Solway Firth
Proposed Special Protection Area (pSPA)
NO. UK9005012

SPA Site Selection Document:
Summary of the scientific case for site selection

A composite of the existing Upper Solway Flats and Marshes SPA and a proposed marine extension
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<td>Marine Scotland 10/07/14</td>
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1. Introduction

This document provides Scottish Natural Heritage’s (SNH) and Natural England’s (NE) advice on the proposed extension to the existing Upper Solway Flats and Marshes Special Protection Area (SPA) in the marine waters of the “Solway Firth” for inshore non-breeding waterfowl and non-breeding gulls. The proposal includes a name change from the Upper Solway Flats and Marshes SPA to the Solway Firth proposed SPA to include the marine extension. From this point forward, the site will be referred to as the Solway Firth proposed SPA (pSPA). The document summarises the evaluation for each of the species of interest according to the SPA site selection guidelines (JNCC, 1999) and provides an overview of how the site boundary was developed.

The Solway Firth pSPA has been selected to provide protection to important wintering grounds used by feeding and roosting red-throated diver, common scoter and goosander which migrate to the UK or from inland breeding sites every year to overwinter or to stop off at as one of their staging posts while on migration. The Solway is also notable for its concentrations of three species of non-breeding gulls. The protection of these inshore waters will make a key contribution to the maintenance of these species in their natural range in UK marine waters and form part of a coherent network of sites at a European level.

The importance of the marine environment for birds which spend all or part of their lives around our coasts is well recognised. A total of 106 species of bird are thought to use UK marine waters of which 45 occur in numbers greater than fifty each year and are dependent on the marine environment for a large part of their lifecycle. All of these 45 species except one (black guillemot) are considered rare or vulnerable bird species (Annex 1), or regularly occurring migratory species by the Birds Directive (EC Directive on the conservation of wild birds (amended) - 2009/147/EC). This means that all Member States are obliged to take account of the requirements of Article 4.1 of the Birds Directive for each of these 44 species.

Article 4.1 states that “Member States shall classify in particular the most suitable territories in number and size as special protection areas for the conservation of these species, taking into account their protection requirements in the geographical sea and land area where this Directive applies”. EU guidance on the establishment of SPAs in the marine environment (2007) sets out the groups of marine birds for which SPAs should be considered in the marine environment. This includes sites for non-breeding waterfowl and gulls.

In the UK, whilst some coastal SPAs include marine waters below the Mean High Water Springs (MHWS) there are only four entirely marine SPAs classified; Outer Thames Estuary SPA (England), Liverpool Bay/Bae Lerpwl SPA (England/Wales) and Bae Caerfyrddin/Carmarthen Bay SPA (Wales) and Belfast Lough - Open Water SPA (Northern Ireland). In Scotland, 31 marine extensions to seabird colony SPAs

1 Nature Conservation Marine Protected Areas were designated in August 2014 for black guillemot.
have also been classified. The existing suite of sites is not considered sufficient to meet the requirements of Article 4.1 because it currently does not include suitable territories at sea for all of the species that the UK has a responsibility for.

Additionally, the UK SPA Review (Stroud, 2001) which concentrated on terrestrial SPAs highlighted that the UK had no existing SPAs to support wintering gulls. The Review recommended that appropriate data be collected to allow a national (UK) assessment of wintering gulls to enable the consideration of additional SPAs. Furthermore, the Review also concluded that there were not enough SPAs for species such as lapwing, ringed plover and great cormorant and that these species should be added into existing sites and new sites, where their populations met the required selection guidelines.

The Solway Firth is being proposed as part of a suite of marine sites that aim to fulfil the requirements for SPAs in the marine environment for rare or vulnerable birds and regularly occurring migratory birds in the UK. As required by Article 4 of the Directive, the classification of the extended area of this site will enable the application of special conservation measures concerning the habitat of Annex 1 and regularly occurring migratory birds in order to ensure their survival and reproduction in their area of distribution.

Full details of the site survey methodologies, data and analysis used to inform the proposed selection of this site are provided in Lawson et al (2015) for non-breeding inshore waterfowl and Burton et al (2013) for non-breeding gulls. All scientific work received full external independent peer review at key stages.

2. Site summary

The Solway Firth pSPA is a large estuarine/marine site with a total area of 1357.49km² situated between the western coastal margins of Cumbria in England and Dumfries and Galloway in Scotland, off the west coast of Great Britain (Figure 1). It is one of the largest estuaries in the UK along with Morecambe Bay and the Wash.

The Solway Firth (including the classified Upper Solway Flats and Marshes SPA and the proposed marine extension) supports populations of European importance of the following Annex 1 species:

- Red-throated diver (*Gavia stellata*)
- Whooper swan (*Cygnus cygnus*)
- Barnacle goose (*Branta leucopsis*)
- Golden plover (*Pluvialis apricaria*)
- Bar-tailed godwit (*Limosa lapponica*)

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2 Qualifying Annex 1 species of the pSPA marine extension
And supports migratory populations of European importance, of the following species:

- Pink footed goose (*Anser brachyrhynchus*)
- Shelduck (*Tadorna tadorna*)
- Teal (*Anas crecca*)
- Pintail (*Anas acuta*)
- Shoveler (*Anas clypeata*)
- Scaup (*Aythya marila*)
- Common scoter (*Melanitta nigra*)
- Goldeneye (*Bucephala clangula*)
- Goosander (*Mergus merganser*)
- Oystercatcher (*Haematopus ostralegus*)
- Knot (*Calidris canutus*)
- Ringed plover (*Charadrius hiaticula*)
- Grey plover (*Pluvialis squatarola*)
- Lapwing (*Vanellus vanellus*)
- Dunlin (*Calidris alpina*)
- Sanderling (*Calidris alba*)
- Redshank (*Tringa totanus*)
- Turnstone (*Arenaria interpres*)
- Curlew (*Numenius arquata*)
- Cormorant (*Phalacrocorax carbo*)
- Black-headed gull (*Larus ridibundus*)
- Common gull (*Larus canus*)
- Herring gull (*Larus argentatus*)

*Named qualifiers of the water bird assemblage.*

The coastal area within the existing SPA includes a range of habitats including mudflats and sandflats, lagoons, salt marshes and inland water bodies. This diversity is extended into the marine environment with the sea bed comprising a wide range of mobile sediments.

The inner Solway firth is shallow often less than 10m deep, as is Wigtown Bay. This and the funnel-like shape of the inner firth cause strong tidal currents and therefore the sediments tend to be predominantly sandy nature. Channels within the estuary are constantly moving changing the shapes of sandbanks.

The tidal currents decrease in speed to the north of the Irish Sea, and hence the sea-bed sediments generally become muddier. However, northwards towards the entrance to Luce Bay, the sea bed is largely covered with a coarse gravel overlying till or glacial sediments.

The extensive mudflats and sandflats of the Solway support a typical estuarine fauna including a mix of polychaetes worms and bivalves, together with vast numbers of

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3 Qualifying migratory species of the pSPA marine extension
4 Species included as part of the 2001 UK SPA Review requirements
the burrowing amphipods *Corophium volutator* and *Bathyporeia* species (Perkins 1973). A wide range of pelagic and demersal fish also occur in the area, which acts as spawning grounds or nursery areas for a number of species.

Red-throated divers and goosanders move to coastal areas in winter from their breeding sites and feed on a wide variety of fish, which they catch by diving from the surface and pursuing their prey underwater. The fish species taken will be influenced by what is locally most readily available, but the diet of divers and goosanders can include haddock *Melanogrammus aeglefinus*, cod *Gadus morhua*, herring *Clupea harengus*, sprats *Sprattus sprattus* and gurnard *Eutrigla gurnardus* along with smaller species such as sand-eels *Ammodytidae*, pipefish *Syngathidae*, gobies *Gobiidae*, flatfish *Pleuronectidae* and butterfish *Pholis gunnellus*.

Common scoter feed almost exclusively on molluscs and small crustaceans, diving from the surface to pluck their prey from the sea bed.

Diving activity varies among species but average foraging dive depths for red-throated diver, common scoter and goosander are shallower than 15m.

The presence of high densities of non-breeding waterfowl at this site is indicative of the productivity and availability of prey these shallow waters and their habitats provide.

Black-headed gull, common gull and herring gull use the inshore waters primarily for roosting, although some day time foraging in intertidal areas will also take place.

Whilst the shallower areas may be the focus for foraging activities, the wider area within close proximity will also be used by non-breeding birds for preening, moulting, loafing and roosting. The northern Irish Sea is relatively land-locked and the exposure of coasts to winds is variable. Local topography and wind direction are important in determining local conditions and extreme wind speeds and therefore prime factors in determining suitable habitat for birds that over-winter.
Figure 1. The Solway Firth pSPA.
3. Bird survey information

Inshore non-breeding waterfowl (red-throated diver, common scoter and goosander)\(^5\)

Areas of search
Existing data (including Wetland Bird Surveys (WeBS), Important Bird Areas (IBA) under BirdLife International, existing survey data and an atlas of seabird distributions) and information from published scientific literature were used to determine which initial areas might be important for inshore wintering waterfowl. Based on this initial assessment, 46 areas of search were identified across the UK. The Solway Firth was one of the areas of search identified as holding potentially large numbers of birds and therefore merited further survey.

A combination of aerial survey and shore-based surveys were conducted between 2000 and 2012.

Aerial transects
Line transect aerial surveys were carried out by the Wildfowl and Wetlands Trust (WWT) on 11 occasions during three non-breeding seasons on 5\(^{th}\) November, 11\(^{th}\) December and 13\(^{th}\) March 2001/02, 10\(^{th}\) November, 28\(^{th}\) November, 22\(^{nd}\) January and 16\(^{th}\) February 2004/05 and 8\(^{th}\) November, 13\(^{th}\) December, 2\(^{nd}\) February and 20\(^{th}\) February 2005/06 to enable estimates of non-breeding populations to be made. No data were collected during migration periods or for aggregations of moulting birds.

The data from the aerial transect surveys were used to calculate the mean maximum counts of number of individuals (population estimate) and produce density distribution maps for red-throated diver and common scoter. The population estimates were compared against the relevant national and/or biogeographic reference population estimates (Musgrove et al 2013 or Wetlands International 2014) to provide a percentage of the reference population for each species of interest (Lawson et al 2015).

Shore-based counts of red-throated divers in the Solway Estuary from 2009-2011 were also provided by a local ornithologist to augment the aerial survey counts.

Shore-based counts
Aerial surveys are one of the most effective methods for surveying inshore concentrations of birds over large areas. However, certain species are not amenable to survey from aircraft and some species that remain very close to the shore (such as goosander) may often be missed, as the aircraft makes sharp turns at the shoreline.

Accordingly, Wetland Bird Survey (WeBS) counts were collated between 2008/09-2012/13 for goosander and were used to calculate mean maximum count of number of individuals (population estimate). The population estimates were compared

\(^5\) Full details of the methodologies, data and analysis used are provided in the JNCC Report 567: Lawson et al 2015 and the JNCC generic document ‘Identification of important marine areas for inshore wintering waterbirds’. JNCC Report 567 received full external independent peer review.
against the relevant national and/or biogeographic reference population estimates (Musgrove et al. 2013 or Wetlands International 2014) to provide a percentage of the reference population.

**Estimating numbers of birds within an SPA boundary**

SPA boundaries were drawn only for those species which occurred in qualifying numbers in the area of search (section 4) and for which suitable aerial survey data were available (section 5). ArcGIS was used to calculate the area [km$^2$] of each 1km x 1km cell, or partial cell, located within the new boundary. For each grid cell the total number of individuals for each species was then estimated by multiplying the cell area with the species densities within each individual cell. The total of individuals for each species within the new boundary was provided by summing all cell totals within the boundary by species and season.

The number of birds within the SPA boundary was then reassessed against the UK SPA Selection Guidelines to ensure the site still qualified for consideration as an SPA.

**Species identified through the UK SPA Review 2001**

**Shore-based counts (ringed plover, lapwing and cormorant)**

Wetland Bird Survey (WeBS) counts were also used to identify any SPA Review species for consideration within the existing Upper Solway Flats and Marshes SPA and likewise, compared against the relevant biogeographic reference population estimate (Wetlands International 2014) to provide a percentage of the reference population for each species of interest.

**Wintering gulls**

The 6th national wintering gull survey (Wintering Gull Roost Survey (WINGS)) was undertaken over the period 2003/04 - 2005/06 (Banks et al. 2006, Burton et al. 2013). The national survey consisted of a co-ordinated count of key sites, identified prior to the survey as being important for gulls on the basis that previous Winter Gull Roost Surveys or recent local bird reports had shown that they had held at least 1000 roosting gulls. Counts of key sites were supplemented by counts of additional randomly selected stretches of coastline. One off counts were carried out as the gulls flew into their night-time roosts to give an estimation of numbers. Estuaries were treated as single discrete sites, with their boundaries matching those of existing protected sites.

The population estimates were compared against the relevant national and biogeographic reference population estimates (Burton et al. 2013) to provide a percentage of the reference population for each species of interest.

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6 Full details of the methodologies, data and analysis used are provided in Burton, 2013.
WeBS surveys primarily count wader and wildfowl species during daylight and consequently do not adequately assess maximum numbers of any gull species using a site. Nevertheless the WeBS data are important because they consistently support the maximum site populations singly estimated from WINGS and therefore provided confidence that the site was being regularly used.

4. Assessment against the UK SPA Selection Guidelines
The UK SPA Selection Guidelines establish a two stage process for SPA identification (JNCC, 1999). Stage 1 allows identification of areas that are likely to qualify for SPA status.

Stage 1
To qualify under Stage 1 the area needs to meet one or more of the following four guidelines:

1.1. The area is used regularly by 1% or more of the Great Britain population of a species listed in Annex I to the Birds Directive in any season.
1.2. The area is used regularly by 1% or more of the bio-geographical population of a regularly occurring migratory species (other than those listed in Annex I) in any season.
1.3. The area is used regularly by over 20,000 water birds (water birds as defined by the Ramsar Convention) or 20,000 seabirds in any season.
1.4. The area meets the requirements of one or more of the Stage 2 guidelines in any season, where the application of Stage 1 guidelines 1.1-1.3 for a species does not identify an adequate suite of most suitable areas for the conservation of that species.

Stage 2
Those areas that meet one or more of the Stage 1 guidelines undergo further consideration using one or more of the ecological judgements set out in Stage 2. There are seven Stage 2 judgements. These judgments are used to facilitate the selection of the most suitable areas from the areas identified at Stage 1 to produce a network of marine SPAs in the UK. The Stage 2 judgements are:

2.1 Population size and density
2.2 Species range
2.3 Breeding success
2.4 History of occupancy
2.5 Multi-species area
2.6 Naturalness
2.7 Severe weather refuges

Assessment against Stage 1 of the UK SPA Selection Guidelines
The proposed marine extension straddles both Scottish and English territorial waters with the largest proportion lying in Scottish waters. Therefore, SNH were
responsible for applying the assessment against the selection guidelines in consultation with Natural England.

Red-throated diver (Annex 1 species) were present in numbers at or above 1% of the GB population. This species met Stage 1.1 of the SPA guidelines.

Goosander and common scoter are regularly occurring migratory waterfowl but did not occur in numbers at or above 1% of their biogeographical population and therefore did not meet Stage 1.2 of the guidelines. However, numbers exceed 1% of the GB population and together with 12 other species (including existing SPA species) they comprise a non-breeding waterbird assemblage exceeding 20,000 birds. Hence, goosander and common scoter met Stage 1.3 of the SPA guidelines.

Similarly, black-headed gull, common gull and herring gull are regularly occurring migratory seabirds that did not occur in numbers at or above 1% of their biogeographical populations and therefore did not meet Stage 1.2 of the guidelines. However, all exceeded 1% of their GB population. Black-headed gull, common gull and herring gull all contribute to a waterbird assemblage of more than 20,000 individuals. These species therefore met Stage 1.3 of the guidelines.
Table 1. Assessment against Stage 1 of the UK SPA Selection Guidelines

<table>
<thead>
<tr>
<th>Species and season</th>
<th>Population size in site</th>
<th>% of GB population</th>
<th>Feature of 2001 Review</th>
<th>Listed as feature of existing terrestrial SPA</th>
<th>Listed as feature of assemblage of existing terrestrial SPA</th>
<th>Criterion for qualification in the new extended Solway Firth pSPA</th>
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</thead>
<tbody>
<tr>
<td>Red-throated diver (non-breeding)</td>
<td>527</td>
<td>3.1</td>
<td></td>
<td></td>
<td></td>
<td>1.1</td>
</tr>
<tr>
<td>Whooper swan (non-breeding)</td>
<td>250</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td>1.1</td>
</tr>
<tr>
<td>Barnacle goose (non-breeding)</td>
<td>12,300</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td>1.1</td>
</tr>
<tr>
<td>Pink-footed goose (non-breeding)</td>
<td>14,900</td>
<td>100</td>
<td>√</td>
<td></td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>Shelduck (non-breeding)</td>
<td>1,600</td>
<td>2</td>
<td></td>
<td></td>
<td>√</td>
<td>1.3</td>
</tr>
<tr>
<td>Teal (non-breeding)</td>
<td>1,400</td>
<td>1</td>
<td></td>
<td></td>
<td>√</td>
<td>1.3</td>
</tr>
<tr>
<td>Pintail (non-breeding)</td>
<td>1,400</td>
<td>6</td>
<td>(2)</td>
<td></td>
<td></td>
<td>1.2</td>
</tr>
<tr>
<td>Shoveler (non-breeding)</td>
<td>120</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1.3</td>
</tr>
</tbody>
</table>

7 The population estimates are based on the mean maximum population estimates provided in Lawson et al, 2015 for all inshore aggregations of non-breeding waterfowl and amended, where appropriate to the site boundary. Population estimates for wintering gulls are based on Burton, 2013. All numbers are individual birds unless otherwise indicated.
9 100% of the Svalbard population that winters in GB
10 100% of the Icelandic population that winters in GB
<table>
<thead>
<tr>
<th>Species</th>
<th>Population</th>
<th>% of Bio-Geographic Populations</th>
<th>Status</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scaup (non-breeding)</td>
<td>2,300</td>
<td>57 (2)&lt;sup&gt;11&lt;/sup&gt;</td>
<td>√</td>
<td>1.2</td>
</tr>
<tr>
<td>Common scoter (non-breeding)</td>
<td>1,588</td>
<td>1.6</td>
<td></td>
<td>1.3</td>
</tr>
<tr>
<td>Goldeneye (non-breeding)</td>
<td>300</td>
<td>2</td>
<td>√</td>
<td>1.3</td>
</tr>
<tr>
<td>Goosander (non-breeding)</td>
<td>146</td>
<td>1.2</td>
<td></td>
<td>1.3</td>
</tr>
<tr>
<td>Oystercatcher (non-breeding)</td>
<td>33,850</td>
<td>12 (4)</td>
<td>√</td>
<td>1.2</td>
</tr>
<tr>
<td>Lapwing (non-breeding)</td>
<td>5,037</td>
<td>0.8</td>
<td>√</td>
<td>1.3</td>
</tr>
<tr>
<td>Golden plover (non-breeding)</td>
<td>3,380</td>
<td>2</td>
<td>√</td>
<td>1.1</td>
</tr>
<tr>
<td>Grey plover (non-breeding)</td>
<td>720</td>
<td>3</td>
<td>√</td>
<td>1.3</td>
</tr>
<tr>
<td>Ringed plover (passage)</td>
<td>981</td>
<td>(1.3)</td>
<td>√</td>
<td>1.2</td>
</tr>
<tr>
<td>Knot (non-breeding)</td>
<td>15,300</td>
<td>7 (4)</td>
<td>√</td>
<td>1.2</td>
</tr>
<tr>
<td>Dunlin (non-breeding)</td>
<td>11,900</td>
<td>3</td>
<td>√</td>
<td>1.3</td>
</tr>
<tr>
<td>Sanderling (non-breeding)</td>
<td>260</td>
<td>2</td>
<td>√</td>
<td>1.3</td>
</tr>
<tr>
<td>Redshank (non-breeding)</td>
<td>2,100</td>
<td>2 (3)</td>
<td>√</td>
<td>1.2</td>
</tr>
<tr>
<td>Bar-tailed godwit* (non-breeding)</td>
<td>4,800</td>
<td>8</td>
<td>√</td>
<td>1.1*</td>
</tr>
<tr>
<td>Curlew</td>
<td>6,700</td>
<td>7</td>
<td>√</td>
<td>1.2</td>
</tr>
</tbody>
</table>

<sup>11</sup> The %s of the bio-geographic populations are given in parentheses.
| (non-breeding) | (2) | | | | |
|---|---|---|---|---|
| Turnstone (non-breeding) | 600 | 1 | | √ | 1.3 |
| Cormorant (non-breeding) | 581 | 1.6 | | | 1.3 |
| Black-headed gull (non-breeding) | 13,732 | 0.6 | (√) | | 1.3 |
| Common gull (non-breeding) | 12,486 | 1.8 | (√) | | 1.3 |
| Herring gull (non-breeding) | 3,034 | 0.4 | (√) | | 1.3 |
| Water bird assemblage | 122,200 | | | √ | 1.3 |

*Since classification bar-tailed godwit has been added to Annex 1, hence amended status
(√) Wintering gulls (no species identified) were listed as unrepresented, due to inadequate data, in the 2001 Review
Assessment against Stage 2 of the UK SPA Selection Guidelines

One or more of the Stage 2 guidelines are used to identify the most suitable areas for classifying as SPA from those areas that meet the Stage 1 guidelines. The focus for considering which areas were most suitable concentrated on three of the seven judgements; population size and density, species range and multi-species areas. Population densities were only considered for non-breeding Annex 1 species.

Non-breeding waterfowl

Fourteen areas around Scotland (from the initial 22 areas of search) were identified as meeting Stage 1.1 for non-breeding Annex 1 species (great northern diver, black-throated diver, red-throated diver and Slavonian grebe). To help identify the most suitable sites for SPAs from the 14 areas, the non-breeding Annex 1 species were ranked for each site according to their population size, density and number of other non-breeding qualifying species also present within each area. Particular emphasis was placed on identifying areas that function as “hotspots” for many species rather than just a few. The results of the ranking exercise for Solway Firth are provided in Table 2.

<table>
<thead>
<tr>
<th>Assessment/Qualifying feature</th>
<th>Ranked importance for non-breeding Annex 1 species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Great northern diver</td>
<td>Not qualifying</td>
</tr>
<tr>
<td>Black-throated diver</td>
<td>Not qualifying</td>
</tr>
<tr>
<td>Red-throated diver</td>
<td>4th most important site in Scotland – Moray Firth and Firth of Forth have a smaller populations but ranked higher due to the number of other non-breeding waterfowl species also qualifying at the site.</td>
</tr>
<tr>
<td>Slavonian grebe</td>
<td>Not qualifying</td>
</tr>
</tbody>
</table>

The Solway Firth has been selected because it supports the second largest concentration of non-breeding red-throated diver in Scotland and is the most northerly representation in English waters.

Stage 2 judgements were also assessed for the other non-breeding (non-Annex 1) species (common scoter and goosander) in the proposed marine extension to ensure it was appropriate to include these species within the Solway Firth site (Table 3). The pSPA supports the third largest concentration of non-breeding common scoter in Scotland and the largest concentration of goosander in the north of their GB range, so is an important multi-species site (Table 3).

For common scoter and goosander, which are more widely dispersed in Great Britain, the Solway Firth supports the largest concentrations in the north and/or west of their GB wintering ranges.

12 Ranking was only applied to non-breeding Annex 1 species to provide an initial short-listing of most suitable areas that could then be subject to further checks for other marine bird interests. Ranking combines population size, density and multi-species interest to provide an overall rank.
**Wintering gulls**

In addition, the 2003/04 -2005/6 National Winter Gull Survey, based on counts of birds flying to coastal roosts, identified the Solway Firth as holding large aggregations of non-breeding black-headed, common and herring gulls. The Solway Firth pSPA supports the second largest non-breeding concentrations of these gulls in Scotland and is the only concentration in the north-west of their GB range.

Further details on the selection process and the final suite of sites being proposed is provided in the SNH supplementary document ‘Site selection of the marine SPA suite’ (SNH, 2016).
Table 3. Summary of assessment against Stage 2 of the UK SPA Selection Guidelines for inshore wintering waterfowl and wintering gulls, including summary of individual species influences on boundary.  

<table>
<thead>
<tr>
<th>Stage 2 judgement/ Qualifying features</th>
<th>Population size(^{13})</th>
<th>Species range</th>
<th>Influence on site boundary?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Red-throated diver (nb)</strong></td>
<td>2(^{nd}) largest population in Scotland, 5(^{th}) largest in GB.</td>
<td>Representative of the north and western part of this species’ GB range in winter</td>
<td>Pre-dominant species influencing seaward boundary</td>
</tr>
<tr>
<td><strong>Common scoter (nb)</strong></td>
<td>3(^{rd}) largest population in Scotland,</td>
<td></td>
<td>Influence in multi-species areas only(^{14})</td>
</tr>
<tr>
<td><strong>Goosander (nb)</strong></td>
<td>Largest marine population in GB.</td>
<td>Representative of the north-western part of this species’ GB range in winter</td>
<td>No influence on boundary.</td>
</tr>
<tr>
<td><strong>Black-headed gull (nb)</strong></td>
<td>2(^{nd}) largest population in Scotland</td>
<td>Representative of the north-western part of this species’ GB range in winter</td>
<td>No influence – widely distributed in multispecies areas throughout pSPA</td>
</tr>
<tr>
<td><strong>Common gull (nb)</strong></td>
<td>2(^{nd}) largest population in Scotland</td>
<td>Important component representative of the north-western part of this species’ GB range in winter</td>
<td>No influence – widely distributed in multispecies areas throughout pSPA</td>
</tr>
<tr>
<td><strong>Herring gull (nb)</strong></td>
<td>2(^{nd}) largest population in Scotland</td>
<td>Important component representative of the north-western part of this species’ GB range in winter</td>
<td>No influence – widely distributed in multispecies areas throughout pSPA</td>
</tr>
</tbody>
</table>

**Stage 2 judgement (whole site)**


\(^{13}\) Population estimates from Lawson *et al.* 2015 for inshore wintering waterfowl.

\(^{14}\) Areas of multi-species interest lying outwith the red-throated diver species-specific boundary.
Distribution of these species overlaps with a roosting site for 3 species of migratory seabirds. A total of 28 qualifying species regularly occur in the pSPA with 6 of these in the marine extension.

<table>
<thead>
<tr>
<th>History of occupancy</th>
</tr>
</thead>
<tbody>
<tr>
<td>The importance of the area for waterfowl has long been recognised although data are sparse on the English side. Earliest records date back over hundred years. MacPherson and Duckworth (1886) noted birds on the English side of the Solway whilst Gray (1869) and Gladstone (1910) did similar on the Scottish side. Further knowledge was contributed by a series of authors (Berry 1939, Baxter and Rintoul 1953, Atkinson-Willes 1953, Prater 1981, Owen et al 1986, Lack 1986 and Thom 1986 throughout the 20th century to culminate with Forrester et al (2007).</td>
</tr>
</tbody>
</table>
5. Site status and boundary

The proposed name for this site is the “Solway Firth SPA”.

Marine sites present no visual surface features by which a seaward boundary can be identified. A site boundary was developed by reviewing the distribution of each qualifying species and selecting those areas which contained the highest densities. Red-throated diver and common scoter were recorded in good numbers from aerial survey and these data were used to establish mean density surfaces. Maximum curvature was used to establish a density threshold for each species. This method finds the threshold bird density below which disproportionately large areas of sea would be required in order to increase the number of birds protected within the SPA. A line was then drawn around all cells that exceed the density threshold to produce a species-specific boundary.

The area covering the species-specific boundary for red-throated diver (qualifying under guideline 1.1) was then compared with the distributions of other non-breeding species (qualifying under guideline 1.4) to establish the degree of overlap. At the Solway Firth pSPA, the distribution of red-throated diver encompasses a substantial proportion of the species-specific boundaries for common scoter as well as the most important shore count sectors for goosander. These combined distributions were used to produce an inshore wintering waterfowl composite species boundary.

The final boundary was created by drawing the boundary as tight as possible to the composite species boundary ensuring all cells exceeding density thresholds (maximum curvature) where included within the boundary. To avoid creating an over-complex boundary however some rationalisation of the final boundary was required, resulting in small areas with cells not exceeding the density threshold also being included in the final boundary. Whilst these areas did not exceed the density threshold, they are still likely to support lower densities of the qualifying species.

The site comprises the existing Upper Solway Flats and Marshes SPA with the addition, in the outer reaches, of an extension into the fully marine area. The proposed site extends to 1357.49km$^2$. Boundary co-ordinates for the pSPA are given on the site map in Annex 1.
6. Information on qualifying species
Coverage in this section is confined to species over and above those already classified as features in the Upper Solway Flats and Marshes SPA (See Table 1 above).

Red-throated diver
Red-throated divers were distributed mainly in four areas of the Firth (Figure 2). The mean peak estimate of non-breeding numbers of this species in the pSPA, over the period 2001/02-2005/06 was 527 individuals (3.1% of the Great Britain population). This considerably exceeded the site selection Stage 1.1 threshold of 170 birds (>1% of the Great Britain population of an Annex 1 species). This is the most important single location, after the Firth of Tay, for red-throated diver in Scotland and is the most northerly representation in English waters.

Population size and density
The non-breeding population of red-throated divers in the Solway Firth pSPA (527 birds) is the second largest in Scotland, exceeding those in both the Moray Firth and Firth of Forth. It is the only known significant (more than 170 birds) population of red-throated divers, other than the greater Firth of Clyde, on the Scottish west coast. Together the four Scottish concentrations, and the much larger ones in the Outer Thames Estuary (6,466 birds, 38% of the Great Britain population), Liverpool Bay, North Norfolk coast and Greater Wash, are the main population centres in Great Britain. The Solway Firth has the third highest mean peak density (0.37 birds /km²) in Scotland although there is considerable variation in the density in different parts of the site.

Distribution within the site
Red-throated diver was the predominant species influencing the extent of the proposed marine boundary (Figure 2).
Figure 2. The distribution of red-throated divers in the Solway Firth

Species range
The non-breeding range of the red-throated diver extends round the total coastline of Great Britain although precise distribution in terms of both numbers and density varies hugely. The vast majority of the British population is concentrated in the south and east of England but significant populations are concentrated in the large Scottish firths, contrasting with the very low non-breeding numbers in north and west Scotland. Importantly the Solway Firth and the adjacent Greater Firth of Clyde are the most significant northerly concentrations on the western coast of Great Britain.
History of occupancy
Red-throated divers have been a noted species in the Solway Firth for at least 150 years (Gladstone 1910). Whilst detailed data are sparse (Lack 1986) and structured counts are few (WeBS), only during the last decade has focussed aerial survey revealed the detail of the numbers and distribution and hence the true importance of the area.

Common scoter
Three main concentrations of non-breeding common scoters are found within the Solway Firth (Figure 3). The densest concentration was on the Scottish shore off Rockcliffe with a second area in Wigtown Bay. The third location was towards the English side offshore of Whitehaven. The mean peak estimate of numbers of this species in the pSPA over the period 2001/02-2005/06 was 1,588 individuals (1.6% of the GB population). This is less than the international threshold of 5,500 birds but considerably more than the Great Britain threshold of 1000 individuals (>1% of the Great Britain population of a migratory species as part of a waterbird assemblage under Guideline 1.3). Current numbers are far less than the huge concentrations residing in English and Welsh coastal waters but it is the third largest concentration in Scotland (combining Forth/Tay populations) and the only sizeable one on the west coast.

Population size and density
The contemporary WeBS report and data from the present study show a minimum of nine sites are currently of international or national importance for this species during non-breeding in Great Britain; three in Scotland, three in England, the Solway (jointly England & Scotland) and two off the Welsh coast. The non-breeding population of 1,588 common scoter (1.6% of the Great Britain population), in the Solway Firth pSPA, is the only large concentration off the Scottish west coast. Three locations, solely in Scotland, are nationally important supporting more than 1000 birds, of which the Moray Firth (5,479 birds) is the largest and the Forth/Tay (2,060 birds) is marginally the smallest.

Distribution within the site
The common scoter distribution at this site falls entirely within the seaward extent of the red-throated diver distribution and therefore does not influence the proposed boundary (Figure 3).
Species range
Common scoters occur round most of the coasts of Great Britain with the exception of the west and north coasts of Scotland where they are largely absent and Orkney and Shetland where they are sparse. Particular Scottish populations are found in the Firths of Forth and Tay, and the Moray & Dornoch Firths. The regular mainland range of the species is as far up the west coast as the Argyll islands and the Hebrides but only with the advent of maritime survey in the last few decades have the true extent of numbers in some localities such as Carmarthen, Cardigan and Liverpool Bays and the Solway Firth become known. The flocks in the Solway Firth
represent the northern-most significant concentration on the west coast of Great Britain.

History of occupancy
Common scoter in large numbers, have been a noted species in the Solway Firth for at least 150 years (Gladstone 1910). Whilst detailed data are sparse, only during the last decade has focussed aerial survey revealed the detail and hence the true importance of the area.

Goosander
The mean peak number of goosander during the period 2007/08-2011/12 estimated within the pSPA was a minimum of 146 individuals. This is less than the international threshold of 2,700 but greater than the Great Britain threshold of 120 birds (>1% of the Great Britain population of a migratory species as part of a waterbird assemblage under Guideline 1.3).

Population size and density
Few sites in Britain support significant numbers of goosander however seven sites in Great Britain, all north of a line between the Solway Firth and the mouth of the Tweed, are of national importance. No sites are of international importance. The Solway Firth area is the largest concentration (in some years with more than 500 individuals (2010/11 and 2011/12)), and the only one on the west coast of GB. The Firth of Forth and Loch Leven, both in the east of the country, are the only other locations to support over 200 birds. A further 10 sites, 6 in Scotland, support more than 50 birds.

Species range
Substantially an inland non-breeding species in Great Britain, goosanders are most frequent around the Home Counties of England and north of Yorkshire/ Lancashire as far as the Highlands in Scotland (Lack 1986). Prater (1981) suggests that the only known marine concentration in the 1970s was in the Moray Firth but, a few decades later, WeBS counts reveal several concentrations in the low hundreds, all in Scotland, of which the largest is in the Solway Firth.

Distribution within the site
Detailed information is not available on the distribution of goosander.

History of occupancy
Never reported in large numbers, goosanders have been a noted species in the Firth for at least 150 years (Gladstone 1910). Whilst detailed data are sparse, structured counts have confirmed the presence of good numbers from at least the early 1990s (WeBS 2014).

Ringed Plover
Large numbers of ringed plover move through the Upper Solway Flats and Marshes SPA on passage during spring and autumn. Over the five most recent years (2007/08-2011/12) the mean peak number was 981 birds (1.3% of the biogeographic population. Peak numbers on the Solway occur either during the spring (April – May) or autumn (August- September) passage periods.
Population size and density
With a mean peak count of 981 birds (1.3% of the biogeographic population) this is the most important area for the species in Scotland. Only the four large estuary systems of the Ribble, North Norfolk Coast, Humber and Wash, all in England, support greater numbers – again during the passage periods. The relative importance of the Solway, for spring or autumn passage, as with other British sites for this species varies considerably between years.

Distribution within the site
Low tide distributions are concentrated around Mersehead sands, Blackshaw bank and Skinburness.

Species range
The species is widespread around the shores of Great Britain, with the exception of the far south west of England. This range is well represented round the coasts of England in the major estuaries. However, in the north of Great Britain important sites are far less numerous. The Firth of Forth, the Outer Hebrides and Tiree are the best examples with the Solway, in its cross-border location, being important in the chain of sites up the west coast of Britain.

History of occupancy
Large numbers have been recorded in the Solway Firth for at least 40 years (Prater 1981) with detailed WeBS counts published from the 1980s.

Lapwing
Originally identified in the 2001 Review as a named species within the waterbird assemblage (8,632 birds; 0.6% of the Great Britain population) in the Upper Solway Flats and Marshes SPA. Over recent years (2007/08-2011/12) the peak numbers have decreased (as has the national population) to 5,037 birds (0.8% of the Great Britain population) but the site still meets the Site Selection Guidelines for a species within an assemblage of more than 20,000 birds (more than 2,000 individuals of a migratory species under Guideline 1.3).

Population size and density
Supporting peak numbers of 5,037 birds the Solway Firth is the largest coastal site for lapwing in Scotland and the 20th largest site in Great Britain. Only three west coast sites in Great Britain, the Dee, Mersey and Ribble estuaries; most of the important sites lie on the east and south coasts of England.

Distribution within the site
Low tide distributions are concentrated around Blackshaw bank, Priestside bank, Silloth bay and the inner estuary.

Species range
Outside the Highlands of Scotland the lapwing is very widely distributed, in both inland and coastal habitat in Great Britain. In Scotland the low lying island groups and the eastern coastal arable areas are the major strongholds hence, on the rugged west coast, the area around the Solway Firth is particularly important.
History of occupancy
Large numbers have been recorded in the Solway Firth for at least 40 years with detailed WeBS counts published from the early 1980s (Prater 1981).

Cormorant
Originally the cormorant was identified in the 2001 Review, as a named species within the waterbird assemblage (502 birds; 3.8% of the Great Britain population) in the Upper Solway Flats and Marshes SPA. Over recent years (2007/08-2011/12) the peak numbers have increased slightly to 581 birds, but, due to increase in the national population, this is now only 1.6% of the GB population although the species still meets the Site Selection Guidelines (>1% of the Great Britain population of a migratory species as part of a waterbird assemblage under Guideline 1.3).

Population size and density
Although the peak population (581 birds) has increased and is now a smaller proportion of the national population the Solway Firth remains one of the most important sites for non-breeding cormorant in Great Britain. It is the 7th largest in Great Britain.

Species range
During non-breeding the cormorants range is extensive, including both coastal and inland waters. The Solway Firth is the only notable concentration north of Morecambe Bay, and the only one in the north and west of Scotland. The site is representative of the species north-western range.

History of occupancy
Large numbers have been recorded in the Solway Firth for at least 40 years with detailed WeBS counts published from at least the mid 1980s (Prater 1981).

Distribution within the site
Detailed information is not available on the distribution of cormorants, which are counted as part of WeBS.

Black-headed gull
During winter Great Britain supports over 2,155,000 black-headed gulls; almost 200,000 of which occur in Scotland. The largest concentrations are in the Firth of Forth and the Solway Firth; numbers of all species are relatively low in other coastal locations.

Population size and density
In January 2004 the roosting population of black-headed gulls in the Solway Firth was estimated at 13,732 birds (0.6% of the GB population and more than 2,000 individuals) and the second largest known concentration in Scotland. Hence the pSPA meets the Site Selection Guidelines for a species within a waterbird assemblage of more than 20,000 birds (more than 2,000 individuals of a migratory species under Guideline 1.3).
Species range
During winter the black-headed gull is very widely distributed throughout England but relatively scarce in Scotland north of the central belt and the eastern seaboard. The Solway Firth is therefore the western representative of the northern range in Great Britain.

Distribution within the site
The night time roosting distribution at sea within the pSPA is largely unknown.

History of occupancy
Detailed counts are few but large numbers of black-headed gulls have been recorded in the area of the Solway Firth for over 40 years (Prater 1981). However it is only with the recent structured national counts, targeted specifically at roosting birds, which have revealed the true numbers of birds present.

Common gull
During winter Great Britain supports almost 700,000 common gulls; over 200,000 of which occur in Scotland. The largest coastal concentrations are in the Firth of Forth and the Solway Firth and the two largest inland concentrations on the Loch of Skene, Grampian (17,284 birds) and West Water Reservoir, Borders (10,050 birds).

Population size and density
In January 2004 the population of common gulls in the Solway Firth was estimated at 12,486 birds (1.8% of the GB population) and the second largest known coastal concentration in Scotland. Hence the pSPA meets the Site Selection Guidelines for a species within a waterbird assemblage of more than 20,000 birds (more than 1% of the Great Britain population of a migratory species under Guideline 1.3).

Species range
During winter the common gull is well distributed throughout England but perhaps concentrated towards the east side of the country, a trend which continues in Scotland into Orkney and Shetland. The Solway Firth is therefore an important western representative of the northern range in Great Britain.

Distribution within the site
The night time roosting distribution at sea within the pSPA is largely unknown.

History of occupancy
Detailed counts are few but large numbers of common gulls have been recorded in the Solway Firth for over 40 years (Prater 1981).

Herring gull
During winter Great Britain supports almost 730,000 herring gulls; over 270,000 of which occur in Scotland. The largest coastal concentrations are in the Firth of Forth and the Solway Firth and the largest inland concentration on the Roughrigg Reservoir, Strathclyde (15,144 birds).
Population size and density
In January 2004 the population of herring gulls in the Solway Firth was estimated at 3,034 birds (0.4% of the GB population and more than 2,000 individuals). Hence the pSPA meets the Site Selection Guidelines for a species within a waterbird assemblage of more than 20,000 birds (more than 2,000 individuals of a migratory species under Guideline 1.3).

Species range
Herring gulls are ubiquitous round the coasts of Great Britain. The Solway Firth is a western representative of the northern-most parts of that range.

Distribution within the site
The night time roosting distribution at sea within the pSPA is largely unknown.

History of occupancy
Detailed counts are few but large numbers of herring gulls have been recorded in the Solway Firth area for over 40 years (Prater 1981).

7. References


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Gray R. 1871. The Birds of the West of Scotland; Including the Outer Hebrides, with Occasional Records of the Occurrence of the Rarer Species Throughout Scotland Generally


JNCC generic documents:
Identification of important marine areas for inshore wintering waterbirds


MacPherson, H.A. and Duckworth, W. 1886. The birds of Cumberland: critically studied, including some notes on the birds of Westmorland.


SNH, JNCC & MS 2016. Summary report of the marine Special Protection Area (SPA) stakeholder workshop.


Annex 1. Site map
Annex 2. Citation


CITATION FOR PROPOSED SPECIAL PROTECTION AREA (SPA)

SOLWAY FIRTH
(INCLUDING THE UPPER SOLWAY FLATS AND MARSHES SPECIAL PROTECTION AREA AND MARINE EXTENSION)
(UK9005012)

Site Description:

The Solway Firth proposed Special Protection Area (SPA) is a large estuarine/marine site on west coast of Great Britain. The proposed SPA includes the classified Upper Solway Flats and Marshes SPA with extensive areas of intertidal mudflats, fringing saltmarshes and grazing marshes. The offshore sediments of the proposed marine extension are substantially sand, associated with mud and gravel towards the edges of the firth, especially in the smaller tributary estuaries. The series of sandbanks north east of the Isle of Man is the result of strong currents and an abundant supply of sand. The inner firth is shallow, as is Wigtown Bay, but further west towards the north-eastern Irish Sea the water deepens steadily to over 40 m.

Qualifying Interest:

The Solway Firth proposed Special Protection Area (SPA) qualifies under Article 4.1 by regularly supporting a non-breeding population of European importance of the following Annex 1 species: red-throated diver Gavia stellata (a mean peak estimate of 521 individuals; 3.1% of the Great Britain population) for the years 2001/02 to 2005/06), whooper swans Cygnus cygnus (an average of 250 individuals; 1.5% of the north west European population; 4% of the British non-breeding population) for the years 1986/87 to 1990/91), barnacle geese Branta leucopsis (an average of 12,300 individuals; 100% of the Svalbard population, all of which winter in Britain) for the years 1986/87 to 1990/91), golden plover Pluvialis apricaria (an average of 3,380 individuals; 2% of the Great Britain population) for the years 1986/87 to 1990/91) and bar-tailed godwit Limosa lapponica (an average of 4,800 individuals; 4% of east Atlantic flyway, 8% of the Great Britain population) for the years 1986/87 to 1990/91.

The site also qualifies under Article 4.2 by regularly supporting populations of European importance of the following migratory species (average peak counts recorded during the five year period 1986/87 to 1990/91): pink-footed geese Anser brachyrhynchus (an average of 14,900 individuals; 14% of the Icelandic population, all of which winter in Britain), pintail Anas acuta (an average of 1,400 individuals; 2% of north west European, 6% of the Great Britain population), scaup Aythya marila (an average of 2,300 individuals; 2% of north west European, 57% of the
Great Britain population), **oystercatcher** *Haematopus ostralegus* (an average of 33,850 individuals; 4% of east Atlantic flyway population, 12% of the Great Britain population), **knot** *Calidris canutus* (an average of 15,300 individuals; 4% of the east Atlantic flyway, 7% of the Great Britain population), **curlew** *Numenius arquata* (an average of 6,700 individuals; 2% of east Atlantic flyway, 7% of the Great Britain population) and **redshank** *Tringa totanus* (an average of 2,100 individuals; 2% of east Atlantic flyway, 3% of the Great Britain population).

The site also qualifies under **Article 4.2** by regularly supporting populations of European importance of **ringed plover** *Charadrius hiaticula* during the non-breeding (passage) period (a mean peak population estimate of 981 individuals; 1.3% of the biogeographic population) for the years 2007/08 to 2011/12.

The site further qualifies under **Article 4.2** by regularly supporting in excess of 20,000 water birds. In the five non-breeding period 1986/87 to 1990/91 an average peak count of 122,200 waterfowl was recorded, comprising 43,100 wildfowl and 79,100 waders. During the period 2001/02-2010/11 the marine extension in the outer Solway Firth added approximately a further 5,000 waterbirds to the non-breeding assemblage. In addition to the species named above this includes nationally important populations of the following species: **shelduck** *Tadorna tadorna* (an average of 1,600 individuals; 2% of the Great Britain population), **teal** *Anas crecca* (an average of 1,400; 1% of the Great Britain population), **shoveler** *Anas clypeata* (an average of 120 individuals; 1% of the Great Britain population), **goldeneye** *Bucephala clangula* (an average of 300 birds; 2% of the Great Britain population), **grey plover** *Pluvialis squatarola* (an average of 720 individuals; 3% of the Great Britain population), **sanderling** *Calidris alba* (an average of 260 individuals; 2% of the Great Britain population), **dunlin** *Calidris alpina* (an average of 11,900 individuals; 3% of the Great Britain population) and **turnstone** *Arenaria interpres* (an average of 600 individuals; 1% of the Great Britain population). It also includes nationally important populations of the following species: **common scoter** *Melanitta nigra* (a mean peak population estimate of over 1,588 individuals; 1.6% of the Great Britain population) for the years 2001/02 to 2005/06, **goosander** *Mergus merganser* (a minimum mean peak population estimate of 146 individuals; 1.6% of the Great Britain population) for the years 2007/08 to 2011/12, **lapwing** *Vanellus vanellus* (a mean peak population estimate of 5037 individuals; 0.8% of the Great Britain population and > 2,000 individuals) for the years 2007/08 to 2011/12, **cormorant** *Phalacrocorax carbo* (a mean peak population estimate of 581 individuals; 1.6% of the Great Britain population) for the years 2007/08 to 2011/12, **black-headed gull** *Chroicocephalus ridibundus* (a peak population estimate of 13,732 individuals; 0.6% of the Great Britain population) for the years 2003/04 to 2005/06, **common gull** *Larus canus* (12,486 individuals; 1.8% of the Great Britain population) for the years 2003/04 to 2005/06 and **herring gull** *Larus argentatus* (a peak population estimate of 3034 individuals; 0.4% of the Great Britain population) for the years 2003/04 to 2005/06.

The above figures are minimal estimates due to gaps in count coverage of this large and complex site.

Area: 1,357.49 km² (135,749.35 ha).
Location: 54° 73.723’ N 3° 80.639’ W
OS Sheet 1:50,000 – 83, 84, 85 & 89

07 June 2016

Scottish Natural Heritage

Rockcliffe Marsh SPA classified on the 1 October 1986, Upper Solway Flats and Marshes SPA (including Rockcliffe Marsh SPA) classified on the 30 November 1992