central Fisheries Board (Inland Fisheries Ireland)
Year :	1993
Title :	Notes on the flora of the Owenmore Catchment Cos Sligo (H28) and East Mayo (H26)
Author :	Douglas, C.; Goodwillie, R.; Mooney, E.
Series :	Irish Naturalists' Journal, 24(5): 218-220
Year :	2002
Title :	Investigations on aquatic plants in Lough Arrow: Findings from a study undertaken in July 2001 and comparison with a study of 1984.
Author :	King, J.J.
Series :	Unpublished report to Central Fisheries Board (Inland Fisheries Ireland)
Year :	2006
Title :	A reference-based typology and ecological assessment system for Irish lakes. Preliminary investigations. Final report. Project 2000-FS-1-M1 Ecological assessment of lakes pilot study to establish monitoring methodologies EU (WFD)
Author :	Free, G.; Little, R.; Tierney, D.; Donnelly, K.; Coroni, R.
Series :	Environmental Protection Agency, Wexford
Year :	2008
Title :	Water Quality in Ireland 2004-2006
Author :	Clabby, K.J.; Bradley, C.; Craig, M.; Daly, D.; Lucey, J.; McGarrigle, M.; O'Boyle, S.; Tierney, D.; Bowman, J.
Series :	Environmental Protection Agency, Wexford
Year :	2009
Title :	The marl lakes of the British Isles
Author :	Pentecost, A.
Series :	Freshwater Reviews, 2(1): 167-197
Year :	2010
Title :	Water Quality in Ireland 2007-2009
Author :	McGarrigle, M.; Lucey, J.; Ó Cinnéide, M.
Series :	Environmental Protection Agency, Wexford

Year :	2015
Title :	Water Quality in Ireland 2010-2012
Author :	Bradley, C.; Byrne, C.; Craig, M.; Free, G.; Gallagher, T.; Kennedy, B.; Little, R.; Lucey, J.; Mannix, A.; McCreesh, P.; McDermott, G.; McGarrigle, M.; Ní Longphuirt, S.; O'Boyle, S.; Plant, C.; Tierney, D.; Trodd, W.; Webster, P.; Wilkes, R.; Wynne, C.
Series :	Environmental Protection Agency, Wexford
Year :	2016
Title :	A narrative for conserving freshwater and wetland habitats in England
Author :	Mainstone, C.; Hall, R.; Diack, I.
Series :	Natural England Research Reports Number 064
Year :	2016
Title :	Lake ecological assessment metrics in Ireland: relationships with phosphorus and typology parameters and the implications for setting nutrient standards
Author :	Free, G.; Tierney, D.; Little, R.; Kelly, F.L.; Kennedy, B.; Plant, C.; Trodd, W.; Wynne, C.; Caroni R.; Byrne, C.
Series :	Biology and Environment: Proceedings of the Royal Irish Academy, 116B: 191-204
Year :	2017
Title :	Water Quality in Ireland 2010-2015
Author :	Fanning, A.; Craig, M.; Webster, P.; Bradley, C.; Tierney, D.; Wilkes, R.; Mannix, A.; Treacy, P.; Kelly, F.; Geoghegan, R.; Kent, T.; Mageean, M.
Series :	Environmental Protection Agency, Wexford
Year :	2020
Title :	Sublittoral vegetation of Lough Arrow in 2019
Author :	Roden, C.; Murphy, P.
Series :	Report to the INTERREG VA CANN (Collaborative Action for the Natura Network) Project

Spatial data sources

Year : 2021

Title : OSi Prime 2 water polygon file

GIS Operations : WaterPolygons feature class clipped to the SAC boundary. Expert opinion used to identify Annex I habitat and to resolve any issues arising

Used For : 3140 (map 3)

Conservation Objectives for : Lough Arrow SAC [001673]

3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

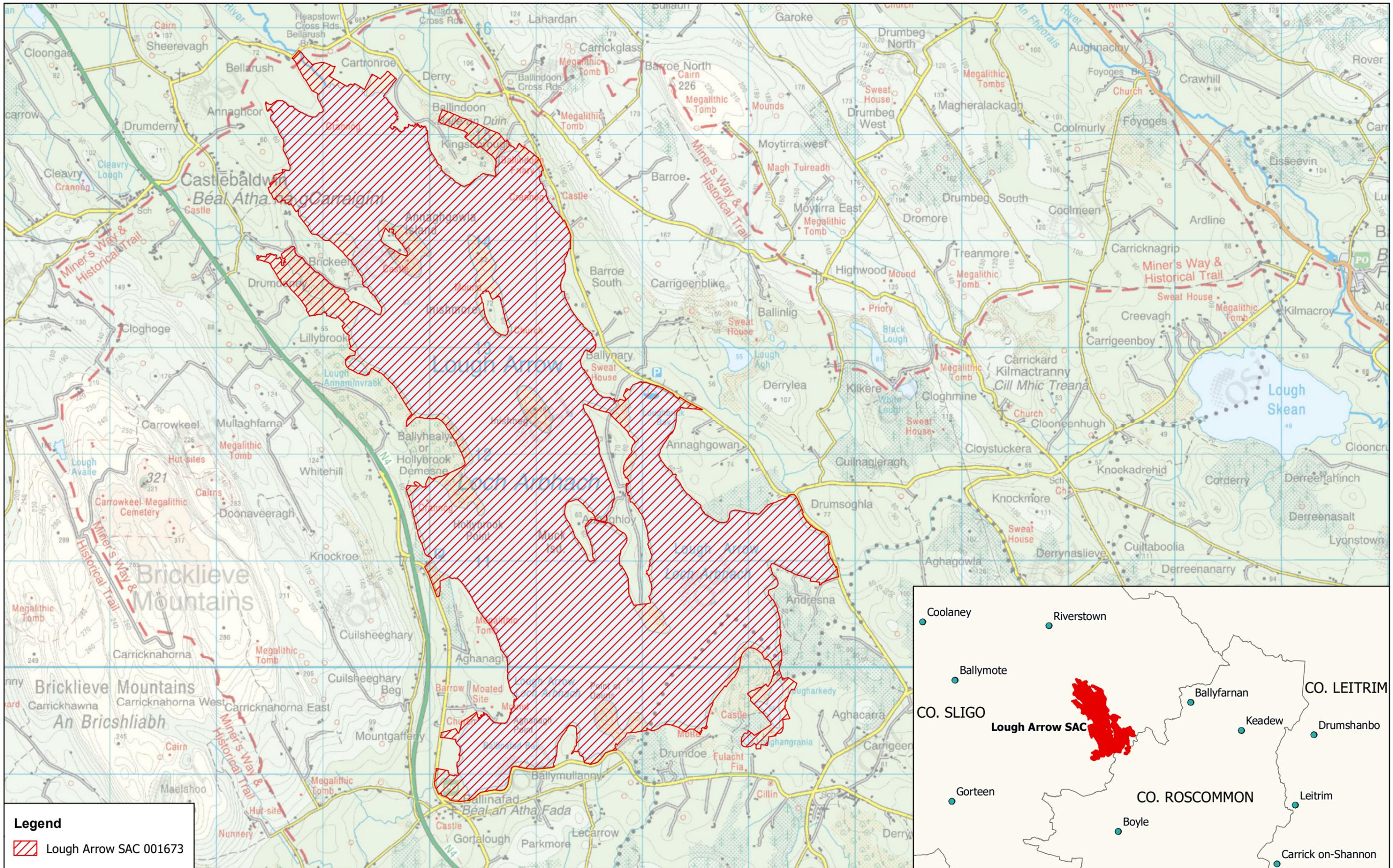
To restore the favourable conservation condition of Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. in Lough Arrow SAC, which is defined by the following list of attributes and targets:

Attribute	Measure	Target	Notes
Habitat area	Hectares	Area stable or increasing, subject to natural processes	Lake habitat 3140 in Lough Arrow was assessed as in bad conservation condition in 2012 (NPWS, 2013); however, more extensive survey in 2019 by the CANN project found patches of cyanophyte crust, a third charophyte species and assessed the lake as poor in both 2012 and 2019 (Roden and Murphy, 2020; Roden et al., 2020). Lough Arrow has suffered from eutrophication since at least the 1970s (Clabby et al., 2008; McGarrigle et al., 2010). The surface area of the lake is the simplest measure of extent and should be stable or increasing. It may also be possible to estimate the area of the vegetation communities/zones that typify the habitat. Further information relating to all attributes is provided in Roden et al. (2020) and O Connor (2015). See also Pentecost (2009) and Roden et al. (2020) for an overview of marl lakes in Britain and Ireland. Habitat 3140 was in bad, deteriorating conservation status across Ireland in the three reporting periods 2006-2018 (NPWS, 2007, 2013, 2019)
Habitat distribution	Occurrence	No decline, subject to natural processes	As noted above, lake habitat 3140 is found in Lough Arrow and was surveyed in 2012 (Roden et al., 2020) and by the CANN project in 2019 (Roden and Murphy, 2020). Detailed charophyte surveys were conducted by Inland Fisheries in 1984 and 2001 (Champ and King, 1987; King, 2002). Lough Arrow was also briefly surveyed by Goodwillie et al. (1992) (see also Douglas et al. (1993)). Praeger visited Lough Arrow in 1897 (Praeger, 1899). It is also a Water Framework Directive (WFD) monitoring lake. The Unshin River (SAC 001898) flows out of Lough Arrow. See map 3
Vegetation composition: typical species	Occurrence	Typical species present, in good condition, and demonstrating typical abundances and distribution	Only 3 charophyte species were recorded in Arrow in 2019: <i>Chara virgata</i> , <i>C. rudis</i> , <i>C. curta</i> , the latter very scarce (Roden and Murphy, 2020), and 2 in 2012 (Roden et al., 2020), significant declines from the 5 found in 2001 (King, 2002), 9 in 1984 (Champ and King, 1987) and 4 by Praeger in 1897 (N.F. Stewart, pers. comm.). Typical species such as <i>C. aculeolata</i> , <i>C. aspera</i> , <i>C. contraria</i> and <i>C. globularis</i> are no longer present. Negative indicators in 2012 and 2019 included abundant <i>Lemna trisulca</i> , large pondweeds and non-native <i>Elodea canadensis</i> and <i>E. nuttallii</i> . Round colonies of <i>Cladophora</i> sp. were considered to be of conservation interest (Roden and Murphy, 2020; Roden et al., 2020). 3140 typical species include cyanobacteria, algae, higher plants and water beetles (NPWS, 2013, 2019; O Connor, 2015). Roden et al. (2020) list species present in marl lakes in good condition, as well as other widespread and local/rare species

Vegetation composition: characteristic zonation	Occurrence	Restore characteristic charophyte and crust zones	In 2019, 5 transects had 2 charophyte zones, 3 had 1, and 2 had 3 (Roden and Murphy, 2020). Marl lakes in good condition have ≥4 characteristic zones, typically including cyanophyte crust zone, <i>C. curta</i> zone, <i>C. rudis</i> zone, <i>C. virgata</i> zone and, in some, <i>C. denudata</i> or <i>Nitella flexilis</i> zone (Roden et al., 2020). Arrow had a poor condition, patchy cyanophyte crust with abundant <i>Littorella uniflora</i> and other angiosperms at 0-2m; a <i>C. virgata</i> zone with frequent <i>Elodea</i> was commonest (1-3.5m); a <i>C. rudis</i> zone was largely absent; <i>P. perfoliatus</i> , <i>P. lucens</i> , <i>Lemna trisulca</i> , <i>Elodea</i> spp. dominated the deepest zone to 4.5m (Roden and Murphy, 2020). Earlier surveys also found <i>L. uniflora</i> , pondweeds and other higher plants in shallow water. Roden et al. (2020) give cyanophyte crust methods and a novel C&K score: Arrow had average C&K score of 0.37, indicating poor condition (Roden and Murphy, 2020)
Vegetation distribution: maximum depth	Metres	Restore maximum depth of vegetation (euphotic depth), subject to natural processes	Maximum depth of vegetation was 4-5m in Lough Arrow in 2012 and 3.6-4.8m in 2019 (Roden and Murphy, 2020; Roden et al., 2020). It has a <i>Potamogeton/Elodea</i> group close to the euphotic depth at c.4m. Champ and King (1987) reported that Arrow stratifies in most years with an autumn planktonic algal peak when mixing recommences, and had similar algal species in 1980s to 1950s. Praeger (1899, 1901) stated that Lough Arrow was "wonderfully clear (being supplied mostly by springs)", describing it as a "lovely lake, with exquisite surroundings". The target for maximum depth of vegetation colonisation (euphotic depth) in marl lakes is >7m (Roden et al., 2020). Euphotic depth is considered to be a key measure of the structure and functions of marl lake vegetation and has been found to exceed 10m in some Irish marl lakes (Roden et al., 2020)
Hydrological regime: water level fluctuations	Metres	Maintain appropriate hydrological regime necessary to support the habitat	Water level at Lough Arrow is monitored by the Office of Public Works (OPW) (Station 35087 Ballynary). It is largely fed by springs on the lake bed (Praeger, 1901; Goodwillie et al., 1992). Fluctuations in lake water level can be amplified by activities such as abstraction and drainage. In undisturbed marl lakes, fluctuations follow predictable seasonal trends and relationships exist with the vegetation zones (Roden et al., 2020). In summer, more than 90% of the crust zone should be covered and water level should never be lower than the top of the <i>Chara curta</i> zone; in winter, all zones should be submerged (Roden et al., 2020). Groundwater normally exerts a strong influence on the hydrology of marl lakes. Increased water level fluctuations can increase wave action, up-root vegetation, increase turbidity, alter the substratum and lead to nutrient release from sediment
Lake substratum quality	Various	Maintain/restore appropriate substratum type, extent and chemistry to support the vegetation	Muddy silt was recorded in Lough Arrow in 2012 and mud, silt and rock in 2019 (Roden and Murphy, 2020; Roden et al., 2020). The lake bed is steeply sloping and rapidly reaches a depth of 20m (Champ and King, 1987). Increased accumulation of nutrients and organic matter in the substratum at Lough Arrow may contribute to the poor condition of the habitat. In general, marl lakes are dominated by limestone bedrock, calcareous silt and sand, and loose stones (Roden et al., 2020). Deposited peat may indicate excessive sediment inputs and sediment can accumulate phosphorus and release it into the water column (Roden et al., 2020). Further research into acceptable sediment phosphorus concentrations and other aspects of substratum quality in marl lakes would be beneficial

pH and Alkalinity	pH units, mg/l	Maintain appropriate water and sediment pH, alkalinity and cation concentrations to support the habitat, subject to natural processes	Free et al. (2006) reported alkalinity of 120.3mg/l and pH of 8.58 in Lough Arrow. The Environmental Protection Agency (EPA) reported alkalinity of 107, 112 and 111mg/l in 2007-09, 2010-12 and 2013-15, respectively (McGarrigle et al., 2010; Bradley et al., 2015; Fanning et al., 2017). The lower alkalinity boundary for the habitat may lie between 80 and 100mg/l; however, alkalinity is far higher in most Irish marl lakes, exceeding 200mg/l in some cases (Roden et al., 2020). Acidification is not considered a threat to habitat 3140, but eutrophication can lead to at least temporary increases in pH to toxic levels (>9/9.5 pH units). Maximum pH should be <9.0 pH units, in line with the surface water standards (The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019). Further study of the sediment pH, alkalinity and cation concentration may assist in understanding of nutrient cycling
Nutrients	mg/l P; mg/l N	Restore the concentration of nutrients in the water column to sufficiently low levels to support the habitat and its typical species	The EPA reported High total phosphorus (TP) status in Lough Arrow 2007-12 and Good TP status in 2013-15. Average concentrations between 2010 and 2018 ranged from 0.010-0.013 mg/l, higher annual averages (meso-eutrophic) of 0.019, 0.024 and 0.023mg/l were recorded in 2001, 2005 and 2006, respectively (Free et al., 2006, Clabby et al., 2008; Roden and Murphy, 2020; Roden et al., 2020). Roden et al. (2020) found that most marl lakes in good condition have TP ≤0.01mg/l and this is the target for good condition although vegetation attributes determine the overall conservation condition (Roden et al., 2020). ≤0.01mg/l TP is equivalent to oligotrophic (OECD, 1982) and WFD High Status (The European Communities Environmental Objectives (Surface Waters) (Amendment) Regulations 2019). WFD High Status targets for total ammonia (annual average ≤0.04mg/l N and annual 95th percentile ≤0.09mg/l N) may also be appropriate. Arrow had High ammonia status 2007-2015. See also Free et al. (2016)
Water colour	mg/l PtCo	Restore appropriate water colour to support the habitat	Water colour in Lough Arrow was 10mg/l PtCo in 2001 (Free et al., 2006), 23mg/l PtCo in 2012 (Roden et al., 2020), 22, 20 and 20mg/l PtCo in 2016, 2017 and 2018, respectively (Roden and Murphy, 2020). Roden et al. (2020) found that water colour (dissolved light-absorbing compounds) is negatively correlated with euphotic depth, charophyte species richness and cover, and positively correlated with vascular plant cover in marl lakes. Roden et al. (2020) set good condition at <15mg/l PtCo; however, the most important Irish marl lakes have very clear waters with colour of <5mg/l PtCo. Roden et al. (2020) also set a TP×Colour Index with a target of <0.1 for Good; Arrow was 0.25 in 2019 indicating poor condition (Roden and Murphy, 2020). Increased colour decreases light penetration and reduces the area of macrophyte habitat, particularly at the lower euphotic depths. The primary source of increased colour in Ireland is peatland disturbance, e.g. through overgrazing, afforestation
Dissolved organic carbon (DOC)	mg/l	Maintain/restore appropriate organic carbon levels to support the habitat	Dissolved organic carbon (DOC) in the water column is linked to water colour. It can provide a substrate (food source) for heterotrophic organisms, which can impact directly (e.g. shading) and indirectly (e.g. nutrient release) on the characteristic lake communities. Damage and degradation of peatland, e.g. through afforestation or turf-cutting, leading to decomposition of peat is likely to be the predominant source of dissolved and particulate organic carbon in Ireland. An increase in DOC from catchment sources may have mirrored the recorded increase in colour in Lough Arrow

Turbidity	Nephelometric turbidity units/ mg/l SS/ other appropriate unit	Maintain/restore appropriate turbidity to support the habitat	Water transparency was poor at Lough Arrow in 2012, with much particulate matter (Roden et al., 2020). This contrasts to Praeger (1899, 1901) who emphasised the water clarity of Arrow. Turbidity can significantly affect the quantity and quality of light reaching rooted and attached vegetation and can, therefore, impact on lake habitats. The settlement of higher loads of inorganic or organic material on lake vegetation communities may also have impacts on sensitive, delicate species. Turbidity can increase as a result of re-suspension of material within the lake, higher loads entering the lake, or eutrophication. Turbidity measurement and interpretation is challenging. As a result, it is likely to be difficult to set habitat-specific targets for turbidity in lakes
Transparency	Metres	Restore appropriate Secchi transparency. There should be no decline in Secchi depth/transparency	Lough Arrow had Secchi depth of 3.2m in 2001 (Free et al., 2006), 4.3-5.1m in 2004-06 (Clabby et al., 2008), 4.2m in 2012 (Roden et al., 2020) and 4m in 2019 (Roden and Murphy, 2020). Transparency relates to light penetration and, hence, to the depth of colonisation of vegetation. Roden et al. (2020) advised it is preferable to measure euphotic depth directly by observation, but noted that a decreasing trend in Secchi depth indicates declining water quality. Transparency can be affected by phytoplankton blooms, water colour and turbidity. Secchi depth in marl lakes in good condition is generally >6m. The OECD fixed boundary system set transparency targets for oligotrophic lakes of $\geq 6m$ annual mean Secchi disk depth and $\geq 3m$ annual minimum Secchi disk depth
Attached algal biomass	Algal cover	Maintain/restore trace/absent attached algal biomass (<5% cover)	Clabby et al. (2008) noted shoreline evidence of enrichment at Lough Arrow. At the north of Lough Arrow in 2019, a great abundance of <i>Cladophora</i> 'balls' (<i>Aegaropila linnaei</i>) (round colonies, probably formed by wave action) was noted as of conservation value rather than an indicator of eutrophication (Roden and Murphy, 2020; Roden et al., 2020). Nutrient enrichment can favour epiphytic and epipellic algae that can out-compete the submerged vegetation. Roden et al. (2020) noted that occasional blooms of filamentous algae occur in marl lakes in the absence of excess nutrients, especially species of the orders Zygnematales or Oedogoniales, but that drifting masses of <i>Cladophora</i> species may indicate a decline in water quality. In general, the cover abundance of attached algae in marl lakes (3140) should be trace/absent (<5% cover)
Fringing habitat: area and condition	Hectares	Maintain/restore the area and condition of fringing habitats necessary to support the natural structure and functioning of lake habitat 3140	Much of Arrow's shoreline is agricultural grassland and conifer plantation. There are extensive reedbeds of <i>Phragmites australis</i> and particularly <i>Schoenoplectus lacustris</i> (Goodwillie et al., 1992). Areas of freshwater marsh, swamp and wet and dry woodland also occur. <i>Thelypteris palustris</i> (Near Threatened, Wyse Jackson et al., 2016) was recorded by D.A. Webb in a fringing marsh in 1969. On its shore, Praeger (1901) noted <i>Saxifraga hypnoides</i> and <i>Carex diandra</i> . <i>C. strigosa</i> occurs in wet woodland (Douglas et al., 1993). The fringing habitats along lake shorelines intergrade with and support the structure and functions of the lake habitat. Equally, fringing habitats are dependent on the lake, particularly its water levels, and support wetland communities and species of conservation concern. Many of the fringing wetland habitats support higher invertebrate and plant species richness than the lake habitats themselves. See Mainstone et al. (2016)



Legend

 Lough Arrow SAC 001673

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 Department of Housing, Local Government and Heritage

**MAP 1:
 LOUGH ARROW SAC
 CONSERVATION OBJECTIVES
 SAC DESIGNATION**

Map to be read in conjunction with the NPWS Conservation Objectives Document

**SITE CODE:
 SAC 001673; version 3.01.
 CO. SLIGO / ROSCOMMON**

0 0.25 0.5 1 Kilometre



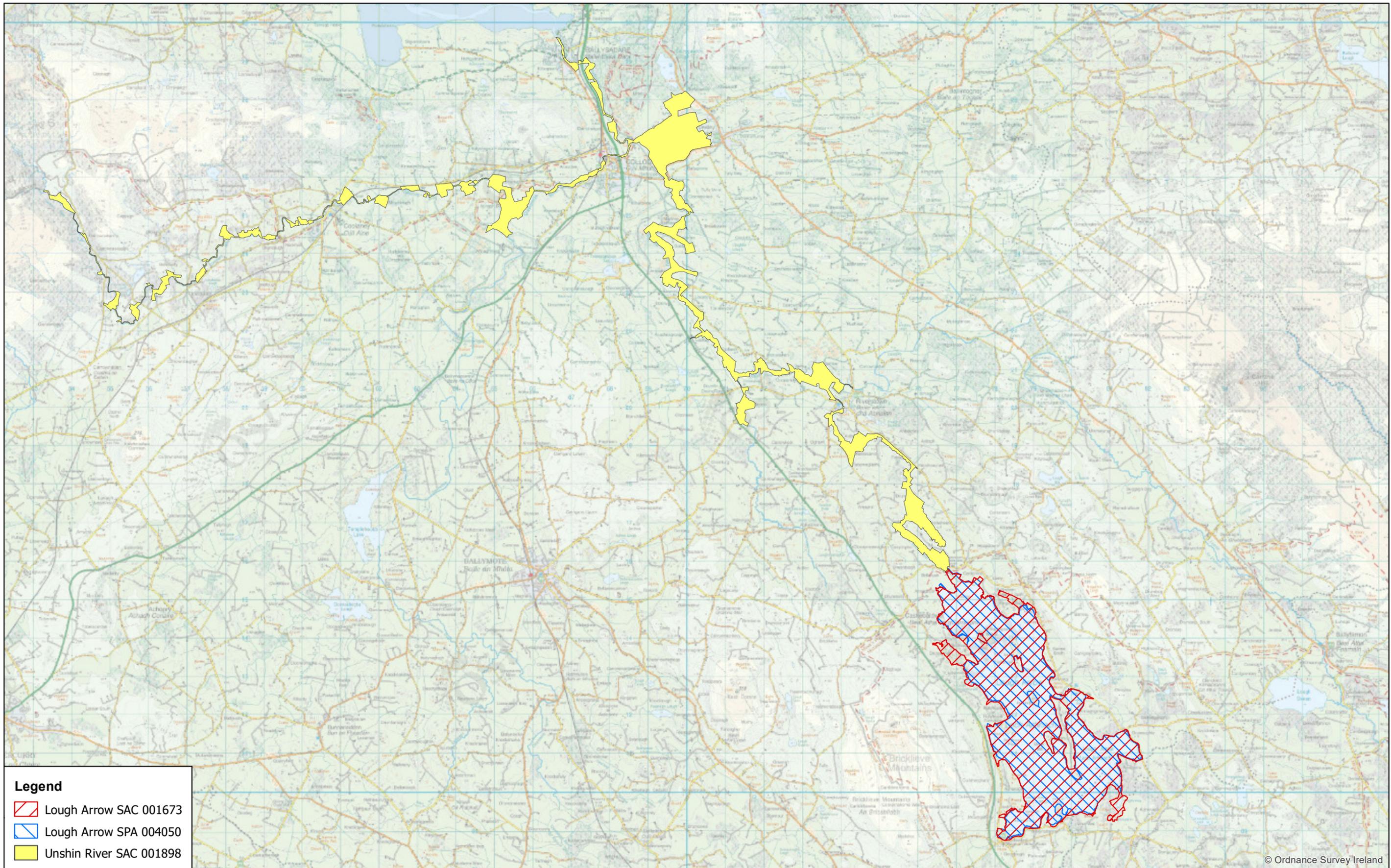
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbheithnithe a déanamh ar theorainneacha na gceantar comharthaite. Suirbhéarachtá Ordonáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachtá Ordonáis na hÉireann Rialtas na hÉireann

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Date: October 2021



Legend

-  Lough Arrow SAC 001673
-  Lough Arrow SPA 004050
-  Unshin River SAC 001898

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**MAP 2:
LOUGH ARROW SAC
CONSERVATION OBJECTIVES
OVERLAPPING AND ADJACENT SITES**

Map to be read in conjunction with the NPWS Conservation Objectives Document

**SITE CODE:
SAC 001673; version 3.01.
CO. SLIGO / ROSCOMMON**

0 1 2 4 Kilometres



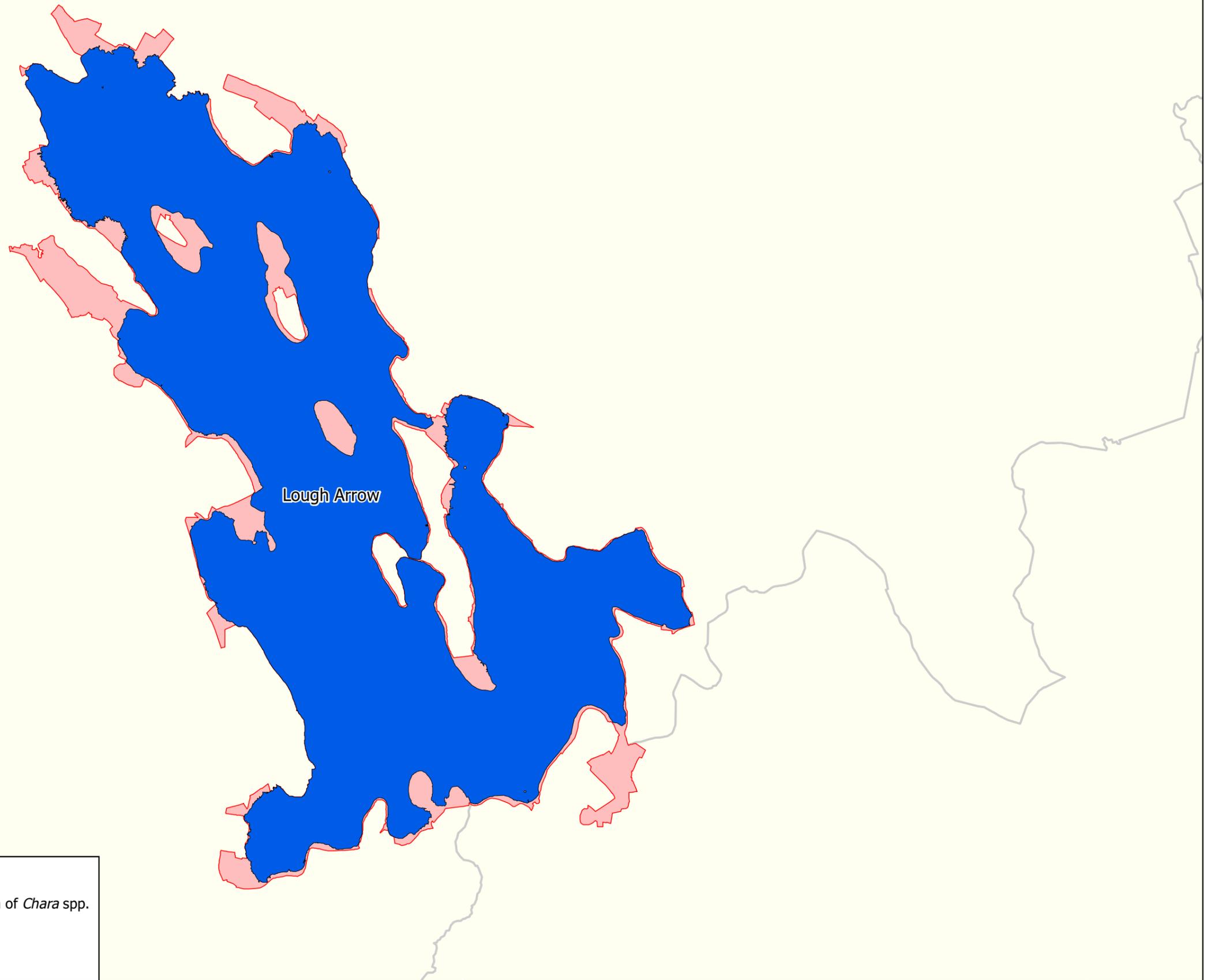
The mapped boundaries are of an indicative and general nature only. Boundaries of designated areas are subject to revision.
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Níl sna teorainneacha ar na léarscáileanna ach nod garshuíomhach ginearálta. Féadfar athbhreithnithe a déanamh ar theorainneacha na gceantar comharthaíthe. Suirbhéarachtá Ordoanáis na hÉireann Ceadúnas Uimh OSI-NMA-014. © Suirbhéarachtá Ordoanáis na hÉireann Rialtas na hÉireann

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Legend

- 3140 Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
- Lough Arrow SAC 001673
- OSI Discovery Series County Boundary

