

**Further Information Relevant to the HRA relating to Sand Dredging and
Lough Neagh SPA & Rea's Wood/Farr's Bay SAC (Primarily bird related issues)**



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21A Windsor Avenue
Belfast
BT9 6EE

Phone

E-mail

Company No NI47970

VAT Reg 830 705059

www.allenmellon.com

Contents

1	Background	3
2	Issues to be covered (all relate directly to SPA designation features)	5
2.1	Breeding Common Tern	5
2.1.1	Population and distribution	5
2.1.2	Initial Assessment of Potential Impacts – disturbance	7
2.1.3	Initial assessment of Potential Impacts – foraging	7
2.2	Breeding Great Crested Grebe	9
2.2.1	Population and distribution	9
2.2.2	Initial assessment of Potential Impacts – disturbance	15
2.2.3	Initial assessment of Potential Impacts – foraging	16
2.2.4	Initial assessment of Potential Impacts – loss of habitat	16
2.3	Wintering & Passage Great Crested Grebe	18
2.3.1	Population and distribution	18
2.3.2	Initial assessment of Potential Impacts – disturbance	19
2.3.3	Initial assessment of Potential Impacts – foraging	20
2.4	Overall Waterbird Assemblage (numbers & diversity)	20
2.4.1	Population and distribution	20
2.5	Possible impacts on Rea's Wood and Farr's Bay SAC	20
2.5.1	Site Description	20
2.5.2	Possible impacts – erosion and loss of sand	21
Appendix 1	Email correspondence with [REDACTED] of DCAL Inland Fisheries concluding 26 May 2015.	

1 Background

The aim of this document is to compile information deemed relevant to the required Habitats Regulation Assessment/Test of Significance (HRA/TOS), which will be undertaken by Northern Ireland Environment agency who are the Competent Authority in this regard.

The information presented here was scoped in conversation and via e-mail correspondence with officers of NIEA, Quarryplan and [REDACTED] representing the sand traders.

In relation to the issues to be discussed below, a map of the proposed dredging area plus approximate commuting routes is illustrated below.

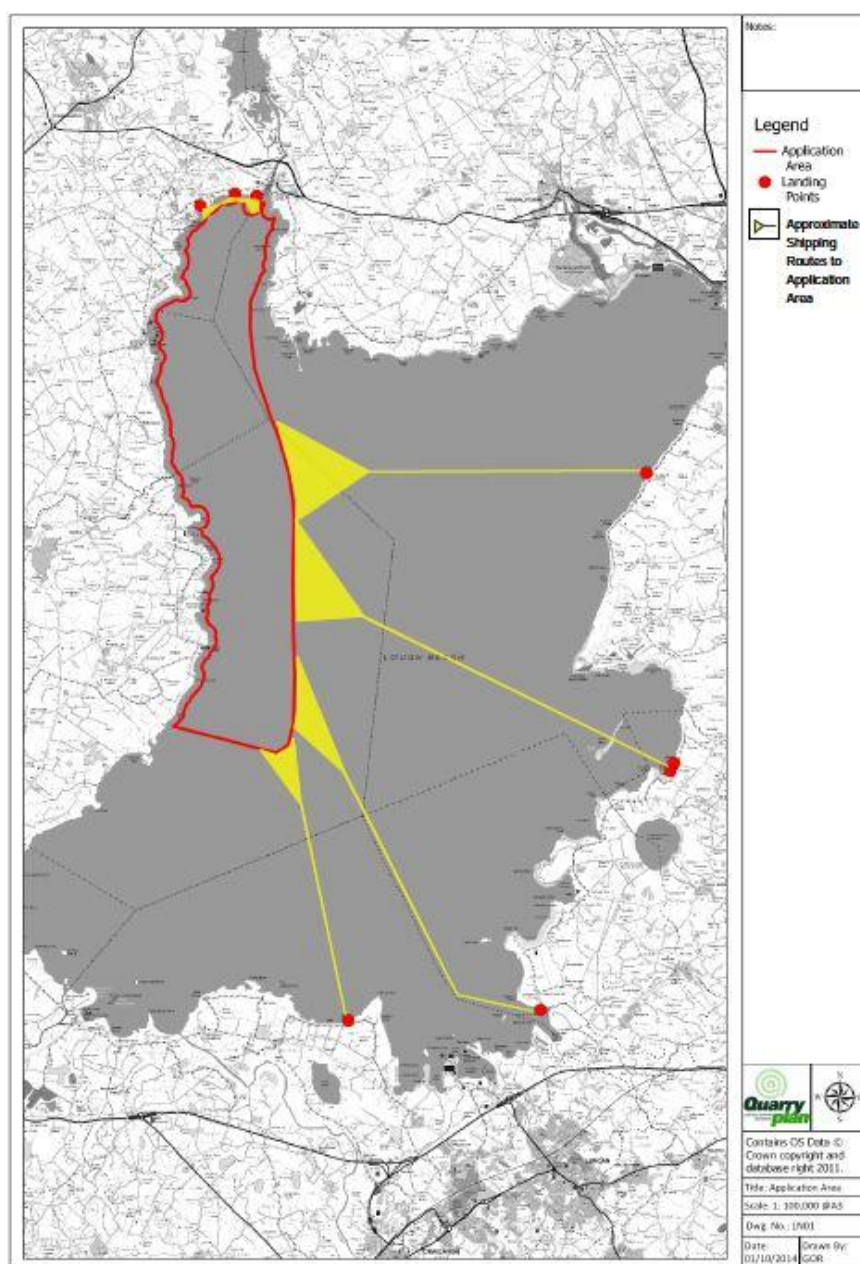


Figure 1: Proposed dredging zone and indicative commuting routes

There are currently 15 dredgers operating on the Lough. This should be placed in context with the 450-500 private moorings, which include concentrations at Kinnegar (190), sandy Bay (60) and Ballyronan (90). There are also an unknown number of fishing boats (licencing refers to the fisherman NOT the boat so one licence can cover multiple boats) but it could be in the region of 200 (Jim McGarry, published in the Inland Waterways News (Volume 29/2)). There are also private jet skis and innumerable self-launched private boats. As there is no Navigation Authority with responsibility for licensing then control is virtually impossible. Peak activities are likely to be in summer and therefore relevant to breeding waterbirds including Common Terns and Great Crested Grebes.

The smaller craft are also much more able to move into shallows and potentially land on islands. Jet-skis can penetrate very close inshore and can even disturb reed swamp habitat (personal observations Antrim Bay). The dredgers cannot move into water shallower than 3.0 metres and given the 0.5 metre variation in lough level then a cautionary approach has to be taken.

At the current time the estimated usage based on a five day week is that dredgers operational working hours are in Summer 0500 – 1800hrs and in Winter 0800 – 16.00 hrs with roughly 98% efficiency during these times. There is NO night time work (as defined by NPPF- Technical Guidance) during the winter months and only the two hours before 0700 in the summer months. The amount of sand removed varies annually but is on average 1.5 million tonnes per annum (██████ pers. comm.).

The following quotes are extracted from “Potential for bringing Lough Neagh into public ownership – a scoping study (February 2014) Lough Neagh Cross Departmental Working Group” and place some context on the current ongoing discussions -

5.2.2 Sand Extraction

Sand extraction is the largest industry working on Lough Neagh today, providing the raw material necessary for a range of products within the glass, tile and concrete industries. Up to 1.7 million tonnes of sand is extracted from Lough Neagh annually and this supplies a quarter of all local construction industry in Northern Ireland.

At present there are 6 sand companies working the Lough: Emersons, Scotts, Mulhollands, RMC, Lagan and Walls. The sand industry has been important to the Lough Neagh area, providing employment both directly and indirectly.

5.4.10 DETI, with the advice of Geological Survey Northern Ireland (GSNI), is responsible for issuing Mineral Prospecting Licences under the Mineral Development Act (Northern Ireland) 1969, which deals with non-precious metals and certain other minerals. The department, through GSNI, is also responsible for issuing Petroleum Licences under Petroleum (Production) Act (Northern Ireland) 1964. Currently there are no licences issued over Lough Neagh. A small number of Invest NI client companies are involved in sand extraction at Lough Neagh. There are no substantive issues around this extraction work and Invest NI does not provide any type of support towards this activity. DETI has confirmed that ownership of Lough Neagh does not impact on its interests as outlined above

2 Issues to be covered (these all relate directly to SPA designation features)

2.1 Breeding Common Tern (currently in Favourable Condition)

2.1.1 Population and distribution

There are currently only FOUR extant breeding colonies in the wider Lough Neagh Basin, two of which are on Lough Neagh within the SPA, one is on artificial rafts at Lough Beg (within SPA but outside the area which is dredged) and a fourth is outside the SPA and dredged area on artificial rafts at Portmore Lough. It is very likely, given the mobility of tern breeding colonies, that these all relate to the “lough Neagh population”.

The two remaining Lough Neagh sites relevant to the HRA are the Torpedo Platform (Antrim Bay J129868) and Padian (SE Corner J064635). Very small numbers may still attempt to nest at McGarry's (Nr Moore's Quay – J098779) – tern summary from [REDACTED] (NIEA) pers. comm. 11/05/2015 and [REDACTED] 12-14/05/2015. See Fig. 2

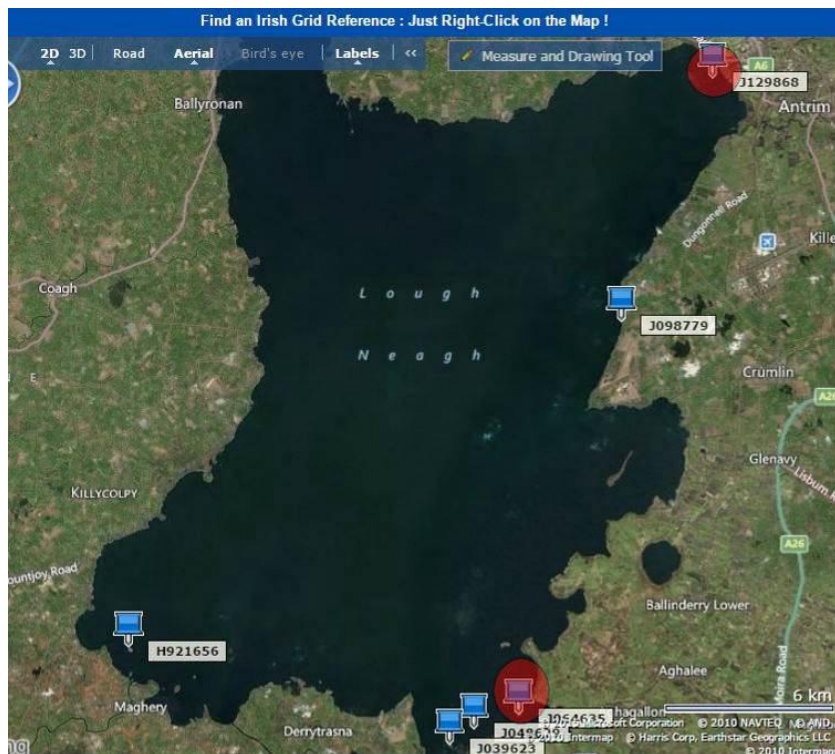


Fig 2: All tern sites – Lough Neagh SPA

Three other sites, Owen/Roe, Croaghan and Scaddy all previously held small numbers of breeding common tern whilst River Rock only held a single pair in 1980.

Table 1 summarises the count data from 1995 to 2014. This table reflects the difficulty in obtaining accurate counts for apparent operational reasons and on occasions a reluctance to land on the sites. Counts therefore are all of numbers of terns, which are crudely converted by halving to number of pairs. This inevitably will be an underestimate. What is clear is that the two new raft sites (Lough Beg and Portmore) have provided safe nesting sites in some years and are likely to have caused a redistribution or a genuine increase in numbers but because of the lack of counts from Padian and the Torpedo platform this is not quantifiable. Based on the little available data around 70% of the Lough Neagh population appears to use the Torpedo Platform.

Lough Neagh Common Tern totals (birds)	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Lough Neagh	185	150	109	19		92	nc	94	79	118
Portmore Lough (rafts in place from 2005)										
Lough Beg (rafts in place from 2011)										
TOTALS (INDIVIDUALS)	185	150	109	19		92		94	79	118
Approx. number pairs	93	75	55	10		46		47	40	59
	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Lough Neagh	96	98	83		123	138	202	?	?	?
Portmore Lough (rafts in place from 2005)	0	0	2	26	62	108	124	?	?	180
Lough Beg (rafts in place from 2011)								?	50	12
TOTALS (INDIVIDUALS)	96	98	85		185	246	326	?	50+	192+
Approx. number pairs	48	49	43	13+	93	123	163	?	25+	96+

Table 1: Tern numbers Lough Neagh and satellite sites

2.1.2 Initial Assessment of Potential Impacts – disturbance

Direct disturbance (visual and human); Indirect Disturbance (wash)

The rafts at Portmore and Lough Beg will obviously be unaffected by the proposals. The Torpedo Platform will also be unaffected because of

1. the distance from the dredging zone and commuting routes and;
2. it is also raised above the water level and will be unaffected by any wash from any boat or craft.

Padian (apparently the least important colony based on available information) lies close to the SE commuting route. This site regularly held 40-50 pairs from 1985-1995 (NIEA data) when dredging and the commuting route were in operation. Numbers then declined but thought in main due to predation, unsuitable vegetation and possibly uncontrolled landings (assessment made for SPA recommendations Allen & Mellon 2004). It would appear therefore that the sand dredging operations and commuting routes did not adversely impact on the tern colony historically and are unlikely to do so with a continuation of historical levels.

2.1.3 Initial assessment of Potential Impacts – foraging

The only way the dredgers could directly impact on foraging terns would be through disturbance and/or removal or obscuring (through plumes) of prey items. Common terns within the lough feed on fish fry and invertebrates, mainly chironomids (personal observations). They can be seen hawking after flying (adult) chironomids as well as collecting emerging individuals by dipping at the surface. There has been no work on Lough Neagh to quantify proportions within their diet but studies elsewhere (at sea) in Northern Ireland shows the massive variability in their diet, their opportunistic nature and their ability to fly long distances to find prey (various reports Allen & Mellon for JNCC). The previously supplied macro-invertebrate study has shown that there is no reduction in the Lough Neagh macroinvertebrate fauna. In fact it is entirely possible that some of Lough Neagh's breeding terns fish outside the Lough and theoretically they could even go out to sea. Sandwich terns nesting on Lough Erne commute to fishing grounds in Donegal Bay, a minimum distance of 29 kilometres (Personal & RSPB observations). Terns from the Torpedo Platform would only have to fly 27 kilometres to reach Belfast Lough. The over-riding governing factor is therefore a safe nest site rather than prey availability close-by.

During operations there is potentially an issue with pluming perhaps causing prey unavailability at these locations. Firstly disturbance could cause more prey to be available on a temporary basis by stirring up the lough bed. Secondly other works have shown that

any plumes rapidly drop out of suspension¹, this study looked mainly at land based operations but the assessment of pluming remains relevant and provides a worst case scenario given the positive differential in depth and therefore volumetric dilution capacity further out in the Lough.

The abundance and availability of fry in the Lough (also prey of Great Crested Grebe) is also relevant despite the points made above referencing foraging distances. There is no definitive assessment currently available although DCAL and AFBI have access to data being compiled for a PhD by [REDACTED] and they have confirmed in correspondence in May 2015, held as Appendix 1, which maintains that despite a variety of anthropogenic influences fish stocks are very healthy.

With reference to DCAL's position proposing an increase in the current harvesting levels on Lough Neagh from an existing estimated level of 10% to a revised level of 30% of the population, DCAL commented – "The estimate of harvest levels for L Neagh by commercial fisheries is based on some rudimentary assessments of data currently available. The fisheries management plan will seek to review the current harvest levels, to determine what scientific assessment is required to fully assess fish stocks and to consider what future exploitation levels should be to ensure the long term sustainability of the fish stocks resource".

[REDACTED] (Fisheries and Aquatic Ecosystems Branch) has outlined that it is his opinion that existing / historical activities on the Lough have not had an effect on fish stock levels, DCAL commented: "This refers to ALL anthropogenic activities and is based on an historic and current status quo whereby 50 years of fishing and sand extraction from around the lough has not resulted in recurring fish stock problems albeit perch were overfished (PhD evidence suggests now returning in great numbers) and eel has suffered from EU wide stock collapse. However, as outlined previously the "engine room" for driving this production in the lough is focused around the nursery area previously outlined and targeted by the 15 regular bait net trawlers. This habitat is based on the kind of sand now in demand and thus any in roads into its removal from here (which was not dredged for the past 50 years) is a change in status quo and is therefore likely to induce negative impacts."

The operation of flood prevention water level management at Toome has an ignorant effect on fish numbers insofar as millions of scale fish fry are 'flushed' into the Lower Bann system and are lost to Lough Neagh. DCAL responded – annual autumnal flood events, witnessed at Toome, where the coghill nets provide the evidence of the wash downs; it's also plausible that there will be other wash downs going unnoticed as no nets are in the water. Volumetric analysis places the losses at approximately 7million fry per net.

Given the percentage of fish which are harvested plus the losses at the Toome sluice it is hard to envisage how the available prey for common terns (and grebes) would be adversely impacted by sand dredging.

¹ Lough Neagh Sand Extraction Operations Impacts of Sediment Rich Discharges Preliminary Article 6 Assessment Test of Likely Significance

Even though there are concerns that the physical effect of dredging may impact on the fish nurseries and reduces the areas where bait nets can be trawled by fishermen there may also be possible detrimental impact on juvenile fish in shallow rearing areas, particularly for pollan stocks. The current zoning negotiations aim to separate the areas in question, removing the potential for impacts by sand dredging, in the nursery area. The impact of both fishing and opening the Toome sluices (flushing) appears to be possibly of greater significance with respect to fish stock and therefore with potential to impact on the avian population.

Given the size of Lough Neagh (c. 380-390 sq km) and extent of the potential foraging range within the lough it is hard to see how the dredging could have any impact on foraging terns. Work done by the national park authorities in the USA² on lakes, set boat density limits of between one boat to 4.5 acres and one boat to 18 acres of water depending on the type of environment from urban park lake to primitive or wilderness area. Looked at on an overall scale therefore the current density of boating recreation on Lough Neagh overall is low with at peak times one boat (of any type) per c. 45 hectares. However, the clustering of most boats and boat launches in the Lough will create higher densities on a local basis which would be a more relevant potential disturbance issue.

2.2 Breeding Great Crested Grebe (currently in Favourable Condition)

2.2.1 Population and distribution

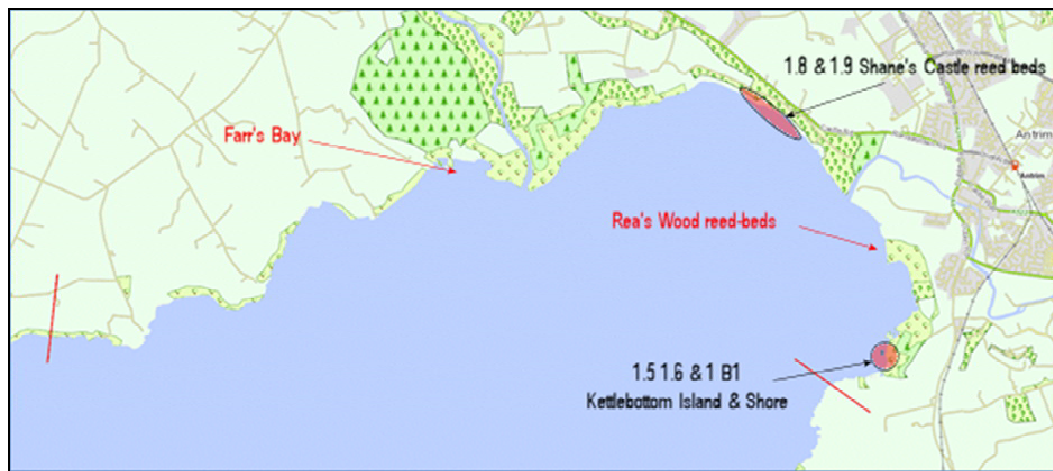
The most recent survey was undertaken in 2012³. It was concluded that the Lough Neagh breeding population in 2012 should be estimated at 1,041 pairs which remains the largest breeding concentration of this species in the UK or Ireland. Species which have undergone major population changes are flagged by issuing an “Alert” if the population has changed (either increased or decreased) by more than 25% and a higher level of alert if the population has changed by over 50%. The baseline figure used is the population size at the time of designation which was 500 pairs. The size of the population has been hotly debated since the 1990’s when extremely large counts were recorded, these apparently anomalous counts are discussed in full in the cited report. The figure obtained in the 2012 survey was 1,041 pairs which is in line with counts prior to the 1995-99 counts and subsequent targeted counts undertaken by NIEA staff.

² Lake Mead National Recreation Area. Lake Management Plan and Environmental Impact Assessment 2002

³ Allen & Mellon environmental (2012) Lough Neagh SPA Monitoring Report NIEA Ref: ASSI030: An assessment of the population and distribution of breeding Great Crested Grebes 2012

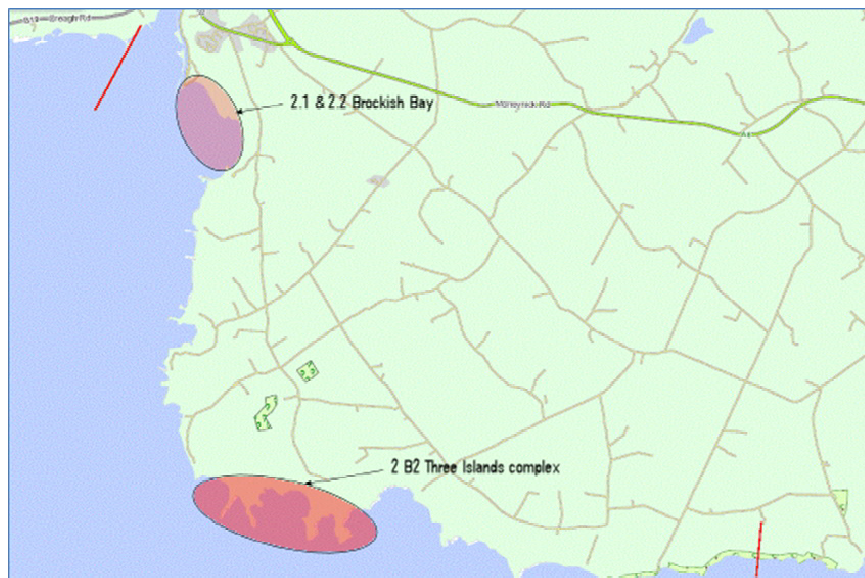
The key sites for breeding great crested grebes are as follows:

Antrim Bay (Figure 3)



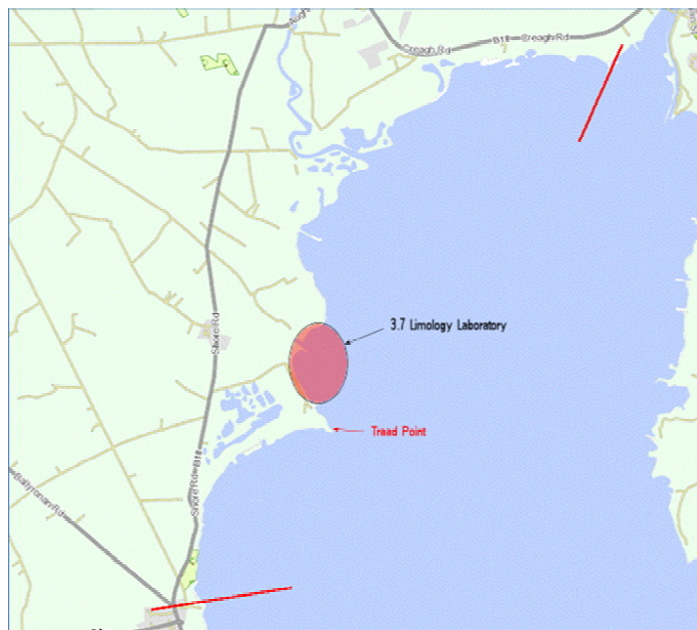
A total of 132 Great Crested Grebes were recorded in this Section. The most significant concentrations were at Kettlebottom Island and adjacent shoreline (52 birds) and Shane's Castle reed-beds (49 birds).

Brockish Bay & Three Islands (Figure 4)



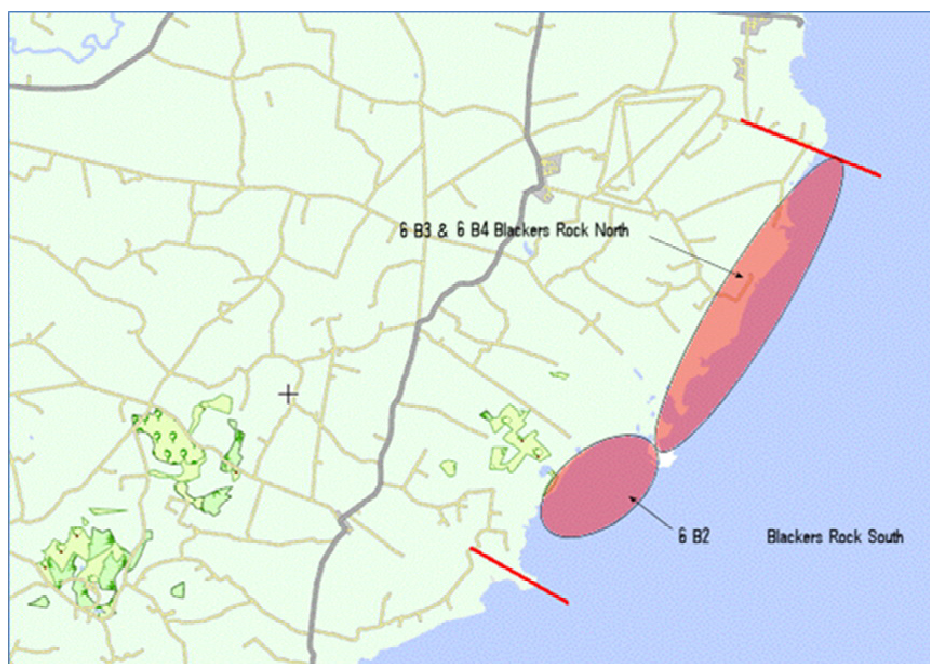
A total of 147 Great Crested Grebes were recorded in this Section. The most significant concentrations were noted at Brockish Bay (62 birds) and the extensive Three Islands complex (67 birds).

North of Traad Point (Figure 5)



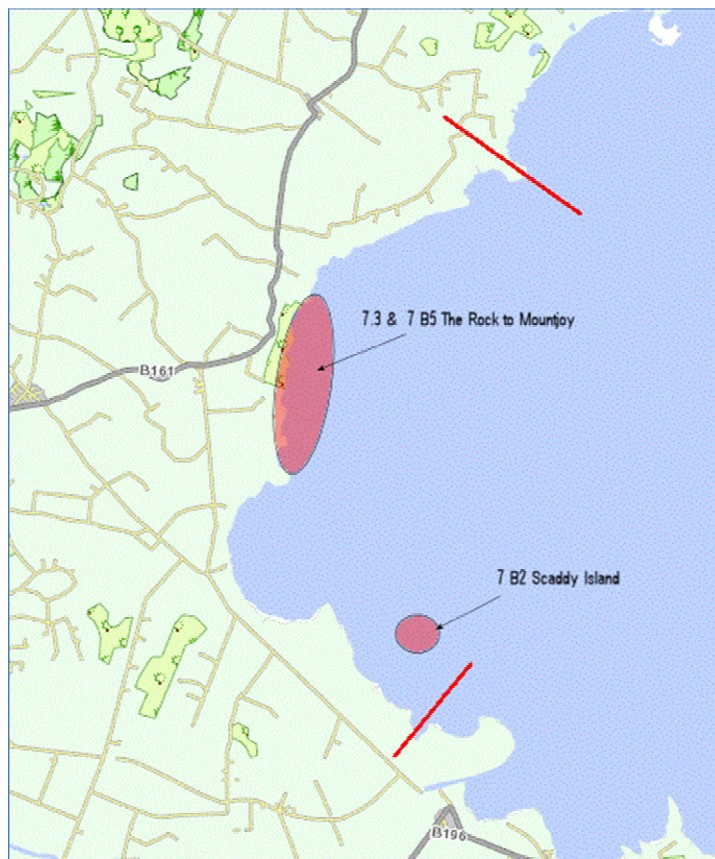
A total of 68 Great Crested Grebes were recorded in this Section. The most significant concentration was noted around the Limology Laboratory north of Traad Point (38 birds).

Blacker's Rock (Figure 6)



A total of 178 Great Crested Grebes were recorded in this Section. The most significant concentrations were noted to the north (113 birds) and south (64 birds) of Blacker's Rock.

Rock, Mountjoy & Scaddy (Figure 7)



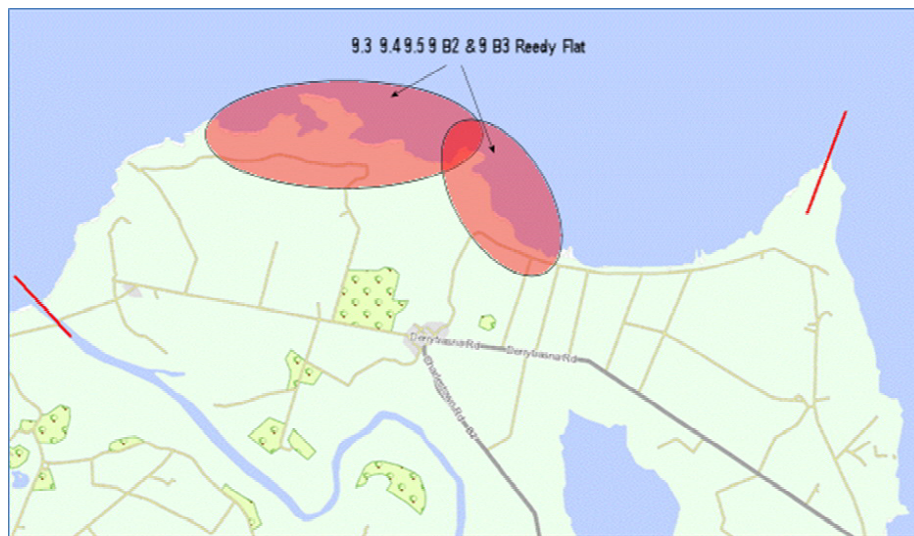
A total of 148 Great Crested Grebes were recorded in this Section. The most significant concentrations were noted at Scaddy Island (80 birds) and between The Rock and Mountjoy (36 birds).

Bann Mouth (Figure 8)



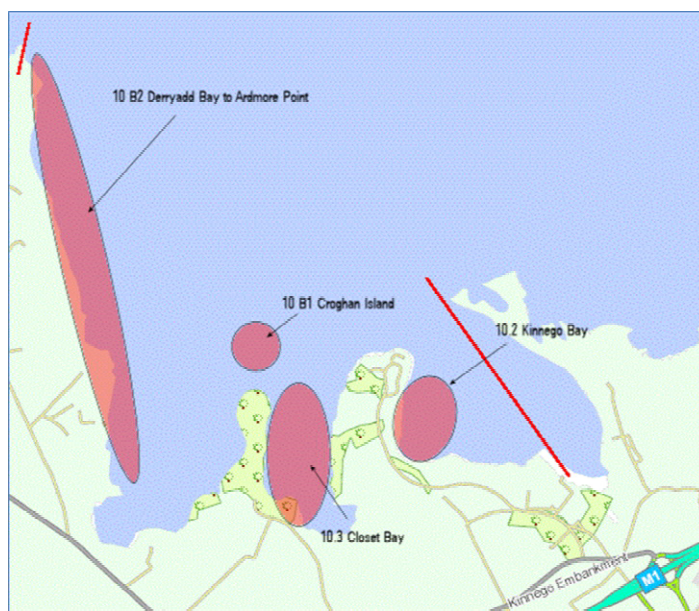
A total of 99 Great Crested Grebes were recorded in this Section. The most significant concentration was noted west of the Bann mouth (42 birds).

Reedy Flat (Figure 9)



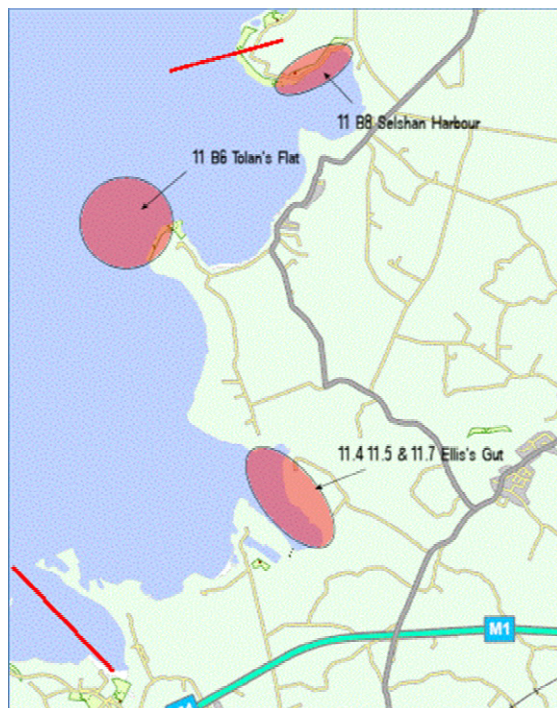
A total of 104 Great Crested Grebes were recorded in this Section. The most significant concentrations were noted around Reedy Flat (76 birds).

Oxford Island area (Figure 10)



A total of 173 Great Crested Grebes were recorded in this Section. The most significant concentrations were noted at Croghan Island (46 birds), between Derryadd Bay and Ardmore Point (54 birds), Closet Bay (33 birds) and Kinnego Bay (24 birds).

Tolan's Flat Area (Figure 11)



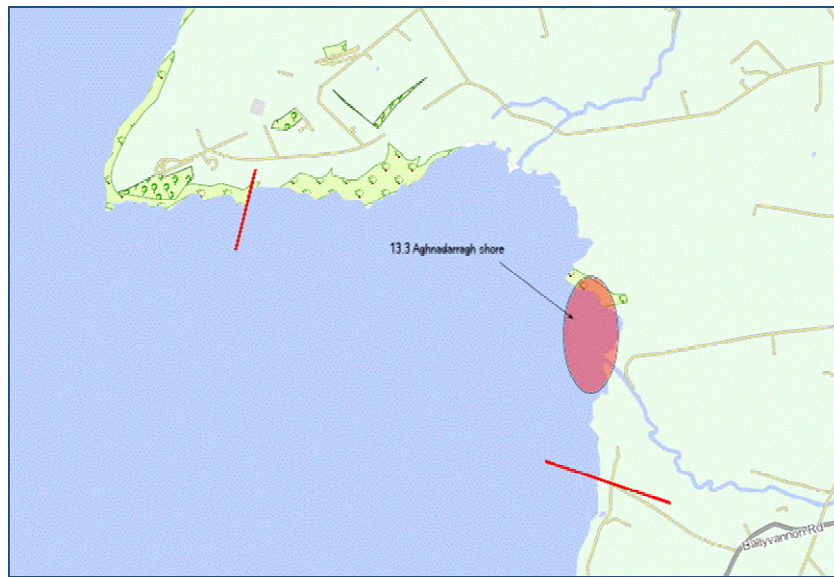
A total of 133 Great Crested Grebes were recorded in this Section. The most significant concentrations were noted at Ellis's Gut (27 birds), Tolan's Flat (26 birds) and Selshan Harbour (26).

Sandy Bay (Figure 12)



A total of 106 Great Crested Grebes were recorded in this Section. The most significant concentration was noted at Sandy Bay (64 birds).

Aughnadarragh area (Figure 13)



A total of 46 Great Crested Grebes were recorded in this Section. The most significant concentration was noted at Aughnadarragh shore (23 birds).

The other sections had only small numbers of scattered grebes or none at all.

2.2.2 Initial assessment of Potential Impacts – disturbance

Direct disturbance (visual and human); Indirect Disturbance (wash)

The likely disturbance caused by most of the dredging traffic must be considered minimal compared to the other boat traffic on the Lough, this is discussed in the previous section (2.1). Probably more relevant is the 3 metre depth restriction (draft requirement) of the barges which would not be as relevant to many other craft on the Lough. In effect this would ensure the barges will remain more distant from the colonies. Grebes when breeding can be hard to persuade to leave their nesting locations, most commonly amongst beds of common reed (*Phragmites communis*) and only loud intermittent noise such as hand clapping close-by can persuade them to move into open water (personal observations). The nest is floating so as long as water levels do not drop too low and beach the nest it will successfully float whilst anchored to reed stems. Only a steep wash would potentially have negative impacts. For example grebes continue to successfully nest close by an existing sand landing point at Sandy Bay (Figure 12) with no apparent negative impacts. Previous studies (Allen & Mellon 2012; Perry 2000⁴) have not highlighted sand dredging as being a potentially

⁴ Perry K W (2000) The Ecology and Conservation of Great Crested Grebes *Podiceps cristatus* at Lough Neagh, Northern Ireland – thesis submitted to the School of Environmental Studies, Faculty of Science, University of Ulster.

damaging operation and the overall Lough Neagh population remains double that estimated at the time of designation which is accepted as a probable original underestimate. Nevertheless it seems reasonable to state that the overall population on the Lough has, at worst, remained stable.

The distribution of breeding grebes set against the dredging operation map is illustrated in Figure 14. The colonies close to the proposed dredging zone plus those close to landing points equated at the last survey to around 406 birds which roughly calculate as 350 pairs (See 2012 report for calculations), about one third of the breeding population.

2.2.3 Initial assessment of Potential Impacts – foraging

The diet of great crested grebes is primarily fish fry although they will take small numbers of crustaceans and other invertebrates. The potential availability of fish fry is covered in Section 2.1.3. The issue of sediment plumes is also addressed in Section 2.1.3.

2.2.4 Initial assessment of Potential Impacts – loss of habitat

As already stated great crested grebes nest primarily in shoreline stands of common reed which often grow on a sandy/silt substrate. The sands and silts are generally bound by the vegetation but sand extraction could potentially cause a redistribution of substrates within the lough. The question is therefore will continued extraction of sands directly impact the nesting habitat of great crested grebes by reducing it through loss of substrates? This is not a straightforward question, as there are a number of variables that need to be taken into account.

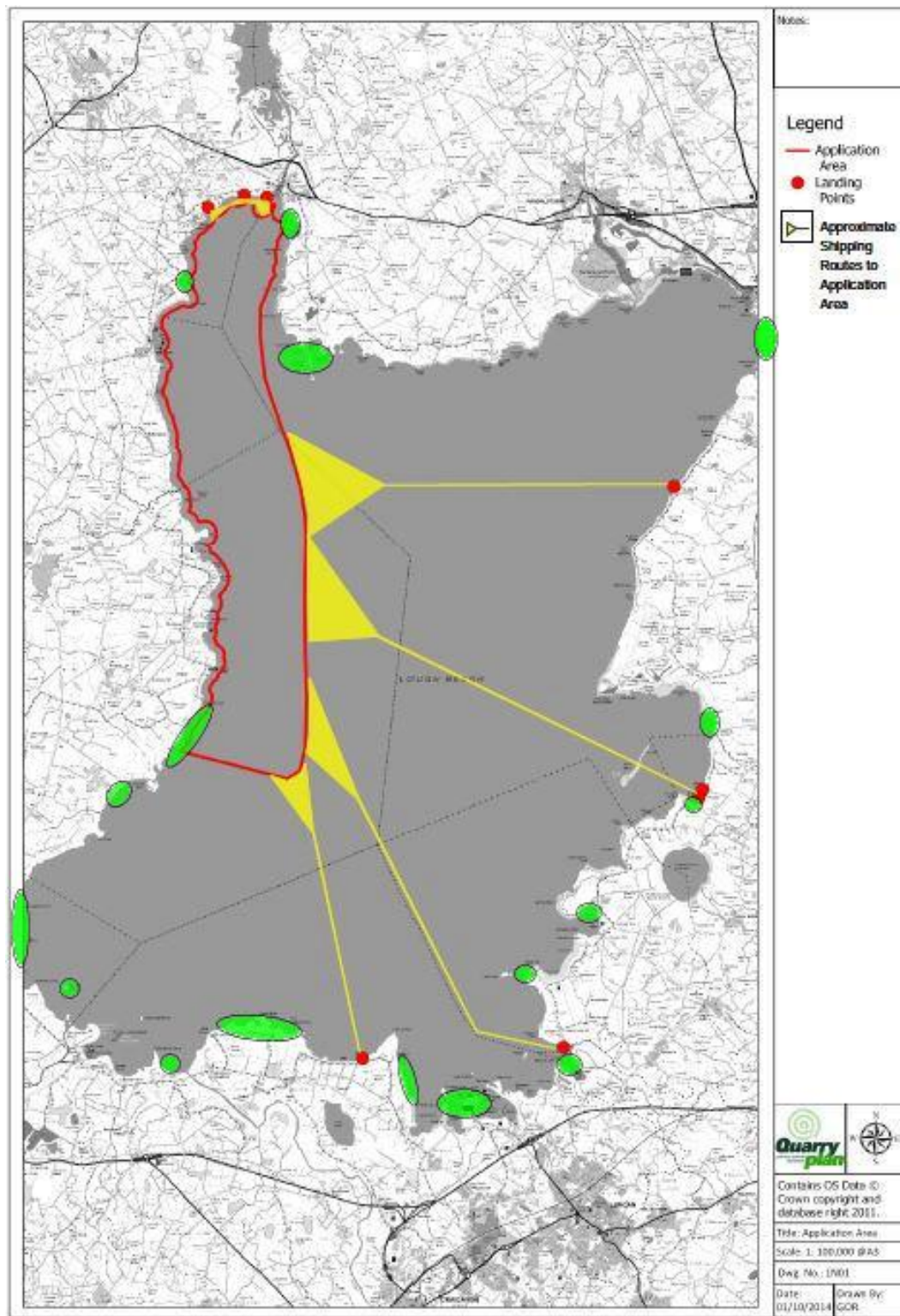


Figure 14: Concentrations over 90 breeding great crested grebes plotted against dredging activity.

There is no evidence that sand extraction is having an impact on some reed beds and marginal vegetation, this is considered to be the case as these species by necessity have to be tolerant to changes in water levels and weather conditions.

Common reed is a rapid coloniser of shallow water and aerial imagery (2002-2012) would suggest that in some parts of the Lough, reed beds are slightly increasing in extent e.g. Blacker's Rock and there is no evidence that reed beds were diminishing in terms of extent. NIEAs own site condition and integrity monitoring must indicate if there has been any fundamental change bearing in mind that commercial sand dredging has been undertaken for over 70 years.

The following is taken from Rivers Agency website relating to the Lough Neagh water levels.

The situation is complicated further by the fluctuating water levels and the shallow overall nature of the lough. The water level in Lough Neagh is controlled by the Toome sluice gates. Within the statutory 'control' range of 12.45 metres and 12.60 metres above sea level Rivers Agency strive to maintain a 'operational' level of 12.47 metres during the winter months when the risk of lough draw-down is least and flood risk is high and 12.57 metres during the summer months when the opposite applies. The operating levels both provide a 25 millimetre margin within the respective closest limits of the control range in order to provide the necessary leeway. In practice it is impossible to consistently keep Lough Neagh levels within this narrow range because of natural floods and droughts.

The lough level at the north end of the lough can also be affected by wind action. In the prevailing south-west wind, water can literally be pushed up along the northern shores occasionally causing a significant disparity (in excess of 10 centimetres) between the sampling points at Oxford Island and Toome Bridge.

2.3 Wintering & Passage Great Crested Grebe (currently in Favourable Condition)

2.3.1 Population and distribution

The relationship between the breeding and wintering populations are not well understood. It is very probable that the wintering population contains a significant proportion of breeding birds plus immigrants and presumably passage birds. The links with the wintering Belfast Lough population were explored by Perry (2000) but evidence was sparse. Having peaked in the late nineties the Belfast lough population has now virtually disappeared whereas the Lough Neagh wintering population has remained relatively stable and well under the Alert Limits.

Grebes tend to inhabit deeper water than the loafing diving ducks and therefore are often well offshore. This inevitably leads to undercounting in anything other than ideal count conditions. As count dates are set in advance counts often take place in poor conditions

leading to under counting of the more distant species and especially grebes. This will undoubtedly have a bearing on the 5 year rolling means and annual peak counts.

The count trends for Lough Neagh are illustrated in Figure 15. NIEA will have section data available but this should be examined with care as it will on occasions reflect the ability of the observer to actually see birds at distance e.g. if a count point is at height relative to the surface then birds will be visible, whereas at lough level they would not be.

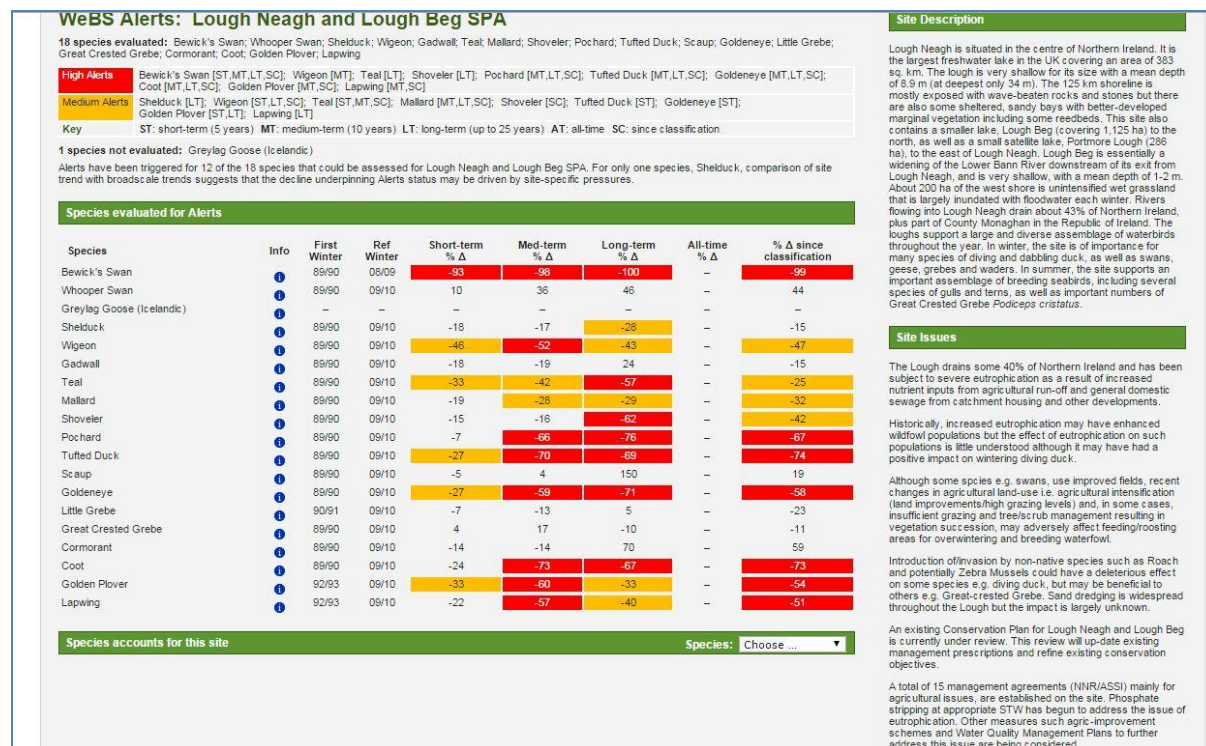


Figure 15: Lough Neagh & L. Beg SPA WeBS Alerts

The grebes are highly mobile around the lough and often travel in large groups. This is one of the few species which will be encountered in the daytime in the middle of the lough.

2.3.2 Initial assessment of Potential Impacts – disturbance

As previously discussed for other species the potential disturbance relates to the traffic, in this case sand barges, the number of barges vs the number of other craft constitutes only a small percentage. Unlike loafing diving ducks the grebes occupy the deeper waters and will readily swim away from potential disturbances (pers. obs.). With relatively narrow commuting belts used by the barges any disturbance caused will inevitably be very minimal and very time constrained.

2.3.3 Initial assessment of Potential Impacts – foraging

The diet of great crested grebes is primarily fish fry although they will take small numbers of crustaceans and other invertebrates. The potential availability of fish fry is covered in section 2.1.3. The issue of sediment plumes is addressed in Section 2.1.3.

2.4 Overall waterbird assemblage (numbers & diversity)

2.4.1 Population and distribution

The diversity within the overall assemblage remains in favourable condition whereas the total numbers is in unfavourable condition. This is entirely driven by the declines in the four key diving duck species (Pochard, Tufted Duck, Scaup & Goldeneye). The issues surrounding these declines are covered in a separate report, which concludes that the trends reflect short-stopping rather than intrinsic factors in the lough.

The other waterbirds, primarily consisting of dabbling ducks such as Mallard, Teal and Wigeon, plus geese, swans, coot etc feed close inshore and on adjacent wet grasslands. These areas are unaffected by the proposed operations and many of the key sites for these species lie well outside areas of dredging activity or on hinterlands.

2.5 Possible impacts on Rea's Wood and Farr's Bay SAC

Assessing Plans and Projects, as required under Article 6(3) of the Habitats Directive - Habitats Regulations Assessments (HRA) are required to assess proposed plans and projects in light of the site's conservation objectives⁵.

The report referenced above cites the following as being the main threats, pressures and activities with impacts on the site (The list is not exhaustive, but deals with the most likely factors that are either affecting Rea's Wood & Farr's Bay, or could affect it in the future).

- Changes in Water Level
- Woodland Clearance
- Dead Wood Removal
- Invasion by Exotics
- Drainage of Swamp Woodland
- Fly-tipping
- Nitrogen Deposition

⁵ <http://www.doeni.gov.uk/niea/print/reas-wood-farrs-bay-sac-conservation-objectives-2015.pdf>

2.5.1 Site Description

The SAC is situated on the NE shore of Lough Neagh and is one of the best examples of alluvial forests in Northern Ireland. The site contains a complete successional sequence from open water through reeds-swamp to alder woodland. These habitats occur on permanently inundated and ponded areas that have developed as a result of successive lowering of the Lough. The swamp woodland grades to drier woodland inland.

2.5.2 Possible impacts – erosion and loss of sand

In theory this site could be impacted by loss of sediments and direct erosion through increased wave action. This could also be deemed to be a “change in water level”. When changes occurred in the past through lough lowerings a new succession was started on the newly exposed shoreline. It is hard to envisage how the current and proposed extraction would impact on the site directly. Indirect impacts would be through sand/sediment redistribution but this would have to be on a massive scale to potentially have any impact. As the lough level oscillates significantly because of water abstraction at times of low water levels it is hard to envisage how there could be any impact.

The sheltered shallow nature of Antrim Bay will give a level of protection from the proposed operations and is probably more vulnerable to strong prevailing south-west winds than any other action. There has been no previous suggestion that the current ongoing programme of dredging has had any negative impact on the SAC.

Wind-driven circulation of the water column causes re-suspension and mobilisation of the Lough’s sediments (Douglas & Rippey, 2000⁶). They estimated that 96% of the total annual mean sedimentation rate was contributed by resuspended materials. Jewson (1976)⁷ demonstrated that light penetration could sometimes be so reduced by sediment resuspension as to limit phytoplankton growth.

Lough Neagh acts as a net sediment trap for materials transported from elsewhere in the catchment by the afferent rivers (Carter, 1993⁸). Rippey et al. (1982⁹) using sediment cores, estimated that the annual mean primary sedimentation rate was 2.3 g/m² /d. Douglas and Rippey (2000) demonstrated that the sedimentation rates varied considerably throughout the Lough basin due to variation in wind direction and velocity.

⁶ Douglas, R. W., & Rippey, B. (2000). The random redistribution of sediment by wind in a lake. *Limnology and oceanography*, 45(3), 686-694.

⁷ Jewson, D. H. (1976). The interaction of components controlling net phytoplankton photosynthesis in a well-mixed lake (Lough Neagh, Northern Ireland). *Freshwater biology*, 6(6), 551-576.

⁸ Carter, R.W.G. (1993). The morphology, hydrodynamics and sedimentation processes of Lough Neagh. In *Lough Neagh: the ecology of a multipurpose water resource* (eds R.B. Wood & R.V. Smith), pp. 35-57. Kluwer Academic Publishers, Dordrecht.

⁹ Rippey, B. & Jewson, D.H. (1982) The rates of sediment-water exchange of oxygen and sediment bioturbation in Lough Neagh, Northern Ireland. *Hydrobiologia*, 92, 377-382.

The bottom sediments of Lough Neagh can largely be divided into principal zones, the littoral (< ca. 6 m) and the profundal, which are divided by a transitional zone (Carter, 1993). The sediments of the littoral zone are typically coarse-grained (e.g. gravels, mixed sands and clays) whilst the larger profundal area is dominated by fine-grained biogenic muds (Carter, 1993). The shoreline of Lough Neagh includes rocky, exposed bays and sheltered sandy bays, some of which support reed beds and stands of macrophytes.

The sediments of the Lough are described as being very roughly 52% mud, 40% sand and 8% rocky. The profundal zone is entirely fine mud, the intermediate zone mainly sand and the littoral both sandy and rocky.

The EC Priority Habitat involved (H91E0 - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, Alnion incanae, Salicion albae)) is currently assessed as being in Favourable Condition¹⁰ in an NI context. These woodland habitat types are recognised as being dynamic and to maintain their status they require inundation on a regular basis. NIEA will have their assessment as to the favourability status of the actual site and stated reasons as to factors affecting such in condition reports and conservation plan.

The issue of direct erosion potentially caused by sand barges versus other boat and water craft traffic has been discussed in relation to other features in 2.1.3 and 2.2.4.

¹⁰ http://jncc.defra.gov.uk/pdf/Article17Consult_20131010/H91E0_NORTHERNIRELAND.pdf

Appendix 1

Email correspondence with [REDACTED] of DCAL Inland Fisheries
concluding 26 May 2015.

[REDACTED]

From: [REDACTED]
Sent: 26 May 2015 12:23
To: [REDACTED], Quarryplan Limited; [REDACTED]
Cc: [REDACTED]
Subject: RE: DCAL Lough Neagh Scale Fish Stocks Matters Arising

[REDACTED], following questions have been raised with the DCAL minister (this is not an exhaustive list and there may be others):

1) Mrs Dolores Kelly MLA
AQO – 6763/11-15
25/9/14

To ask the Minister of Culture, Arts and Leisure for her assessment of the sustainability of the commercial fishing of Lough Neagh.

The long term sustainability of the Lough Neagh commercial fishery is a key priority for my Department. The fishery makes a significant contribution to the local economy and some three hundred families around the Lough derive income from it.

I recently visited the Lough Neagh Fishermens Co-operative Society's facilities at Toome and I was impressed with the Co-operative's positive approach to the future management and sustainability of the fishery.

I have commissioned the Agri-Food and Biosciences Institute (AFBI) to undertake further research on fish stocks throughout the catchment. AFBI's work provides an important scientific basis to my Department's role in the conservation and protection of the fishery and will inform the development of the Lough Neagh Fishery Management Plan.

There has already been extensive work carried out on salmon and eel stocks and a suite of conservation measures are already in place in respect of these species.

There is currently no scientific evidence on other fish stocks that would confirm that any factors, including commercial fishing, are having a detrimental effect on stocks. AFBI is currently carrying out a research project on Lough Neagh that will provide information on the location and population levels of all fish species in the Lough. AFBI and my Department are also carrying out research into commercial fishing methods on the Lough and the potential impact this may have on stocks.

The habitat in and around Lough Neagh is important and my Department is undertaking habitat survey work on the tributaries flowing into Lough Neagh. This will identify areas where poor habitat is limiting fish stock levels and where further remedial work is required.

I am also concerned at the potential detrimental impact on fish stocks of sand dredging in Lough Neagh and my Department is in discussions with other Government Departments and stakeholders on the need to regulate such activity.

Mr Steven Agnew MLA
AQO 5850/11-15

To ask the Minister of Culture, Arts and Leisure, for her assessment of the health of fish stocks in Lough Neagh, including Atlantic salmon, eels, Pollan and Dollaghan trout, in relation to the impact any decline may be having on the local fishing industry. – details can be found on the NI Executive website but follows a similar line to that above.

2) Full details of eel and salmon data can be found on the following link:

3) The report on trout stock status in the DCAL area is attached.

4) With regards to your queries below see comments in red text:

- 'The current status of scale fishing on Lough Neagh is such that DCAL would encourage that current harvesting levels of 10% of the population should be increased to 30% of the population'. – The estimate of harvest levels for L Neagh by commercial fisheries is based on some rudimentary assessments of data currently available. The fisheries management plan will seek to review the current harvest levels, determine what scientific assessment is required to fully assess fish stocks and to consider what future exploitation levels should be to ensure the long term sustainability of the fish stocks resource.
 - 'Pollan recruitment figures for Lough Neagh indicate that the Pollan population is performing well.'
 - 'The commercial eel fishery is performing well in contrast to the rest of the eel fisheries in Europe. Other commercial eel fisheries have been closed/restricted as they were unable to demonstrate the achievement of EU Conservation targets e.g. Erne, ROI, Denmark, Holland etc' – The Neagh Bann EMP based on an average over the period 2003-2014 of assessing silver eel escapement has met its required targets. Full details can be found in the EMP reports and DCAL Stats digest.
 - [REDACTED] outlined that it is his opinion that existing / historical activities on the Lough have not had an effect of fish stock levels, please can you confirm this in the form of a statement. – This refers to ALL anthropogenic activities and is based on an historic and current status quo whereby 50 years of fishing and sand extraction from around the lough has not resulted in recurring fish stock problems albeit perch were overfished (PhD evidence suggests now returning in great numbers) and eel has suffered from EU wide stock collapse. However, as outlined at our meeting, the "engine room" for driving this production in the lough is focused around the nursery area outlined on the map and targeted by the 15 regular bait net trawlers. This habitat is based on the kind of sand now in demand and thus any in roads into its removal from here (which was not dredged for the past 50 years) is a change in status quo and is therefore likely to induce negative impacts.
 - 'The operation of flood prevention water level management at Toome has a ignorant effect on fish numbers insofar as millions of scale fish fry are 'flushed' into the Lower Bann system and are lost to Lough Neagh'. – Correct: annual autumnal flood event, witnessed at Toome, where the coghill nets provided the evidence of the wash downs; its also plausible that there will be other wash downs going un noticed as no nets are in the water. Volumetric analysis places the losses at approx 7million fry per net.
- DCAL has proposed the conservation zoning of bait net spawning / nursery habitat for scale fish to be considered by the sand dredging industry – we are currently trying to get agreement with the QPANI and the LNFCs on areas for sand dredging as an interim measure prior to any planning consideration by the DOE. As I have outlined there are concerns that the physical affect of dredging not only impacts and reduces the areas where bait nets can be trawled by fishermen but also of the possible detrimental impact on juvenile fish in shallow rearing areas - particularly for pollan stocks.

5) Permission to use any of [REDACTED] data from his PhD is a matter for [REDACTED] to consider and we have no power to grant access, It is in write up phase.

Thanks

[REDACTED]
Inland Fisheries
Department of Culture, Arts & Leisure
Causeway Exchange
1-7 Bedford Street
Belfast, BT2 7EG
[REDACTED]



Please consider the environment - do you really need to print this e-mail?

From: [REDACTED] Quarryplan Limited [REDACTED]
Sent: 25 May 2015 15:24
To: [REDACTED]
Cc: [REDACTED]
Subject: DCAL Lough Neagh Scale Fish Stocks Matters Arising

[REDACTED], further to our very useful meeting we had at the tail end of last week I undertook to provide you with a written request for information in order that you can provide a formal response to specific questions.

1. Can DCAL provide annual fish counts for Lough Neagh over time to allow for trend analysis?
2. Can we have access to the existing research undertaken by [REDACTED] to help inform our planning application process?
3. Can you, as indicated provide previous public statements from your Department which reflect the following statements that you made during the meeting, or address any of the following the points in the written response to be provided for above?
 - 'The current status of scale fishing on Lough Neagh is such that DCAL would encourage that current harvesting levels of 10% of the population should be increased to 30% of the population'.
 - 'Pollan recruitment figures for Lough Neagh indicate that the Pollan population is performing well.'
 - 'The commercial eel fishery is performing well in contrast to the rest of the eel fisheries in Europe. Other commercial eel fisheries have been closed to allow for improvement in eel numbers e.g. Erne, ROI, Denmark, Holland etc'
 - [REDACTED] outlined that it is his opinion that existing / historical activities on the Lough have not had an effect of fish stocking levels, please can you confirm this in the form of a statement.
 - 'The operation of flood prevention water level management at Toome has a ignorant effect on fish numbers insofar as millions of scale fish fry are 'flushed' into the Lower Bann system and are lost to Lough Neagh'.
 - DCAL has proposed the conservation zoning of bait net spawning / nursery habitat for scale fish to be considered by the sand dredging industry.

I look forward to hearing from you at the earliest opportunity,

Regards

[REDACTED] BSc MRICS
Chartered Mineral Surveyor



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