Solutions for Conserving Birds and Halting Climate Change

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AMERICAN BIRD CONSERVANCY

Solutions for Conserving Birds and Halting Climate Change

Introduction

Climate change is having a significant impact on birds in the Americas, both on species already of conservation concern and species that may now be common and unthreatened, and solving this problem will be a focus of conservation for decades to come. American Bird Conservancy is working to reduce the impacts of climate change on birds and their habitats, and to ensure that all birds of the Americas maintain healthy and vigorous populations into the 22nd Century and beyond.

Solutions for Conserving Birds and Halting Climate Change by American Bird Conservancy lays out a strategy for addressing those impacts through policy changes to conserve birds and reduce carbon emissions, and actions taken on the ground in maintaining, protecting, or creating habitat.

Executive Summary

American Bird Conservancy is working to provide solutions and supporting policies that both address climate change, and ensure the conservation of birds and their habitats. *Solutions for Conserving Birds and Halting Climate Change* includes detailed recommendations on how to conserve birds and mitigate impacts from new energy developments, and how forests can be better protected and managed to sequester carbon.

Western Yellow-billed Cuckoo are particularly vulnerable to collisions. Photo by Larry Thompson

For new energy installations in the U.S., we are witnessing a rapid shift away from electricity generated by burning coal to renewable energy sources and natural gas. In 2017, solar was the leading form of new energy production with over 60 percent of the global market share, with bird-friendly distributed solar accounting for nearly half of the U.S. total.

One key climate solution benefitting birds is to further incentivize solar installations in the already developed landscape, such as rooftops and parking lots. This will speed the growth in renewable energy and lower the risks to birds posed by other sources of energy production, new power lines, and climate change. Another is increasing investments in energy efficiency across all sectors of the economy.

It also is necessary to have regulations that ensure impacts are mitigated and that use available best management practices, as the energy infrastructure is transformed to run off renewables. This can be accomplished through incidental take permitting under the Migratory Bird Treaty Act, land management plans with mandatory mitigation and adaptive management requirements, and establishing a system to fairly compensate for any remaining unmitigated impacts.

Planting trees and protecting existing carbon stores is another key climate solution. Currently, eleven percent of U.S. emissions are absorbed by forests, but projected loss of forests to urbanization could see this natural carbon reduction cease sometime during the 2020's. Keeping these forests as forests, protecting high carbon areas, sustainably managing forests to build carbon stores over time, planting extensive new forests, and increasing urban forest cover all benefit to the climate and provide increased habitat for birds.

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a. Maintain existing carbon-stores, particularly old-growth and mature forests.

b. Keep forests as forests to maintain the existing level of carbon sequestration.

c. Plant trees and forests in appropriate landscapes and urban areas.

Solutions for Conserving Birds and Halting Climate Change

1. Problem Solving Environmental Laws and Processes

Mandatory Mitigation, Best Management Practices, and Adaptive Management

Require application of the mitigation hierarchy to avoid, minimize and compensate for impacts to birds and their habitats. Best management practices developed to reduce bird mortality that can be reasonably implemented should be mandatory. All projects and plans should include population and habitat loss thresholds that, if exceeded, trigger mandatory adaptive management to reduce impacts.

Greater Sage-Grouse conservation depends on mitigation of development impacts. Photo by Vivek Khanzode.

In 2016, President Obama issued a memorandum Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment to promote appropriate mitigation and protect our natural resources, particularly on public lands. This mitigation policy, which has since been rescinded by the Trump administration, had great potential to enable federal managers to foster wildlife and habitat conservation, by avoiding the loss of irreplaceable resources, and encouraging private investment in the restoration of natural resources that are affected by development.

The best way to prevent the loss of wildlife and other natural resources is the maintenance of intact ecosystems. However, when development is deemed necessary, the policies outlined in the Memorandum were likely to have had significant benefits for birds and their habitats.

Foremost among the policy advances in the Memo is its requirement that federal agencies ensure projects provide a net benefit and no loss of irreplaceable resources, by mitigating the impact of development projects on the environment, and offsetting any impact those projects have on wildlife and their habitats. The mitigation hierarchy would be utilized to avoid habitat loss on state and federal lands through smart planning, to minimize impacts by requiring best management practices, and, when needed, to compensate for any unavoidable impacts.

This policy was both timely and urgently needed because, under current regulations, we are losing irreplaceable resources to development of all kinds, on public and private lands, at an alarming rate, including endangered species habitat. Rare and endangered habitats such as sagebrush, desert riparian areas, grasslands, and mature forests are all being lost without effective mitigation taking place. As a result, many bird species are now endangered or losing

ground, including Northern Spotted Owls, Marbled Murrelets, California Spotted Owls, Greater Sage-Grouse, Western Yellow-billed Cuckoos, Sprague's Pipits, and Golden Eagles.

Further, to ensure avoidance is given a fair opportunity and not rejected without full consideration, it must come first in the process. Landscape-scale analysis under the National Environmental Policy Act is needed prior to development to identify Irreplaceable Resources and avoidance areas, and to assess likely cumulative impacts. This landscape scale planning could incorporate existing programmatic Environmental Impact Statements and ecosystem assessments, and be done on a national or regional basis, or as part of the regular forest planning and resource management planning revision process.

Pending completion of these broad-scale assessments, determinations of how to consider avoidance, net benefit, specific best management practices, what's required to ensure no net loss, and the amount of compensation that may be needed, should be defined in further guidance and regulations.

American Bird Conservancy supported the Department of the Interior Landscape-Scale Mitigation Policy's direction regarding compensatory mitigation, which says, "measures should not be considered until after all appropriate and practicable avoidance and minimization measures have been applied." Through the creation of a fair and transparent compensation system, significant private resources can be directed to conserving and restoring important bird habitats.

We applauded the Landscape-Scale Mitigation Policy's consideration of greenhouse emissions and carbon storage. America's forests play a critically important role in sequestering carbon emissions, and in providing habitat for a vast array of bird species. It is essential that we keep forests as forests, and ensure that federal forests are managed sustainably by accounting for carbon emissions and recognizing the benefits of protecting and restoring habitats and ecosystems that store carbon.

Migratory Bird Treaty Act Incident Take Permitting

The Migratory Bird Treaty Act protects migratory birds from being killed. The agency has authority to regulate incidental take and can create a permitting system, similar to take permits now authorized by the Endangered Species Act and Bald and Golden Eagle Protection Act.

In 1918, the United States enacted the Migratory Bird Treaty Act (MBTA) to implement a 1916 treaty between the U.S. and Canada to protect migratory birds. The Act helped restore populations of many birds, ranging from herons and egrets to shorebirds and waterfowl.

In a legal opinion issued December 2017, the Trump Administration abruptly reversed decades of government policy and practice — by both Democratic and Republican administrations — on the implementation and enforcement of the MBTA. The Act's prohibition on the killing or "taking" of migratory birds has long been understood to extend to "incidental take" — meaning unintentional, but predictable and avoidable, killing from threats such as oil pits that trap birds, and tall towers and power lines responsible for many bird collisions.

Under the Administration's revised interpretation, the MBTA's protections will apply only to activities that purposefully kill birds. Any incidental take — no matter how inevitable, avoidable, or devastating its impact on birds — is now immune from enforcement under the law.

Blackburnian Warlber. Photo by Bruce Beehler.

In May of 2018, a coalition of national environmental groups, including American Bird Conservancy, Center for Biological Diversity, Defenders of Wildlife, National Audubon Society, National Wildlife Federation, and the Natural Resources Defense Council, filed litigation challenging the Administration's move to eliminate these longstanding protections. In September, eight states joined the effort and filed suit against the administration to reinstate these vital bird protections.

Opposition against the weakening of the Act is also mounting in Congress. All 10 Democratic members of the Senate's Committee on Environment and Public Works sent a letter to Interior Secretary Ryan Zinke, calling on him to keep enforcing the MBTA, cited as the country's most important bird conservation law. In their letter, the Senators call attention to the 100-year history of the MBTA and why it remains essential.

ABC and a coalition of more than 500 conservation groups have called on Congress to defend the Act. And, in a remarkable show of support for keeping the MBTA strong, 17 high-ranking officials from previous Republican and Democratic administrations sent a letter to Sec. Zinke opposing the change. "This legal opinion is contrary to the long-standing interpretation by every administration (Republican and Democrat) since at least the 1970s, who held that the Migratory Bird Treaty Act strictly prohibits the unregulated killing of birds," they wrote.

The bipartisan group of signers includes several former Deputy Secretaries of Interior and several former directors of the U.S. Fish and Wildlife Service. They agreed on the effectiveness

of the MBTA, stating, "The Migratory Bird Treaty Act can and has been successfully used to reduce gross negligence by companies that simply do not recognize the value of birds to society or the practical means to minimize harm."

There are Good Reasons for Industry to Support MBTA Permitting

The risk of liability under the MBTA has long provided the oil and gas industry, wind energy development companies, and power transmission line operators with an incentive to work with the U.S. Fish and Wildlife Service to minimize bird deaths. For example, in an effort to protect migratory birds and bats and avoid potential MBTA liability, the wind energy industry, conservation groups, and the Service worked to develop comprehensive guidelines aimed at ensuring best practices for siting and developing wind projects. The Administration's new policy eliminates this incentive for industries and individuals to minimize and mitigate foreseeable impacts of their activities on migratory birds, putting already-declining populations of our nation's songbirds and other migratory birds at risk.

In practice, enforcement of the MBTA has only occurred in a few instances when companies failed to adopt accepted industry best practices — and ignored government cautions and requests for mitigation. Only a handful of companies from across the energy sector have been prosecuted and fined, in spite of their known impacts on birds.

NEPA: Best Science, Environmental Analysis, and Public Involvement

THE NATIONAL ENVIRONMENTAL POLICY ACT (NEPA) PROVIDES AN EXCELLENT PROCESS TO ENSURE THAT BEST SCIENCE AND PUBLIC INVOLVEMENT ARE CONSIDERED IN MANAGEMENT DECISIONS. EXEMPTIONS TO ENVIRONMENTAL LAWS HAVE LED TO MAJOR ENVIRONMENTAL DAMAGE AND ARE NOT NEEDED TO ADDRESS DEVELOPMENT CONFLICTS OR NEW THREATS, INCLUDING CLIMATE CHANGE.

NEPA is a bipartisan environmental impact review law that makes informed decision-making a key component of every major federal action that has the potential to impact the environment. It requires government agencies to engage in a transparent review process intended to discover any significant environmental effects before a decision is made. NEPA also ensures that those who manage federal projects make informed decisions based on the best information while involving and informing the public.

NEPA is a critical law that empowers local communities to protect themselves and keep the government accountable for dangerous, rushed, and poorly planned federal projects that could impact the environment. Without NEPA, millions of people would have their meaningful voice taken away in federal government decisions that influence their lives and their surrounding environment.

NEPA is the legal foundation of reasonable, balanced, and transparent protections for our environment. It is a law that has made informed decision-making about the environment a key component of every major federal action. NEPA has been able to do this in several ways. First,

NEPA protects the public. Everyone has the right to live, work, and play in healthy communities where the air and water are safe. NEPA protects the health and safety of local communities by ensuring they are aware and properly informed of possible threats to their health and environment.

NEPA is also a roadmap to smart decision-making that saves taxpayer money. It accomplishes this by helping to identify and avoid potentially costly problems beforehand, sound environmental reviews help developers understand what problems and where choke points exist. By identifying these, project sponsors can make early modifications to their plans, saving time and taxpayer money.

Spectacled Eider. Photo by USFWS.

NEPA provides a fair mechanism to analyze different means to mitigate the anticipated impacts of a project. The development of alternatives is an essential component of NEPA that gives the public and decision makers an opportunity to assess and compare potential solutions to reduce or eliminate likely impacts.

Moreover, NEPA requires our government to take climate resiliency seriously. NEPA requires consideration of greenhouse emissions and a project's potential contribution to climate change. Ignoring the effects of greenhouse gas emissions and climate change effects of federal projects puts local communities and projects are severe risk. Environmental reviews required under NEPA protect vulnerable communities by ensuring that new roads, bridges, and other critical infrastructure will be built to last and remain resilient in the face of extreme weather events.

NEPA should be embraced because it leads to better decisions and provides a fair opportunity for public participation in government decisions that affect the environment and local communities. NEPA isn't just an environmental protection statute, it's a critical tool for civic engagement that we cannot afford to lose.

Loopholes to NEPA Causing Harm to Forests and Loss of Carbon

Regarding categorical exclusions, American Bird Conservancy is opposed to the 3,000 acre exclusion and designation process created by the 2014 Farm Bill and believes it should be eliminated. Logging has significant impacts which always need to be considered in at least an environmental analysis. In addition, designated treatment areas were not adequately prioritized. We are opposed to any new categorical exclusions for logging.

In particular, we strongly oppose expanding the breadth of existing categorical exclusions to enable larger-scale salvage logging. The science is clear that post-fire salvage logging does not advance ecosystem integrity or restoration, which is a stated purpose of this rulemaking, and

instead is a “tax” on the environment. Thus, expanding the acreage for salvage logging projects that can be categorically excluded from NEPA analysis would be completely inappropriate.

We oppose further relaxing its definition of extraordinary circumstances. The extraordinary circumstances direction is integral to appropriate application of existing categorical exclusions. The public needs the assurance that the filter is sufficiently rigorous.

The 20-Year Monitoring reports of the Northwest Forest Plan indicate that it is recovering mature and late-successional forests as predicted, and as a result, water quality and the abundance of suitable habitat for listed species is increasing. Continuing the successful Northwest Forest Plan, and undertaking other regional landscape planning efforts provided for under the Forest Planning Rule should be an agency priority.

Spotted Owlets. Photo by USFWS.

2. Bird Smart energy

All forms of energy production and use have impacts on the environment and bird conservation, some greater than others. In some cases, impacts can be mitigated or even eliminated.

Smoke stacks. Photo by stock.xchng

Controlling Greenhouse Emissions

ABC strongly supports legislative, regulatory, legal, public education and market-based efforts, in the US and elsewhere, to control greenhouse gas emissions and rapidly phase out use of fossil fuels. We recommend providing generous tax incentives to home and business owners so that they can make use of low-impact energy alternatives such as increased efficiency and distributed solar, to meet the challenge of climate change.

Energy Conservation and Energy Efficiency

The most rapid, cost effective, and efficient way to reduce the effects of energy production and use is to use less energy. This can address all of the conservation problems associated with energy at once, and at all levels. The best way to reduce energy consumption is to use it more efficiently. This can mean increasing vehicle fuel efficiency to reduce the need for fossil fuels for transportation, improving household usage of energy, and a host of other energy-efficiency efforts, a list that can go far beyond what can be included in this document. ABC should always be supporting and encouraging all efforts to reduce the amount of energy being consumed, such as supporting the goals of the American Council on an Energy Efficient Economy.

Distributed Solar Energy

Distributed solar energy production, that is, solar panels on roofs of buildings or parking lots near where the energy is to be used, is the most bird friendly method of solar energy production and should be incentivized. At large scale solar energy production facilities, collision and incineration issues should fully be addressed and mitigated for all installations. Collectors should be developed or installed placed so that their reflective surfaces are not seen by birds as spaces they can fly through.

Solar electric systems catch the energy directly from the sun resulting in no emissions (Bull 2001). Solar energy in quantity based on the industrial development model requires huge installations and a large footprint on the landscape (Mahmoud 2004). It has been estimated that an area of 60 square miles in relatively clear central Oregon would have to be covered with solar cells in order to meet the present electric needs of that state.

Effects on Birds from Industrial Scale Solar

The main impact of production of solar power on birds is due to the large footprint needed for industrial-scale energy production. In addition, some birds collide with or are harmed by structures that are part of, or are associated with, the solar power system, especially solar systems that use large areas of mirrored collectors focused on a central collecting station ("concentrated solar"), as opposed to large areas of photovoltaic panels.

ABC is concerned about the relatively high risks to birds from concentrated solar technology. Researchers at the Solar One installation documented the death of 70 birds from 26 species over a 40 week period (McCrary et al. 1986); i.e., 1.9-2.2 birds/week during the monitoring period. Mortalities were largely a result of birds flying into the mirrored surfaces of the solar-collecting mirrors, although there was mortality from birds flying into the highly-concentrated solar beams ("flux"). It is unclear, however, how many birds this might affect (State of California).

Photovoltaic panels, as are seen on rooftops, have much lower impact on birds. Although the panels may be glass covered and therefore reflective, they are rarely placed in situations where birds would attempt to fly through them, and they are not transparent.

Storks on solar panels. Photo by Mich Klootwijt

Solar Solutions

Distributed solar systems (photovoltaic solar panels placed on rooftops of buildings and parking lots rather than large areas of solar collectors on agricultural or public lands) are the preferred systems, having few drawbacks for birds. Large-scale solar collection systems that can displace or damage bird habitat, are preferable to fossil fuels systems, but collisions and other impacts should be fully mitigated.

ABC does not agree with the common argument that, because feral cats, collisions with buildings and power lines and pesticides kill vastly more birds than alternative energy, that we should not be concerned about the losses (Kahn, 2014). These losses are not trivial and, when population numbers are low, the loss of any individuals can have a population-level effect (Clarke, 2013).

In addition, the impact of all human-caused sources of avian mortality is cumulative and unsustainable. According the 2016 State of the Birds report, one third of migratory bird species are in decline or facing serious threats. We should therefore be addressing all major sources of avian mortality.

Our nation's native birds should not be viewed as "collateral damage" in our war on climate change, particularly if much of the conflict can be eliminated through improved science, siting and regulation. ABC supports the development of alternative energy as a means of reducing our dependence on fossil fuels and to address the growing the problem of anthropogenic climate change. However, as with wind energy development, ABC believes that it must be done right and with minimal impact on our nation's ecologically-important birds and their habitats (see Lovich and Ennen, 2011).

ABC therefore encourages the USFWS and other U.S. natural resource agencies to study systematically the effects of solar energy on birds and other wildlife and their habitats. It also encourages immediate research on ways to mitigate the effects of solar energy on birds, including ways to retrofit photovoltaic solar panels so that insects and birds do not perceive them as bodies of water (Upton, 2014).

Siting is also critical, and in order to reduce risk, industrial-scale solar facilities should not be placed near populations of rare or endangered species, in major migratory routes, near wetlands or close to active agricultural lands (McCrary et al., 1986). Steps must also be taken to require mitigation and compensation when public trust resources, including federally-protected birds, are being killed by solar facilities, even after every precaution has been taken.

As with wind energy development, ABC supports mandatory mitigation requirements for solar energy development that will effectively protect our nation's native birds from this rapidly expanding industry. ABC also favors independent assessment of risks preconstruction and monitoring of bird deaths post-construction to remove any potential conflict of interest.

Further, ABC believes that, whenever energy development and land use decisions are made, the public should be offered the opportunity to assess a full range of renewable energy development alternatives. Only focusing on large, industrial-scale solar projects does not consider potential alternatives including distributed solar generation of renewable energy on existing structures (e.g., buildings, parking lots, homes) that do not harm wildlife, degrade pristine habitat or require the construction of new power lines.

Bird-Smart Wind Energy: solutions for sustainable wind energy development

American Bird Conservancy's Bird-Smart Wind Energy Program promotes bird-friendly solutions to advance the sustainable development of wind energy, while minimizing impacts to bird life. Since 2010, we have worked to reduce risk to birds during planning stages, with a focus on pre-construction considerations. Our thanks to Holly Goyert who drafted this section, and to Michael Hutchins, Kelly Fuller, and Michael Fry for their contributions to the Bird-Smart Wind Energy Program.

American Bird Conservancy supports efforts across the USA to reach energy sustainability goals, combat climate change, and reduce our dependence on fossil fuels. However, wind turbines and their associated infrastructure can negatively affect bird populations, through direct collision and habitat loss. Given our mission to protect America's most threatened and endangered bird species and their habitats, our approach is to provide solutions for responsible renewable energy development, including "bird-smart" practices to minimize these impacts.

Sustainable wind energy sources in the US are rapidly increasing, both onshore and offshore. On land, there currently exist over 54,000 turbines operating in 41 states in the US, with approximately 90 GW of capacity (Fig. 1). The number of turbines are predicted to triple in the next three decades, by over 50,000 onshore and up to 50,000 offshore (DOE 2015, 2016).

Based on three studies from the last five years (Smallwood, 2014, Loss et al. 2014, Erickson 2015)[1], American Bird Conservancy estimates that approximately 1 million birds are killed annually from collisions with wind turbines in the US (Hutchins et al. 2016)[2]. This does not include impacts from collisions with associated infrastructure (e.g., power lines), habitat loss, displacement or other indirect impacts. Given projected onshore and offshore build-out (i.e., the expected growth of the wind energy industry), that figure is projected to increase to 3-5 million annually by 2050.

[1] See Johnson et al. 2016 for a comparison among studies

[2] Derived from the build-out since those three studies were conducted, and new techniques using canines to increase carcass detectability.

Photo credit: Wind turbines and birds by J Marjis, Shutterstock.

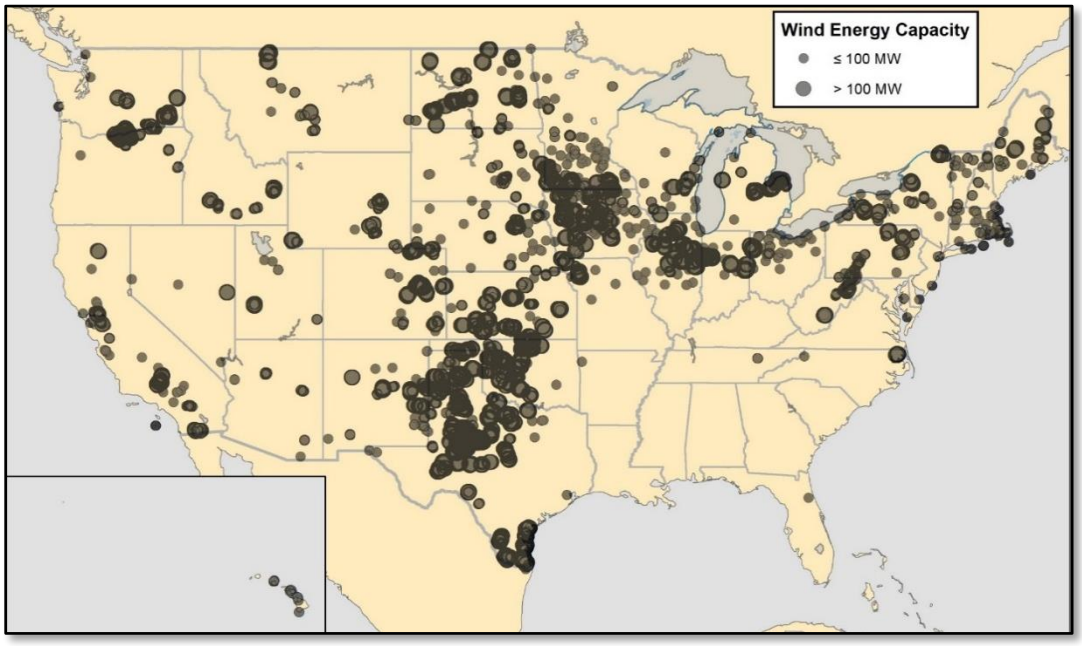

Figure 1. Currently, more than 54,000 turbines exist in the U.S with approximately a 90 GW energy capacity operating in 41 states, concentrated in the Midwest (American Wind Energy Association, AWEA). Turbine data shown here were sourced from the USGS Wind Turbine Database.

Birds contribute substantial ecological services to the environment, and bird-watching people contribute over $40 billion to the national economy (Carver 2013). American Bird Conservancy works to ensure that the benefits of wind energy outweigh its costs, by minimizing and mitigating its impacts on birds. Our wind energy policy provides a strategy to prioritize early

decision-making steps in wind energy development: “avoid when planning, minimize while designing, reduce at construction, compensate during operation, and restore as part of decommissioning” (according to the “mitigation hierarchy”, May 2017).

American Bird Conservancy supports wind power development when it is bird-smart, which means following six principles:

(1) proper siting of turbines away from high-bird-collision-risk areas;
(2) independent, transparent pre-and-post-construction monitoring of bird impacts;
(3) effective construction and operation minimization of bird mortality by wind energy facilities;
(4) mitigation to compensate for any unavoidable bird mortality and habitat loss;
(5) evaluation of wind energy as part of a complete analysis on all feasible renewable alternatives; and
(6) environmental compliance with a rigorous local, state, and federal regulatory framework.

American Bird Conservancy works with the government, industry, and conservation partners towards our goals to promote a science-based approach to bird-smart wind energy.

Photo credit: Wind turbines with flock by J Marjis, Shutterstock.

Bird-smart Principle 1: proper siting of turbines away from high-bird-collision-risk areas

Land-based Development

The first best practice step in wind energy planning, with regard to bird impacts, is to conduct an independent pre-construction risk assessment at the proposed site to carefully evaluate the exposure and vulnerability of birds to turbines and their associated infrastructure (Drewitt and Langston 2006). It is good practice to avoid developing areas in or near sites where birds concentrate, during migration or other times of year.

High risk areas include regions where birds are exposed to development, in part due to their distribution and abundance. For example, proper siting avoids avian hotspots, which are areas where a high abundance and diversity of resident and migratory birds congregate in ecologically important habitat. Other "no-go" zones are Important Bird Areas, Critical Habitat as designated under the Endangered Species Act (ESA), sensitive habitat (e.g., wetlands), reserves, migratory bottlenecks, the edges of ridges used by migrants, and breeding concentrations or movement corridors.

Photo credit: Wind turbine with flock by Bildagentur Zoonar GmbH, Shutterstock

To aid wind energy project developers, American Bird Conservancy has created a Wind Risk Assessment Map (Fig. 2) identifying levels of risk throughout the country. While well-sited wind

facilities require extensive resource investment at an early stage, they help to ease the ensuing regulatory and decision-making process, as it relates to monitoring, minimization, and mitigation (see Bird-smart Principles 2-4 below).

Areas of moderate risk could include habitat that has been previously altered (e.g., urban environments), coldspots, and resilient habitat (e.g., agriculture). Developers may proceed with caution in areas of moderate risk, as long as they follow stringent monitoring, minimization, and mitigation requirements. For example, the design of movement corridors through or around wind energy arrays, via micro-siting, can help to enable turbine avoidance. Developers could also consider reducing turbine number and density, and selecting turbine sizes with a rotor swept zone that minimizes collision risk, based on at-risk species. There exists a tradeoff in energy output, where few, large turbines have equivalent capacity to a large matrix of small turbines. A reduction in turbine number and/or density may help to minimize collision or displacement risk, as long as the rotor zone remains outside the range of flight heights of at-risk species.

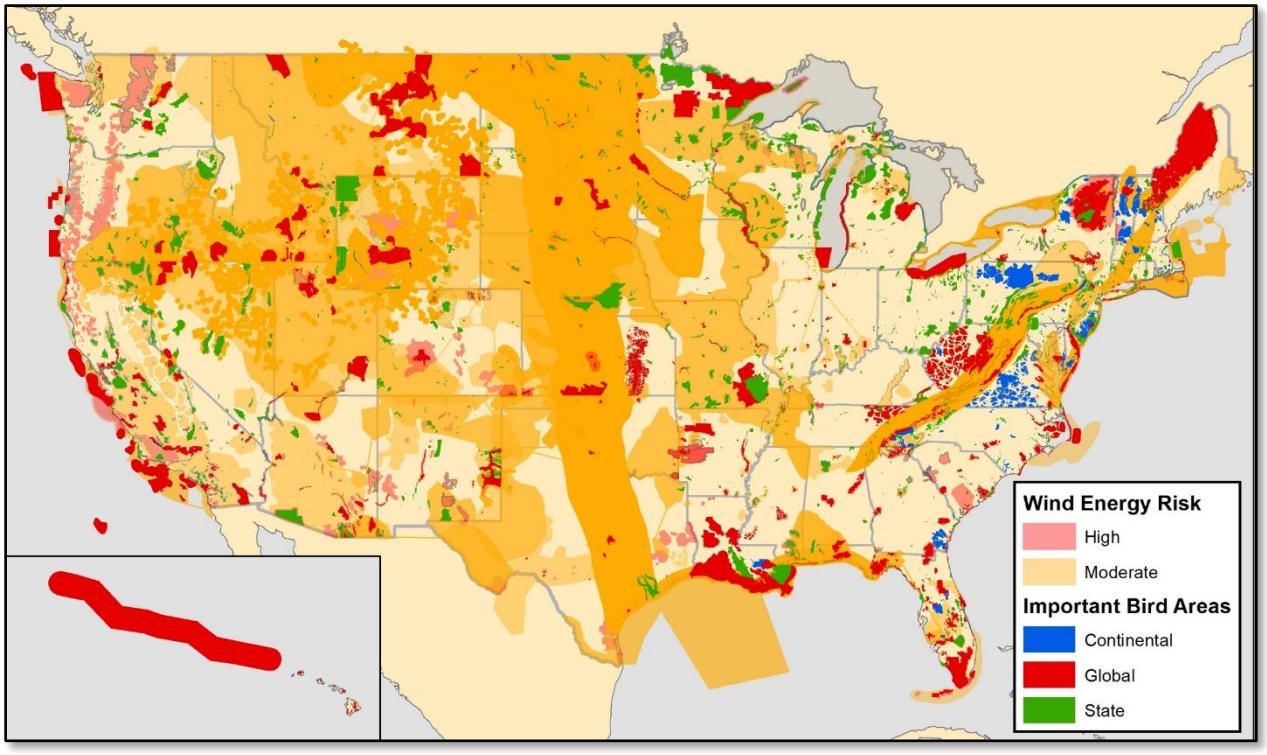

Figure 2. American Bird Conservancy's U.S. Wind Development Bird-Risk Assessment Map. Wind energy development should avoid high risk areas, indicated in red (where dark shades of red highlight Global Audubon Important Bird Areas (IBAs)). If developers choose to proceed in areas of moderate risk (orange on the map), they should follow stringent monitoring, minimization, and mitigation requirements. Continental IBAs are shown in blue, and state IBAs are in green.

Offshore Development

Offshore wind facilities should not be placed near populations of rare or endangered species, large breeding colonies, or in major migratory pathways. The definition of "near" may vary from species to species, as some birds travel long distances to forage. Special attention should be paid

to avoid wind development near nesting islands, where seabirds could be at risk of collision when transiting between at-sea foraging grounds and their breeding sites.

American Bird Conservancy's Seabird Maps and Information for Fisheries (SMIF) tool provides a list and summary of the seabird species found across the world's oceans.

To inform the offshore siting process, Winship et al. (2018) modeled and mapped the relative density of marine birds on the Atlantic Outer Continental Shelf, using three decades of aerial and boat-based visual surveys at sea. However, the ocean is a characteristically dynamic habitat, where conditions can change rapidly over time and space (e.g., upwelling, forage resources), thus influencing the distribution and concentration of wildlife. Climate change is exacerbating such environmental volatility, and shifting the long-term distribution, persistence and predictability of hotspots. To fully evaluate risk during the time frame of 30-year wind energy leases, developers and regulators will need to consider long-term forecasts of seabird hotspots.

Offshore wind energy has been subject to structured regional planning, more so than terrestrial wind energy, which mostly operates within private lands (DOE 2016). This is in part because waters within 200 nautical miles (nm) of shore fall within US federal or state (less than 3nm offshore) jurisdiction. The US Bureau of Ocean Energy Management (BOEM) is the federal regulatory and leasing agency that manages federal waters. Over five years ago, they began the planning and leasing process for several wind energy areas on the Atlantic Outer Continental Shelf (Fig. 3).

Opportunities exist to encourage proper siting in the Atlantic and Pacific, but largely in state waters, where planning has begun more recently (Fig. 4). In the Atlantic, Massachusetts, New Jersey, New York, North Carolina, and South Carolina are planning the highest renewable energy capacity (Table 1). As part of the Atlantic Marine Bird Cooperative, American Bird Conservancy is leading a working group to incorporate birds into this marine spatial planning process.

In the Pacific, Hawaii has proposed the most ambitious goal of achieving 100% renewable energy by 2045. Consequently, it also has the highest number of endangered birds, which American Bird Conservancy's Oceans & Islands team actively works to protect. We have directly helped inform the planning process for proposed wind energy areas in both the Atlantic and Pacific (Rhode Island, Massachusetts, and California), and we plan to expand this effort as we continue to comment on other projects.

Photo credit: Wind in water by Sergey Galushko, Shutterstock

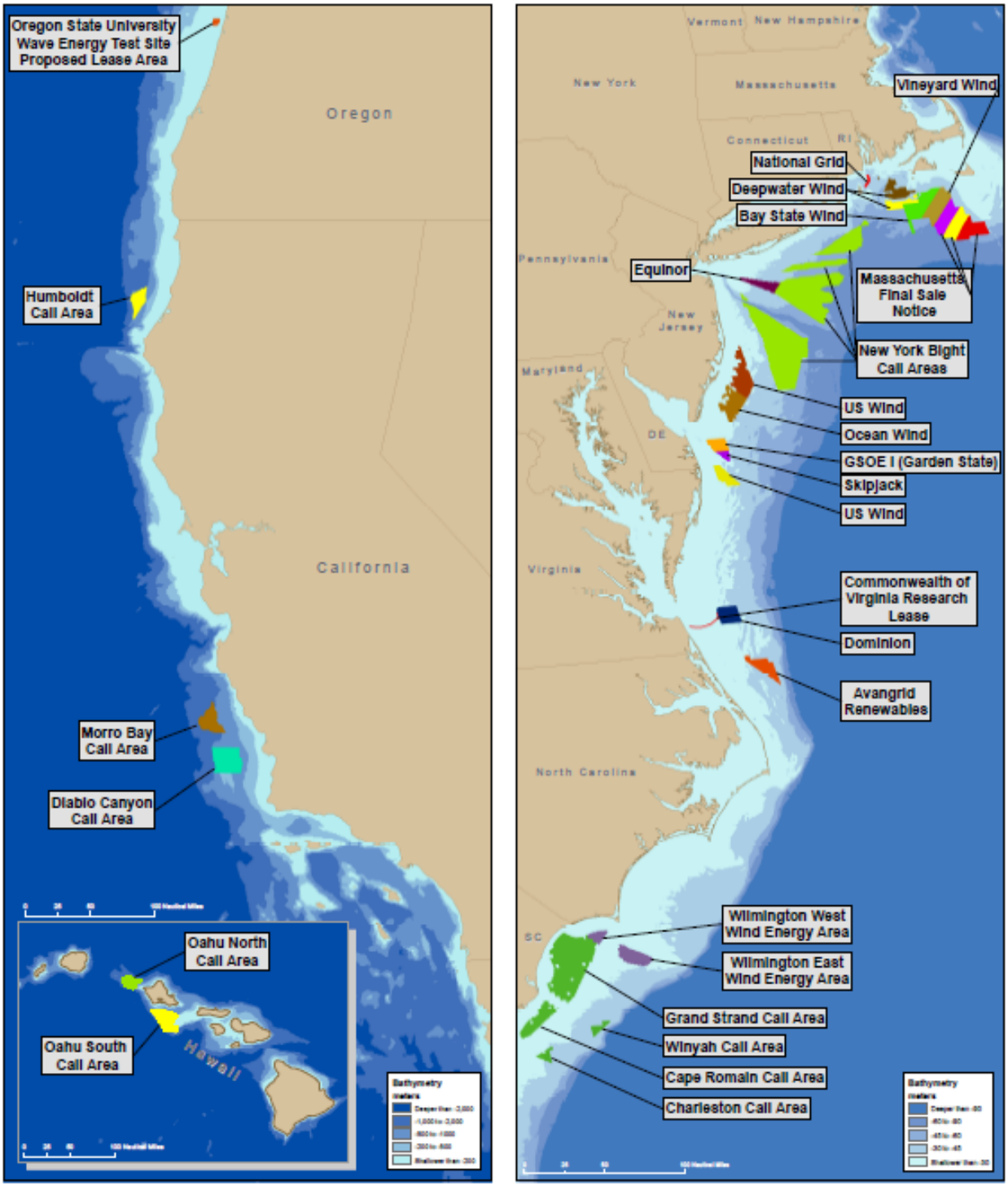

Figure 3. Wind energy areas managed by the federal Bureau of Ocean Energy Management (BOEM). Call Areas are in the early planning stage, while others are farther along into the leasing stage. From https://www.boem.gov/All-States-Poster/.

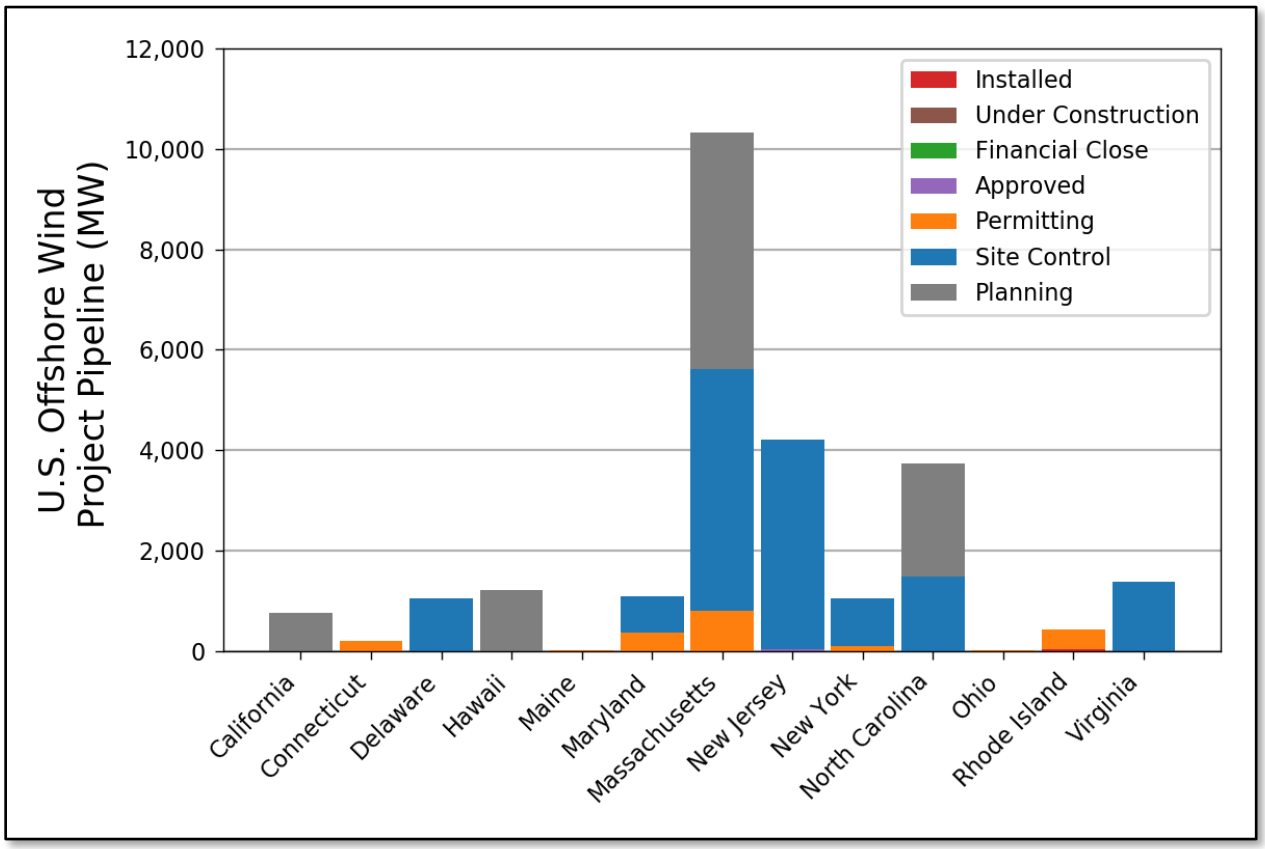

Figure 4. The planned offshore wind energy capacity for coastal states, from Beiter et al. 2018. For comparison, the first and only offshore wind farm in the U.S. is in Rhode Island state waters: the Block Island Wind Farm, which operates across 5 turbines (30 MW total capacity). The legend shows the stages of development, beginning with Planning and ending with Installed. Careful siting is most effective during the Planning stage.

Table 1. The planned offshore wind energy capacity and renewable energy goals for U.S. coastal states, adapted from Musial et al. 2017, Beiter et al. 2018, and the BOEM Renewable Energy Map Book 2018. New York (NY), South Carolina (SC), Massachusetts (MA), New Jersey (NJ), North Carolina (NC), Virginia (VA), Hawaii (HI), Maryland (MD), California (CA), Ohio (OH), Maine (ME), Rhode Island (RI), Delaware (DE), New Hampshire (NH). For comparison, the U.S. goal is 86 GW of offshore wind energy produced by 2050 (DOE 2016), which would represent 14,333 6 MW turbines, but this could change rapidly with shifting priorities and other factors.

	Planned		Goal			
	Capacity (MW)	Area (km^2)	Capacity (GW)	by Year	% Renewable	by Year
NY	22,029	7,343	2.4	2030	50	2030
SC	12,006	4,002				
MA	5,613	2,101	1.6	2027		
NJ	4,197	1,399	3.5	2028		
NC	3,735	1,245			12.5	2021
VA	1,383	463			15	2025
HI	1,200	399			100	2045
MD	1,086	322			25	2020
CA	765	275			50	2025
OH	21	10				
ME	12	9	5	2030		2030
RI	630		1	2020	38.5	2035
DE	600				25	2025
NH					25	2025

Bird-smart Principle 2: independent, transparent pre-and-post-construction monitoring of bird impacts

It is best practice to monitor the impacts of wind energy on birds using an independent body to assess pre-construction risk and post-construction injury to birds. This guideline removes conflicts of interest due to company self-reporting, and avoids perceived incentives for under-reporting. Any study should include consultation with avian experts that are not paid employees of wind energy companies, but who are intimately familiar with the local avifauna and their habitats. As described below (Bird-smart Principle 4), such independent studies can be supported through a mitigation fund. To allow for public oversight of study design and results, transparency is essential, as our nation's birds are a public trust resource.

Bird-smart wind power should employ a site-specific monitoring plan that is federally and state reviewed and approved (e.g., an Avian Protection Plan). A monitoring plan should be included in all Construction and Operation Plans, and reviewed during the National Environmental Policy Act (NEPA) process. An effective plan covers at least 5-10 years and requires independent, transparent, site-specific studies that use standard pre- and post-construction "Before, After – Control, Impact" (BACI) or "Before-After Gradient" (BAG) protocols. These methods set a comprehensive annual baseline against which post-construction studies can be evaluated, to quantify the cumulative impacts of wind turbines on birds.

With oversight from regulatory agencies, the plan should be modified on an annual basis, to inform the adaptive management process for improved operational minimization and mitigation. For example, at the first (and only) offshore wind farm in the US, located off the coast of Block Island, Rhode Island, Deepwater Wind reports the results of their monitoring plan to the US Army Corps of Engineers (USACE), USFWS, and Rhode Island Coastal Resource Management Council (CRMC). These organizations review the information biannually and modify the plan as appropriate.

Photo credit: Wind turbines at sea by Boscorelli, Shutterstock.

Pre-construction assessments should last at least two years and use all existing available bird study data, providing sufficient site-specific data to best account for detection probability, local environmental variability and bird movements at the appropriate spatial/temporal resolution.

Post-construction studies should run for at least five years (long enough to determine the efficacy of operational minimization measures and make needed revisions). Implementing a suite of methods is necessary to assess displacement sensitivity (e.g., boat and aerial surveys, with tracking studies), as well as collision vulnerability (e.g., radar combined with vibration/bioacoustics collision sensors). Together with life history factors, these contribute to population vulnerability, which is used to evaluate risk when combined with exposure to the hazard of wind turbines (bird abundance and distribution; Marques et al. 2014; Fox et al 2006).

Displacement

Avoidance behavior displayed by some birds around wind facilities suggests that, even if they don't collide with wind turbines, birds may experience habitat loss, particularly from large wind farms (Garthe et al. 2017, Mendel et al. 2019). Advancements in tracking technology have made it possible to identify behavioral avoidance of wind turbines by individual birds. For example, GPS tracking can be used on large birds (e.g., > 200g) to quantify fine- and macro-scale movements, with a special focus on altitudes within the rotor-swept zone. Alternatively, nanotags are miniaturized tracking devices attached on small birds that are detected by receiving towers throughout the Motus Wildlife Tracking System network. This tool uses automated digital telemetry to estimate the macro-exposure of birds to wind energy development, such as wind energy area crossings (Loring et al. 2018).

Surveys that assess avian exposure to wind energy development can also address displacement vulnerability (Kelsey et al. 2018). To estimate abundance at a micro-spatiotemporal scale, developers should deploy continuous turbine-mounted acoustic monitors to detect the calls of passing birds and bats. Radar, aerial surveys, and boat-based surveys (in the offshore realm) estimate the abundance and distribution of birds at a macro-spatial scale. Radar should be monitored on a continuous (daily) basis to detect large birds and flocks at altitudes within the rotor zone. Traditional (observer) aerial or high-resolution digital aerial surveys should be run on a monthly basis, and weekly during peak movement periods; digital aerial surveys can be used to estimate altitudes within the rotor zone. In the offshore realm, boat-based surveys have the advantage of detecting bird behaviors and should also operate on a monthly basis, weekly during peak movement.

Photo credit: Northern Gannet in flight by Dolores Harvey, Shutterstock

All site-specific avian exposure surveys should follow BACI or BAG protocols within the wind energy area (i.e., treatment) and a reference area (i.e., control plots). Careful selection of reference areas requires a representative sample of the wind energy area consistent with standard environmental variables – these variables differ depending on the habitat type (i.e., terrestrial versus offshore). For example, in the offshore realm, a control plot should represent the species assemblage affected by the wind energy area, through a range of habitat covariates that include water depth, productivity, and distance to shore. Mendel et al. (2019) used a BACI approach with 14 years of pre-construction data and 3 years of post-construction data from boat-based and aerial surveys. They showed that wind facilities in the North Sea caused a loss (i.e., reduction and redistribution) of available loon habitat, which could lead to indirect long-term effects on their populations.

Collisions

Flight height of a given species is considered the most important factor in determining that species' collision risk (Furness et al. 2013) and avoidance potential (Band 2012). A radar study around the Great Lakes conducted by the U.S. Fish and Wildlife Service (Bowden et al. 2015) suggests that many migratory birds often fly at lower levels than once thought.

For seabirds that use dynamic soaring, flight height and behavior are positively related to wind speed and direction. For example, albatrosses and petrels exhibit gliding flight behaviors, where their flight heights increase to within rotor height during high winds (Ainley et al. 2015). Gannets, gulls (including kittiwakes), and terns also fly within rotor height and have shown particularly high collision and displacement vulnerability scores (Willmott et al. 2013). Advancements in digital aerial survey technology (Johnston and Cook 2016) and the use of drones (Harwood et al. 2018) in the last couple of years have shown that boat surveys underestimate flight heights, therefore many collision and displacement vulnerability scores are likely to be even higher than estimated in these previous studies.

Photo credit: Birds surround a Chinese wind turbine by Changhua Coast Conservation Action, Flickr Creative Commons License

American Bird Conservancy encourages the USFWS, Department of Energy (DOE), BOEM, and other federal and state natural resource agencies to further study species-specific collision risk and avoidance potential. **Pre-construction** assessments should involve site-specific collision risk modeling, based on avian exposure to the wind energy area (i.e., abundance and distribution), hazards imposed by the turbine parameters (i.e., based on rotor zone), and vulnerability (i.e., based on life history parameters such as flight height and other bird behaviors, including foraging and migratory activity).

Post-construction studies should employ statistical models that best account for variations in local conditions and the relative difficulty of locating bird carcasses in different conditions, particularly due to scavenging by predators. Standardized mortality statistics should be calculated via the Generalized Fatality Estimator, GenEst. On land, the use of dogs within search radii > 105m is imperative to maximize the detection of carcasses. Smallwood 2018 states that "fatality rates are being underestimated because too often investigators and permitting agencies have assumed that disproportionate numbers of fatalities fall straight down or near the wind turbine. This common assumption has justified maximum search radii that fall far short of the area needed to adequately detect available carcasses of birds and bats. Even at the recent wind projects in the [Altamont Pass Wind Resource Area], the search radius of 105 m appears to be too short" (p. 13). Determining post-construction mortality for birds is even more difficult in the offshore realm than onshore, since carcasses are immediately lost in the water, thus precluding species identification and determination of actual numbers taken.

Given the low detectability of bird carcasses, American Bird Conservancy encourages research on new technologies that will test and verify accurate pre-construction risk assessment and post-construction mortality monitoring at offshore wind facilities. Several techniques used to monitor bird strikes with turbines are under development or in the testing stages (Dirksen 2017). Turbine-mounted systems include vibration/bioacoustics and multi-sensor (MUSE) wildlife detection systems; radar and infrared camera Thermal Animal Detection Systems (TADS); as well as accelerometers, microphones, and video cameras (WT-Bird). Rigorous metrics are needed to

improve upon existing methods of pre-construction risk assessment and post-construction mortality studies, particularly offshore (Bailey et al. 2014).

Cumulative impacts

Estimating the potential impact of one wind energy facility in a site-specific study is very different from assessing the impact of several facilities in a strategic study of the same area (Busch et al. 2013). Site characterization and assessment studies need to follow BACI or BAG protocols (i.e., with appropriately-selected control plots adjacent to the lease area for comparison, as stated above).

In contrast, strategic surveys are larger-scale, longer-term, and set a baseline against which to compare the impacts of different wind energy areas. It falls to government regulators to develop a comprehensive decision-making process that involves both site-specific and strategic surveys to estimate the cumulative impacts of wind energy on birds (see Goodale and Milman 2014). Such studies should be transparent, independent from the leasing industry, and systematically designed to accurately and precisely quantify the collision and displacement vulnerability of protected birds to offshore wind energy development.

Bird-smart Principle 3: effective construction and operational minimization of bird mortality by wind energy facilities

Several cost-effective strategies can be taken to minimize bird mortalities, although further innovation and testing is needed (Bailey et al. 2015, Wang et al. 2015, Dirksen 2017). Improving existing methods is an important factor in taking a science-based approach to wind-energy development, since "technologies to minimize impacts at operational facilities for most species are either in early stages of development or simply do not exist" (DOE EERE 2014).

American Bird Conservancy encourages further research on ways to minimize the effects of wind turbines on birds, including measures to deter birds and to detect-and-cease wind turbine rotation (i.e., feather, curtail) when large numbers of birds are present (May et al. 2015). Until such approaches become reliable, a precautionary approach is necessary to compensate for the low detectability of bird mortality that results from inadequate monitoring and minimization technology.

Bird-smart wind power uses the best existing technology and management practices to avoid harm to birds. Cables that connect wind energy to the electrical grid can pose a significant risk to birds through collisions and electrocution (Manville 2005). Avian Power Line Interaction Committee (APLIC) standards are fundamental to minimizing these issues: above-ground transmission lines should be buried in high risk areas, and meteorological towers should be un-guyed.

Attractant removal is good practice, such as anti-perching devices and lighting that minimizes nighttime migratory bird collision mortality (such as flashing lights). Sonic and visual deterrents can also be effective, such as flight diverters, markers on associated infrastructure, or specialized light spectrum deterrent devices using UV or red/blue LED lights or lasers. Effective

construction and operation minimization should be implemented as part of a monitoring plan to reduce bird fatalities.

During high risk times of year, operational curtailment is necessary (i.e., feathering, or shutting-down turbines), for example during poor visibility weather and peak movement periods (e.g., nocturnal, seasonal migration, or post-breeding season). Offshore marine environments are particularly dynamic and can change rapidly with changing weather conditions, such as strong wind and fog.

Photo credit: Roseate Tern by Luke Seitz

Measures need to be taken into account to accommodate changing distributions in bird hotspots, as a result of weather conditions and climate change. Existing detection-and-curtailment systems (e.g., IdentiFlight and DTBird) detect eagles and activate warning sounds prior to curtailment, which occurs within seconds. Further research is necessary to generalize this technology to other realms (e.g., offshore) and to other at-risk species, including solitary birds and large flocks. Best practice involves adaptive management to maximize the efficacy of a monitoring and minimization plan. That means revising operational measures, such that when parameters are exceeded they trigger required remedies. For example, Greater Sage Grouse planning is updated when habitat loss is exceeded.

In the offshore realm, it may be possible to install floating turbines that can be re-located under circumstances where bird distributions shift dramatically (i.e., an adaptive post-construction matrix design). However, adaptive management requires a robust monitoring and minimization program involving independent, transparent reporting of bird injuries to regulatory agencies.

Bird-smart Principle 4: mitigation to compensate for any unavoidable bird mortality and habitat loss from wind energy development

Following efforts by developers to properly site wind energy facilities and minimize bird mortalities, further harm to birds can be unavoidable. In these situations, bird-smart wind power redresses the loss of any birds or habitat, to a net benefit standard. This means that developers must find ways to produce enough birds to offset the losses imposed by collisions, displacement, and the cumulative effects of wind turbines. Examples include predator control and post-construction/decommission restoration of disturbed habitat (e.g., replanting of native vegetation).

Best practice for developers is to buy into a mitigation fund, for example via an HCP or other memorandum of understanding (MOU) with a natural resource agency (e.g., USFWS). This can be used to support conservation and independent research on the vulnerability of birds to the wind energy facilities, improve monitoring and minimization through technology innovation, and offer other compensatory conservation actions.

Compensation should also include acquiring additional habitat for migratory birds, such as off-site habitat conservation projects at wintering grounds, National Wildlife Refuges, and/or marine protected areas. Under a Section 10 ESA consultation, the USFWS has clear authority to require compensatory mitigation (Wilkinson 2019). Landowners or developers can apply for Incidental Take Permits (ITP) to engage in Safe Harbor Agreements, Candidate Conservation Agreements, and HCPs (e.g., Great Plains Wind Energy HCP). Offshore wind energy involves Section 7 ESA consultation, meaning that an ITP could include restoration to breeding colonies, such as that which occurred at the Bird Island Roseate Tern colony in 2017 (MassWildlife 2017).

When compensatory mitigation results in no net impact to a protected species or habitat, it can save a lot of time for developers, by helping to shorten review time or altogether avoid formal Section 7 ESA consultation with the USFWS (Wilkinson 2019). American Bird Conservancy supports compensatory actions that help in the recovery trajectory for endangered or rare species, particularly when they produce a net benefit to birds that is otherwise not possible using minimization measures, alone.

Bird-smart Principle 5: evaluation of wind energy as part of a complete analysis on all feasible renewable alternatives

Given all of the aforementioned impacts of wind energy on birds, it is good practice that project developers conduct a complete feasibility analysis to determine whether other renewable alternatives may be more appropriate at their proposed sites. Alternative energy sources, such as distributed solar energy (i.e., photovoltaic panels on preexisting structures such as houses, parking lots, or other buildings), can require less infrastructure, such as power lines, and have less impact on birds.

In 2011, the Bureau of Land Management and the California Public Utilities Commission considered distributed solar as a feasible alternative to three energy projects in San Diego County (BLM/CPUC EIS). California is an example of a state that invested so heavily in solar that it is exporting its power to other states (Penn 2017). A complete feasibility analysis would determine the need and justification for additional energy capacity generated from other renewable sources, including wind energy.

Photo credit: Distributed solar panels and wind turbines along road by Djomas, Shutterstock

Bird-smart Principle 6: environmental compliance with a rigorous local, state, and federal regulatory framework

In the US, birds are protected federally from incidental take by wind turbines under the ESA, Bald and Golden Eagle Protection Act (BGEPA), and Migratory Bird Treaty Act (MBTA). Despite efforts to weaken the ESA and MBTA, these laws have a record of success, and their protections remain essential.

A recent interpretation of the MBTA exonerates developers from incidental take of migratory birds – this is extremely insufficient, under litigation, and opposed by several organizations and members of congress. American Bird Conservancy recommends a process of protecting migratory birds similar to the BGEPA. Additionally, we have been actively involved in the NEPA process to ensure that Environmental Assessments (EA) and Environmental Impact Statements (EIS) include adequate measures to monitor, minimize, and mitigate bird mortalities. American Bird Conservancy is particularly concerned about the effects of wind turbines on rare species, including those listed as Threatened and Endangered.

Photo credit: Bald Eagle and wind turbines by Louise Redcorn

American Bird Conservancy works with legislators to improve the existing policy and regulatory framework designed to protect birds. We also collaborate with state and federal agencies to provide guidelines for energy developers.

In 2011, the US Fish and Wildlife Service published voluntary guidelines for developing wind energy on land. American Bird Conservancy favors mandatory, rather than voluntary guidelines for wind energy that effectively protect our nation's native birds from this rapidly expanding industry, both on and offshore.

In 2015, American Bird Conservancy petitioned the Department of the Interior to develop a rulemaking process and mandatory permitting system – this was endorsed by several partner groups. Guidance for developing offshore wind energy is currently under review by the USFWS, which is a step in the right direction. We urge a precautionary approach when it comes to wind energy compliance with avian guidelines and regulations.

American Bird Conservancy encourages regional planning to guide leasing decisions, with state and federal oversight, as has occurred with the U.S. National Offshore Wind Strategy by the U.S.

Departments of Energy and the Interior (DOE 2016). For Threatened and Endangered species, planning processes should involve a Habitat Conservation Plan (HCP) under a Section 10 ESA consultation. For example, the Great Plains Wind Energy HCP was developed to cover the Whooping Crane migratory corridor from North Dakota to Texas (orange on our Wind Risk Assessment Map, with stopover sites in red). Wind exclusion zones have been incorporated into Greater Sage Grouse planning, in the vicinity of known leks. Organization of an independent avian stakeholder advisory group is key to the regional planning process.

Photo credit: Birds and wind turbine sunset by NiekGoossen, Shutterstock

Build capacity

An independent avian stakeholder advisory group should be charged with a variety of tasks throughout the wind energy planning and operation process. This group makes informed decisions about the potential impacts of offshore wind energy development, contributes to the NEPA process, encourages regional planning, and establishes mandatory guidelines and best management practices. It also helps to identify knowledge/data gaps, interpret data, methods, and results from the monitoring plan, and assess cumulative impacts.

The group provides transparency by disseminating data and results to public, and also ensures multi-agency oversight. It should assess the need for incidental take permits, recommend adaptive management of operations, and help to develop and implement the mitigation fund. As an example, the New York State Energy Research and Development Authority (NYSERDA) has developed an Environmental Technical Working Group (ETWG) to pursue similar goals. Such existing groups may be used as a foundation to structure future groups dedicated to regional issues nationwide.

American Bird Conservancy is currently organizing a stakeholder working group to engage industry, government agencies, and other environmental NGOs in establishing and adhering to Best Management Practices for wind energy development in the Great Lakes. During spring and fall in the Great Lakes, vast numbers of birds and bats, many of which migrate at night, gather along the shorelines and eventually fly along or over the lakes during their annual migration to and from the boreal forests of Canada where they breed. Being tied to water, federally-protected Bald Eagles are likely to experience impacts from wind energy development in and around the Great Lakes.

The cumulative impact of the many existing and planned projects in the region is likely to be substantial. For example, the southwestern quadrant of Lake Erie (coastal Ohio) has been designated a Global IBA by the National Audubon Society. A Global IBA is defined by BirdLife International as a place of international significance for the conservation of birds and other biodiversity. American Bird Conservancy, in partnership with the Black Swamp Bird Observatory, successfully challenged a turbine in this IBA, at the Air National Guard's Camp Perry, OH. We continue to work proactively to ensure that the first offshore wind facility in the Great Lakes sets a rigorous precedent in the development of bird-smart wind energy.

Photo credit: Geese and wind turbines by J Marjis, Shutterstock., Shutterstock.

3. Conserving Forest Carbon

Storing Carbon, Managing Forests, and Providing Essential Habitat for Birds

In areas that would naturally be forested, forests of all successional stages provide many benefits for birds and help reduce the effects of climate change. Forests store carbon, in great quantities, and they also reduce exposure to direct sun and wind, and act as sponges to hold and release rainfall slowly, rather than allowing rapid runoff. Forested areas in general provide more mesic conditions and cooler temperatures than bare, open areas.

Siuslaw National Forest. Photo by Steve Holmer.

Maintaining forests where they are now, is therefore one of the simplest solutions for combatting the effects of climate change. Reforestation of appropriate areas using native tree species can help to combat increasing aridity caused by climate change, reduce exposure and maintain more mesic conditions. In addition, reforestation removes carbon from the atmosphere, storing it in the trees themselves and in soil.

Not all areas that once were forested can be reforested, due to agriculture and other human activities and needs. Shade cover (from silvopasture, shade coffee, or shade cacao), however, can provide some of the benefits of a fully forested area with respect to reducing heat and exposure—therefore evaporation levels—and water retention, while at the same time protecting bird habitat.

This powerful emissions sink offsets 11 percent of total U.S. carbon emissions. Forests make up more than 90 percent of land sector sequestration in the U.S. Assuring a stable or growing forest sink in the U.S. will require a combination of practices to maintain existing carbon stores, enhance future sequestration and reduce emissions. Increasing forest carbon sequestration can be accomplished by investing in reforestation to expand forest cover and helping landowners to deploy carbon-oriented forest management strategies. Reducing forest emissions and preventing loss of future sequestration power can be accomplished by investing in actions such as conservation easements to prevent forest conversion and forest restoration.

Protecting High Carbon Forests

Mature and old growth forests, particularly those found in Alaska and the Pacific Northwest are globally significant carbon stores that climate scientists are strongly recommending be protected from logging or conversion to other uses. These forests, found primarily on federal lands and facing a growing risk of being logged, also provide critical habitat for birds protected under the ESA including the Marbled Murrelet and Northern Spotted Owl.

Marbled Murrelet on nest. Photo by Thomas Hamer.

The Marbled Murrelet is an amazing seabird that in the Pacific Northwest nests in mature and old-growth trees. Due to extensive habitat loss caused by widespread logging near the coast of central to northern California, Oregon, and Washington State, a distinct population segment of the Marbled Murrelet is federally listed as threatened under the Endangered Species Act.

A region-wide court injunction against logging on federal lands and political gridlock prompted intervention in the ancient forest debate by incoming President Bill Clinton. A forest summit was held in Portland, Oregon in 1993, and agencies were directed to develop the Northwest Forest Plan. This was a first of its kind, multispecies and ecosystem conservation plan, intended to protect late-successional forests and riparian areas, as well as the Northern Spotted Owl, Marbled Murrelet, Pacific Salmon stocks, and 600 other old-growth-dependent species. The Plan went into effect in 1994 and it remains today the best available conservation framework of its kind.

The Northwest Forest Plan is first and foremost, a multispecies management plan for listed species including the Northern Spotted Owl, Marbled Murrelet and salmon stocks that provides the land management agencies with an “adequate regulatory mechanism” to comply with the Endangered Species Act, the National Forest Management Act, the Clean Water Act, and the National Environmental Policy Act. The Northwest Forest Plan promotes an ecosystem management approach with the specific goal of protecting those listed species and perpetuating and expanding the size of the region’s late-successional forest ecosystem.

Studies show that the Northwest Forest Plan is working as intended to retain mature and old forests, and that the highly fragmented forest ecosystem is growing back into the large blocks of mature forest habitat needed to maintain water quality and recover threatened species such as the Northern Spotted Owl, Marbled Murrelet and Pacific salmon stocks. It is important to note that the Northwest Forest Plan is a 100-year plan, now in its 21st year, and significant habitat gains for Northern Spotted Owl and to a much lesser degree Marbled Murrelets are not anticipated until mid-century.

Overall, under the Northwest Plan, 97% of the Murrelet habitat on federal lands has been conserved. However, it is important to remember that the Northwest Forest Plan alone does not provide enough to provide habitat protection for Murrelet recovery. As the 1996 rule notes, the FEMAT viability assessment concluded: "We believe there is only about a 60 percent likelihood that the Marbled Murrelet population on federal lands would be stable and well distributed after 100 years, regardless of which option is selected." (p. 26262)

In the 2009 5-year status review, FWS stated that although the Northwest Forest Plan protects some murrelets, without critical habitat, "conservation benefits would not likely extend to all areas currently protected for the murrelet." State lands have an important role to play in murrelet conservation and carbon storage and there are currently conservation efforts in Oregon and Washington to increase habitat protection for the murrelet that will have a side effect of increasing both carbon stores and sequestration capacity.

Old Growth Cedar, Mt. Baker-Snoqualmie National Forest. Photo by Steve Holmer.

Reforestation

In places that would be naturally forested, but where forests have been lost, due to human causes, reforestation is important for providing habitat for birds. Large areas of the Mississippi Delta and other eastern forests converted to agriculture are ideal locations.

Reforestation addresses important issues of climate change. Forests sequester carbon, and trees can help to stabilize temperatures, reduce evaporation, and maintain water flows in the face of rising temperatures and changing rainfall patterns. Forests create a more moderate and stable ecosystem for birds and other wildlife, so reforestation of areas from which the trees have been cut is a key need for improving ecosystem resiliency.

American Bird Conservancy believes that reforestation after disturbance is not always appropriate. There is a shortage on the landscape of high-quality early-seral habitat (snag forests) that some bird species such as Black-backed Woodpecker rely on almost exclusively for foraging habitat. Post-fire logging in particular can have particularly severe impacts on waterways and wildlife habitat, by removing much of the remaining above-ground biomass that survived the fire. Site-specific analysis of disturbed areas, and allowing for natural regeneration in some areas is necessary to ensure an adequate balance of habitat types.

Avoided Deforestation

Protecting forests, including working forests, through acquisition in fee and conservation easement helps to protect and stabilize the forest carbon sink. Reducing land development in the U.S. by 13 million acres compared to a future higher development scenario could avoid the loss of approximately 40 million metric tons CO2 of annual sequestration by 2050. In areas where forests now exist, keeping those forests intact is one of the best ways to slow climate change.

Cutting a forest releases the majority of the carbon it held to the atmosphere; keeping the forest intact keeps the carbon locked down. Avoiding deforestation is therefore an important goal. This can be accomplished by establishing protected areas for the forest, but maintaining the forest can also be encouraged by providing carbon credits as a payment to the forest's owners as long as the forest remains intact. This and other innovative funding mechanisms can be used to avoid deforestation.

When trees are cut greenhouse gases are released into the atmosphere; roughly 20% of annual emissions of such heat-trapping gases result from deforestation and forest degradation. Avoided deforestation is the concept where countries are paid to prevent deforestation that would otherwise occur (Ebeling and Yasué 2008). Funds come from industrialized countries seeking to meet emissions commitments under international agreements like the Kyoto Protocol et seq. and international frameworks such as REDD+.

The idea is attractive because it can help fight climate change at a low cost while improving living standards for some of the world's poorest people, safeguarding biodiversity, including avifaunal diversity, and preserving other ecosystem services (Ebeling and Yasué 2008).

Urban Reforestation and Management

Urban forests cover more than 130 million acres in the U.S. and deliver more than 10 percent of forest-based sequestration. Many cities and suburban areas have large tracts of vacant land and smaller fragments of land available to add to this forest base. Urban tree planting combined with enhanced tree maintenance can substantially increase urban forest sequestration and deliver additional carbon mitigation benefits through energy savings, especially if tree planting is targeted to areas suffering from urban heat island impacts.

State and local governments can play an essential role in accelerating forest carbon mitigation. The foundation of this approach is identifying dedicated revenue streams that can fund several types of actions.

This Eastern Old Growth forest in western Maryland is extremely rare. Photo by Steve Holmer.

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American Bald Eagle. Photo by Floridastock.