APPENDIX 1

To:
Planning Committee
Chorley Borough Council

From:
Councillor Kevin Joyce
Eccleston and Mawdesley

2nd July 2007

RE: Plan for construction of a wind farm at Mawdesley

Councillors,

I understand that you have recently received a planning application for a wind farm at Mawdesley.

I have looked into this matter in detail following a number of enquiries from Mawdesley residents opposed to the development, I thought it my duty to make the committee aware of some facts which may not be widely known. I have tried to avoid opinions and have quoted the sources for figures used.

I would be very grateful if you would consider the following points as you evaluate any planning application.

1. The environmental benefits of wind power do not justify its cost

Wind power provides a very small percentage of the electricity needs of the UK. According to DTI figures from 2005 [1]

GWh generated by UK onshore wind farms	769
GWh generated by offshore farms	204
TOTAL	973 GWh

The total electricity consumption for the same year was 407,265 GWh. Thus the combined on and offshore wind power contribution to UK electricity needs was less than **0.25%.** (one quarter of 1%)

Despite this minor contribution to the nation's energy provision it is estimated that wind farm developers across Britain could share more than £8 billion in subsidies over the next four years.[2]

In 2004 the Sunday Times launched a campaign calling for the UK government to re-examine its energy strategy and pushing for a moratorium on the future development of wind farms until their benefits have been properly established. This had the support of many environmental campaigners and economists.

Michael Howard, then Conservative Party leader, announced that a future Conservative government would rein in the controversial expansion of wind farms.

You might wonder why so many people are against wind farms when it is often said that we have a desperate need for cleaner energy. It is simply because the numbers may not add up.

Whilst it is accepted that energy generated by wind powered turbines is amongst the greenest in terms of carbon emissions (5g Carbon/kWHour, against around 400g Carbon/kWHour for coal fired) spending £8 billion to achieve this reduction does not represent financial, or environmental, value.

The use of wind power to generate 973GWh each year means that we do not need to use fossil fuels to generate those 973GWh. The carbon saving associated with the use of wind power is therefore the difference between the carbon emissions from producing 973GWh using fossil fuels and the carbon emissions from producing 973GWh using wind power.

This comes to 574,070 tonnes per year,[3] which sounds like a lot, until you consider what else might be done with £8 billion to reduce carbon emissions.

AN EXAMPLE

Let's consider low energy light bulbs. £8 billion would buy 1.6 billion low energy light bulbs (cost of £5 each over the counter at B&Q). The average house has 10 light bulbs, which means that 160 million households can be provided with energy saving light bulbs for the same cost as the wind power subsidy.

This means that for £8 billion every household in the US, UK and France could be entirely equipped with energy saving light bulbs.[4] What might be saved, in terms of carbon emissions, if this was done, bearing in mind that 19% of the total energy expended worldwide is used for lighting.

It has been estimated that if every household in the United States replaced just three of its incandescent light bulbs it would reduce emissions of CO2 by 23 million tonnes, and reduce demand for electricity in the US by the equivalent of 11 coal fired power stations.[5]

Including the households from the UK and France we would be looking at a potential CO2 reduction of around 34 million tonnes worldwide for the expenditure of £8 billion currently being used for wind power.

For considerably less that £8 billion (barely more than £1 billion actually) the UK could replace every incandescent bulb in the UK saving over 9 million tonnes of CO2 a year. This suggests that spending on wind power to reduce CO2 emissions is not a wise use of money.

The developers of the Mawdesley wind farm might consider this information to be irrelevant, because they feel they are not receiving any subsidy. They may not receive any help to build the wind farm, but they will receive subsidy for the power they produce as a result of the governments' complex renewable obligation certificates.

To quote Paul Golby, the chief executive of E-ON UK (former Powergen), **"Without the renewable obligation certificates nobody would be building wind farms"** [6]

The government has been persuaded that wind power can contribute to its green energy targets. To try and encourage energy providers to use wind power providers are obliged to buy a percentage of power from renewable sources at roughly three times the cost of traditional fuels such as coal, oil and gas.

This Renewable Obligation forces a consumer sourced subsidy to be paid to the renewable generator. This results in an increase in electricity prices to all consumers, whether or not they subscribe to a green tariff.

Critics suggest that this system operates to simultaneously penalise customers through higher bills and benefit the big power companies who least need the money. Although the government denies the scheme is a form of subsidy, many experts disagree, saying developers and suppliers are reaping hundreds of millions of pounds because of direct government intervention.

The system has been criticised by the Auditor General [7] and the House of Commons Committee of Public Accounts [8].

Prominent environmentalist, Dr John Etherington [9], is amongst many critics of the scheme and has said, **"These are effectively a hidden tax on all electricity consumers and a huge hidden subsidy to renewable energy providers."**

I attach a report by Dr Etherington which describes the subsidy process in detail and which explains how **a big wind turbine can earn £400,000 per annum of which half will be subsidy, paid by all consumers.** This is the reason that many people who have considered the numbers in detail have decided that the UK policy on wind farms is wrong.

Chorley Council should consider carefully whether it wants to support a system which many experts describe as financial folly.

2. Wind farms can cause considerable damage to wildlife

The problems caused to birds by wind farms have been described extensively in the general media.

Simply speaking, birds in flight can be killed by the spinning turbine blades.

Supporters of the wind power industry would point out that the numbers of birds killed is relatively small, and this is correct. The RSPB has raised objections to wind farms where the proposed site is within the range of a protected species (such as the Golden eagle) or on a migratory flight path.

However, leaving these considerations aside there is new research available which suggests that the impact of wind farms on bird populations may be more serious and long lasting than first thought, and may go much deeper than the actual number of birds killed.

The proposed site of this wind farm, Mawdesley, is a 6 mile drive from Martin Mere, only around 3 miles to a bird taking a direct route. As you may know, Martin Mere was designated an area of Special Scientific Interest in 1974 and Blackpool Council declared the site a Nature Reserve in 1991.The BBC nature series "Autumnwatch", hosted by Bill Oddie is to be presented from Martin Mere later this year.

Habitats at Martin Mere include open water, reed beds, grassland and small pockets of woodland and scrub. The site has a wide range of birds with many migrants in spring. The population of Martin Mere includes various ducks, geese and swans, water rail, long-eared owls, terns, little gulls, waders and warblers, bitterns, whimbrels, the marsh harrier and the osprey. The reserve is also exceptional for its plants (including orchids) and invertebrates such as butterflies, moths and dragonflies.

I attach to this letter a copy of *Systematic Review 4 - Effects of wind turbines on bird abundance - Summary Report*, produced by the Centre for Evidence Based Conservation at the University of Birmingham.

The summary is fairly detailed in its analysis of the statistics (the full report is a monster, but available from Birmingham University for anyone who wants it) and comes to the simple conclusion, that birds move away from areas around wind turbines.

I will quote from the conclusion of the summary report:

"..if impacts on bird abundance are to be avoided, the available evidence suggests that wind farms should not be sited near populations of birds of conservation importance, particularly Anseriformes."

Anseriformes are waterfowl by the way (ducks, geese and swans).

This warning has a particular significance when you consider the proximity of the proposed wind farm site to Martin Mere.

Martin Mere was left behind by glacial retreat after the last ice age and its habitat originally stretched for many miles across the county. As late as the 17th century the wetlands habitat extended some 1300ha.

As land has been developed over recent centuries the natural habitat required to support the diverse bird species became smaller and smaller. This process can eventually lead to a situation known in environmental fields as Islandisation.

It refers to the tendency for suitable wildlife habitats to become smaller and eventually encircled by non suitable habitats.

Islandisation is a massive problem for conservation. It has been described as one of the biggest threats to species survival by Sir David Attenborough.

The effects of Islandisation are very easy to visualise. If a wading bird living on Martin Mere attempts to move away from the area it finds no suitable habitat in the surrounding areas.

Islandisation means that entire populations can collapse because of quite small changes in their environment. They try to move, but end up in an entirely unsuitable environment and cannot survive.

This is a situation which is starting to affect the millions of nesting seabirds in the cliffs of the Scottish islands. Their cliff top habitats are protected, but the open sea where they gather food are not. The birds are being killed at sea, poisoned by plastic, contaminated with oil, etc... all of which encourages the remaining birds to leave for pastures new.

Unfortunately, their protected cliffs are the only suitable habitat. Birds will not consider the logic of staying where they are, they will simply move away and die.

The point I am trying to make is that to protect Martin Mere you have to protect the environment around Martin Mere, you have to avoid the process of Islandisation.

I appreciate that Martin Mere is not within Chorley Borough, but surely as elected officials within Lancashire we must bear some responsibility to protect this rare and irreplaceable resource.

I might also mention that every pub in the Chorley area which carries tourism information has a leaflet on Martin Mere. If we believe that Lancashire has a future as a tourist destination we would be insane to do anything which would risk the beauty of Martin Mere.

I was rather surprised to learn that neither Martin Mere or the RSPB have raised a complaint about the proposed wind farm at Mawdesley. I can only assume that the individuals who are actually aware of this proposed development are not familiar with the scientific studies which have been published.

3. Allowing a wind farm on the migratory path to Martin Mere may be contrary to a number of international agreements to which the UK is a signatory

This may sound a little dramatic, but unless you are a wildlife enthusiast, or a dedicated bird watcher, you may not be aware of the international importance of Martin Mere.

The Mere supports migratory populations of global significance. Consider Whooper Swans. These animals breed on wetland in sub arctic Eurasia. They pair for life, and their cygnets stay with them all winter when they migrate to northern Europe and eastern Asia. Icelandic swans tend to over winter in England and Ireland, especially at Martin Mere. Counts conducted on the Mere suggest that a staggering 11% of the entire world population of Whooper Swans visit Martin Mere.

Given this international significance it is not surprising that Martin Mere is subject to at least 2 international agreements concerning the protection of wild birds, their habitat, and their migratory routes:

(a) European Community Directive 79/409/EEC - 1979
European Community Directive 79/409/EEC (1979) [10] on the conservation of wild birds (the 'Birds Directive') was produced in response to the 1979 Bern Convention on the conservation of European habitats and species (the 'Bern Convention'). This Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. Martin Mere is covered under Article 4 which provides for protection of wetlands of international importance.

(b) Agreement on the Conservation of African-Eurasian Migratory Waterbirds - 1995
The Whooper Swan (11% of which may over winter at Martin Mere) is protected under the UN Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) [11]. This international treaty was concluded on 16 June 1995 in the Netherlands and came into force on 1 November 1999 following ratification by the required minimum of fourteen states (comprising seven from Africa and seven from Eurasia).

The AEWA covers 235 species of birds ecologically dependent on wetlands for at least part of their annual cycle, including many species of divers, grebes, pelicans, cormorants, herons, storks, rails, ibises, spoonbills, flamingos, ducks, swans, geese, cranes, waders, gulls, and terns.

The agreement covers 119 countries from Europe, parts of Asia and Canada, the Middle East and Africa and provides for coordinated and concerted action to be taken throughout the migration system ('flyways') of the waterbirds to which it applies.

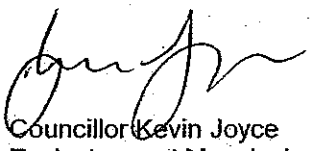
Parties to the Agreement are called upon to engage in a wide range of conservation actions which are described in a comprehensive Action Plan. This detailed plan addresses such key issues as species and habitat conservation and the management of human activities.

We should consider whether allowing a wind farm to be built in the migratory path of Whooper Swans is contrary to the terms of this international directive.

Conclusion

I do apologise for the extreme length of this document, and I am grateful to anyone who has stuck it out to this point. I have tried to avoid opinions, and I hope I have demonstrated the fact that the development of a wind farm in Mawdesley may be unwise financially, could damage the local environment, and therefore the local economy, and may contravene international agreements.

Yours Sincerely



Councillor Kevin Joyce
Eccleston and Mawdesley

References:
[1] DTI Digest of UK Energy Statistics (http://www.dtistats.net/energystats/dukes06.pdf)
[2]Sir Ian Fells, professor of energy conversion at Newcastle University (http://www.warmwell.com/04jul25suntimeswind.html)
[3] "Impact of Wind Generation in Ireland on the Operation of Conventional Plant and the Economic Implications", 2004 - study by the Irish National Grid concluded "reductions in CO2 emissions ranging from 0.59 tonnes of CO2 per MWh to 0.33 tonnes per MWh" – (http://www.eirgrid.com/EirGridPortal/uploads/Publications/Wind%20Impact%20Study%20-%20main%20report.pdf)
[4] There are 109 million households in the United States[Nielson Media research (2004-2005)] and around 24.7 million in both the UK[National Statistics Office (www.statistics.gov.uk)] and France[23.8 million according to INSEE (French Census figures 1999)]
[5] Dr Matt Prescott (http://news.bbc.co.uk/2/hi/science/nature/4667354.stm)
[6] Interview with Daily Telegraph published 26/03/2005
[7] Renewable Energy REPORT BY THE COMPTROLLER AND AUDITOR GENERAL. HC 210 Session 2004-2005 (11 February 2005)
[8] House of Commons Committee of Public Accounts. Department of Trade and Industry: Renewable Energy. 6th Report of Session 2005-6
[9] Dr John Etherington was formerly a Reader in Ecology at the University of Wales and in 1975 was one of the first people to publish warnings about the impact of human activity on carbon dioxide emissions and the possible "greenhouse effect".
[10] HM Joint Nature Conservation Commitee (http://www.jncc.gov.uk/page-1373)
[11] UN AEWA (http://www.unep-aewa.org/)

Wind power subsidy in the UK

by Dr John Etherington © 2006

Summary *Wind power in the UK receives a largely covert subsidy which currently doubles its value to the generator, and unlike conventional taxation-sourced support is not open to public view or Parliamentary attention. Wind power has a huge environmental impact and saves minimal carbon dioxide (CO2) emission.*

Though there are capital subsidies available for installation of wind power in the UK, especially offshore, this account is concerned with the most important subsidy: - that on wind electricity, provided by the Renewables Obligation (RO) and other benefits, set in place in 2002. Wind power is our fastest growing renewable electricity generator, though it still represents less than 0.5% of UK electricity supply.

The crucial importance of the RO may be gauged from the statement by Paul Golby, the chief executive of E-ON UK (former Powergen), who said: "Without the renewable obligation certificates nobody would be building wind farms" *Daily Telegraph* (26/03/2005).

Renewables Obligation

The Renewables Obligation as its name suggests places an obligation on electricity suppliers to purchase qualifying renewably generated electricity but it also forces a consumer-sourced 'subsidy' to be paid to the renewable generator. The mechanism of payment results in an increase in electricity price to all consumers, whether or not they subscribe to a 'green tariff'. Few consumers are aware of this fact and neither government nor developers apprise them of it.

The RO is operated through the mechanism of Renewables Obligation Certificates (ROCs - see Figure 1) and these certificates are a marketable commodity, generating additional income for the renewable generator.

The ROC has a buy-out price which was agreed at £30/megawatt hour (MWh) in 2002 and, index-linked, has now reached £32.33/MWh. This provides a 'floor' below which the subsidy on wind and other renewables can never fall.

Climate Change Levy exemption (CCLe)

In addition to the consumer-sourced RO another small advantage is given to the renewable generator. Non-renewable fuels pay a tax of £4.30/MWh, but renewables are exempt and so, effectively, are given an extra £4.30/MWh for their electricity.

The net subsidy - about £45/MWh

From 2002 when the RO system replaced the former NFFO (Non-fossil Fuel Obligation) the price of ROC's steadily increased. Two years ago it reached about £47/MWh (buy-out price of £30 plus £17 market increment) but very recently (2006) the increment has dropped back to c. £10 giving the RO a total value of about £40/MWh.

Adding to this, the CCLe of £4.30/MWh, we have a total subsidy close to £45/MWh

Wind electricity price is inflated to £90/MWh

As of January 2006 the wholesale price of electricity has risen to about £45/MWh (compared with c. £20/MWh a couple of years ago).

The implication is that the net subsidy, currently about £45/MWh, roughly doubles the value of wind electricity to c. £90/MWh (and prior to 2005-6 price changes, it almost trebled it).

This is probably the largest per unit subsidy ever paid for any commodity and the wind power industry has gained similar advantage in most other countries through either similar direct subsidy or, as in the US, through tax-breaks to wind power companies.

At present, coal-fired generation receives a per MWh subsidy which is less than a 25th of the wind subsidy. Gas-fired generation has never been subsidised and nuclear ceased to be subsidised in 1995-6 and has incidentally repaid with interest the bail-out loan made to it some years ago.

A big wind turbine earns £400,000 p.a. of which half is 'subsidy', paid by all consumers

Many wind turbines are of 2.0 MW or greater capacity and about

120 m in height. Because of limitation by wind speed, a 2.0 MW machine produces a quarter or a little more of its rated capacity, i.e. 0.5 MW on average.

Over one year it generates 0.5 x 24 x 365 = 4,380 MWh, and at the renewables price of £90/MWh, the gross earning is £394, 200 p.a.

About half of this income is from the consumer-sourced subsidy, without which the machine would be close to bankruptcy.

Big earnings, big 'footprint' but not much electricity or CO2-saving

One might assume that as the wind generators are so substantially rewarded, they produce a lot of electricity but this is not so. At the moment DTI figures show that wind provides less than 0.5% of UK electricity.

If the 2.0 MW wind turbines, wind-limited as above, were to replace the output of a large, 2000 MW conventional power station it would require at least 3000 turbines spread over 750 km2 of countryside. Some Footprint,!

Incidentally the Replaced, power station could not be closed as its electricity is still required to fill the gaps when the wind turbines are not fully generating.

The main reason given by government for installing wind power is that it will save carbon dioxide (CO2) emission and consequently reduce the rate of Global warming,

Government,s own prediction for CO2 saving by renewable electricity (mainly wind) in 2010 is just 9.2 million tonne CO2, which is less than four ten-thousandths (0.0004) of global man-made CO2 emission. Some chance, our Windmills, have, of altering the weather!

Government has been told but fails to respond

In February 2005 the Auditor General* reported that "the level of support provided by the Renewables Obligation is greater than necessary to ensure that most new onshore wind farms... are developed" and that "The Renewables Obligation is currently at least four times more expensive than the other means of reducing carbon dioxide currently used in the United Kingdom...

Later in 2005, the House of Commons Committee of Public Accounts ** reported that "Requiring users to source supplies from uneconomic providers has the same affect as taxing users to subsidise the providers, but is not as transparent or amenable to parliamentary control" and also that "The cost of the Renewables Obligation is passed on by electricity suppliers to consumers through higher prices. ....By 2010, the cost of the Renewables Obligation, which does not appear on electricity bills and is not explained to consumers, is expected to reach £1 billion per annum (at 2002 prices)."

For all the impact this has had on the Commons, the Auditor General's Office and the Committee of Public Accounts might as well have saved public money and gone off to the golf course!

* Renewable Energy REPORT BY THE COMPTROLLER AND AUDITOR GENERAL. HC 210 Session 2004-2005 (11 February 2005)

** House of Commons Committee of Public Accounts. Department of Trade and Industry: Renewable Energy. 6th Report of Session 2005-6

John Etherington PhD DIC BSc ARCS

Dr John Etherington was Reader in Ecology in the University of Wales until his retirement in the early 1990s. He was educated at Imperial College in the 1950s-60s. Much of his research and teaching was in the field of environmental chemistry and physics. He first wrote,* en passant, *about the impact of human activity on carbon dioxide emission and the possible "greenhouse effect" in a book published in 1975 and re-editioned in 1982.

CENTRE FOR EVIDENCE-BASED CONSERVATION

SYSTEMATIC REVIEW NO. 4

Effects of wind turbines on bird abundance
Summary Report

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Summary

Background

Wind energy is the fastest growing energy technology in the world, with a yearly growth rate estimated at 30%, reflecting policy commitments in many countries to renewable energy in order to meet greenhouse gas emission targets. Wind energy is seen as a key element of the shift to sustainable energy supplies; however, despite the clean image of wind energy, there is some evidence that wind farm developments may have potentially deleterious environmental impacts. Attention has been brought to the possible impacts on bird populations caused by displacement and direct 'bird strikes'. Here we systematically review the impact of wind turbines on bird population abundance.

Objective

The objective has been to assess the evidence on the positive and negative effects of wind turbines on bird abundance. To achieve this four questions were identified:

1. Do wind turbines effect bird abundance?
2. Are some bird taxon more vulnerable than others?
3. Does the number or power of turbines in a windfarm installation have an impact on the effect of windfarms on bird abundance?
4. Can any other ecological factors or windfarm characteristics be identified which have an impact on the effect of windfarms on bird abundance?

Study Inclusion Criteria

Studies were included if they fulfilled the relevance criteria below.

- *Subjects(s)* studied – any bird species (information was extracted on Falconiformes & Accipitriformes, Anseriformes, Passeriformes and Charadriiformes except *Laridae*).
- *Intervention* used – commercial wind installations in any country: wind farms and turbines.
- *Outcome(s)* – population size or distribution, breeding success, population mortality rate, recruitment rate, turnover rate, immigration rate, emigration rate, demography, dispersal behaviour, collision mortality, displacement disturbance, movement impeded, and habitat loss or damage. (Only information on bird abundance was extracted).
- *Comparator* – appropriate controls (e.g. reference areas) or pre-development comparators

- *Type of study* – any primary studies

Scope of the Search

The following computerised databases were searched: English Nature's "Wildlink, JSTOR, Index to Theses Online (1970 to present), Internet search – Dogpile meta-search engine, SCIRUS, COPAC and ISI Web of Knowledge. In addition, the RSPB library was hand-searched, as were bibliographies. Recognised experts and current practitioners in the fields of applied avian ecology and renewable energy technology were contacted. Foreign language searches were undertaken to ensure that the scope of the review was truly global.

Main results

A total of 124 articles were accepted for full text viewing based upon an initial screening of title and abstract, including foreign language articles. Of these, 15 were of sufficient quality and relevance to meet the inclusion criteria reporting on the results of 19 datasets. Nine of these datasets were complete although three only reported on a limited number species. The remaining 10 datasets were incomplete. Nine did not present variance measures, one did not include turbine characteristics and three of the sites were not independent as they shared the same control.

Random effects weighted mean difference meta-analysis of six complete independent datasets with more than three species produced negative effect sizes, two of which were statistically significant, suggesting that windfarms can have a negative impact on bird abundance. Combination of the complete datasets using Random effects standardised mean difference meta-analysis resulted in a pooled effect size of -0.328 ($P < 0.0001$). The inclusion of incomplete datasets (with down-weighted dummy variances) reduced the size of the effect and its significance (-0.033, $P = 0.002$), whilst including these data with average weighting further reduced the effect size and probability fell beyond the 0.05 significance threshold (-0.022, $P = 0.054$).

Combination of the complete datasets with effect sizes derived from overall means of within-windfarm samples resulted in a negative and significant pooled effect size (-0.712, $P = 0.0001$) which remained with the addition of down-weighted data with dummy variances and non-independent data. (-0.257, $P = 0.023$). Effect sizes were also derived using species as replicates and again the pooled effect size was negative and significant (-0.489, $P = 0.035$) although the significance fell beyond the 0.05 threshold when down-weighted data with dummy variances and non-independent data was added (-0.240, $P = 0.089$).

Meta-regression was used to investigate reasons for heterogeneity in results. Bird taxon had a significant impact on the effect of windfarms on bird abundance ($r = 0.290$, $SE = 0.070$, $P = 0.0001$) with Anseriformes (ducks) experiencing greater declines in abundance than other bird groups, followed by Charadriformes (waders), Falconiformes and Accipitriformes (raptors) and Passeriformes (songbirds).

Turbine number did not have a significant impact on bird abundance whilst turbine power had a very weak but statistically significant effect ($r = 0.002$, $SE = 0.0007$, $P = 0.004$) with low power turbines resulting in greater declines in abundance than high

power turbines.

Bird taxon, turbine number and turbine power were combined with habitat type, the migratory nature of the species, latitude, location, size of area, time since operation of windfarm and data quality using multivariate meta-regression. Time since windfarms commenced operation had a significant impact on bird abundance ($r = 0.519$, $SE = 0.155$, $P = 0.001$) with longer operating times resulting in greater declines in abundance than short operating times. Latitude had a very weak but statistically significant effect ($r = -0.099$, $SE = 0.032$, $P = 0.002$) with high latitudes resulting in greater declines in abundance than low latitudes.

Conclusions

Available evidence suggests that windfarms reduce the abundance of many bird species at the windfarm site. There is some evidence that Anseriformes (ducks) experience greater declines in abundance than other bird groups suggesting that a precautionary approach should be adopted to windfarm developments near aggregations of Anseriformes and to a lesser extent Charadriformes particularly in offshore and coastal locations. There is also some evidence that impact of windfarms on bird abundance becomes more pronounced with time, suggesting that short term bird abundance studies do not provide robust indicators of the potentially deleterious impacts of windfarms on bird abundance.

These results should be interpreted with caution given the small sample sizes and variable quality data. More high quality research and monitoring is required, in particular, long term studies with independent controls and variance data. Pending further research, if impacts on bird abundance are to be avoided, the available evidence suggests that windfarms should not be sited near populations of birds of conservation importance, particularly Anseriformes.