

## APPENDIX 10.22

### THE IMPACT ON WADING BIRDS OF THE M4 SEVERN ROAD BRIDGE: LITERATURE REVIEW AND FIELD SURVEYS (JANUARY 2006)

#### 1. SUMMARY

- 1.1 A literature review and field survey was completed to investigate the impact of the M4 Second Severn Crossing (road-bridge) on wading birds of the Severn Estuary.
- 1.2 The literature review found no evidence to indicate that the M4 Crossing is a current or future threat to the wading bird interest of the site – which is of international importance.
- 1.3 Field surveys were completed in the autumn and winter months. The surveys found little evidence to indicate that presence of the road bridge directly affects wading bird feeding, distribution or roosting behaviour. The main threat detected on the survey days was recreational disturbance, especially by dog walkers.
- 1.4 The main impact was on the flight pattern of three species Curlew, Dunlin and Lapwing; their flight paths were temporarily altered as they preferred to fly above the bridge. However, this impact was short-lived and the birds returned to their normal flight cruising height within 100m, with the general direction of flight unaffected throughout.
- 1.5 More surveys are recommended to validate the preliminary findings (1) as sample sizes were small for some species and (2) to survey a greater range and abundance of species.

## **2. THE IMPACT ON WADING BIRDS OF THE M4 SEVERN ROAD BRIDGE: LITERATURE REVIEW AND FIELD SURVEYS**

### **2.0 Introduction**

- 2.1.1 This study investigated the impact of road bridges on wading birds, with reference to the M4 Second Severn Crossing over the Severn Estuary. The study was commissioned in relation to the proposed Mersey Gateway Project which includes a new bridge across the River Mersey at Runcorn in Cheshire. The Second Severn Crossing Bridge is located in an ecologically sensitive area which is important for wading birds. The aim of the work was to provide new information on the likely impacts of the proposed Mersey Gateway Project on wading birds, after construction and use of the Mersey Estuary.
- 2.1.2 The study comprised two parts comprising (1) a literature review of known/potential impacts of the M4 Second Severn Crossing road bridge on wading birds, and (2), field surveys of impacts. The field surveys were carried out in 2003 and 2004 on wading bird distribution, diversity and behaviour on the Severn Estuary in proximity to the M4 Second Severn Crossing.
- 2.1.3 The aim of the field survey was to identify interactions between waders and the bridge, and more specifically to determine the impacts of the presence of the bridge on (1) wader distribution, (2) abundance (3), flight (4), feeding and (5), roosting behaviour. In addition, a desk study was made to evaluate known impacts/future threats to wading birds attributable to the M4 Second Severn Crossing.

### 3. THE STUDY SITES

#### 3.1 The M4 Second Severn Crossing Bridge

3.1.1 The M4 Second Severn Crossing is located in south-west Britain above the Severn Estuary and links Gwent, south-east Wales, with Gloucestershire, in South-west England.

3.1.2 The bridge has an overall length of 5.13Km, comprising 4.1km of approach viaducts and 948m above the Severn, whilst the main Span Pylon Towers reach a height of 137m. There is a single central navigation span over the 'Shoots' channel and approach viaducts on either side. The crossing forms a gentle S shape and near the English side crosses over the top of the Severn railway tunnel. The bridge was constructed between 1992 and 1996.



Photos1a & b: M4 Second Severn Crossing. English side (left) and Welsh side (right)

#### 3.2 Severn Estuary – Ecological Description

3.2.1 The Severn Estuary is located between Wales and England in south-west Britain at the mouth of four major rivers (the Severn, Wye, Usk and Avon) and many lesser rivers. It is a large estuary with extensive intertidal mud-flats and sand-flats, rocky platforms and islands. Saltmarsh fringes the coast backed by grazing marsh with freshwater ditches and occasional brackish ditches. Beds of eel-grass *Zostera* spp. occur on the more sheltered mud and sand-banks. The seabed is rock and gravel with sub-tidal sandbanks. A greater variety of invertebrates tend to occur on the intertidal rock platforms, a more stable habitat with rock pools and a relatively high cover of seaweeds.

3.2.2 The immense tidal range (the second highest in the world) and classic funnel shape make the Severn Estuary unique in Britain and very rare worldwide. This tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide-swept sand and rock. The species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders. A further consequence of the large tidal range is an extensive intertidal zone, one of the largest in the UK.

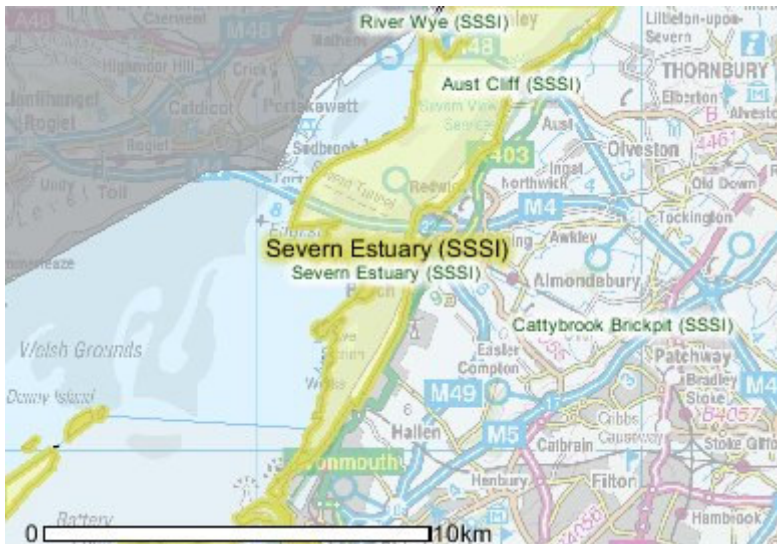
3.2.3 The site is of importance during the spring and autumn migration periods for waders moving up the west coast of Britain, as well as in winter for large numbers of waterbirds, especially swans, ducks and waders. Waterfowl numbers have reduced in recent years due to the run of mild winters.

### 3.3 The Severn Estuary: Protected Status and Importance for Wading and Other Wetland Birds

3.3.1 The M4 New Crossing is an important area for wading birds and wildfowl and is located within an area (the Severn Estuary) which has both national and international designations. Protected status includes:

i. **The Severn Estuary SSSI** (*National protected status*).

The Severn Estuary SSSI covers 9913.34 hectares and was designated in 1989. At the time of designation, the SSSI was identified as of “international importance for wintering and passage wading birds, with total winter populations averaging about 44,000 birds. Numbers can be considerably higher during severe winters when, owing to its mild climate, the Severn supports wader populations that move in from the colder coasts of Britain. The SSSI holds most of the estuary’s internationally important Curlew and Redshank populations, and most of its nationally important Ringed Plover and Grey Plover populations. Other waders which occur in significant numbers within the SSSI are Common Snipe, Knot, Whimbrel and Turnstone. The SSSI is internationally important for Dunlin and supports about 7.5% of the British wintering population of this species. The estuary as a whole supports about 10.5% of the British wintering population and is the single most important wintering ground of Dunlin in Britain.” (Data source: unpublished SSSI Citation, English Nature 1989).



**Figure 1: Location of the Severn Estuary SSSI (England) adjacent to the M4 Second Severn Crossing**

ii. **Severn Estuary Special Protection Area** (*European protected status*)

The Severn Estuary was designated a **Special Protection Area** (SPA) in 1988 and expanded in 1995 under the terms of the *European Community Directive 79/409/EEC on the Conservation of Wild Birds* (the *Birds Directive*). The Severn Estuary SPA extends over 24700.91 hectares. The site qualifies as of European importance for wintering and migrating waterfowl populations, including a range of wading birds. The range of wading species includes:

*On passage;*

- Ringed Plover, 655 individuals representing at least 1.3% of the Europe/Northern Africa - wintering population (5 year peak mean 1991/2 - 1995/6)

*Over winter;*

- Curlew, 3,903 individuals representing at least 1.1% of the wintering Europe - breeding population (5 year peak mean 1991/2 - 1995/6)

- Dunlin, 44,624 individuals representing at least 3.2% of the wintering Northern Siberia/Europe/Western Africa population (5 year peak mean 1991/2 - 1995/6)
- Redshank, 2,330 individuals representing at least 1.6% of the wintering Eastern Atlantic - wintering population (5 year peak mean 1991/2 - 1995/6)

Additionally the site meets the criteria for international importance, on waterfowl assemblage terms by regularly supporting at least 20,000 waterfowl including the waders; Dunlin, Curlew, Redshank, Lapwing, Grey Plover and Whimbrel (Data source: JNCC).

### iii. Severn Estuary Important Bird Area (*International designation*)

The Severn Estuary has international importance status for waders and other waterfowl through being designated an Important Bird Area (IBA) by Birdlife International. The site qualifies on assemblage terms, as it holds 84,900 wintering waterbirds on a regular basis. Wading species which help make the site meet the criteria include:

#### *Internationally Important Species - migration*

- Common Ringed Plover
- Common Redshank

#### *Internationally Important Species - wintering*

- Eurasian Curlew
- Common Redshank
- Dunlin

#### *Nationally Important Species- migration*

- Whimbrel (2,000 birds, 1992, 56%).

#### *Nationally Important Species – wintering*

- Grey Plover (830 birds, 2%)

### iv. Severn Estuary Ramsar site (*International protected status*)

The Severn Estuary was designated a Ramsar site in 1976 under the *International Convention on Wetlands of International Importance* (the Ramsar Convention). The Ramsar site extends over 24662.98 hectares, with qualifying wading bird features including (spring and autumn) migratory flocks of Ringed Plover, Dunlin, Whimbrel and Redshank. In details, the qualifying wader features are:

#### *International Importance- wintering*

- Dunlin, (Northern Siberia/Europe/Western Africa) 31418 individuals, representing an average of 2.3% of the population (5 year peak mean 1991/92-1995/96)
- Redshank, (Eastern Atlantic (wintering) 2110 individuals, representing an average of 1.2% of the population (5 year peak mean 1991/92-1995/96)

#### *National Importance- wintering*

- Curlew (Europe (breeding) 3219 individuals, representing an average of 2.8% of the GB population (5 year peak mean 1991/92-1995/96).
- Grey Plover (Eastern Atlantic (wintering) 439 individuals, representing an average of 1% of the GB population (5 year peak mean 1991/92-1995/96) (Data source: JNCC).

## 4.0 **Current Assessment of Conservation Threats to Wading Birds and Other Waterfowl of the M4 Second Severn Crossing and other Anthropogenic Factors**

4.1 The M4 Second Severn Crossing passes through two Severn Estuary SSSI condition/management units; with the main habitat in each being littoral sediment.

- 4.2 The condition of Unit 30, which extends over 195 hectares, was classed as Favourable when assessment was last made in 2002. The main threats to the future condition of this Unit requiring assessment/action were thought to be disturbance of waterfowl by fisherman and walkers. No mention of impact/threat was made in relation to the M4 Second Severn Crossing. The 290 hectare Unit 31 was last assessed in 2003, and was also deemed in favourable condition. For this Unit, no evidence was available to indicate man-made factors were impacting on the condition of the unit, though comment was made that the “influence of the 2nd Severn Bridge at present is unknown”.
- 4.3 In the statement on the Severn Estuary IBA conservation threats were identified as sea-level rise (leading to erosion, flooding and habitat loss from coastal defence measures), development for industry, housing, infrastructure and recreation, and recreational disturbance. No mention was made of the presence of the M4 road bridge being a substantial threat to the current and future wading bird interest.
- 4.4 For the Severn Estuaries Ramsar Site designation, factors (past, present or potential) considered to adversely affect the site’s ecological character included: changes in land use and development projects (dredging, erosion, eutrophication), pollution, and recreational/tourism disturbance. Once again, there was no mention of the M4 road bridge being a substantial threat to the wading bird interest.

#### **Anecdotal assessment of impact of bridge construction on waders**

- 4.5 On the survey day, a meeting was held with Brian Lancaster who has been birdwatching at the site for over 30 years. Mr Lancaster commented that wader numbers had declined on the Severn Estuary over the period of bridge construction, but this was far more likely attributable to climate change, and the mild winters resulting in fewer birds needing to travel to western Britain to find winter feeding habitat. Mr Lancaster did not consider there had been any noticeable impact of the Severn Crossing on waders. Far greater problems were thought to include recreational disturbance by dog walkers and other members of the public.

- **In conclusion there is no evidence to indicate that the M4 Second Severn Crossing has had a significant ecological impact on the wading bird interest of the Severn Estuary or poses a future threat.**

## **5.0 Field Surveys - Methodology**

- 5.1 Visits to the English (7/2/04) and Welsh (19/10/03) sides were made to study the interaction between wading birds and the M4 Severn Crossing, covering both the migration and wintering periods.
- 5.2 On the first reconnaissance visit in October 2003, 'casual' wading and other shore bird counts were made on both the Welsh and English sides in proximity to the M4 Severn Crossing. Additionally, both sides of the M48 Severn Bridge were also visited briefly to assess impacts on waders in the locality of a more established estuary bridge. On the first survey, the estuary in proximity to the English side of the M4 Severn Crossing was identified as a far superior wading bird habitat and subsequently a greater amount of time was spent on this side.
- 5.3 For part of the first survey day and over the whole duration of the second survey day in February 2004 'effort-related' counts (Welsh side, n=3 hours, English side n=10 hours) were made of wading and other shore birds. A continuous timed watch was made alternating on either side of the road bridge (i.e. north and south), from single fixed-point viewpoints, covering high, low, rising and falling tide periods.
- 5.4 For each wader encounter (individual sighting) the following information was recorded:
- (1) time of observation
  - (2) species
  - (3) number seen
  - (4) distance to the bridge
  - (5) behaviour e.g. flying, feeding, roosting etc.
- 5.5 For flying birds, the following were recorded:
- (1) direction of flight
  - (2) whether travel was under or over bridge
  - (3) whether the flight path was modified due to bridge presence.
- 5.6 On the second survey day on the English side, counts were also made of waders at the Old Crossing (located ca 200 metres north of the bridge) to determine wader distribution and abundance in the vicinity of the bridge.

## 6.0 Field Surveys - Results

### 6.1 Species Diversity and Distribution

6.1.1 Nine species of wading bird were recorded on the surveys: Bar-tailed Godwit, Black-tailed Godwit, Curlew, Dunlin, Knott, Lapwing, Oystercatcher, Redshank and Turnstone.

6.1.2 Wader numbers were relatively low in proximity (within 1000m) of the bridge. Maximum counts in parentheses are given below.

*English side* – Black-tailed Godwit (3), Curlew (300), Dunlin (86), Knott (1), Lapwing (210), Oystercatcher (91), Redshank (29) and Turnstone (28).

*Welsh side* – Bar-tailed Godwit (1), Curlew (10), Dunlin (2), Oystercatcher (4) and Turnstone (2).

Other shore birds recorded included:

*English side* – Black Headed Gull (22), Common Gull (2), Great Black-backed Gull (2), Herring Gull (10), Lesser Black-backed Gull (5), Mute Swan (4) Shelduck (10), Teal (4) and Wigeon (8).

*Welsh side* – Black Headed Gull (290), Common Gull (3), Cormorant (1), Grey Heron (1), Mallard (129) and Shelduck (4).

6.1.3 No waders were recorded in proximity to the M48 Severn Bridge.

### 6.2 Feeding Behaviour

6.2.1 Both Turnstone and Lapwing were recorded feeding on muddy/rocky foreshore directly under the bridge.

- **These observations confirm that the bridge does not act as a barrier to feeding behaviour for these species.**

6.2.2 Dunlin, Black-tailed Godwit, Bar-tailed Godwit, Curlew and Oystercatcher were recorded feeding on open mudflats within 200 metres of the bridge. It was thought these birds were not recorded feeding under the bridge due to a lack of suitable feeding habitat (too rocky), rather than disturbance factors attributable to bridge presence.

6.2.3 Of the non-wading shore birds, a single Grey Heron was recorded feeding within 30m of the bridge. Large numbers of Black Headed Gulls (up to 290) were recorded under and adjacent to the bridge, especially on the Welsh side, with smaller numbers of Common Gulls mixed in.

### 6.3 Roosting Behaviour

6.3.1 Up to 22 Turnstone, 81 Lapwing and 8 Dunlin were recorded roosting at a traditional high tide site (the 'Shaft') on the English side very close to (within ca 50m) the bridge.

- **These data provide preliminary evidence to indicate that roosting behaviour in these species is unaffected by presence of the road bridge.**

6.3.2 Note that the birds were subsequently flushed several times by dog walkers, with only the Turnstones returning in the first instance and finally no birds at all after further disturbance.

- **These observations confirmed recreational disturbance by dog walkers and others poses a far greater risk to the successful roosting of these wading bird species, than the bridge.**



6.3.3 Of the other shore birds, a flock of 119 Mallard were located roosting at low tide directly under the bridge on the Welsh side at the base of one of the pillars, with many of the birds positioning themselves on the dry concrete base.



Photos 2a & b: Roosting Turnstones (left) and their roosting site (circled in red) (right)

#### 6.4 Flight Behaviour- Direction and Height

6.4.1 82 observations of shore bird flight behaviour were recorded in proximity to the bridge, over the 13 hours of recording effort. Of these, just under half of the sightings (43%) were wading birds, with birds flying travelling north-south along the estuary.

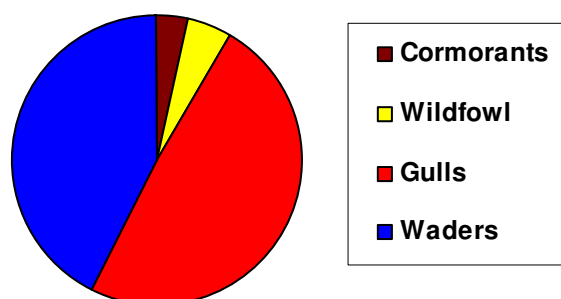


Figure 2: Shore bird types recorded flying over/under the M4 Second Severn Crossing

6.4.2 35 sightings of five wader species were made, including Curlew, Lapwing, Dunlin, Oystercatcher and Turnstone (Table 1).

Table 1: Effort-related observations of waders flying under/over the bridge

Species	Number of sightings	Number of individuals	% flying over (course modified)	% flying over (course unmodified)
Curlew	22	172	100	
Dunlin	3	103	100	
Lapwing	5	333	100	
Oystercatcher	3	17		100
Turnstone	2	23		100

6.4.3 Curlew was the most frequently recorded species (63% of sightings). All birds exhibited the same flight pattern over the 12.5 hour period of sightings. When the birds were close to the bridge (within 100m) they would remain flying in the same general direction but would change course slightly and gain height to fly above the bridge. Thereafter they would soon (again within 100m) drop down to return to their normal diurnal flight cruising

height and continue in the same direction (flying up and down the estuary). Lapwing and Dunlin also exhibited this same behaviour, though there were far fewer sightings to confirm whether this was a general pattern (n=5 and n=3 respectively).

- **In summary the main impact of the bridge on flight behaviour of Curlew, Lapwing and Dunlin on the survey days was a temporary alteration of course to cross above the bridge, with no lasting impact, as the birds soon returned to their normal flight cruising height and continued in the same direction as before they encountered the bridge.**

6.4.4 Turnstone and Oystercatcher flew directly under the bridge at a uniform height and in a set direction.

- **In summary, for Turnstone and Oystercatcher no impact of the bridge was discernable on flight behaviour. However, sample sizes were small and more surveys would be desirable to confirm this.**

6.4.5 47 sightings were made of non-wading shore birds. No impact of the bridge was detected for Mallard and Mute Swan which were recorded flying under the bridge, in a straight line. Shelduck were recorded flying both over and under the bridge, but of concern an additional pair was seen to turn around and fly in the opposite direction on approaching the bridge, suggesting a negative impact. Cormorants were recorded flying both over and under the bridge. All gull sightings (n=40 of five species and 216 individuals) were of birds flying over the bridge in a similar manner to that described for Curlew.

## **7.0 Future Work**

7.1 The report describes results from only two full days of survey work, when relatively few waders were recorded on the estuary in the vicinity of the road bridge. More surveys are recommended to validate the preliminary findings (1) as sample sizes were small for some species and (2) to survey a greater range and abundance of species. Suggested survey times include (1) spring migration period (2) autumn migration (3) following hard weather in the winter.