DEPARTMENTAL BRIEF:

Liverpool Bay / Bae Lerpwl
Special Protection Area

Natural England
Northminster House
Peterborough
PE1 1UA

Countryside Council for Wales
Maes y Ffynnon
Bangor
LL57 2DW

MAY 2010

CONTENTS

LIST OF TABLES

APPENDICES

SUMMARY

Liverpool Bay SPA qualifies for the following reasons:

- The site regularly supports more than 1% of the GB populations of one species listed in Annex I of the EC Birds Directive – see Table 1.
- The site regularly supports more than 1% of the biogeographical population of one regularly occurring migratory species not listed in Annex I of the EC Birds Directive – see Table 1.
- The site regularly supports more than 20,000 waterfowl during the non-breeding season.

Table 1 Summary of qualifying ornithological interest in Liverpool Bay SPA

Species	Count (period)	% of subspecies or population	Interest type
Red-throated diver *Gavia stellata*	922 individuals – wintering (2001/02 – 2006/07)	5.4% GB	Annex I
Common scoter *Melanitta nigra*	54,675 individuals – wintering (2001/02 – 2006/07)	3.4% NW Europe	Migratory
Waterfowl assemblage	55,597 individuals (sum of above)	N/A	>20,000 waterfowl

1 SITE STATUS AND BOUNDARY

The criteria for the selection of sites as SPAs within the UK are set out within the SPA selection guidelines published by the Joint Nature Conservation Committee (JNCC 1999). JNCC selected 50 Areas of Search around the whole UK – areas that were known or suspected to be important for various species of water bird – and conducted surveys in all of them in order to identify the most suitable territories for these species.

From this programme of survey, Liverpool Bay has been identified by the Countryside Council for Wales and Natural England as potentially qualifying as a Special Protection Area, based on data collected from aerial surveys commissioned by both organisations during five winters between 2001/02 and 2006/07, and analysed by the JNCC Seabirds and Cetaceans Team (Webb *et al.*, 2006a, 2006b, JNCC 2008, JNCC Marine SPA Team 2009). The proposal is further supported by aerial survey data collected during the winters of 2000/01 (Oliver *et al.*, 2001) and 2003/04 (WWT unpublished data), as well as shore-based observations dating back to winter 1970/71. These data demonstrate that the SPA regularly supports wintering red-throated divers *Gavia stellata* and common scoter *Melanitta nigra*, as well as an assemblage of waterfowl in the non-breeding season, in numbers of European importance.

JNCC has determined a protocol whereby data describing the distribution of red throated divers and common scoter can be analysed and a boundary drawn that represents the optimal solution between protecting a significant proportion of the populations in that wider area (given their distribution) and avoiding the inclusion of areas which are apparently of lesser importance to the species. While this process may result in markedly different numbers and indeed different average densities of birds within different SPAs, the boundaries have been defined consistently across sites using the same method.

The total area of the proposed Liverpool Bay SPA is approximately 170,292.94 ha.

1.1 Seaward boundary of the SPA

The seaward boundary of the SPA has been proposed using the analyses of aerial survey data carried out by the Joint Nature Conservation Committee (JNCC) Seabirds and Cetaceans Team (Webb *et al.*, 2006a, 2006b, JNCC 2008, JNCC Marine SPA Team 2009). The coordinates of the boundary and other descriptive information are presented on the site map at appendix 1. The SPA lies entirely within the 12 nautical mile limit of English and Welsh Territorial Waters.

1.2 Landward boundary of the SPA

It is proposed that the landward boundary of Liverpool Bay SPA will follow the Mean Low Water mark or the seaward boundaries of existing SPAs or SPAs, whichever is the furthest seaward. Consequently, the landward boundary of Liverpool Bay SPA will be adjacent to (but not abut) Morecambe Bay SPA and directly abut the seaward boundaries of Ribble and Alt Estuaries SPA, Mersey Narrows and North Wirral Foreshore SPA, The Dee Estuary SPA and Traeth Lafan, Conway Bay SPA. In addition, the site also entirely surrounds Ynys Seiriol/Puffin Island SPA. Intertidal mudbanks and sandbanks separated from the mainland coast by subtidal areas at mean low water are within the SPA boundary, except where they are within the boundaries of existing SPAs or SPAs, as is the case in parts of the Mersey Narrows and North Wirral Foreshore SPA and The Dee Estuary SPA.

2 LOCATION AND HABITATS

Liverpool Bay is located in the south-eastern region of the northern part of the Irish Sea, bordering northern England and north Wales, and running as a broad arc from Morecambe Bay to the east coast of Anglesey.

Liverpool Bay is divided between England and Wales at the border running through the Dee Estuary. In England it borders the county of Lancashire, the Unitary Authority area of Blackpool and the Metropolitan Districts Sefton and Wirral. In Wales, it borders the unitary authority areas of Flintshire, Denbighshire, Conwy, Gwynedd and Anglesey. The seaward boundary of the SPA is mostly within the 20m depth contour and marginally (off the coast of north Wales) extends beyond the 25m depth contour.

The seabed of Liverpool Bay consists of a wide range of mobile sediments. Sand is the predominate substrate with a concentrated area of gravelly sand off the Mersey Estuary. Sandbanks off the English coast of the Bay include East Hoyle Bank (largely within the Mersey Narrows and North Wirral Foreshore SPA), parts of Great Burbo Bank (off the mouth of the Mersey). West Hoyle Bank (at the mouth of the Dee Estuary), Dutchman Bank and Chester and Rhyl Flats, are amongst the sand banks off the Welsh coast of the Bay.

The tidal currents throughout the Bay are generally weak and do not exceed 2m/sec. This combined with a relatively extended tidal range of 6 to 8m along the Lancashire coastline facilities the deposition of sediments, encouraging mud and sand belts to accumulate.

Water temperature fluctuates between summer and winter, with the coldest in February and March of 5-6°C. In August the surface water temperatures range between 14-16°C. The salinity level varies from fully saline in the western seaward areas of Liverpool Bay and decreases eastwards to 33 – 31 parts per thousand with the increased fresh water river input.

The Bay holds various fish of commercial importance. Pelagic species such as herring *Clupea harengus* and sprat *Spratus spratus* have nursery grounds in the Bay. Demersal species such as plaice *Pleuronectes platessa* and sole *Solea solea* use the Bay for spawning and as a nursery area. Herring and sprat are amongst the most frequently recorded prey species of red-throated divers (Cramp & Simmons, 1977).

A study in Liverpool Bay investigated how bivalve distributions may influence scoter distributions (Kaiser, 2002, Kaiser et al. 2006). Benthic sampling undertaken to date has found three main bivalve species within the sampling areas. These were *Abra alba, Pharus legumen* and *Donax vittatus*. Species such as *Mactra stultorum* and *Fabulina fabula* were much more patchily distributed. It is clear that each species occurs in distinct patches of variable abundance, and where one species declines it is replaced by another species. Work in Carmarthen Bay (Woolmer, 2003) indicates that common scoters are quite catholic in their selection of prey species, and will forage on species that are at sufficient density and at a suitable depth. This was also supported in the Liverpool Bay research.

2.1 Commercial activities in Liverpool Bay

Liverpool Bay, like most other areas in the coastal and territorial waters of the UK, is subject to a variety of human activities and uses of varying levels of scale and impact.

Commercial fishing

The entire area of the SPA lying in the six to twelve nautical mile zone is accessible to French and Irish vessels. Conwy Bay supports commercially important shellfisheries, although the most productive and heavily fished areas lie just outside the boundary of the proposed SPA.

Shipping and ports

The eastern Irish Sea is a focal point for commercial shipping. With eight commercial ports either located within or adjacent to Liverpool Bay a very high proportion of the shipping traffic traverses the Bay. A number of ports undertake navigational dredging and disposal of material in or adjacent to the SPA.

Historically, Liverpool Bay was actively used for the disposal of domestic sewage sludge and industrial waste. At the peak of activity 50,000 tonnes (dry weight) was disposed of in the Bay each

year but this ceased when all dumping of waste at sea was prohibited under the 1993 International Maritime Convention.

Renewable Energy
The environmental conditions of relatively shallow water, reduced tidal currents and favourable prevailing winds, combined with proximity to densely populated urban and industrial areas, make Liverpool Bay an attractive location for the development of offshore renewable energy industry, in particular wind farms. A number of wind farms are currently in operation, under construction or consented at North Hoyle, Rhyl Flats and Burbo and at the 'Gwynt y Mor' area northeast of Llandudno. The wind farm proposal located at Shell Flat currently requires consent.

Oil and gas installations
There are a number of oil and gas platforms located in the eastern Irish Sea. Although almost all of these lie in deep water outside the boundary of the SPA, there are a number of helicopter flight paths to and from these installations which cross the SPA (Kaiser 2002). Helicopter flights for maintenance and personnel transfer occur directly across the main aggregations of common scoter off Blackpool and the River Ribble although they occur relatively infrequently approximately once per day (one outbound and one inbound trip) for each installation (Kaiser 2002).

Recreational Use
A number of areas on the coasts of North Wales, Merseyside and Lancashire are traditional seaside holiday centres where marine tourism and leisure activities make a major contribution to the local economy. There are existing, partially completed and proposed marina developments at Beaumaris, Conwy and in the Mersey Estuary.

3 ASSESSMENT OF ORNITHOLOGICAL INTEREST

3.1 Survey Information

Estimated peak numbers of waterfowl during the non-breeding season were obtained from Webb *et al.* (2006a, 2006b) and JNCC (2008), with additional data sourced from Oliver *et al.* (2001) and Wildfowl and Wetlands Trust (Unpublished data collected for the All Wales Common Scoter Survey 2003/04). Liverpool Bay SPA supports over 1% of the biogeographical population of one regularly occurring migratory species, and over 1% of the GB populations of one species listed in Annex I to the EC Birds 2009/147/EC The SPA also supports a waterfowl assemblage of European importance during the non-breeding season. The species and assemblage of European importance are described below.

3.2 Red-throated diver – *Gavia stellata*

Although not regarded as threatened within the EU, the conservation status of this species is regarded as unfavourable because of declines in the European breeding population between 1970-1990. The population is now considered stable though depleted.

The non-breeding population of red-throated divers in Great Britain is estimated to be 17,166 individuals (O'Brien et al. 2008), representing between 10% and19% (depending on the areas included) of the NW Europe biogeographical non-breeding population. The Great Britain population estimate is derived from shore-based observations together with more specific aerial and boat surveys. Surveys from boats and planes have been responsible for identifying much larger numbers wintering in British coastal waters than previously known and the Great Britain population is considered to be an underestimate given the large numbers recorded in Liverpool Bay.

The GB wintering population is aggregated in substantial numbers in several areas, from the Moray Firth in the north to NE Norfolk to Kent in the south. It is considered that the wintering population is largely made up of birds which breed in the UK, Greenland, Iceland and Scandinavia. There is little indication that breeding birds from northwest Russia winter in British waters.

Lack (1986) found the distribution to be fairly even along the east coast, with perhaps slightly fewer in the south compared to the north. The species is less abundant around western coasts and has a patchy distribution, though it is still common, especially off western Scotland (Moser *et al.*, 1986; Stone *et al*., 1995). Concentrations have been recorded in Cardigan Bay, the Moray Firth, the Clyde and Forth Estuaries, the Aberdeenshire coast, the Suffolk/Essex coast, as well as close to Tiree (Moser *et al.*, 1986; Barrett & Barrett 1985; Pollitt *et al.* 2000; Thorpe, 2002). Aerial and boat transect surveys in 2002/3 identified a significant concentration in the Outer Thames Estuary (Percival *et al.*, 2004). Shore-based observations from the North Norfolk Coast have identified winter (December-January) peaks during 1992-1995 of up to 820 individuals (Taylor *et al.*, 1999) and this is may be indicative of a further significant concentration.

In the UK, wintering red-throated divers are associated with shallow (between 0-20m deep and less frequently in depths of around 30m) inshore waters, often occurring within sandy bays, firths and sea lochs, although open coastline is also frequently used (Skov *et al*., 1995; Stone *et al.*, 1995). There is some evidence of association with areas of salinity change (e.g. where low salinity river water meets higher salinity level sea water). Such areas tend to fluctuate with state of tide, volume of river flow and wind conditions. Their diet is principally small fish of a variety of species (particularly of the cod family, herring and sprats) and there is evidence to suggest that in some areas, the higher numbers of birds are associated with shoals of sprats.

Red-throated divers moult their flight feathers during September and October when they may become flightless for a short period and are vulnerable to oil pollution at this time. They are an extremely shy species and the initial results of monitoring from some operational offshore wind farms has shown displacement of 80-100% of divers from the development footprint and surrounding buffer area. This displacement is thought to be due to disturbance caused by the turbines and boat-based maintenance activities. Inappropriately sited developments could displace significant numbers of the GB wintering population. In a review of the sensitivity of 26 species of 'seabird' to the development of offshore windfarms, Garthe & Huppop (2004) found that the red-throated divers had the second highest species sensitivity index score. Other forms of renewable energy, such as tidal barrages, could also impact on the species' wintering numbers and distribution. Red-throated Divers are especially sensitive to disturbance at sea (Garthe & Huppop 2004) and usually avoid boats. Entanglement in various types of static fishing gear and netting is one of the most frequently identified causes of death in NW European and GB waters (Okill 2002, Erdmann *et al.* 2005). Impacts on the prey species of dredging and dumping activities could be detrimental though requires more research to determine the scale of impact.

Consents for developments which are likely to have a significant effect on the SPA such as those resulting in increased pollution, removal and disturbance of substrate and turbidity leading to difficulty in locating and catching prey would be subject to appropriate assessment and the tests of the Conservation of Habitats and Species Regulations 2010. The same provisions would also assist in the regulation of the use of types of fishing gear likely to cause significant mortality.

Although the wintering population is clearly aggregated in a discrete number of areas around the UK coast, these aggregations are, in comparison with other species, loose and spatially extensive. It has been argued that SPAs are not an appropriate mechanism for protecting wintering populations of this species. However, in view of the aggregated nature of the discrete populations and its vulnerability to disturbance together with the scale of development proposals affecting the main wintering areas, it can be concluded that SPA classification to protect these wintering populations is an appropriate and necessary special conservation measure.

Wintering red-throated divers occur throughout Liverpool Bay SPA with highest recorded densities off the Ribble Estuary, North Wales and the North Wirral Foreshore (Webb *et al.*, 2006a.). Red-throated divers use the SPA in wintering numbers of European importance (922 individuals, 5.4% of the GB population, 2001/02 – 2006/07).

3.3 Common scoter – *Melanitta nigra*

Common Scoter is not listed in Annex I to the Birds Directive and is assessed against stage 1(2) of the SPA selection guidelines (JNCC, 1999) using the relevant biogeographical population estimate. Common scoter is a regularly occurring migratory species and the subspecies *M.n. nigra* winters in the Baltic and west Atlantic south to Mauritania (Wetlands International, 2002).

The wintering population of common scoter within this area is considered to be approximately 1.6 million individuals (of which it was previously estimated that 50,000 individuals wintered around the coast of Britain).(Kershaw & Cranswick, 2003). As described above for red-throated diver, the Great Britain population size (derived largely from shore-based surveys) is clearly an under-estimate given the large numbers recorded in Liverpool Bay.

Non-breeding common scoters can be found around most of the coast of the UK, with concentrations around the Moray Firth, Firth of Forth, north-east England, East Anglia, Carmarthen Bay, Cardigan Bay, north Wales, and north-west England (Lack, 1986; Kirby *et al.*, 1993).

Common scoter migrate from their breeding grounds to moulting and overwintering grounds at more southerly latitudes and arrive in Liverpool Bay in large numbers from October onwards. Male birds arrive first, followed by females from December onwards. The females also depart for the breeding grounds before males (in February). Some birds remain in Liverpool Bay over the summer period but these tend to be immature or birds that are moulting. Liverpool Bay is an important overwintering site for common scoter due to its abundant bivalve shellfish stocks that occur in shallow waters at depths of less than 20m.

In the UK, wintering common scoters are associated with shallow (between 0-20m deep (less frequently in depths of around 30m)) offshore areas with sandy sea beds (Lack, 1986). Kaiser (2002) conducted a review of the literature concerning the diet of common scoter. This revealed that in each of 8 quantitative studies, the % value for the occurrence of molluscs in their diet exceeded 90% and that for bivalves exceeded 88%.

Common scoter, are an extremely shy species. In a review of the sensitivity of 26 species of 'seabird' to the development of offshore windfarms, Garthe & Huppop (2004) considered that common scoter had the highest vulnerability score in relation to disturbance by ship and helicopter traffic. Entanglement in various types of static fishing gear and netting is one of the most frequently identified causes of death in NW European waters (Erdmann *et al* 2005). Impacts on the prey species of dredging and dumping activities could be detrimental though requires more research to determine the scale of impact.

Consents for developments which are likely to have a significant effect on the SPA such as those resulting in increased pollution, removal and disturbance of substrate would be subject to appropriate assessment and the tests of the Conservation of Habitats and Species Regulations 2010. The same provisions would also assist in the regulation of the use of types of fishing gear likely to cause significant mortality.

Common scoters have a more clustered distribution within Liverpool Bay than red-throated divers, with highest concentrations recorded from three broad areas (Webb *et al.*, 2006a):

i) Red Wharf Bay (Anglesey) and Conwy Bay;

ii) Great Orme's Head to the North Wirral Foreshore;

iii) Formby Point to Shell Flat (off Blackpool).

Common scoters use the SPA in winter in numbers of European importance (54,675 individuals, 3.4% of the north-west European population of the *nigra* subspecies, 2001/02 – 2006/07).

3.4 Methodology for boundary setting

Identifying most suitable territories for birds at sea presents particular challenges, in particular the absence of distinct physical features or habitat boundaries which can be used to delineate possible areas. Identification of potential SPAs at sea therefore relies on defining areas on the basis of where the birds themselves are distributed. The basic principle is that the areas where the birds occur at the highest average densities or the greatest frequency are the 'most suitable territories". Where the distribution of a given species in a given area varies continuously from the maximum density to zero, without obvious breaks or a cut-off point, defining areas of sufficiently high density to be included in a potential SPA requires a density threshold to be defined.

The boundary for both red-throated divers and common scoter within Liverpool Bay SPA is based on identifying a density threshold using data collected from aerial surveys in five winters between 2001/2 and 2006/7. Density data was combined from all surveys, and a smoothed grid of density of each species in 1 km sq cells was generated using a mathematical technique known as Kernel Density Estimation (KDE). This method results in a grid of relative density (rather than absolute density) and the grid values in each cell were adjusted by the same amount so that their sum equalled the known population size (mean of peak seasonal counts) for each survey area and an estimated or predicted number of birds of each species in each cell is generated. This grid of predicted bird numbers was used as the basis to examine the relationship between the number of grid cells (area) that might be included within the SPA boundary and the number of birds that would be protected within that area.

For each species, starting with the cell with the highest estimated number of birds, cells were considered in a sequence of descending order according to the number of birds that they were predicted to contain until all the cells had been selected. A graph was drawn showing the relationship between the cumulative number of birds and the number of cells considered as more and more cells were added to the total. Having derived the cumulative curve, -the next stage is to find the point on the graph which represents the optimum balance between number of cells (i.e. area selected) and number of birds.

Although the curve is smooth, it is not an even curve. A 'Maximum Curvature' method (MC) was applied, using a mathematical description of the relationship between number of birds and area to find the point where the relationship between number of birds and area changes at the greatest rate as the cells are progressively added, that is to find the point where the graph curves at the greatest rate. The point of maximum curvature was taken as the optimum density in the relationship between number of birds and the size of the area selected. Only the cells selected up to this point were included within the proposed site. A boundary was then drawn to enclose those cells. In order to produce a boundary without too many "turning points", which would be difficult to map and to use, some subjective judgement was required to simplify the boundary and reduce the number of turning points, striking a balance between ensuring that all selected cells are included while minimising the inclusion of additional areas.

The boundary has been drawn in order to optimise the number of birds within the site in relation to the size of the sea area. To encompass all of the sea areas that have been shown by the aerial surveys to support any birds would have resulted in an even larger site. As it stands, the boundary represents an attempt to maximise the population afforded protection while excluding additional areas where bird density is lower and the conservation gain from affording protection is less clear.

The Maximum Curvature method is scale-independent and makes no assumptions about the relative value of number of birds and size of area; it only describes the curvature. However, the method is affected by the total number of grid squares in the area of search, so the grid squares used in the analysis were also constrained by excluding squares with zero bird density and those outwith the maximum limit of sightings in the raw data. A full account of the methodology by which the boundary was defined is set out in JNCC Marine SPA Team (2009).

3.5 Non-breeding waterfowl assemblage

During the period 2001/02 – 2006/07, Liverpool Bay SPA supported at least 55,597 individual waterfowl in the non-breeding season. This assemblage is of European importance and includes the populations of both species of waterfowl regularly occurring in Liverpool Bay SPA that are migratory or listed in Annex I to the Birds Directive and which constitute qualifying ornithological interest features in their own right. It is common practice in the UK to identify the main component species that characterise a waterfowl assemblage (as well as those species that are of European importance in their own right and selected under stages 1(1) or 1(2) of the SPA selection guidelines (JNCC, 1999)). Such species are identified under stage 1(3) of the SPA selection guidelines (JNCC, 1999) because they are regularly occurring migratory species present in numbers exceeding 1% of the GB population or 20,000 individuals (Stroud *et al*, 2001). Aside from common scoter *Melanitta nigra* and red-throated diver *Gavia stellata*, no such species have been identified as particularly important components of the assemblage of waterfowl that uses Liverpool Bay in the non-breeding season. Aerial survey data analysed by Webb *et al.* (2006a) and shore-based observations presented in county and regional bird reports suggest that eider *Somateria mollissima*, red-breasted merganser *Mergus serrator*, great crested grebe *Podiceps cristatus*, cormorant *Phalacrocorax carbo* and little gull *Larus minutus* (for which there is no Great Britain population estimate) may all occur within the SPA in numbers of national importance. However, on the basis of current information it is not possible to be certain that all of the individuals concerned are using the SPA (as opposed to areas immediately adjacent to it) or that important numbers occur regularly. A programme of further data collation, collection and assessment regarding the populations of these other species within the Liverpool Bay SPA is both necessary and anticipated. This will improve the evidence base upon which future decisions regarding amendments to the size and make-up of the non-breeding waterfowl assemblage of the SPA can be made.

No adjustments to the boundary identified from the analysis of common scoter and red throated diver were made in relation to the waterfowl assemblage, as these two species are the most important component species of the assemblage.

3.6 Interests which do not currently meet the SPA selection criteria

There are some data that indicate usage of parts of the SPA by breeding little *Sterna albifrons*, sandwich *S. sandvicensis* and common terns *S. hirundo* (Allcorn *et al.*, 2003), which are classified or potentially qualifying features of the Dee Estuary SPA, Ribble and Alt Estuaries SPA and Mersey Narrows and North Wirral Foreshore SPA, which are adjacent to Liverpool Bay SPA. There is also evidence, largely from roost sites, that Liverpool Bay is a key post-breeding/autumn passage site for these three tern species. However, further data are needed before it can be determined whether qualifying numbers of terns use the SPA either during the breeding season or while on passage, whether there is sufficient regularity of site usage, and the locations of 'hotspots' within (or beyond) the current SPA boundary. A programme of further data collation, collection and assessment regarding the populations of these other species within the Liverpool Bay SPA is both necessary and anticipated. This will improve the evidence base upon which future decisions regarding amendments to the qualifying features of the SPA can be made.

4 ASSESSMENT AGAINST SPA SELECTION GUIDELINES

4.1 Stage 1

Under stage 1 of the SPA selection guidelines (JNCC, 1999), sites eligible for selection as a potential SPA must demonstrate one or more of the following:

1) an area used regularly by 1% or more of the Great Britain population of a species listed in Annex I of the Birds Directive (79/409/EEC as amended) in any season;

2) an area used regularly by 1% or more of the biogeographical population of a regularly occurring migratory species (other than those listed in Annex I) in any season;

3) an area used regularly by over 20,000 waterfowl (waterfowl as defined by the Ramsar Convention) or 20,000 seabirds in any season is eligible for selection as a potential SPA.

The Conference of the Contracting Parties to the Ramsar Convention has defined the term 'regularly' as used in the Ramsar site selection criteria, and this definition also applies to the SPA selection guidelines (JNCC, 1999). A wetland regularly supports a population of a given size if:

i) the requisite number of birds is known to have occurred in two-thirds of the seasons for which adequate data are available, the total number of seasons being not less than three; or

ii) the mean of the maxima of those seasons in which the site is internationally important, taken over at least five years, amounts to the required level (means based on three or four years may be based on provisional assessments only).

Liverpool Bay SPA qualifies under stage 1(1) because it regularly supports greater than 1% of the GB population of one species (red-throated diver) listed in Annex I. The estimated wintering population of red-throated divers in Great Britain is 17,000 individuals (O'Brien 2008). The 1% qualifying threshold is then c 170 individuals. Webb *et al.* (2006a) estimated that Liverpool Bay SPA supported a peak of 1,599 individual red-throated divers in winter 2001/02 and a peak of 1,210 in winter 2002/03. Subsequent surveys in winters 2004/05 and 2005/06 recorded peaks of 1,061 and 1,053 individuals respectively. The mean of peak counts of red-throated divers that occurred within the SPA boundary is 922 individuals.

Liverpool Bay SPA also qualifies under stage 1(2) as it regularly supports more than 1% of the biogeographical population of one regularly occurring migratory species (common scoter). The site was first surveyed for wintering common scoter in 2000/01 when the peak was 16,604 individuals (Oliver *et al.*, 2001), and although not derived from data collected using the line transect methods of Webb *et al*. (2006a), this estimate is clearly superior to any previous counts. From aerial surveys conducted in winters 2001/02 and 2002/03 Webb *et al.* (2006a) estimated that Liverpool Bay SPA supported a peak of 27,772 individual common scoter in winter 2001/02 and a peak of 79,136 in winter 2002/03. Further aerial surveys in winter 2006/07 recorded an estimated 63,400 individuals with a peak of 60,200 in February 2006. The mean of peak counts of common scoter that occurred within the SPA boundary was 54,675 individuals.

The site also qualifies under stage 1(3) by supporting more than 20,000 waterfowl in the non-breeding season. The assemblage of over 20,000 waterfowl has been calculated by summing the peaks of red-throated diver and common scoter in winters 2001/02 and 2002/03 to derive a mean value over this period. The mean of the peaks of at least 29,371 individual waterfowl in winter 2001/02 and at least 80,346 in winter 2002/3 is 54,859.

4.2 Stage 2

Under Stage 2 of the SPA selection guidelines, the site is assessed as follows:

Table 2 Assessment of the bird interest against stage 2 of the SPA selection guidelines

Feature	Qualification	Assessment
1. Population size & density	✓	Liverpool Bay SPA is the most important known wintering site in the UK for common scoter and the second most important site for red-throated divers. Only the Outer Thames Estuary supports higher numbers of red-throated divers.
2. Species range	✓	The site is the main wintering area on the west coast of Great Britain for both red-throated diver and common scoter. Red-throated divers occur off all coasts of Great Britain but there are no known significant concentrations nearer to Liverpool Bay than Carmarthen Bay or western Scotland. The nearest major concentration of common scoter is found in Carmarthen Bay.
3. Breeding success	-	Not applicable as this site is selected only for its importance for birds in the non-breeding season.
4. History of occupancy	✓	Although full aerial surveys have only been carried out very recently, tables 3 and 4 (below) show that significant numbers of red-throated divers and common scoter have been recorded from coastal locations in Liverpool Bay since at least 1970. This is an indication that large numbers of both species are likely to have been present in the Bay since at least that time.
5. Multi-species area	✓	The site supports one qualifying migratory species and one species listed in Annex I.
6. Naturalness	✓	Since it is mostly below mean low water mark, the SPA is likely to be in a relatively natural state, save for the generally localised impacts of dredging, oil and gas exploration, wind farm construction, demersal trawling and other commercial activities.
7. Severe weather refuge	-	No data are available to determine whether the site functions as a severe weather refuge.

Table 3 Peak winter counts of common scoter and red-throated divers from coastal sites in England adjacent to Liverpool Bay SPA 1970/1 – 2002/3

	Common scoter			Red-throated diver		
Winter	North Wirral Foreshore[1]	Sefton Coast[2]	Fylde Coast[3]	North Wirral Foreshore[1]	Sefton Coast[2]	Fylde Coast[3]
2002/3	401	1818	3250	15	23	56
2001/2	463	1800+	1811	45	101	23
2000/1	98	514	2264	15	52	40
1999/00	21	572	3146	12	21	6
1998/9	45	435	850	20	57	75
1997/8	66	811	3216	60	30	102
1996/7	100	190	600	45	32	137
1995/6	100	630	1500	60	31	93
1994/5	97	2000	472	23	13	58
1993/4	100	78	980	17	44	39
1992/3	68	93	500	19	12	107
1991/2	165	210	1800	15	n/a	15
1990/1	33	350	1036	20	6	35
1989/90	75	83	395	67	6	4
1988/9	58	650	c.1000	21	15	5
1987/8	300	n/a	100	30	1	8
1986/7	50	120	650	10	2	22
1985/6	70	800	500	27	20+	12
1984/5	37	203	100	58	3	22
1983/4	50	240	135	10	n/a	9
1982/3	70	150+	275	20	7	5
1981/2	72	175	120	8	17	4
1980/1	110	150	210	6	9	n/a
1979/80	22	30	30	6	5	n/a
1978/9	18	500	70	69	5	7
1977/8	60	300	n/a	62	n/a	n/a
1976/7	57	n/a	n/a	26	1	n/a
1975/6	present	500	n/a	11	50+	n/a
1974/5	c.1000	300+	n/a	7	n/a	n/a
1973/4	35	c.5000	n/a	17	4	n/a
1972/3	29	n/a	n/a	1	present	present
1971/2	49	n/a	n/a	50	present	present
1970/1	29	n/a	n/a	24	n/a	n/a

Main viewing locations on each stretch of coast: 1 = Hilbre Island, Red Rocks, Hoylake, Leasowe and New Brighton; 2 = Formby Point, Seaforth Nature Reserve, Ainsdale, Freshfield, Southport, Birkdale, and the Alt Estuary; 3 = Rossall Point, Blackpool, Anchorsholme and Squires Gate.

Sources: Lancashire Bird Reports 1970-2002; Cheshire and Wirral Bird Reports 1970-2002.

Table 4 Peak winter counts of common scoter and red-throated divers from coastal sites in Wales adjacent to Liverpool Bay SPA 1970/1 – 2002/3

	Common scoter			Red-throated diver		
Winter	Anglesey[1]	West of Great Orme[2]	East of Great Orme[3]	Anglesey[1]	West of Great Orme[2]	East of Great Orme[3]
2002/3	250	n/a	n/a	3	n/a	10
2001/2	291	n/a	n/a	73	71	n/a
2000/1	370	615	n/a	25	90	n/a
1999/0	150	800	n/a	22	74	n/a
1998/9	500	150	n/a	8	18+	n/a
1997/8	n/a	400	n/a	2	37	n/a
1996/7	700-800	500-600	n/a	2	90+	n/a
1995/6	500	n/a	n/a	1	30	n/a
1994/5	40	n/a	n/a	9	20	n/a
1993/4	80	n/a	n/a	1	n/a	n/a
1992/3	80	3,000	n/a	n/a	1	n/a
1991/2	300	2,000	n/a	n/a	n/a	n/a
1990/1	922	n/a	n/a	7	42	n/a
1989/9	2,500	n/a	n/a	24	10	n/a
1988/9	150	1,200	n/a	15	23	n/a
1987/8	225	600	n/a	25	26	n/a
1986/7	500	1,200	n/a	14	14	n/a
1985/6	400	195	n/a	10	n/a	n/a
1984/5	45	120	n/a	n/a	11	n/a
1983/4	43	200	n/a	n/a	20	n/a
1982/3	n/a	100	n/a	present	30	11
1981/2	n/a	3	62	present	n/a	9
1980/1	250	n/a	150	n/a	23	n/a
1979/8	n/a	n/a	n/a	n/a	n/a	n/a
1978/9	n/a	447	n/a	present	30	7
1977/8	1,175	700	360	37	30	3
1976/7	1,800	460	n/a	22	8	7
1975/6	700	300	n/a	present	n/a	18
1974/5	n/a	n/a	n/a	present	9	n/a
1973/4	86	n/a	1,100	present	n/a	3
1972/3	present	present	present	5	n/a	n/a
1971/2	n/a	n/a	n/a	n/a	n/a	n/a
1970/1	n/a	n/a	n/a	n/a	n/a	n/a

Main viewing locations on each stretch of coast: 1 = Red Wharf Bay; 2 = Conwy Bay; 3 = Llanddulas, Penmaenmawr, Llanfairfechan, Abergele

Sources: Cambrian Bird Reports 1970 - 2002.

5 COMPARISON WITH OTHER SITES IN THE UK

A comparison of Liverpool Bay SPA is made below against other SPAs in the UK selected for wintering red-throated diver and common scoter or non-breeding waterfowl assemblages.

Table 5 Comparison with other UK SPAs that support similar qualifying species

Site/Species	**1991/92 - 1995/96 unless stated otherwise**	**% of population**
RED-THROATED DIVER (winter)		% GB
Outer Thames Estuary SPA	6486 (1998 –2006/07)	38%
Liverpool Bay SPA	***922 (2001/2 – 2006/7)***	***5.4%***
Firth of Forth	88	1.8%
COMMON SCOTER (winter)		% *nigra*
Liverpool Bay SPA	***54,675 (2001/2 – 2006/7)***	***3.4% NW Europe (106.9% GB)***
Carmarthen Bay	16,864 (1997/8 – 2001/2)	1.1% (33.7% GB)
North Norfolk Coast	2,909	0.2% (5.8% GB)
Firth of Forth	2,653	0.2% (5.3% GB)
Firth of Tay and Eden Estuary	1,444	0.1% (2.9% GB)
Lindisfarne	654	0.0% (1.3% GB
Ribble and Alt Estuaries	582	0.0% (1.2% GB)
Moray and Nairn Coast	531	0.0% (1.1% GB)
WATERFOWL ASSEMBLAGE (non-breeding)		
The Wash	400,273	n/a
Ribble and Alt Estuaries	301,449	n/a
Morecambe Bay	210,668	n/a
Humber Estuary	153,934 (1996/7 – 2000/1)	n/a
Upper Solway Flats and Marshes	133,222	n/a
The Dee Estuary	130,408	n/a
Blackwater Estuary	109,815	n/a
Foulness	107,468	n/a
Mersey Estuary	99,467	n/a
Severn Estuary	93,986	n/a
Chichester and Langstone Harbours	93,142	n/a
North Norfolk Coast	91,249	n/a
Duddon Estuary	78,415	n/a
Somerset Levels and Moors	72,874	n/a
The Swale	65,390	n/a
Medway Estuary and Marshes	65,274	n/a
Stour and Orwell Estuaries	64,768	n/a
Ouse Washes	64,392	n/a
Liverpool Bay SPA	***55,597***	***n/a***
Solent and Southampton Water	53,948	n/a
Martin Mere	46,196	n/a
Hamford Water	44,461	n/a
Breydon Water	43,225	n/a
Lindisfarne	41,870	n/a
Lower Derwent Valley	39,936	n/a
Abberton Reservoir	39,155	n/a
Colne Estuary	38,548	n/a

Site/Species	1991/92 - 1995/96 unless stated otherwise	% of population
Benfleet and Southend Marshes	34,789	n/a
Thames Estuary and Marshes	33,433	n/a
Dengie	31,452	n/a
Poole Harbour	28,426	n/a
Arun Valley	27,241	n/a
Nene Washes	25,437	n/a
Alde – Ore Estuary	24,962	n/a
Exe Estuary	23,513	n/a
Rutland Water	23,501	n/a
Broadland	22,603	n/a
Gibraltar Point	22,137	n/a
Teesmouth and Cleveland Coast	21,406	n/a
Mersey Narrows and North Wirral Foreshore	20,269	n/a

Source: Stroud *et al.* (2001)

6 REFERENCES

Allcorn, A., Eaton, M.A., Cranswick, P.A., Perrow, M., Hall, C., Smith, L., Reid, J.B., Webb, A., Smith, K.W., Langston, K.W. & Ratcliffe, N. 2003. *A pilot study of breeding tern foraging ranges in NW England and East Anglia in relation to potential development areas for offshore windfarms.* Unpublished report to DTI.

Barber, S. 1988. *Cheshire Bird Report 1987*. Cheshire Ornithological Association.

Barber, S. 1989. *Cheshire and Wirral Bird Report 1988*. Cheshire and Wirral Ornithological Society.

Barber, S. 1990. *Cheshire and Wirral Bird Report 1989*. Cheshire and Wirral Ornithological Society.

Barber, S. 1991. *Cheshire and Wirral Bird Report 1990*. Cheshire and Wirral Ornithological Society.

Barber, S. 1992. *Cheshire and Wirral Bird Report 1991*. Cheshire and Wirral Ornithological Society.

Barber, S. 1993. *Cheshire and Wirral Bird Report 1992*. Cheshire and Wirral Ornithological Society.

Barber, S. 1994. *Cheshire and Wirral Bird Report 1993*. Cheshire and Wirral Ornithological Society.

Barber, S. 1995. *Cheshire and Wirral Bird Report 1994*. Cheshire and Wirral Ornithological Society.

Barber, S. 1996. *Cheshire and Wirral Bird Report 1995*. Cheshire and Wirral Ornithological Society.

Barber, S. 1997. *Cheshire and Wirral Bird Report 1996*. Cheshire and Wirral Ornithological Society.

Barber, S. 1998. *Cheshire and Wirral Bird Report 1997*. Cheshire and Wirral Ornithological Society.

Barber, S. 1999. *Cheshire and Wirral Bird Report 1998*. Cheshire and Wirral Ornithological Society.

Barrett, J. & Barrett, C.F. 1985. Divers in the Moray Firth, Scotland. *Scottish Birds* 13: 149-154.

Cramp, S. & Simmons, K.E.L. 1977. *Handbook of the birds of Europe, the Middle East, and North Africa: the Birds of the Western Palearctic. Vol. 1: Ostrich-Ducks.* Oxford University Press, Oxford.

Crawford, R. 1985. *Cheshire Bird Report 1984*. Cheshire Ornithological Association.

Croft, K.G. 1986. *Cambrian Bird Report 1985*. Cambrian Ornithological Society.

Dare, P.J. 1975. *Cambrian Bird Report 1974*. Cambrian Ornithological Society.

Dare, P.J. 1976. *Cambrian Bird Report 1975*. Cambrian Ornithological Society.

Dare, P.J. 1977. *Cambrian Bird Report 1976*. Cambrian Ornithological Society.

Dare, P.J. 1978. *Cambrian Bird Report 1977*. Cambrian Ornithological Society.

Dare, P.J. 1979. *Cambrian Bird Report 1978*. Cambrian Ornithological Society.

Dare, P.J. 1980. *Cambrian Bird Report 1979*. Cambrian Ornithological Society.

Dare, P.J. & McLean, I. 1982. *Cambrian Bird Report 1981.* Cambrian Ornithological Society.

Davies, A. 1992. *Cambrian Bird Report 1991*. Cambrian Ornithological Society.

Davies, A. 1993. *Cambrian Bird Report 1992*. Cambrian Ornithological Society.

Davies, A. 1994. *Cambrian Bird Report 1993*. Cambrian Ornithological Society.

Dunstan, S., Jones, M., Liggett, C., McCarthy, B., Marsh, P.J., Rigby, D.J. & White, S.J. 2000. *Lancashire Bird Report 1999*. Lancashire and Cheshire Fauna Society Publication No. 100.

Dunstan, S., Jones, M., Liggett, C., Walsh, J.F. & White, S. 1999. *Lancashire Bird Report 1998*. Lancashire and Cheshire Fauna Society.

Erdmann, F, Bellebaum, J, Kube, J, Schulz, A. 2005. Losses of seabirds and waterfowl by fisheries with special regards to the international important resting , moulting , and wintering areas in the coastal waters of Mecklenburg -Western Pomerania. Final Report by LUNG, ILN Griefswald & IfAO 130pp.

Feltham, M. 2003. *Cheshire and Wirral Bird Report 2002*. Cheshire and Wirral Ornithological Society.

Garthe, S. & Huppop, O. 2004. Scaling possible adverse effects of marine windfarms on seabirds: developing and applying a vulnerability index. *Journal of Applied Ecology* **41** 724-734

Gibson, S.J. 1986. *Cheshire Bird Report 1985*. Cheshire Ornithological Association.

Gravett, T. 1987. *Cambrian Bird Report 1986*. Cambrian Ornithological Society.

Gravett, T. & Currie, F.A. 1988. *Cambrian Bird Report 1987*. Cambrian Ornithological Society.

Gravett, T. 1989. *Cambrian Bird Report 1988*. Cambrian Ornithological Society.

Gravett, T. 1990. *Cambrian Bird Report 1989*. Cambrian Ornithological Society.

Gravett, T. 1991. *Cambrian Bird Report 1990*. Cambrian Ornithological Society.

Guest, J. 1979. *Cheshire Bird Report 1978*. Cheshire Ornithological Association.

Guest, J. 1987. *Cheshire Bird Report 1986*. Cheshire Ornithological Association.

Guest, J.P. 1980. *Cheshire Bird Report 1979*. Cheshire Ornithological Association.

Guest, J.P. 1981. *Cheshire Bird Report 1980*. Cheshire Ornithological Association.

Guest, J.P. 1982. *Cheshire Bird Report 1981*. Cheshire Ornithological Association.

Hewett, D. 1995. *Cambrian Bird Report 1994*. Cambrian Ornithological Society.

Hewett, D. 1996. *Cambrian Bird Report 1995*. Cambrian Ornithological Society.

Hewett, D. 1997. *Cambrian Bird Report 1996*. Cambrian Ornithological Society.

Hunter, J.S.A. 1983. *Cheshire Bird Report 1982*. Cheshire Ornithological Association.

Hunter, J.S.A. 1985. *Cheshire Bird Report 1983*. Cheshire Ornithological Association.

JNCC. 1999. *The Birds Directive – selection guidelines for Special Protection Areas*. JNCC Peterborough.

JNCC 2008. Boundary options for a possible Special Protection Area for Common Scoter in Liverpool Bay. Unpublished paper to Marine Protected Areas Policy Group by JNCC Marine SPA Team, December 2008.

JNCC Marine SPA team. 2009. Defining draft SPA boundaries for common scoter and red-throated divers using optimum density thresholds. Unpublished paper to UK Conservation Agency Chief Scientists' Group, April 2009.

Jones, L.A., Coyle, M.D., Evans, D., Gilliland, P.M., & Murray, A.R., 2004. *Irish Sea Marine Natural Area Profile.* English Nature Report.

Jones, M. 1979. *Lancashire Bird Report 1978*. Lancashire and Cheshire Fauna Society Publication No. 76.

Jones, M. 1980. *Lancashire Bird Report 1979*. Lancashire and Cheshire Fauna Society Publication No. 77.

Jones, M. 1981. *Lancashire Bird Report 1980*. Lancashire and Cheshire Fauna Society Publication No. 79.

Jones, M. 1982. *Lancashire Bird Report 1981*. Lancashire and Cheshire Fauna Society Publication No. 81.

Jones, M. 1983. *Lancashire Bird Report 1982*. Lancashire and Cheshire Fauna Society Publication No. 82.

Jones, M. 1985. *Lancashire Bird Report 1983*. Lancashire and Cheshire Fauna Society Publication No. 83.

Jones, M. & Blacow, L.G. 1985. *Lancashire Bird Report 1984*. Lancashire and Cheshire Fauna Society Publication No. 84.

Jones, M., Dunstan, S., Liggett, C., Walsh, F. & White, S. 1997. *Lancashire Bird Report 1996*. Lancashire and Cheshire Fauna Society Publication No. 97.

Jones, M., Dunstan, S., Liggett, C. & White, S. 1996. *Lancashire Bird Report 1995*. Lancashire and Cheshire Fauna Society Publication No. 96.

Jones, M., Hulme, G. & Blacow, L.G. 1990. *Lancashire Bird Report 1989*. Lancashire and Cheshire Fauna Society Publication No. 89.

Jones, M., Hulme, G., Cadman, R.A. & Walsh, J.F. 1992. *Lancashire Bird Report 1991*. Lancashire and Cheshire Fauna Society Publication No. 91.

Jones, M., Hulme, G., Cadman, R.A. & Walsh, J.F. 1993. *Lancashire Bird Report 1992*. Lancashire and Cheshire Fauna Society Publication No. 92.

Jones, M., Hulme, G., Cadman, R.A. & Walsh, J.F. 1994. *Lancashire Bird Report 1993*. Lancashire and Cheshire Fauna Society Publication No. 93.

Jones, M., Hulme, G., Cadman, R.A. & Walsh, J.F. 1995. *Lancashire Bird Report 1994*. Lancashire and Cheshire Fauna Society Publication No. 94.

Jones, M., Hulme, G., Cadman, R.A., Walsh, J.F. & Blacow, L.G. 1991. *Lancashire Bird Report 1990*. Lancashire and Cheshire Fauna Society Publication No. 90.

Jones, M., Stirling, E. & Blacow, L.G. 1986. *Lancashire Bird Report 1985*. Lancashire and Cheshire Fauna Society Publication No. 85.

Jones, M., Stirling, E. & Blacow, L.G. 1987. *Lancashire Bird Report 1986*. Lancashire and Cheshire Fauna Society Publication No. 86.

Jones, M., Stirling, E. & Blacow, L.G. 1988. *Lancashire Bird Report 1987*. Lancashire and Cheshire Fauna Society Publication No. 87.

Jones, M., Stirling, E. & Blacow, L.G. 1989. *Lancashire Bird Report 1988*. Lancashire and Cheshire Fauna Society Publication No. 88.

Kaiser, M.J. 2002. Predicting the displacement of common scoter Melanitta nigra from benthic feeding areas due to offshore windfarms. COWRIE Research Report COWRIE-BEN-03-2002,

Kaiser M.J., Galanidi M., Showler D.A., Elliott A.J., Caldow R.W.G., Rees E.I.S., Stillman R.A. & Sutherland W.J. 2006. Distribution and behaviour of Common Scoter *Melanitta nigra* relative to prey resources and environmental parameters. *Ibis* **148:** 110-128.

Kershaw, M. & Cranswick, P.A. 2003. Numbers of Wintering Waterbirds in Great Britain and the Isle of Man, 1994/1995 – 1998/1999): I. Wildfowl and selected waterbirds. *Biological Conservation* **111**: 91 – 104.

Kirby, J.S., Evans, R.J. & Fox, A.D. 1993. Wintering seaducks in Britain and Ireland: populations, threats, conservation and research priorities. *Aquatic Conservation: Marine and Freshwater Ecosystems* 3: 105-117.

Lack, P. 1986. *The Atlas of Wintering Birds in Britain and Ireland*. T & A D Poyser, Calton.

Mercer, A.J. 1972. *Cambrian Bird Report 1971*. Cambrian Ornithological Society.

Mercer, A.J. 1973. *Cambrian Bird Report 1972*. Cambrian Ornithological Society.

Mercer, A.J. & Dare, P.J. 1974. *Cambrian Bird Report 1973*. Cambrian Ornithological Society.

Moser, M.E., Broad, R.A., Dennis, R.H. & Madders, M. 1986. The distribution and abundance of some coastal birds on the west and north-west coasts of Scotland in winter. *Scottish Birds* 14: 61-67.

O'Brien S.H., Wilson L.J., Webb, A. & Cranswick P.A., 2008. Revised estimate of numbers of wintering red-throated divers *Gavia stellata* in Great Britain. Bird Study 55:152 – 160.

Okill, D. 2002. Red-throated diver. In: C. Wernham, M. Toms, J. Marchant, J. Clark, G. Siriwardena & S. Baillie. *The migration atlas. Movements of the birds of Britain and Ireland*. T & AD Poyser, London pp 109 – 111.

Oliver, F., Robinson, P., & Harrod, C. 2001. *Common scoter* Melanitta nigra *survey in Liverpool Bay*. CCW Contract Science Report No. 470.

Percival, S., Cranswick, P., Hartley, C., Ford, J., Harding, I., Dodds, P. & Percival, T. 2004. *Thames Estuary proposed offshore wind farm. Progress report on ornithological surveys August 2002 – December 2003.* Ecology Consulting, Durham.

Pollitt, M., Cranswick, P., Musgrove, A., Hall, C., Hearn, R., Robinson, J. & Holloway, S. 2000. *The Wetland Bird Survey 1998-99: Wildfowl and Wader Counts.* Slimbridge: BTO, WWT, RSPB & JNCC.

Pritchard, R. 1999. *Cambrian Bird Report 1998*. Cambrian Ornithological Society.

Pritchard, R. 2000. *Cambrian Bird Report 1999*. Cambrian Ornithological Society.

Pritchard, R. 2001. *Cambrian Bird Report 2000*. Cambrian Ornithological Society.

Pritchard, R. 2002. *Cambrian Bird Report 2001*. Cambrian Ornithological Society.

Pritchard, R. 2003. *Cambrian Bird Report 2002*. Cambrian Ornithological Society.

Raines, R.J. 1971. *The Cheshire Bird Report 1970*. Cheshire Ornithological Association.

Raines, R.J. 1972. *The Cheshire Bird Report 1971*. Cheshire Ornithological Association.

Raines, R.J. 1973. *The Cheshire Bird Report 1972*. Cheshire Ornithological Association.

Raines, R.J. 1974. *The Cheshire Bird Report 1973*. Cheshire Ornithological Association.

Raines, R.J. 1975. *The Cheshire Bird Report 1974*. Cheshire Ornithological Association.

Raines, R.J. 1976. *The Cheshire Bird Report 1975*. Cheshire Ornithological Association.

Raines, R.J. 1977. *The Cheshire Bird Report 1976*. Cheshire Ornithological Association.

Raines, R.J. 1978. *The Cheshire Bird Report 1977*. Cheshire Ornithological Association.

Schofield, C.C. 2000. *Cheshire and Wirral Bird Report 1999*. Cheshire and Wirral Ornithological Society.

Schofield, C. 2001. *Cheshire and Wirral Bird Report 2000*. Cheshire and Wirral Ornithological Society.

Schofield, C. 2002. *Cheshire and Wirral Bird Report 2001*. Cheshire and Wirral Ornithological Society.

Skov, H., Durinck, J., Leopold, M.F. & Tasker, M.L. 1995. *Important Bird Areas for Seabirds in the North Sea including the Channel and the Kattegat.* Cambridge, BirdLife International.

Spencer, K.G. 1971. *Lancashire Bird Report 1970*. Lancashire and Cheshire Fauna Society Publication No. 60.

Spencer, K.G. 1972. *Lancashire Bird Report 1971*. Lancashire and Cheshire Fauna Society Publication No. 62.

Spencer, K.G. 1973. *Lancashire Bird Report 1972*. Lancashire and Cheshire Fauna Society Publication No. 64.

Spencer, K.G. 1974. *Lancashire Bird Report 1973*. Lancashire and Cheshire Fauna Society Publication No. 66.

Spencer, K.G. 1975. *Lancashire Bird Report 1974*. Lancashire and Cheshire Fauna Society Publication No. 68.

Spencer, K.G. 1976. *Lancashire Bird Report 1975*. Lancashire and Cheshire Fauna Society Publication No. 70.

Spencer, K.G. 1977. *Lancashire Bird Report 1976*. Lancashire and Cheshire Fauna Society Publication No. 72.

Spencer, K.G. 1978. *Lancashire Bird Report 1977*. Lancashire and Cheshire Fauna Society Publication No. 74.

Stone, C.J., Webb, A., Barton, C., Ratcliffe, N., Reed, T.C., Tasker, M.L., Camphuysen, C.J. & Pienkowski, M.W. 1995. *An atlas of seabird distribution in north-west European waters.* Peterborough, JNCC.

Stroud, D.A., Chambers, D., Cook, S., Buxton, N., Fraser, B., Clement, P., Lewis, P., McLean, I., Baker, H. & Whitehead, S. 2001. *The UK SPA network: its scope and content*. Volumes 1-3. JNCC, Peterborough.

Taylor, M., Seago, M., Allard, P. & Dorling, D. 1999. *The Birds of Norfolk.* Sussex, Pica Press.

Thorpe, R.I. 2002. Numbers of wintering seaducks, divers and grebes in North Cardigan Bay, 1991 – 1998. *Welsh Birds* **3**: 155 – 170.

Webb, A., McSorley, C.A., Dean, B.J. & Reid, J.B. 2006a. *Recommendations for the selection of, and boundary options for, an SPA in Liverpool Bay.* JNCC Report 388.

Webb, A., McSorley, C.A., Dean, B.J., Reid, J.B., Cranswick, P.A., Smith, L. & Hall, C. 2006b. *An assessment of the numbers and distribution of inshore aggregations of watrerbirds using Liverpool Bay during the non-breeding season in support of possible SPA identification..* JNCC Report 373.

Wetlands International. 2002. *Waterbird Population Estimates – Third Edition. Wetlands International Global Series No. 12.* Wageningen, The Netherlands.

White, S.J., Aspin, W.C., Bickerton, D.A., Disley, A.S., Dunstan, S., Liggett, C., McCarthy, B., Marsh, P.J. & Rigby, D.J. 2003. *Lancashire Bird Report 2002*. Lancashire and Cheshire Fauna Society Publication No. 104.

White, S.J., Bickerton, D.A., Dunstan, S., Liggett, C., McCarthy, B., Marsh, P.J. & Rigby, D.J. 2001. *Lancashire Bird Report 2000*. Lancashire and Cheshire Fauna Society Publication No. 101.

White, S.J., Bickerton, D.A., Dunstan, S., Liggett, C., McCarthy, B., Marsh, P.J. & Rigby, D.J. 2002. *Lancashire Bird Report 2001*. Lancashire and Cheshire Fauna Society Publication No. 103.

White, S., Dunstan, S., Jones, M., Liggett, C. & Walsh, A.F. 1998. *Lancashire Bird Report 1997*. Lancashire and Cheshire Fauna Society.

Wildfowl and Wetlands Trust. Unpublished data collected for the All Wales Common Scoter Survey 2003/04.

Woolmer, A. 2003. *The benthic ecology of Carmarthen Bay*. Unpublished PhD thesis, University of Wales, Swansea. Countryside Council for Wales Marine Monitoring Report No. 10, 354 pp.

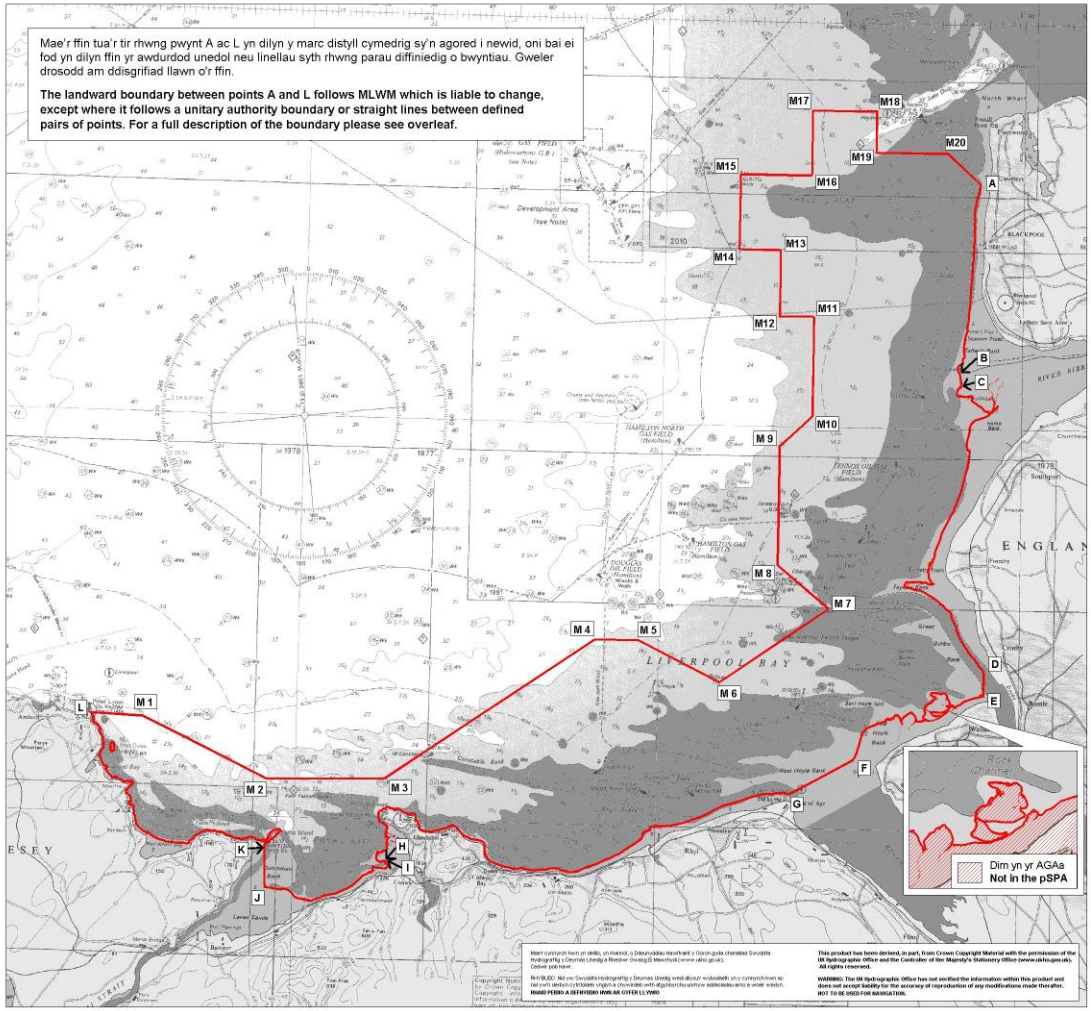
Wynmclean, I., Currie, F.A. & Thomas, R.S. 1983. *Cambrian Bird Report 1982*. Cambrian Ornithological Society.

Wynmclean, I., Currie, F.A. & Thomas, R.S. 1984. *Cambrian Bird Report 1983*. Cambrian Ornithological Society.

Wynmclean, I., Croft, K.G., Currie, F.A. & Thomas, R.S. 1985. *Cambrian Bird Report 1984*. Cambrian Ornithological Society.

Appendix 1


Cyngor Cefn Gwlad Cymru
Countryside Council for Wales
NATURAL ENGLAND
Liverpool Bay / Bae Lerpwl
Map 1 o'r/of 1
Côd Safle y GE
EC Site Code
UK9020294
Ardal Gwarchodaeth Arbennig arfaethedig (AGAa)
potential Special Protection Area (pSPA)
Arwynebedd cyfan
Total area
170,292.94 ha
Hydred
Longitude
03° 12' 34" Gorllewin
West
Lledred
Latitude
53° 36' 10" Gogledd
North
G/N
N.G. Mae'r ffigurau Lledred/Hydred i gyd wedi deillio o System Geodesig y Byd 84 (WGS 84)
N.B. All Latitude/Longitude figures have been derived from World Geodetic System 84 (WGS 84).
Taflunio map: Y Grid Cenedlaethol Prydeinig
Projection: British National Grid
Rhif diweddaraf
Version number
5
08/10/2009
Graddfa / Scale 1: 515,000
Noder: Cafodd y data eu cymryd ar raddfa 1 :2500 o Brif Fap yr Arolwg Ordnans 2006, eu gosod ar Siart y Morlys OS1826, ar raddfa 1:200,000 a'u lleihau i 1 :515,000.
Note: Data captured at 1:2500 scale from Ordnance Survey Master Map, 2006 placed on Admiralty Chart OS1826, scale 1:200,000 and reduced to 1:515,000.
This map is based upon Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Countryside Council for Wales Licence No. 100019813 2009
Lloegr
England
Cymru
Wales


Mae'r ffin tua'r tir rhwng pwynt A ac L yn dilyn y marc distyll cymedrig sy'n agored i newid, oni bai ei fod yn dilyn ffin yr awdurdod unedol neu linellau syth rhwng parau diffiniedig o bwyntiau. Gweler drosodd am ddisgrifiad llawn o'r ffin.
The landward boundary between points A and L follows MLWM which is liable to change, except where it follows a unitary authority boundary or straight lines between defined pairs of points. For a full description of the boundary please see overleaf.
A
B
C
D
E
F
G
H
I
J
K
L
M1
M2
M3
M4
M5
M6
M7
M8
M9
M10
M11
M12
M13
M14
M15
M16
M17
M18
M19
M20
Dim yn yr AGAa
Not in the pSPA

Liverpool Bay / Bae Lerpwl
Ardal Gwarchodaeth Arbennig arfaethedig (AGAa)

Disgrifiad o'r ffin
Gweler drosodd am fap

Mae'r ffin tua'r tir rhwng pwynt A ac L yn dilyn y marc distyll cymedrig sy'n agored i newid, oni bai ei fod yn dilyn ffin yr awdurdod unedol neu linellau syth rhwng parau diffiniedig o bwyntiau:

- **B i C**
- **D i E**
- **G i F**
- **H i I**
- **J i K**

O bwynt **M20** cymrwch gyfeirbwynt 133° o'r Gogledd Cywir; pwynt **A** yw'r man ble mae'r llinell yma'n croesi'r marc distyll cymedrig.

Mae'r llinell sy'n uno pwyntiau **B** i **C** yn dilyn ffin sir Gaerhirfryn.

Pwyntiau **D** ac **E** yw'r mannau ble mae llinell benodol ar draws ceg afon Merswy'n croesi'r marc distyll cymedrig; y ddau bwynt sefydlog yw lledred 53° 27.94' Gogledd, hydred 03° 2.49' Gorllewin, a lledred 53° 26.66' Gogledd, hydred 03° 2.54' Gorllewin.

Yng ngenau Aber Afon Dyfrdwy, pwynt **F** yw lle mae'r llinell hydred 03° 13.17' gorllewin yn croesi'r Marc Distyll Cymedrig a phwynt **G** yw lle mae'r llinell hydred 03° 18.68' gorllewin yn croesi'r Marc Distyll Cymedrig.

Pwyntiau **H** ac **I** yw'r mannau ble mae llinell hydred 03° 52.0' Gorllewin yn croesi'r marc distyll cymedrig o boptu prif sianel Aber Afon Conwy.

Pwyntiau **J** a **K** yw'r mannau ble mae llinell hydred 04° 02.43' Gorllewin yn croesi'r marc distyll cymedrig ar fynediad dwyreiniol Afon Menai.

O bwynt **M1** cymrwch gyfeirbwynt 273° o'r Gogledd Cywir; pwynt **L** yw'r man ble mae'r llinell yma'n croesi'r marc distyll cymedrig. Mae Goleudy Trwyn Eilian hefyd ar yr un cyfeiriant.

Pwynt	Lledred Graddau	Lledred Munudau	Hydred Graddau	Hydred Munudau
L	Gweler uchod			
M1	53	24.9 N	4	12.8 W
M2	53	21.933333 N	4	2.25 W
M3	53	22.083333 N	3	52.6 W
M4	53	29.3 N	3	35.2 W
M5	53	29.3 N	3	31.5 W
M6	53	27.3 N	3	24.7 W
M7	53	31 N	3	15.8 W
M8	53	33.1 N	3	20.1 W
M9	53	39.1N	3	20.1 W
M10	53	40.6 N	3	17.4 W
M11	53	45.5 N	3	17.4 W
M12	53	45.5 N	3	20.3 W
M13	53	48.8 N	3	20.3 W
M14	53	48.8 N	3	23.8 W
M15	53	52.65 N	3	23.8 W
M16	53	52.65 N	3	17.8 W
M17	53	55.9 N	3	17.8 W
M18	53	55.9 N	3	12.2 W
M19	53	53.85 N	3	12.2 W
M20	53	53.85 N	3	6.2 W
A	Gweler uchod			

Liverpool Bay / Bae Lerpwl
Potential Special Protection Area (pSPA)

Boundary description
See overleaf for map

The landward boundary between points **A** and **L** follows MLWM which is liable to change, except where it follows a unitary authority boundary or straight lines between defined pairs of points:

- **B to C**
- **D to E**
- **G to F**
- **H to I**
- **J to K**

From point **M20** take a bearing 133° from True North; point **A** is where this line crosses MLWM.

The line joining points **B** to **C** follows the Lancashire county boundary.

Points **D** and **E** are where a fixed line across the mouth of the Mersey crosses MLWM; the two fixed points are latitude 53° 27.94' North, longitude 03° 2.49' West, and latitude 53° 26.66' North, longitude 03° 2.54' West.

At the mouth of the Dee Estuary, point **F** is where the line of longitude 03° 13.17' West crosses Mean Low Water Mark and point **G** is where the line of longitude 03° 18.68' West crosses Mean Low Water Mark.

Points **H** and **I** are where the line of longitude 03° 52.0' West crosses MLWM on either side of the main channel of the Conwy Estuary.

Points **J** and **K** are where the line of longitude 04° 02.43' West crosses MLWM on either side of the eastern entrance to the Menai Strait.

From point **M1** take a bearing 273° from True North; point **L** is where this line crosses MLWM. Point Lynas lighthouse also lies on the same bearing.

Point	Latitude Degrees	Latitude Minutes	Longitude Degrees	Longitude Minutes
L	See above			
M1	53	24.9 N	4	12.8 W
M2	53	21.933333 N	4	2.25 W
M3	53	22.083333 N	3	52.6 W
M4	53	29.3 N	3	35.2 W
M5	53	29.3 N	3	31.5 W
M6	53	27.3 N	3	24.7 W
M7	53	31 N	3	15.8 W
M8	53	33.1 N	3	20.1 W
M9	53	39.1N	3	20.1 W
M10	53	40.6 N	3	17.4 W
M11	53	45.5 N	3	17.4 W
M12	53	45.5 N	3	20.3 W
M13	53	48.8 N	3	20.3 W
M14	53	48.8 N	3	23.8 W
M15	53	52.65 N	3	23.8 W
M16	53	52.65 N	3	17.8 W
M17	53	55.9 N	3	17.8 W
M18	53	55.9 N	3	12.2 W
M19	53	53.85 N	3	12.2 W
M20	53	53.85 N	3	6.2 W
A	See above			

Appendix 2

EC Directive 79/409 on the Conservation of Wild Birds potential Special Protection Area (SPA)

Name: Liverpool Bay / Bae Lerpwl

Counties/Unitary Authorities: The SPA lies entirely in UK territorial waters adjacent to the following counties/unitary authorities: Lancashire, Blackpool, Sefton, Wirral, Sir y Fflint/Flintshire, Sir Ddinbych/Denbighshire, Conwy, Gwynedd, Ynys Môn/Isle of Anglesey.

Boundary of the SPA: See SPA map. The landward boundary of the SPA generally follows mean low water mark or the boundaries of existing and potential SPAs, whichever is the furthest seaward. The seaward boundary lies mostly within the 20m depth contour and only marginally (off the coast of north Wales) extends beyond the 25m contour.

Size of SPA: The SPA covers an area of 170,292.94 ha.

Site description: Liverpool Bay is located in the south-eastern region of the northern part of the Irish Sea, bordering north-west England and north Wales. The SPA is a broad arc from Morecambe Bay to the east coast of Anglesey. The sea bed of the SPA consists of a wide range of mobile sediments. Large areas of muddy sand stretch from Rossall Point to the Ribble Estuary, and sand predominates in the remaining areas, with a concentrated area of gravelly sand off the Mersey Estuary and a number of prominent sandbanks off the English and Welsh coasts. The tidal currents throughout the SPA are generally weak, which combined with a relatively large tidal range facilitates the deposition of sediments. The seabed and waters of the site provide an important habitat in the non-breeding season for major concentrations of red-throated divers *Gavia stellata* and sea-ducks, notably common scoter *Melanitta nigra*, which visit the area to feed on the fish, mollusc and crustacean populations. The area is also a feeding ground for breeding and passage terns.

Qualifying species:
The site qualifies under **article 4.1** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the Great Britain population of the following species listed in Annex I in any season:

Annex I species	Count and season	Period	% of GB population
Red-throated diver *Gavia stellata*	922 individuals – wintering	2001/02 – 2006/07	5.4%

The site also qualifies under **article 4.2** of the Directive (79/409/EEC) as it is used regularly by 1% or more of the biogeographical population of the following regularly occurring migratory species (other than those listed in Annex I) in any season:

Migratory species	Count and season	Period	% of subspecies or population
Common scoter *Melanitta nigra*	54,675 individuals – wintering	2001/02 – 2006/07	3.4% NW Europe

Assemblage qualification:

The site qualifies under **article 4.2** of the Directive (79/409/EEC) as it is used regularly by over 20,000 waterbirds (waterbirds as defined by the Ramsar Convention) in any season:

In the non-breeding season, the site regularly supports at least 55,597 individual waterbirds (2001/02 – 2002/03), including red-throated diver *Gavia stellata* and common scoter *Melanitta*

nigra.

Principal bird data sources:

Webb, A., McSorley, C.A., Dean, B.J. & Reid, J.B. 2006a. *Recommendations for the selection of, and boundary options for, an SPA in Liverpool Bay.* JNCC Report 388.

Webb, A., McSorley, C.A., Dean, B.J., Reid, J.B., Cranswick, P.A., Smith, L. & Hall, C. 2006b. *An assessment of the numbers and distributions of inshore aggregations of waterbirds using Liverpool Bay during the non-breeding season in support of possible SPA identification.* JNCC Report 373.