

WIND AND WILDLIFE INTERACTIONS

December 21, 2011

Coordinator: Welcome and thank you for standing by. At this time, all participants will be on a listen only mode for the duration of today's conference. For Q&A please refer to your Net portion to ask any questions. Today's conference is being recorded. If you have objections, you may disconnect at this time.

And I would now like to turn the call over to Mr. Ian Baring-Gould Sir, you may begin.

Ian Baring-Gould: Great. Thank you and welcome everybody to another session of the Wind Power America webinar series. And this one very excited about, focusing on wind and wildlife interactions.

We have a great series of speakers on today's call. Taber Allison from the American Wind Wildlife Institute who is going to give us kind of an overview of where things stand in wind turbine and wildlife interactions.

We have Cris Hein from Bat Conservation International talking clearly about bats and wind energy, giving us an update on the kind of - the current research and research trends going forward. And then followed by Christy Johnson-Hughes from the Fish and Wildlife Service who is going to give us an update on their guidelines.

And so a very good presenta- or series of presentations here that I'm sure all of us, as we get ready for the holidays, are going to enjoy. Just as a reminder, we do question and answers through the electronic form so if people go up to - if you have a question, you can go up through the Q&A menu bar that you see at the top left portion of your screen.

That will open up a little window and you can answer your questions - or ask your questions there. We are going to do clarifying questions at the end of each presentation but hold all kind of general questions until the end after everybody has a - has had a chance to give their presentations and then we'll take some time to do - to questions at that point.

As always, this webinar is being recorded and will be made available in about a week's time on the Wind Powering America Web site. So you will be able to see the slides again if there's something here that you don't catch as well as point this to other people who might not have been able to make today's call but you know might be interested.

So without further ado, let's get to Taber's presentation. Taber Allison is the director of research and evaluation for the relatively newly formed American Wind Wildlife Institute where he sees all of the research programs and development for the Institution.

Taber has gotten his PhD in ecology from the University of Minnesota and has worked in numerous, pretty high profile positions through his tenure, including faculty at Ohio State, program officer of ecology for the National Science Foundations, vice president of science, policy and climate change for Mass Audubon Society, as well as sitting on the DOI Wind Turbine Federal Advisory Committee, so a vast amount of experience in this issue of wind turbines and wildlife with a very strong understanding of the wildlife aspects of this, which is fabulous and brings a lot of credibility to everything that he says. So very much looking forward to Taber's presentation. Taber.

Taber Allison: Well, thank you very much Ian and welcome everyone. As Ian described, I will be giving a brief overview of some of the key issues or areas of concern

associated with wind energy development and wildlife and then describe the American Wind Wildlife Institute, or AWWI, is an organization which was formed to address some of these concerns and the uncertainty.

As I say, my overview will be necessarily brief, but I did want to describe briefly what the key areas of interest are with respect to impacts of wind energy development on wildlife. Now collision fatalities have been an area of longstanding focus for both birds and bats - bats more recently.

And Cris Hein, also a speaker on this webinar, will talk about that. So I won't touch on that issue in any detail. (Unintelligible) trauma is another recently described source of impact of wind energy development on bats that I think Cris will address.

There are also concerns associated with direct laws to habitat and also what we could call indirect effect - effects not directly associated with the impact of the project but could lead to such things as demographic effects or habitat fragmentation.

Barrier effects, which could be - result in a loss of habitat and/or have associated energetic costs. And then finally, an issue I think that's of interest to anyone in wildlife about the effects of all human activity is what is the cumulative impact of - as it relates to wind energy development and wildlife?

I'm going to focus primarily on collision fatalities. As I mentioned, this is - we've been collecting data from projects on collision fatalities of both birds and bats for many years. And it's probably our richest database of information.

And most projects now are conducting what we would call fatality assessments where they're doing surveys in the post-construction operating environment of the wind energy facility to locate bird and bat carcasses.

And what we're seeing is a growing convergence in the methodology for collecting the data, including estimating detection biased or observer bias as well as removal of carcasses by scavengers, both factors which, if not included, could lead to underestimates of mortality or fatalities (at) projects.

And because we're collecting more and more data and every year we have more and more data to work with, we're able to begin producing summaries based on a more restrictive data set where we're looking at projects that are collecting data that all seasons of occupancy over a continuous 12 month period were reporting fatalities by species.

And you can see the attached graph which summarizes fatalities - bird fatalities, all birds, at 46 wind facilities. And this - these data were compiled as of 2010. And as I say, the number continues to increase, the number of projects reporting.

But you can see that the metric that is typically used as the number of bird fatalities per megawatt of name plate capacity. So that's the theoretical output of a turbine per year. And you can see that there's quite a range of fatality levels across projects.

Most of the projects are approximately three fatalities per megawatt per year. You can look at - in more detail - oops, excuse me. I'm sorry. No, that's - when you look at how those fatalities are divided up by group or (guild) of birds, you can see that the vast majority of bird fatalities is composed on songbird or passerines.

And to some extent, this is not surprising because songbirds are far and away the most abundant group of birds in North America. And you can see that there is quite a range amongst some of the other major bird groups.

And not surprisingly, this pattern of fatality varies from one region to another. You can look more specifically at rafters. Rafters, in particular, are a group of birds that have been identified as being particularly vulnerable to collision at wind facilities, a higher rate of fatalities relative to abundance.

And over on the left-hand side, you can see the graph. Again, we can begin to look at this regionally. We can see that California, for example, has - tends to have higher rates of rafter fatalities at wind facilities than other parts of the country.

You can also see that there are several projects which haven't recorded any rafter fatalities. When we begin to look at generalizations as we start to gather information, there is growing evidence that we can predict risk to rafters on the basis of rafter activity in abundance.

And this might seem to be a self-evident result but it isn't, because when we look at patterns with other groups, it - risk is not clearly tied to the abundance or the activity of a particular group. But behavioral factors are also important.

So this is an area that is - an area of continued important researches we're trying to understand the risk factors that explain the difference or patterns that we see and fatalities from one wind facility to another.

There's a lot interest in actually understanding how many birds are killed at wind facilities every year and also trying to determine whether or not this

level of fatality is ecologically significant. In other words, does it contribute or influence population trends in bird species?

And we are getting enough information from projects in different regions or landscape types that we're beginning to be able to calculate what I guess I would say are meaningful averages of bird fatalities per megawatt across different regions.

And you can see a range of 2-1/2 to 3-1/2 birds per megawatt per year across the country for all species. And you can see an estimated range for rafters. And you might guess that there are fairly large confidence limits around those.

And arguably one could take those numbers by region and multiply them by the installed capacity in each region to get an estimate of the number of birds killed every year. I think we currently report a total installed capacity of 44,000 megawatts across the United States.

But I think that would probably be less interesting to do than to zoom in on particular regions to try and understand whether or not the estimated level of fatalities is going to have a population level impact. Such is the example that you see here that was conducted by (Judds and Erickson) in the Columbia plateau region which is an area along the border of Oregon and Washington, where they did a build out scenario based on fatality estimates from seven studies in the region.

And here you can see the results of that. They took the fatality rates for these species here from those seven studies and then from those studies, they estimated that if the same level of fatalities occurred at build out with a 6000 megawatt build out level, that you would get the annual number of fatalities listed in the first column for those five species.

And then you could compare that number to an estimated population size for each of those species and see what percentage of the population every year might be predicted to die in collision at a facility. And you can see that for the species listed here, for most of them, the number of - or percentage of fatalities is very low as a percentage of the total population.

One can also see that for (Perusianis Hawk), the number appears to - looks to be high and one might use judgment here to conclude that wind might have a significant impact - the population level impact on (Perusianis Hawk).

We can do this sort of analysis for birds because we do have population estimates of each species in the U.S. thanks to the army of amateur (burgers), who do the breeding bird survey data and other sources of data and modeling by Partners in Flight have enabled us to estimate population estimates or develop population estimates for species that would enable us to do that kind of analysis.

I point out now - and Cris may mention later - is that such an analysis right now is not possible for bats. When we look at other sources of impact, we have direct habitat effects and in general, Project Footprint is generally low, approximately one acre per turbine, a BLM and their programmatic and environmental impact statement estimated a 5% to 10%.

The project area may be directly affected. And so greater concern is - tends to be focused on indirect effects including displacement of species from otherwise suitable habitat by disturbance or demographic effects that - associated with disturbance that might result in lower productivity.

And then I mentioned barrier effects before which would be a kind of effect where individuals of a population are not able to get to an area - desired area, for example, migrating game like mule deer trying to move from their summer range to their winter range might not - a barrier would be something that would make it difficult, if not impossible to make that trip.

There's evidence from oil and gas development that such barrier effects exist. But no data yet on demonstrating this for wind facilities. There have been several studies on - particularly focused on indirect effects. Most of the analyses are relatively recent and as I say, we do not have as much information on this kind of effect as we do on fatality levels.

And as you can see, particularly the studies on birds, the results tend to be mixed. In some cases effects are demonstrated statistically. And in other effects, other studies, no effects have been able to be demonstrated statistically.

So it's in this context of concern and uncertainty that the American Wind Wildlife Institute was formed as a model framework for collaboration and wind wildlife research. AWWI is a collaboration, as I said, of the wind industry, non-profit conservation organizations and state agency to accomplish the shared mission of facilitating timely and responsible wind energy development while protecting wildlife and wildlife habitat.

AWWI is composed of partners and friends listed here, wind energy developers, suppliers to the industry, including turbine suppliers like GE and (Bestas), as well as the major national conservation non-profits and the Association of Fish and Wildlife agencies represents state agencies.

AWWI operates through a series of integrated initiatives including research on wind and wildlife, development assessment tools, development and evaluation of mitigation and education and outreach.

Some of the tools that we have developed include the landscape assessment tool in partnership with TNC which is a tool that provides data layers on the distribution of species and other environmental attributes of interest as you can see over in the left hand side under Table of Contents.

And in this picture here of (raptor count) data that developers, for example, can use to do preliminary landscape level screening or a tier one type of analysis in the U.S. Fish and Wildlife Service guidelines that you'll be hearing more about, where they can generate reports identifying the presence - or potential presence of species of concern that might require further analysis in potential sighting projects in that area.

We're also developing a research information system, a centralized database to organize existing wind and wildlife data in order to address some of the questions about impacts of wind energy development on wildlife. We're in the process of developing an RIS pilot and prototype and we expect to complete this prototype by June of 2012 and hopefully begin answering some questions.

Our research program that I mentioned before, we recently - the board approved the AWWI research program where we will be able to provide currently modest funding for proposals on wind and wildlife. And we have already funded some work on a variety of projects over the past few years as well as partnering with other organizations.

Our research criteria, as you can see here, emphasizing near term results to inform decision making and regulation is one criteria that I want to emphasize

in particular as well as attempting to leverage the research information system while offering a distinctive AWWI role.

And finally, and most recently, in the area where we integrate our research initiatives with our mitigation activities, we convened an eagle workshop in November of this past year to evaluate the current knowledge and status - our knowledge of population status of eagles, their vulnerability to wind energy development with the goal of identifying research priorities that AWWI in particular would support in collaboration with conservation groups, the service and wind industry stakeholders.

So my contact information is listed there and (Abby Arnolds), our executive director and her contact information, and if you have any questions that you would like to address, you can do so using that - those - that contact information. So thank you very much.

Ian Baring-Gould: Great. Thank you so much Taber. Let's move on and get the - kind of the update on bats after Taber's great presentation kind of filling us in on what's happening with bird and other kind of wildlife and what AWWI is working on.

So next is Cris Hein and Cris Hein is a conservation specialist with Bat Conservation International and is also the program director of the Bats and Wind Energy Cooperative which brings together - I'm sure Cris will talk about it - but brings together industry as well as bat experts to try and understand this relatively new issue that we've been having with wind and bat interactions.

Cris has a PhD in forestry from the University of Georgia and has worked in the area of bats for over 12 years with a focus specifically on wind and bat interactions for over five years. So Cris, please fill us in. Thank you.

Cris Hein: Thank you for the introduction Ian and I'll just jump right in here. Bats were not considered an issue with respect to wind development until summer 2003. Data collected at the Mountaineer Wind Energy Facility in West Virginia showed unexpectedly high bat fatalities.

Approximately 1400 to 4000 bats were estimated to have been killed during the study. And similar results were reported in Tennessee and Pennsylvania at about the same time. And today, estimates of bat fatality may exceed hundreds of thousands of bats per year.

In response to the initial findings back in 2003 and a growing concern over the cumulative impact of wind development on bats, the Bats and Wind Energy Cooperative was formed. And as four founding members organizations - the organization that I work for (EZI), the American Wind Energy Association, the U.S. Fish and Wildlife Service and the National Renewable Energy Laboratory.

And since its inception, we've conducted a number of research experiments and studies at wind energy facilities and produced a number of products up until this year - six (referee) journal articles and 12 study reports. And we have a number coming out this next year on more recent research that we've conducted.

Our research priorities were based off a meeting that was held in 2008. And so wh- the Bats and Wind Energy Cooperative, is focused on is trying to determine whether there's a relationship between preconstruction activity and post-construction fatality.

And this would allow us to - prior to the site being built, assess the risk or potential risk of a site based on activity of bats. We're also looking at two ways, strategies of reducing bat fatality through operational mitigation or raising the turbine cut in speed, the speed at which turbines begin spinning and generating electricity and also using acoustic (occurrence).

And the last one - last priority - is trying to get a handle on the population level of bats. And as Taber mentioned, at present, we can't do that. We don't know very much about how many bats are out on the landscape.

So based on studies that we've conducted and other publicly available information, we know that eleven of the 45 species that occur in the U.S. have been killed by wind turbines. Now the vast majority of fatalities are comprised of three species, and these are commonly grouped together and called migratory tree roosting bats.

These species are the Eastern red bat, the hoary bats and the silver haired bats. Although they make up the vast majority of fatalities, at certain sites, other species can constitute high proportions. (Kay bursting) species such as the little brown bat can make up about 20% of fatalities at certain sites.

The Brazilian free tailed bat, which is a species that occurs in Western and Southern states, can also make up a high percentage of fatalities. This is also a migratory species but it roosts in caves and studies from California, Oklahoma and Texas have given us some insight on the impacts of wind on this species.

Another interesting thing about this bat is that the fatalities are primarily made up of pregnant and nursing females, so not only are we removing the adult population but also the young of that year. So that's of concern.

The species experiencing the highest fatalities have little or no protection. They might have some state status but certainly are not listed - federally listed as threatened or endangered. Many of these species are thought to be in decline.

There's some evidence in the literature that the Eastern red bat population is declining. The problem here is that bats are long lived but slow reproducing mammals, typically only having one to two pups or babies per year.

And the fatalities are killing - the fatalities are made up of the prime breeding age of adults. So it's difficult for these bats to recover from large kill events. And while we don't know the population level and can't quantify the exact impact to bats, we are concerned about the cumulative impacts of wind particularly as it expands.

Taber showed a similar figure with respect to birds. This one here is taken from the same NWCC avian bat fact sheet showing bats mortality at a number of facilities. And you can see that the highest fatality rates tend to occur in the Eastern U.S. and the states along the Appalachian (forted) ridge line.

But we do have some sites in the Midwest and Western settings, in agricultural settings that also have high fatality rates. But for the most part, in the West, particularly on the Columbia plateau eco region, fatality rates are relatively low at or around two bats per megawatt.

And you are able to look at the spread of study sites, you'll see regions that are missing. We have a lot - a big gap of knowledge in areas of the Southwest and West - Utah, Colorado, the border states. Very little information from these regions.

It's concerning to (chiroptologists) because this is the region where the Brazilian free tail bat occurs and other free tail species, and we know that they're vulnerable to wind development. But there's also evidence from Mexico that suggests that pollen and nectar feeding bats are vulnerable to wind as well.

And these bats are rare in the U.S. and the Mexican long nosed bat is federally endangered so that's a concern as well for this region. Looking at some of the patterns, we see that both bat activity and fatality is highest during the fall, roughly from mid July through early, mid October.

And this coincides with migration and mating behavior of bats. Bat activity and fatality also tend to be higher on nights that are warm and have low wind conditions. Thermal imaging monitoring showed that bats do approach and investigate both non-moving and moving turbines.

But there's no evidence showing that bats collide with non-moving turbines. We do - there is evidence showing that bats may be attracted to these structures. We don't know if that applies to all species or what that attractant might be.

They may do view these turbines as potential roost sites. They may be attracted to insects which may congregate around turbines. These are issues that have yet to be addressed but important in resolving this issue.

So based on preliminary findings, we know the given period of the year in which bat fatalities are highest. We know under what conditions roughly - low wind nights and we know that bats don't collide with non-moving turbines.

So armed with this information, the idea of shutting off the turbines during specific times and conditions might prove successful in reducing bat fatalities. And a number of studies have shown the success. Two international studies conducted showed that by raising the turbine cut in speed from 4 to 5-1/2 meters per second, in Germany they showed a 50% reduction in fatalities.

And in Canada, an almost 60% reduction in fatalities. The first U.S. based study conducted by the Bats and Wind Energy Cooperative was conducted in Pennsylvania and (unintelligible) renewable (calcium) and wind power project. And here we demonstrated that over a two year period, that up to 93% fewer bats were killed when the turbine cut in speed was raised from normal operations, which at this site was 3-1/2 meters per second, to either 5 or 6-1/2 meters per second.

Now we tested two different treatment cut in speeds. But we found no significant difference between the two, so we grouped them together. But a significant reduction in fatalities at a relatively small production loss, less than 1% of total annual production loss during the time that these turbines were curtailed.

A more recent study, conducted by West, Inc. at (Fallow) Ridge, also showed that a change in (creditive) speed can significantly reduce bat fatalities. They used the same control and treatment groups so they had (unintelligible) turbines normally operating at 3-1/2 meters per second, and then the two treatment cut in speeds.

And again, they showed approximately 50% reduction in fatalities by raising the cut in speed to 5 meters per second and an even greater reduction in fatalities by raising the turbine speed to 6-1/2 meters per second.

So this study was able to show a difference between the two treatment groups, so it appears that the higher the cut in speed, the less fatalities you can expect. We want to continue these studies, add replication to our existing information, test this strategy under different conditions, different habitats, different species, to see if it works under a set of different conditions.

We also want to fine tune the process. (Can we) look at different cut in speeds? Can we produce more wind energy and still have fewer bat fatalities? So there's a lot of tweaking that can be done to optimize the strategy.

We're going to conduct two studies in this next year - one in Vermont, one in West Virginia, and are always looking for new sites for experimentation. The next mitigation strategy deals with trying to generate a disorientation of uncomfortable air space around the turbines that will deter bats and reduce fatalities.

And the idea is to generate an ultrasonic noise that matches the frequency in which bat echo location calls are in, in order to jam the bats or make it difficult for them to navigate or orient across the landscape.

In the study that we conducted - this picture here shows a schematic showing the rough placement and orientation of the deterrent devices that we had. We had eight devices on each of ten turbines, so a total of 80 deterrents on a given turbine. Three were on either side pointing down and two were on top pointing up, one towards the blades and one away from the blades.

We conducted this study at (Unintelligible) Renewable Locust Ridge Facility in Pennsylvania and the smaller picture on the left shows a close up of the actual deterrent. And you can see it's just a box with a 16 speaker setup.

The picture on the right shows its attachment to the turbine. We used an arm to extend it out over the (nacel). And then the larger picture there is taken from the ground just to give you some perspective on the relative size of these deterrent devices compared to the length of the turbine blades on the side of the turbine.

The devices emit a broadband frequency from about 20 kilohertz to 100 kilohertz. This is above our hearing - human hearing - and within the range in which bats use for their echo location.

The strongest frequency - or the (redina) frequency - was 50 kilohertz for these devices. Now we're finalizing our report which we made public here at the beginning of the year so I'm not going to get into specific results but I will say that we did find significantly fewer fatalities at deterrent equipped turbines.

Not as high of a reduction in fatalities as with the curtailment studies, but something that intrigues us and makes us want to continue this type of study. There's also a high variation in results that we need to resolve.

One promising thing is that the deterrents appeared to be more effective for bats that have a lower frequency range for their echo location calls. And these would include bats like the Hoary bat and the silver hair bat which are vulnerable to wind development.

Now we had a number of mechanical and electrical problems with the devices which may have resulted in some of the high variation. But we also have physical constraints on emitting noise. The physics of sound makes this a complex situation.

Sound attenuates in the atmosphere and the higher the frequency, the faster the attenuation or the shorter the distance that the sound will carry. So we, based on some research done by (Joe Swachak) in California, we decided that in order to create a loud enough noise to deter bats, they needed to be at about 66 decibels.

And so at 50 kilohertz emitting a noise as powerful as 66 decibels under the given conditions here on this graph, (unintelligible) 10% relative humidity and pressure, we can only extend that noise out to about 40 meters.

And that's not too bad. But if you get to conditions more similar to Pennsylvania where we were at where the relative humidity was 80%, this decreases the effective range of the deterrent at 50 kilohertz, the distance that the sound will carry is between 15 and 20 meters.

So certainly not the distance, the length of the turbine blade and likely had an impact on our results. So we have a lot of research and development that we need to continue with and we'll probably continue that through this next year.

So we don't have a functioning device ready to use at facilities. We're still in the process of working with engineers to develop the next generation device. And we hope to have some studies set up by 2013.

One thing that we want to do with the device or the set of devices to maximize the air space, we don't feel like we did that with the current study. Certainly we feel that we were missing the lower portion of the rotor swept area.

So that's one change that we can make with the design. I just want to briefly mention some new research that we wrapped up this past year in partnership

with the U.S. Geological Survey related post-contraction bat activity and bat fatality.

We set up acoustic detectors on top of the turbine (recel). We conducted daily fatality searches. And we also had near infrared video cameras focused in on the entire rotor swept area so we could document bat behavior as they fly within and around the rotor swept area.

So we can look at the relationships between all these different technologies and techniques and get a better idea of how bats were behaving around these structures.

Results of this study will come out later in 2012. And finally, this - I - concept of getting population levels for bats is important to understand their - the impacts of wind development and also to understand how effective our mitigation options are. Are we sustaining the populations with these efforts or are we just kicking the can down the road, as it were?

So we are hosting a workshop in a couple weeks to address this final research priority of ours. With that, I thank you for your time and happy to have the opportunity to speak with you today and take questions now or at the end.

Ian Baring-Gould: Thank you Cris. There are no kinds of clarifying questions. So why don't we jump into Christy's presentation and then we've got a few questions that I think everybody will have a fun time responding to.

Our next speaker is Christy Johnson-Hughes from the U.S. Fish and Wildlife Service. And she is the national energy coordinator for coal mining, oil, gas, nuclear and wind activity, so a whole host of activities.

And she works primarily with agencies in the industry to avoid and minimize impacts of wildlife and their habitats. She is a technical advisor on the land based wind energy guidelines that the service is doing and has spent quite a few years in the field working with impacts of wind energy,.

She's been with the service for 15 years and has lots of experience, not only in this area, but also working in fisheries, habitat conservation and endangered species. So Christy's going to give us an update of the new guidelines. Christy.

Christy Johnson-Hughes: Thank you so much Ian. I'm Christy Johnson-Hughes as you heard, Fish and Wildlife Service. And what I'd like to do is give you an overview of our land based wind energy guidelines which, as we've mentioned, has been in the works for quite some time.

And as you heard from the two previous presentations, the reason we came up with these guidelines was because of the concerns about potential impacts to wildlife and their habitats that may be caused by all of this wind energy development.

You know, we're very supportive of wind energy. We believe that it's a crucial part in our energy mix for the United States. But as with anything, there are potential impacts.

So the Fish and Wildlife Service worked with stakeholders - various stakeholders - over several years to try and develop some voluntary guidelines to help direct developers make decisions so that they evaluate the risks of building their facility and whether that may impact wildlife and their habitats and also to provide direction to fish and wildlife service staff on how best to evaluate these projects.

So we have a history a- that resulted in these guidelines. And even though I start here with our background in 2010, it really started back in 2003 with the Fish and Wildlife Services interim wind energy guidelines which were not well received by industry.

And we received a lot of comments on it and decided we needed a new way of doing things. So we put together a federal advisory committee under the Federal Advisory Committee Act and had representatives from various aspects of industry as well as conservation organizations and of states and tribes.

And the committee put together a report which they submitted to the secretary in March 2010, and these recommendations included a potential set of guidelines that we could use.

Now the Service took those recommendations and developed their draft guidelines and published that in the Federal Register in February of 2011 and we got a lot of comments and we then set about revising those guidelines and have provided yet another revised version to the public in July of 2011.

We also - and before I get into the tiered approach - we also did several public meetings with the Federal Advisory Committee and took public comment at those meetings, so we have tried to involve as much public participation in these guidelines as much as possible.

The main component of these guidelines is this thing that we call the tiered approach. And this was developed by the Federal Advisory Committee and retained by the Fish and Wildlife Service because we felt it was a very valuable tool.

It's a step wise process and it really helps organize the questions, help identify our risks, and move from a landscape scale to a project scale through the entire process, so evaluating various potential sites, all the way through to post-construction.

And since my handouts would not look good in Power Point format, they are available through downloads. So in the upper right-hand section of your screen, you'll see an icon that looks like three notebook pages. If you click on that, you will see a tiered approach framework. You click on those and they're available for download.

Same thing with the communication table which I'll be getting to you shortly. But that tiered approach handout goes through a basic almost dichotomous key format for moving through the tiers. And again, all of this is based on risk. In this case, risk to wildlife.

And Taber and Chris talked a lot about impacts to bats and birds. And that's where we've seen quite a few obvious impacts, so fatality numbers can be rather high at some sites. So that stands out.

But there are other impacts that may be occurring that are not as obvious. And they may be occurring to species that are not directly protected under federal laws. But they may be protected under state laws, for example, sage grouse species or prairie chickens and such, where these animals are not being directly killed by these things but they do have an impact.

So the idea is to capture anything that might be happening out there. First at the very large scale and then narrowing it down to the very project specific scale.

As I said, we received a lot of public comment from other federal agencies, a variety of states, of course industry tribes and the general public as well as conservation organizations. We conducted our Federal Advisory Committee meetings that were also open to the public.

We did have letter writing campaigns from the American Bird Conservancy and American Wind Energy Association. And what was interesting is that a - when you take a look at the volume, the WEA and ABC comments were almost exactly opposite of one another which made it very interesting when we were trying to incorporate comments and suggestions because the American Bird Conservancy wanted us to make our guidelines mandatory, while WEA wanted us to keep them voluntary.

We have kept them voluntary because we do not currently have the statutory authority to make these guidelines mandatory at this point in time, so they are voluntary. But it just - it was interesting to look at that in the numbers.

So when we looked at all the comments, major issues that came up, we had a definition of significance. It was based on the Council of Environmental Quality's definition of significant. People felt that was inadequate.

Use of avian and bat protection plans - is that appropriate? How is that used? And then how do we communicate with the Service? What does this mean? How do developers actually adhere to these guidelines? And then there's actually the implementation of this including when do the guidelines take effect, in what part of the development of the project?

Is there under development when these things become final? And then take permits, how do the guidelines work with take permits, particularly the new eagle incidental take permits that were made available very recently?

So significant - this caused a lot of discussion both inside and outside the agency. And so what we tried to do was frame the definitions so that it fits with actually what we do out in the field. And it's consistent with how we review all projects, not just wind energy projects.

There have been concerns that we were evaluating wind energy projects at a different level from how we are reviewing, say, like highway projects or residential projects or navigation projects.

And so we wanted to ensure that that was not the case, that we were consistent and that it relates to the project at hand but there may be cumulative impacts. You heard from Taber and Chris this concern about cumulative impacts to populations over time.

So we don't want to leave that thought out but then again, we had to make it a workable definition as we looked at each project. And then we had these things called avian and bat protection plans. And this is actually a term that came up through avian and power line interactions and mainly raptors.

And so there's a group that was formed to deal with this and try and avoid and minimize these impacts to raptors and striking power lines. So they came up with this term and this product so that this is a way of how a company can document how they're avoiding and minimizing and what steps they're taking, you know best management practices and such, to reduce impacts, literal impacts of raptors to power lines.

So we adopted that term. And essentially it's the same thing. As you go through the tiered approach, you document the questions that were asked,

what risks were identified, how studies were designed to try and evaluate those risks, trying to answer those questions.

And when you come through with that entire document, you find ways to communicate with the service, with the states. You'll find ways to avoid and minimize use best (unintelligible) practices.

In the end you'll have a document that sets forth all this information. And we were calling it Avian Bat Protection Plan. However, the decision was made through many comments, that this really was not what we were looking at. Plan indicated something with a regulatory basis. It also was getting confused with the power line industry.

And so we've now changed the term to Bird and Bat Conservation Strategies because these things may look different depending on the developer. Some of the developers don't even start at tier one. Tier one is very large, broad scale type of review using publicly available information.

Some developers may skip that and go directly to tier two where they start communicating with agencies narrowing their search. So they said, you know, it - my documentation may look different from someone else's. So we called it a strategy.

And it's whatever format the developer wishes to use just to document moving through the tiered approach and talking about their (ongoing) minimization strategies. The Service will not be approving or concurring with these documents.

We are not able to do that. The reason for that is that, as you see in the title, it talks about birds. And the Migratory Bird Treaty Act does not allow us to

issue incidental take at this point in time, except for under certain circumstances. But a general incidental take permit is not available to us at this point in time.

So if we were to approve or concur with this document, it would be seen as a de facto take permit for migratory birds which would not be legal. So we can say that we acknowledge receipt of it. We can comment it saying, you know, this makes sense to us. This looks good. Maybe we can refine the strategy. Here're some recommendations to improve on it.

So we can issue comments. We can acknowledge it. But we cannot approve or concur with this document. Something that came out through various conversations was a communication protocol. Developers were feeling frustrated that they go to one field office and they would be asked for, you know, documentation A, B and C and then they'd go to another field office and be asked for documentation X, Y and Z.

And so there was this perception of inconsistency. And actually there was some reality to that. So we developed a communication protocol to help developers understand what they need to provide to the service or to demonstrate adherence to the guidelines and also what they can expect from the service at that point in time so that both sides know what's going on here, both players.

And it - we feel that it really helps guide this understanding. And it's set out in each tier. And, in fact, also again it's one of the handouts that's available for download, again, at that top notebook page - three notebook page icon. It's a communication table download.

So the idea is, is that these are recommendations. It's all voluntary. So they're going to be varying degrees of - following this, depending on the risk involved. But we also want (effects) to understand that this not just, you know, we're making our recommendations and that people, you know, can file that away and that's nice.

We would like for industry to consider our recommendations seriously. And to incorporate them where feasible with justification. And if that is followed, then we can provide a type of enforcement discretion that essentially says that if people are operating in good faith, they've been communicating with us, they've been going through the tiered approach, then if something does happen - take occurs or is exceeded then what is anticipated, then our law enforcement officials will consider the activities under the guidelines and would take that under advisement so that, you know, there's some discretion about whether they will move forward with an investigation at that time or not.

And it's a little bit stronger language than we usually have for law enforcement because we understand, you know, this - even though it's a logical stepwise progression, there are elements that go above and beyond following federal law.

So we wanted to provide some incentive for industry to follow this. And it's important to remember that the guidelines leave the decisions whether to move forward and what risk to take up to the developer.

That is the developer's realm. But the service retains the authority to evaluate whether the developer's efforts are sufficient. And that's where we have the ability to communicate in writing back and forth on adequacy of documents, of studies, study results, et cetera.

So implementation of this, again, it's voluntary. The guidelines will be implemented when the final version is published in the Federal Register. The goal, again, is to not only get this up and running immediately but to provide training as quickly as possible to all people who will be using these guidelines within six months of publication.

So that's not only official Wildlife Service but other federal agencies, state wildlife agencies, industry tribes, anybody who will be actively using these guidelines.

And again, we were concerned that when these were implemented, how do you deal with those projects that are not brand new when these become final? So under construction and operating upon publication.

So as you can see, initiate after publication, we recommend that they follow the tiered approach and communicate with us. If a project has been initiated prior to publication, then consider where you are in the planning process relative to the appropriate tier and work with the service from there because it may - preconstruction options may not be available but post-construction, fatality monitoring or other types of studies may also be available at that point in time.

And then if they're operating, again, there may be some options participating in other research studies. Again fatality monitoring may be an option at that point.

And then I had mentioned relation to permits. The guidelines are really an overarching document. This is where you're looking for all potential impacts. And then if you identify something in particular that may be impacted -

adversely impact, significantly adversely impacted by the project, then you might follow very particular protocols.

For example, if you anticipate that bald or golden eagles may be affected by the project, then you would follow the eagle conservation plan guidance. If a federally listed species might be identified, such as Indiana bats or another species, then you would follow that survey protocol under there.

So again, the guidelines - big overarching document and then underneath it, you would then follow particular guidance or survey protocols if they are available.

Now at this point in time, we - in fact, today is the closing date for comments by federal agencies to comment on the final draft of the guidelines, the Office of Management and Budget coordinated the multi agency review. We will take the comments that we receive from the agencies and see if we need to do any further revisions to the document.

Then in January or February of 2012, we will publish the final version of this document. It really depends on (O&B) and their review time. That's a little bit out of our hands. But this is a high priority for the Secretary so there's a lot of interest in getting these out and usable as soon as possible.

I mentioned before, training. We want to cover training for everybody at the same time so that it's a consistent message that goes out to everybody. Everybody gets the same information in the same format so that we all know what we're talking about. There's some new terms that were created for use in the guidelines that we need to go over, the whole tiered approach, what does adherence mean, things like that.

So we want to make sure everybody gets a consistent message and like I said its agencies, states, tribes, industry and their consultants.

We've been talking about a web-based training with regional workshops but recently we've been given the opportunity to do a week long course at the National Conservation Training Center that just popped up very recently.

And so we're looking into that. And it would be a training held in the auditorium so it would be 150 seats for that training.

But that will be announced. It'll be sent to all interested parties if that is made available.

And also we will be archiving presentations, videotaping presentations or webinars or whatever final training format we decide on for future use so if people cannot attend the sessions they can still access the information.

And at this point in time the contacts are David Cottingham who is the Senior Advisor to our Director, and my self. And as you can see we have our contact information up there. And when the guidelines do go final they'll not only be in the Federal Register but they will also be posted on our web page and as you can see its fws.gov/windenergy.

Thank you.

Ian Baring-Gould: Great, thank you so much Christy for that overview and your presentation.

Thanks everybody for holding in for the - for all of the presentations. A couple of quick questions, clarifying questions for you Christy and then we've got some questions for everybody.

The handouts that you provided, some people could not see them on their screen, are those available on your web site some place?

Christy Johnson-Hughes: They are available through the prior version of the document which is on the fws.gov/windenergy web site.

And also I believe they will be made available through the NREL page with this presentation.

Ian Baring-Gould: Yes. I was about to say, it will take us a little bit of time, about a week to get it up there. But we'll have the handouts along with the audio of this session.

Another question in regards to the guidelines, how do they look at small wind turbines or smaller wind projects all the way down to the installation of a 10 kilowatt wind turbine or something of that nature?

Christy Johnson-Hughes: That's a very good question. We actually do now have a section in the final draft that talks about scope and scale because we received so many comments about distributed wind and small scale wind facilities or turbines, individual turbines.

And the thing is that this is a voluntary product. So we can't exactly exempt people from a voluntary process. And also there may be the odd occasion where one turbine in the wrong place for example directly next to a golden eagle nest could be a problem.

So what we encourage small wind developers or individuals with distributed wind to use publicly available information to see if there's a potential for any issues. And then if they have concerns they can contact our field offices.

However again all of this is based on potential risk so that depends on the location, the size and the species involved.

So we anticipate that the majority of distributed wind projects will not be following the entire tiered approach. You can skip over tiers if you have low risk.

So it may well be that like if a school which is to put up a turbine, they may not do any studies but they may contact the Fish and Wildlife Service Field Office, get a letter back and they're done.

So it really depends on the relative risk. One of the things we are trying to figure out is cumulative impact over the landscape. But we're not going to saddle distributed wind with that right now. That's a larger scale, long term study that needs to be done with probably multiple agencies.

Ian Baring-Gould: Great. One other question specifically for you that comes in from (Kelly Fuller), has U.S. government ever prosecuted a wind farm for killing birds and maybe broadening that a little bit, what is the history of fining organizations for incidental takes?

Christy Johnson-Hughes: Oh that's also a very good question and one that we discussed quite a bit in the Federal Advisory Committee as well as with the public.

The Fish and Wildlife Service actually tries not to take people to court frequently. We try to work with people and companies. For example there's this settlement agreement with Altamont. And as they are changing their turbines, you know, we've been working with them to try and find ways to reduce the amount of take at Altamont.

But I will say at this point in time that there are two investigations underway. I cannot talk about them. And in fact I don't actually have a lot of information about them. They do involve wind facilities and eagles and they are currently under investigation so I do not know what the end result will be.

Of course keeping in mind, you know, wind has been developing very quickly. And we are just getting an understanding of the impacts of these things to wildlife over time.

So we're playing a bit of catch-up here. But I think that in the next year or so we will have two investigations that might give us some further information on that.

As far as bats there was a court case. The Beech Ridge Facility for bats. And the company was instructed by the federal judge to develop a habitat conservation plan because they anticipated incidental take of bats.

So there - we're starting to get some case history on this now. But again, you know, it's still relatively new. It will take sometime for this to develop.

Ian Baring-Gould: Great and thank you. A question from (Southern Meehan) specifically looking, and I'm going to broaden it a little bit, but general sense of how birds like the snail kite and the wood stork would be impacted by wind farms. These are birds that are primarily located and me broadening the question, primarily located in the southeastern United States where we haven't seen a lot of wind development.

So to any of our speakers what do we know about potential impacts as we start moving into the southeast where we haven't seen a lot of wind development.

Christy Johnson-Hughes: Yes. That's a really good point. And actually we have several developers who've already approached us for development in Florida around the everglades and such, along flyways and exactly those species would be potentially impacted.

And we have no idea how these species may be impacted. The snail kite is a federally listed species. The numbers are not doing well. We're very concerned about them.

So we have told these developers that these are high risk sites. That when you follow the tiered approach we feel that they would lead someone to say maybe you should not build here because of the risks are unknown and may potentially be very high and have a population level effect.

But unfortunately we don't have any real studies yet to understand this. So we need to get some more information out there. And it's going to take us a few years to get that information.

Ian Baring-Gould: Great, thank you; any other comments from our speakers in regards to the southeast?

Taber Allison: I don't have anything to add. I thought Christy's answer was spot on, Taber by the way.

Ian Baring-Gould: Well I'm not going to speak to the birds you mentioned, but with respect to bats there are a couple species that are closely related to bats that we know are vulnerable. They're related to the red bat and the hoary bat.

So there is a concern with fatalities of new species. And there's also some rare species that only occur along the very bottom of Florida and in the Keys. So but they don't have a status. So that would be a concern as well.

Ian Baring-Gould: Great, thank you. Cris a question for you, can we say anything about the locations or range of species of the bats that have not been impacted by wind turbines and what we might be able to understand based on looking at the species that haven't been impacted? And this is a question from (Tom Staten).

Cris Hein: Well there are a couple things with respect to species that aren't impacted as much. These tend to be species that fly lower to the ground and are gleaners of insects off of substrates, leaves, twigs, rocks and so on.

So they're probably not flying in the rotor swept area and avoiding any interaction with the blade whether it's collision or (barrel) trauma.

The other aspect is that the - it appears that the long distance migrants are the ones that are impacted. And it may be just the way that they migrate across the landscape during the fall season at a given height where they're coming in contact with the blades or being attracted to them for one reason or another as opposed to other short distance migrants which don't travel as far across the country and so may not have the exposure of encountering several different facilities along their shorter migratory route.

Ian Baring-Gould: Great. Kind of a summation of a number of questions and this is going out to everybody. And this is looking at comparative impacts of other technologies.

And so I don't want to get too deep into the weeds, but how does the wind industry compare itself to the potential cumulative impacts of other energy technologies and how are those - how do those play into the discussion on a national basis?

Cris Hein: Well with respect to bats we know that other human caused activities result in fatalities. The timber industry can alter and destroy foraging and roosting habitat, mountaintop mining the same thing and can also contaminate water in which bats drink from.

So we know that there are other impacts. Again we don't necessarily know or can quantify the actual impact to the population though so we're (having) that problem regardless of what the cause is.

Taber Allison: I think probably the same can be said for birds and other wildlife that the National Academy recently did a study that looked at the environmental impacts of different sources of energy production and in general noted that while wind energy doesn't have a lot of the impacts associated with production of energy from coal, oil and gas, there was, you know, focus on the sort of the direct fatality impacts that we've discussed on this call that are not as readily quantified with these other sources of energy production which as Cris has pointed out are often associated with the destruction of habitat or release of environmental toxins.

And then of course there's the climate change implications of power production that releases CO2 emissions that wind energy doesn't produce. And then a recently released study by the Union of Concerned Scientists really showing the impacts of different forms of electric power generation on

water usage and water withdrawals and wind energy doesn't use any water in the generation of power.

So, you know, I think there are clearly impacts associated with all energy production. And one of the challenges is coming up with an apples-to-apples comparison.

Christy Johnson-Hughes: Absolutely. This is Christy. And I agree with both Cris and Taber's evaluations and something that my agency struggles with regularly.

And, you know, we look at wind as, you know, a great component to our domestic energy needs. But not without its issues but are those issues on the same degree as other energy development.

And it is. It's very difficult to quantify. But so we kind of default to looking at this as a whole and trying to minimize impacts across the board with all of these various forms of energy, development and consumption hoping that if we take a broad sweep we'll be able to, you know, (assist) the populations in general because and no matter where we turn, you know, there are negative impacts one way or the other.

And humans do have an impact on the landscape, on habitats and on species. And just building a building impacts birds and then people come in and they bring, you know, there are cats, there are possums, there are foxes.

So the list goes on. So that's why we've kind of stepped back from this argument a little bit and said we'll just try and work with all the industries to avoid minimize as much as possible using their technologies that are available to them.

Ian Baring-Gould: Great, thank you. A question for Taber and Cris, most of the studies that you've talked about in your two presentations have focused on large utility scale wind turbines.

Can you comment on other studies that have looked at small, smaller technology, kind of distributed wind as well as vertical access wind turbines which were also not clarified in your studies?

Taber Allison: I'm not - I'm aware of one study on a small, relatively small turbine from the Mass Maritime Academy up in Falmouth, Massachusetts. And the results of that monitoring, fatality monitoring might be available publicly. I think it is available publicly.

But broadly speaking I'm not aware of studies on the smaller turbines like you're describing or the vertical access turbines.

Cris I'm not - I don't know if you are aware of any.

Cris Hein: No. I don't. With respect to bats the taller and larger the turbines, the higher the fatality rate.

And so the smaller turbines that were initially used had faster spinning blades. And I think bats had an easier time detecting those because the fatality weren't that high.

And so I'm kind of providing an educating guess that these smaller turbines that can be used at a house or a building or something like that probably wouldn't pose much of a problem for bats to navigate around and to detect. And I don't know anything about vertical.

Christy Johnson-Hughes: That's consistent with what Fish and Wildlife Service has found on their refuges. We have been conducting small turbine studies on either the smaller propeller style turbines or on horizontal blade. And they're not published. They are internal documents at this point in time but they are public documents.

And there - it's not a huge study. But what we have seen on refuges is that our bird and bat fatalities are very, very small, almost to nonexistent depending on where the refuge is.

Ian Baring-Gould: Great, thank you. A question for you Christy and we talked a little bit about this previously before the webinar and so I'm not sure if you can answer any of these questions.

But there are a couple of questions specifically relating to eagles and new guidelines. In regards to eagles and how you assess eagles, I'm not sure if you're prepared to comment on those. But I would give you the floor to do so if you wanted to.

Christy Johnson-Hughes: Well let's hear the questions. If I can answer them, great and if not, I'll let you know.

Ian Baring-Gould: Well let's see, the Eastern Golden Eagle uses ridges and valley regions of flyways. Why don't they nest in the Mid-Atlantic States where a lot of the wind development is occurring?

Can those eagles be protected?

And that's from (Laura Jackson).

Christy Johnson-Hughes: That's interesting. We've been studying these Golden Eagles who generally are nesting up in Canada and flying south for their winter habitat and often dispersing rather widely across the landscape.

And we have put satellite tracking systems on these eagles. So now we have a very good idea of where they go and when.

But it's very unclear what this interaction will be because as Taber had mentioned behavior is a critical element. For example with the Western Golden Eagles we noticed that mortality is much higher in foraging areas, in their nesting habitats where there's a lot of concentrate activity.

But we're not sure if this winter loafing habitat will cause the same thing.

So it's under investigation. We're spending a lot of time looking at migratory routes and trying to figure out if there may be an impact to the Eastern Golden Eagles at this point in time.

Ian Baring-Gould: Great. Another one from (Bruce White) in Alaska, they've been required to do night eagle observations and wanted to know whether this was common and expect - something that would be expected to take place for most project development.

Christy Johnson-Hughes: You know that one I cannot answer. I am not the expert in the Eagle Conservation Plan Guidance.

And I'm unfortunately not able to answer that because it might be project specific and there might be something with the modeling there.

So what I would do is refer you to our Migratory Bird Management Program. And I can provide a contact if someone would like to send that question.

And can we put that contact on the NREL web site so other people can send a question to My Birds if they need to?

Ian Baring-Gould: Yes, we should be able to.

Christy Johnson-Hughes: Okay, thank you.

Ian Baring-Gould: There was a question about the potential impacts of the eagle conservation plan guidelines for wind development talking about from Taber's perspective the kind of the nature of the concerns for the industry and then for you Christy the steps that Fish and Wildlife are planning on taking in that area.

Taber Allison: Well yes, I mean I'm not necessarily an expert on all the comments that were submitted by the industry on the Eagle Planning Conservation Guidance.

But I am aware that one of the concerns had to do with the length of permits available as it reflected it was a relatively short permit period especially with respect to the life of the project which caused some - a lot of concerns for developers.

There are concerns about the risk prediction models and I think there are also concerns about and questions about what sort of mechanisms or options this would be acceptable for doing the necessary compensatory mitigation in order to satisfy the terms of the programmatic take permits.

Christy Johnson-Hughes: You're absolutely right Taber. I know this has been a huge issue out west and also on projects on Bureau of Land Management lands.

And what the service has done to respond to these comments was as Taber mentioned the incidental take permit have been available for a five year stretch. And that was really not sufficient for industry needs.

So we currently have out for consideration a rule making - rule change to the Eagle Act, the Bald and Golden Eagle Protection Act.

And it's proposed to change the permit from a 5-year permit to a 30-year permit to meet the average lifespan of a wind facility.

In addition we had heard a lot about how do you compensate for impacts to eagles?

So we've had several ideas proposed. One of them is to do an eagle conservation fund so that the monies can go into research and habitat conservation. That has been proposed. It's not final. At this point in time I'm not quite sure where they are with that fund but it has been seriously discussed.

And there was also the concern when you - if you've ever read the Eagle Conservation Plan Guidance at least the previous version that was made public, it was model intense. And it was almost overwhelming for a lot of people to use and including our own staff.

So that has been recognized. So we're making an effort to make it more user friendly and to use existing information as much as possible knowing that there are some areas we still have to do preconstruction surveys to figure out what the eagles are doing but trying to make it more feasible within the needs of the wind energy industry so that, you know, they can meet their timeframes.

We're very conscientious of the fact that there are deadlines for tax incentives and grants and such. And so we need to work within those deadlines.

So there have been several modifications to the Eagle Conservation Plan Guidance as well as the actual rule to try and accommodate wind industry.

Ian Baring-Gould: Great, thank you. Some questions for Cris from (Tom Staten), in order to be effective, do the changes in cutting speeds or lowering cutting speeds have to happen all night long or are they only for kind of the early evening hours or something of that nature?

And then if you could comment on we're seeing a whole rash of new low wind speed operating turbines and whether you think that this will actually make the problems with bat kills or increase the problems with bat kills as those low wind speed operating turbines get deployed?

Cris Hein: Okay, the study that I mentioned curtailed the entire night. There is a study that just came out from Mount Storm in West Virginia that looked at curtailing for the first half of the night versus curtailing for the second half of the night.

And they - there was no difference in the number of fatalities. So that's only one study but that suggests that curtailing needs to occur throughout the night.

But we've got a study coming up this next year that's going to look at a similar set of conditions to see if we replicate the results or find something different.

The other thing we're trying to do is also factor in some other variables such as temperature, barometric pressure. As you can imagine there's no point in

curtailing if it's freezing outside. Bats aren't going to fly under those conditions.

So if we can add in some of these other things we might be able to shorten the period of conditions that you'd have to curtail.

With turbines, with these new generation turbines coming out that operate at lower wind speeds this could be problematic in that one, it could cause more fatalities or if curtailment does occur then you're losing even more potential power that you could generate.

But these might be in areas where wind speed doesn't get very high anyway. You know it could be in a low wind condition regardless.

So it's going to be interesting to see. And I think it's going to be harder to use this as a strategy with those types of turbines. And that's why we're trying to develop an alternative strategy that may prove effective and that's with the deterrents.

And we'd like to have a number of tools in the toolbox for, you know, given conditions.

Ian Baring-Gould: Great, thank you. A question for Taber as we start wrapping down, does AWWI or the industry in general have a recommendation on the duration of mortality monitoring once the turbine complex has been put into operation?

Taber Allison: Well I guess, you know, and Christy can chime in. I don't - wouldn't say there's an AWWI specific recommendation. You know as a member of the Wind Turbine Advisory Committee and which there were industry and conservation organization representatives, I mean I certainly supported the

recommendations that the service has been working with including the recommendations and the discussion that we had in September of this year that Christy was referencing.

So I think the short answer is the duration of monitoring should reflect the level of uncertainty and the level of risk at a particular project or the predicted level of impact.

Christy Johnson-Hughes: Right. The guidelines do not provide any real numbers for preconstruction or post-construction studies for that reason. It's based on risk. It might be one year at one facility with low risk and it might be five years at another facility with high risk. So it's variable.

Ian Baring-Gould: Great, thank you. A question from (Rob Smith) in regards to the use of bird diverters on met towers whether there's any known research on whether those are effective or not as a deterrent for (avian) impact.

Taber Allison: Christy I don't know how - what - how you might answer this. I'm aware that, you know, bird diverters are used on transmission lines and have a certain level of effectiveness.

I'm not aware of too many instances of applying those bird diverters at wind energy facilities. I know that we're looking into a possible application.

Christy Johnson-Hughes: Right. Yes. Taber is exactly right, the application of bird diverters have usually been for different technologies.

And again it would be great to make these somewhat more visible to birds. It's just how do you do that?

And a variety of techniques have been used and nothing has been satisfactory quite yet. But as Taber said research is ongoing.

Ian Baring-Gould: Great, thank you. And the final question to Cris and this is from (Susan June Olsen). And this is have - has lighting like LEDs on blades or on the wind turbines been used to - as a bat deterrent?

Cris Hein: Not specifically for a bat deterrent. But, you know, lighting, having lighting on the turbines could impact bird fatalities as well by attracting birds to the site.

So FAA lighting is reduced as far as the number of turbines that have to have lights and the way they blink and red lights versus white lights.

So I'm not sure that lighting would be the best possible deterrent because it might cause other potential impacts.

Ian Baring-Gould: Great, thank you all. And I think we've gotten through all the questions and thank you again. We've gone way over our expected time which is pretty unusual but we had a bunch of great questions so again thanks to our three speakers for taking the extended time. Probably lucky that we're doing this before the holiday season because everybody's schedule is a little bit more open.

Before we close just want to point out that WPA has these webinars on the third Wednesday of each month, 3:00 pm Eastern. The next two webinars in January and February are going to look at some kind of recent activities in market acceptance and workforce development largely out of the completion of a number of projects that the Department of Energy has funded in both of those areas.

The webinars are, as always are posted in about seven days, though it might take us a little bit more time over the holidays to get it out and that's all video and audio and then those attachments as we mentioned before so those will be available in just a few days.

Lastly, I just want to as always thank the Department of Energy for funding these webinar series and the context for WPA, Jonathan Bartlett at the Department of Energy and then my self and Charles Newcomb here at NREL for any comments or recommendations for potential future webinars that you would like to see and then point you again to the Wind Power America web site that has a fair amount of information.

So thanks everybody, the over 80 people who have hung with us for the hour and a half, have an absolutely wonderful and safe holiday everybody. And we'll be looking forward to talking to you in the New Year. Thank you again and have a great day.

Taber Allison: Okay, thank you Ian.

Christy Johnson-Hughes: Thank you.

Cris Hein: Thank you.

Coordinator: Thank you for your participation in today's conference. You may now disconnect.

END