WREN Meeting Minutes
November 28 – 29, 2016

Overview

The WREN (IEA Wind Task 34) meeting was held November 28 – 29, 2016, in Broomfield, Colorado, U.S. The purpose of this meeting was to discuss the status of key WREN activities, determine the next steps for in-progress projects, and identify the focus of new efforts. This in-person meeting included representatives from six of the ten WREN member countries. France, Norway, Portugal, and Spain were not able to send representatives to this meeting. A participant list can be found in Table 1. The meeting agenda is found in **Attachment 1**.

Table 1. Meeting attendees

Country	Representative(s)	Affiliation
Ireland	Oonagh Duggan	BirdWatch Ireland
Netherlands	Marijke Warnas	Rijkswaterstaat – Branch Water, Traffic and Environment (WVL), Department of Water Quality and Nature Management (VWKN)
Sweden	Annika Nilsson Åsa Elmqvist	Swedish Energy Agency Vindval
Switzerland	Muriel Perron	nateco AG
United Kingdom	Finlay Bennet	Marine Scotland Science
United States	Karin Sinclair Elise DeGeorge Heidi Souder Jocelyn Brown-Saracino Andrea Copping	National Renewable Energy Laboratory U.S. Department of Energy Pacific Northwest National Laboratory

Expected outcome of meeting:

1. **Determine next steps for Cumulative Effects Assessment white paper**
2. **Determine next steps for Green versus Green white paper**
3. **Determine next steps for Environmental Risk-based Management white paper**
4. **Finalize Individual Effects to Population-Level Effects manuscript**
5. **Update on WREN Hub expansion and determination of next steps**
6. **Identify outreach and engagement activities**
7. **Continued planning for next in-person meetings**

Summary of Action Items

- Submit abstracts to CWW. They are due February 15. Let Karin know if you do submit an abstract and what the topic is.
- Marijke to develop surveys, distribute, and review survey data for cumulative effects white paper ahead of June meeting.

iea wind

- Åsa to provide next draft outline for green vs green white paper by end of March. Members provide comments back to Åsa at June meeting. Members will discuss next steps during March conference call.
- Andrea and Elise to send revised outline of risk based management white paper by April and a robust (annotated) outline by June. This could be a good topic for discussion during a workshop at CWW. Elise will support Andrea in developing scope for the workshop and work with Miguel on the logistics. **UPDATE**: workshop abstract was submitted and accepted
- Roel and other authors should begin developing the 2-pager. The team can use the AM 2-pager as a template. **UPDATE**: manuscript was submitted to Renewable and Sustainable Energy Reviews in early January.
- Karin to check with IEA Wind to ensure the AM paper is posted on the IEA Wind webpage. **UPDATE:** done
- Andrea to ensure 2-pager on AM is distributed for review by WREN members, and then move it through the publication process. **UPDATE**: completed
- All WREN members should continue to send documents and other information to Andrea for inclusion in WREN Hub.
- Ireland is interested in contributing to WP3; Oonagh will check on staffing resources.
- Andrea will develop brief on what is being asked for in the state of the science syntheses. **UPDATE**: sent by Andrea November 30, 2016
- One of the webinar topics could focus on the Individual to Population manuscript. Elise to check with WEST and others (to be identified) to find complementary topic.
- Need to identify complementary international study to pair with RODEO-Block Island Wind Farm (includes acoustics in air and water, benthic disturbance and recovery, cable lay and plumes, lighting, etc.). **UPDATE**: This topic was scheduled for March 28, 2017. Consider complementing with MaRVEN (Daniel Wood). Reach out to UK, Netherlands, Spain, France, and Portugal for complementary topics
- WREN members send suggested topics for 2-page summaries to Karin
- WREN members to send Tethys Story ideas to Andrea
- WREN members to send information to Andrea on an as-available basis for inclusion in Tethys Blasts. Encourage your stakeholders to sign up for Tethys Blasts
- WREN members to send Karin details on their networks, organizations or other opportunities that WREN members could work with to disseminate information
- WREN members are encouraged to identify expert forum topics and leaders at any time; send ideas to Andrea.
- WREN members to provide feedback on missing information from the outreach and engagement section of these minutes to Andrea (andrea.copping@pnnl.gov) and Karin.
- WREN members to provide Karin with missing input requested for WREN work plan by December 16, 2016. Karin will complete work plan and submit to IEA Wind Secretary for distribution to ExCo members and vote on acceptance. **UPDATE**: Approved by IEA Wind ExCo

Below is a summary of the topics discussed (including links to specific work package (WP) in the WREN work plan) and any action items identified.

White Papers (WP1)

All white paper topics WREN is working on were discussed during this meeting. For each paper, the following primary sections will be covered:

1. Intent of paper: what are we trying to do and how we are approaching the effort

2. Considerations for this paper: to include caveats, sensitivities, differences among nations

3. Key findings: where appropriate definitions, tools and methods, examples, case studies

Below is a summary of the discussion for each paper. More robust outlines and first steps on gathering information (through surveys or other mechanisms) will be spearheaded by those leading each topic. In the short term, topic paper leads should be prepared to report on the progress to date during a conference call to be scheduled for late March or early April, 2017. Thereafter, it is expected that more detailed discussions of the focus of the papers and progress made towards developing initial drafts will be held during the next in-person meeting in June 2017.

Cumulative Effects Assessment

The paper, led by the Netherlands, should include a section on the definition of cumulative effects, and an overview of how different countries approach cumulative effects. The discussion should include different temporal and spatial scales. The focus of the paper will be wind energy but should include other anthropogenic effects or anthropogenic risks. Top risks specific to cumulative effects analyses will likely be different across countries; this should be discussed in the paper. The pros and cons of different methods to evaluate cumulative effects should be discussed but the paper should not include an opinion of what is the 'best method'. Many documents published through IEA Wind are best practices. White papers can offer many perspectives but should only call something a best practice when it has been shown to be. We should be wary that one paper does not comprise a body of knowledge.

A chapter focused on the science that is being used to advance this concept should be included. This section should ensure areas outside wind energy are included, e.g. wetlands. Transboundary issues, and the evaluation of cumulative effects, should be discussed. This is important for the North Sea (group discussed north sea/offshore wind – could be a case study within this white paper). Long distant migrants may also be considered. Another example could be grouse population at border of Switzerland, Italy and France. Need to look at different policies and how they were affecting grouse population in this area. Reindeer herding and cumulative effects could also be discussed. Also need to look at mining, forestry, and other impacts. What about the Griffin vulture or other examples from Africa, Asia, and other regions? Paper could reference areas with power lines and transboundary issues, such as imperial eagles killed in Egypt. Avian Power Line Interaction Committee (APLIC) may also have some examples. We should check with representatives from Canada and Mexico while at NWCC meeting for other examples. The Best Grid Initiative in Europe is another potential example.

We need to define the specific boundaries of the concept of cumulative effects. For example, does your country use cumulative effects analysis in analyzing wind energy development? How do you define

cumulative effects in your country (may get many answers within one country). What is this definition used for? What are the implications? There will be different goals to consider, such as the licensing of individual projects versus strategic planning across different countries. Another question is how do you work with other countries/other regions, other developers, adjacent industries? There will be different data requirements based on the specific assessment being undertaken. We need to discuss this in the paper. The discussion of individual to population impacts should be included as well.

Other discussion points included:

- What needs to be done to protect international populations – e.g. EWEA – migratory bird people can do this?
- Are cumulative impact analyses a roll up of individual analyses?
- Should we be deconstructing the data?
- Need to think about the practical implications of collecting too much data. Just asking what data should you/do you gather and what data are missing will create challenges.
- If you want to quantify cumulative effects, what would be your priorities? What is the commonality across all of the individual analyses?

During the discussions, the group concluded that one good way to gather information would be through issuance of a survey. As input to the paper, we need to get a clear perspective from a range of users of cumulative effects (regulatory community, research community, others) as well as comparisons from individual country perspectives. One method could be a tiered approach to the survey, with a shorter survey (5-6 questions) for the majority of potential respondents. Could start with a general question as to what you include when it comes to cumulative effects and then hone in on one focus area for clarity. Or you can start with having no boundaries. Open question is a good start – and narrow down from the response that you receive.

Is it contradictory to focus on one specific cause of mortality? Should we focus on single specific issue with respect to the survey, which could be easier to grasp (e.g. collision risk)? How you frame cumulative effects is framed by the issue you are assessing.

Next Steps: key priority questions should be compiled and circulated to WREN members for review; should also circulate questions to country ambassadors (i.e. IEA Wind and others) for feedback. Feedback should be provided to lead author by May.

Writing Team: identifying full team can be done after we receive the information from the survey takers. Annika has offered to enlist the chair of her department to contribute, particularly when it comes to definitions. Finlay may be interested in joining the writing team. Team should be prepared to begin writing after the June WREN meeting. Spain expressed interest in this topic. ACTION: Marijke to develop surveys, distribute, and review survey data ahead of June meeting.

Green versus Green paper

The paper, being led by Sweden, needs to discuss the complexity of the conflicting positions and reconciling societal impacts. Paper should discuss the pros and cons of the issue, and will likely include linkages to decision making theory. The economic value of wildlife is controversial and difficult to

quantify. Need framework to handle questions and tools/guidance to handle the issue. The framework in Sweden only takes the negative impacts into consideration.

This paper should look at what the real question is and how decisions are/should be made. A summary of methods that can be readily applied should be included; could consider U.S. – focused decision making theory. Does this paper need to look at only wind or should it include other energy sources? Energy conservation and reduction should also be covered. We could use the modeling analysis from Wind Vision, which includes water use, land use, etc. Societal benefits of wind power may include legal/economic and decision making theory. Sweden has 2 projects that can be highlighted here. The group concluded that gathering information through issuance of a survey would also be useful for this topic.

There can be a conflict between policy and regulation. Examples can be provided by the Netherlands, U.S., and UK. There may be some overlap with the risk paper. The paper should look at synergies with other white paper topics.

Examples and experiences that should be considered for the paper includes:

1. World Wildlife Federation (WWF). Switzerland will check to see if there is interest, but WWF would need to find its own funding.
2. United Nations Framework Convention on Climate Change (UNFCCC), Clean Development Mechanism. What countries will benefit (not only developed ones)?
3. Offshore wind siting and how it is done

Next steps: Outline needs to be revised and made more specific. Questions for survey need to be developed. Each country can review responses then determine where they can contribute. The paper should be written at a high level. Prior to the meeting, Spain expressed interest in this topic.

ACTION: Åsa to provide next draft outline by end of March. Members provide comments back to Åsa at June meeting. Members will discuss next steps during March conference call.

Environmental Risk Based Management paper

This white paper, being led by the U.S., will explore methods and principles used to evaluate risk at land-based and offshore wind farms and the specific uses of those methods or principles for wind energy development. The paper will attempt to develop recommendations for robust risk estimation techniques and assumptions. The purpose of the improved risk estimates will be to inform future wind farm development, and to provide consistent and accessible methods for data collection and analysis. While wind farms currently undergoing consenting/ permitting processes may benefit from risk-based management, the intent of this white paper is not to complicate ongoing processes but to develop a base of knowledge and analyses that will accelerate wind development moving forward.

This paper will examine how risk management is being used in wind, identify common definitions, summarize what has been done, what is working and what is not. If possible, any best practices should be identified. It should also cover how to integrate risk into applied regulation.

ACTION: Andrea and Elise to send revised outline by April and a preliminary draft by June. This could be a good topic for discussion during a workshop at CWW. Elise will support Andrea in developing scope for the workshop and work with Miguel on the logistics.

Questions/Discussion with Group

It will be important to determine who the audience is for this white paper, e.g. regulators, developers, others? Equally important will be determining how risk based decision making fits within the adaptive management cycle to make better decisions in the future, and to ultimately reduce scientific uncertainty. Where there is uncertainty, there is a role for risk-based management - recognizing that there are tradeoffs between minimizing risk and reducing uncertainty.

The paper needs to outline how risk based management is injected in each stage of the life cycle, including identification of specific tools/principles that are/can be used at each phase of a project. For example, Ireland uses sensitivity mapping for micrositing to manage/minimize risk.

The paper also needs to consider the interconnection with green vs green paper (specifically short term vs long-term far–reaching impact of risk reduction). It was suggested to include RICORE risk based consenting for offshore renewable energy, as well as the three themes of environmental sensitivity. There should be an acknowledgement of the need for a risk based approach at the policy level. Concepts include survey, deploy, and monitor policy, which is a risk-based approach utilized in Scotland. Survey-deploy-monitor allows for feedback to be used to determine whether the risk evaluation is accurate, and use this feedback to calibrate risk.

The group discussed drivers for using risk based management and whether it makes sense to apply the same requirements to small scale projects as to larger projects. It will be important to determine what drives the level of rigor for data collection. For example, where development occurs in low risk areas, is one year of pre-construction data adequate as compared to the standard two years. Depending on how individual risks are determined, this will impact the overall risk score. The paper will discuss whether more years of site characterization data provides meaningful additional information (as opposed to superfluous towards determining risk). For example, do more years of data lead to greater risk reduction or not? The paper will also include best practice on post-consent monitoring. It is important to ask the right overarching question to allow for standardized meta-analysis, and to best measure change, including whether population (abundance and distribution) should be the focus. Performing meta-analysis with standardized data was recommended to better understand risk. Focus may vary but there is a need for a more structured, systematic approach. Data should also be used to retire risk (allocating certain risks as low enough to not need to be managed under a risk management program). Some mentioned that currently there are insufficient post-construction monitoring data to retire risk.

In UK, understanding collision risk is of most concern. Multiple UK offshore developers are contributing to a single data set at the Thanet windfarm[1] to reduce scientific uncertainty associated with the avoidance rates of key seabird species. It was also expressed that we need to understand concerns of performing legitimate meta-analysis based on data collected (pre- vs post-construction) as documented in the BWEC

[1] https://www.carbontrust.com/client-services/programmes/offshore-wind/offshore-renewables-joint-industry-programme-orjip/

synthesis paper[2]. The paper will cover the advantages and disadvantages of meta-analysis as compared to demonstration. The demonstration route can be applied with a goal of acquiring common data for future meta-analysis. That is, demonstration projects usually establish standards, and meta-analyses rely on standardized methods being applied at multiple locations.

This paper could go deeper into how risk factors/decisions are applied going forward. Risks change based on changing conditions and methodologies need to change too. It could include instances where post construction data are used to validate pre-construction assumptions in order to guide better informed decision making processes. It could also include how risk management can be integrated into regulations, where the current focus is on minimizing risk rather than managing risk. Can begin with determining where analyses have been used to guide development and/or revision of regulations – that is, how the analysis and investigation of risk factors in decision making have been used to guide changes in regulation.

Some questions that will need to be answered within the body of the white paper (via survey or facilitated workshop) include, but are not limited to:

- Do you use risk-based management processes or wind regulatory processes in your country (will be defined in the paper)?
- What role does risk based management play in each of the project life cycle steps? Is risk-based management used to minimize risk or to enable Adaptive Management at each of these stages?
    - Concept development and feasibility assessment
    - Planning and siting
    - Installation
    - Project Operations (or turnkey activities?)
    - Repowering
    - Decommissioning

  Does this risk management approach within each of the project life cycle steps flow into adaptive management?

- Are you aware of risk-based management approaches that have been used at wind farms to date (including probability estimates, evaluations of consequence analysis, error analysis, and/or scaling of individual effects to the population level)?
- Where risk based management has been used, what have been the outcomes?
- Are you aware of recommended processes for estimating risk and applying those estimates to land-based and offshore wind data collection efforts in support of permitting processes?
- What data/reports/lessons learned can you share?

[2] Hein, C. D., J. Gruver, and E. B. Arnett. 2013. Relating pre-construction bat activity and post-construction bat fatality to predict risk at wind energy facilities: a synthesis. A report submitted to the National Renewable Energy Laboratory. Bat Conservation International, Austin, TX, USA.
http://www.batsandwind.org/pdf/Pre-Post-constructionSynthesis_FINALREPORT.pdf

Next Steps: Identify writing team and roles/responsibilities. The UK and U.S. are interested in this topic. Lead authors should reach out to Portugal, France and others. WREN members should reach out to attendees of the NWCC international workshop.

Individual Effects to Population-Level Impacts

Manuscript is being prepared for submittal to a journal. Roel previously indicated that a 2-pager could be prepared once the manuscript is submitted such that it will be ready for posting once the manuscript is published by the journal. ACTION: Roel and other authors should begin developing the 2-pager. The team can use the AM 2-pager as a template. **UPDATE**: manuscript was submitted to Renewable and Sustainable Energy Reviews in early January.

Adaptive Management White Paper

The AM was submitted to the IEA Wind ExCo for review and voted on at the ExCo78 meeting. The paper received unanimous approval on November 30, 2016. The paper was immediately posted on WREN Hub. The 2-page summary was in development stage and is anticipated to be published in January 2017.

ACTION: Karin to check with IEA Wind to ensure paper is posted on the IEA Wind webpage.

ACTION: Andrea to ensure 2-pager is distributed for review by WREN members, and then move it through the publication process.

Overview of progress on Tethys and WREN Hub (WP2)

Andrea provided a presentation that included the topics below. The PPT is distributed with these minutes.

- Wind and Marine content separate
- Speeding up Tethys
- Tagging categories
- New content in knowledge base and map viewer
- Webinar stats
- Security
- Use metrics – *Tethys* and WREN Hub
- Upcoming progress for WREN Hub

Finlay mentioned a Wind Farm study group[3] and suggested WREN Hub link to it.

The question was raised as to what people are searching for when they go into WREN Hub. Andrea will be hiring a new intern and will get these statistics. ACTION: Send documents and other information for WREN Hub to Andrea.

State of Science Synthesis (WP3)

A summary of the discussion of this activity, also known as Short Science Summaries (SSS), follows.

[3] http://www.swbsg.org/

1. We agreed that we would outline families of summaries, with the potential to add multiple summaries under each family. The families will include: Species of Concern; Monitoring Tools and Technologies; Mitigation Measures; and Stressors.
2. The initial set of SSSs will focus on Species of Concern, with summaries in the other families added if and when needed.
3. Under the Species of Concern summaries, we will address: the threats (or perceived threats) from wind energy; monitoring methods, results, or issues to determine/validate those threats; mitigation measures and their efficacy; and future research needs.
4. Each SSS will have embedded links back to WREN Hub. Each SSS will have its own media page on WREN Hub, consisting of a short "abstract" on the issue, and links to all relevant papers (contained in the Tethys Knowledge Base).
5. A template for the SSSs will be developed to include subheadings, and specifying the maximum number of words to be used. The template will also use a consistent WREN logo. By popular vote, it was decided that we will use the type face logo for WREN in teal, with the silhouette of a wren (one leg visible), superimposed on the "W", with contrasting color for the tag line.
6. The process for developing each SSS will entail:
    - Identifying and engaging a lead author, preferably a researcher with significant expertise and experience in the subject area.
    - Providing the template to the researcher.
    - The research producing a draft SSS.
    - The draft text will be edited and laid out to an approximation of the finished product.
    - Reviewed of each SSS by the WREN members, and by a selected group of peer reviewers.
    - Minor changes suggested by the reviewers will be incorporated, while substantive comments will be sent back to the author to be addressed.
    - The final SSSs will be placed on the respective media page on WREN Hub for download.
    - WREN members will be asked to translate each SSS into their respective languages.
    - WREN members will be encouraged to print off copies of the SSS and distribute it, as well as directing stakeholders to the electronic version on WREN Hub.

The Species of Concern family of summaries will include:

- Raptors
- Bats
- Seabirds
- Ground nesting birds
- Upland birds
- Marine mammals
- Terrestrial mammals

Initial SSSs will address two different species of concern. In each case, honing in on a single species (within that group) may be used to provide better focus, as opposed to addressing the species group as a whole.

ACTION: Ireland is interested in contributing to this WP but will need to check on staffing resources.

ACTION: Andrea will develop brief on what is being asked for. UPDATE: sent by Andrea November 30, 2016

Outreach and Engagement (WP4)

This work package includes a number of different approaches to disseminating information. The best option will most likely be dependent on the target audience. Our discussion of each option, and some specific ideas for 2017, are described below.

Webinar Series

Webinars are often to report on recent findings, new tools or methodologies, or research in progress. Webinars are meant to reach a broad audience. Interested parties can listen in on a scheduled webinar or download the recorded presentation at a later date. Webinars are posted on the WREN Hub.

The group discussed a number of potential topics and potential presenters for 2017. These include:

- Recent eagle detection and deterrent projects, funded by DOE. Could be shorter webinar (15 mins to an hour) and could be complemented with international multiple component systems. Should consider delivering through NWCC or BOTH WREN and NWCC. Another idea is a complementary discussion on DTBird validation work in Switzerland. This work is complete; speakers could include Roel May (Smøla) and Felix Liechti. Top of the World (WEST) could also provide complementary results. UPDATE: This webinar will need to be later in the year, once all awardees are under contract with DOE
- Visual Monitoring and (Species Identification) – Topic would focus on algorithms to automate detection. Potential speakers include PNNL (effort to distinguish between birds and bats and other. Potential IdentiFlight research; others to be suggested.
- Bats – Several research efforts are in progress including USGS Bat Finder and system combining thermal image cameras with bat detectors in the Netherlands. Per Marijke, this work should be completed in January.
- July 2017: Individual to Population manuscript – white paper authors to provide overview of manuscript. Need to identify other efforts. ACTION: Check with WEST and others.
- July – October 2017: RODEO-Block Island Wind Farm (includes acoustics in air and water, benthic disturbance and recovery, cable lay and plumes, lighting, etc.). ACTION: Need to identify complementary international study. Could focus in on only a few topics; no need to discuss acoustics since this has been covered in previous webinar. UPDATE: This topic will be scheduled for February or March 2017Consider complementing with MARVEN (Daniel Wood). ACTION: Reach out to UK, Netherlands, Spain, France, and Portugal for complementary topics
- Aberdeen Bay – study may start in Fall 2017 – preliminary results one year later
- Ireland getting funding for marine renewable sensitivity mapping for birds – to be completed mid to late 2018
- Driving down the cost of Mitigation
    - Visual monitoring (biomonitors) at wind farms to trigger shutdown of turbines. Check with others (France, Portugal and Spain) for potential projects. Can compare with Pattern Energy project and condor research in the US. Compare with technology?
    - Multi Component systems (with collision detection) to refine collision risk modeling
        - Visual observers, digital camera, radar at Thanet wind farm (wait until this is public information) – Focus is on measuring rate of avoidance

  - NMREC (OSU/UWA)
  - WT Bird? Netherland – measures collisions – research project - Karen Krijgsveld – wait – purpose to validate collision estimates
- USGS/BOEM study that evaluates marine bird vulnerability to offshore wind energy infrastructure in the California Current System (CCS) and similar international study.
- Environmental Uncertainty and Risk and/or Compensation

2-page summaries

The focus of these summaries could be on facts and debunking myths relevant to specific topic. These would not be meant for a broad audience that includes non-scientists, rather than directly for the scientific community. We will need to formalize and development and peer review process for these factsheets and ensure they remain up-to-date.

Finlay and Jocelyn prefers species of concern as a theme, and should include what we know about stressors, how to monitor, what mitigation measures apply. The length would be about 800 words, highlighting the most important message with links to more information. We need to review the AWWI fact sheets to ensure no duplication of effort. Non-US members should take the lead on offshore wind topics.

2-page topics could include summaries of published white papers (AM, I – P); overview of WREN initiative; and outcome of expert forums. ACTION: WREN members should suggest topics.

***Tethys* Stories**

- Tethys Stories are short engaging descriptions of a topic of interest to wind and wildlife, and will be featured on the front page of Tethys.
- Examples of Tethys Stories can be found by following the link from the current Tethys Story, and clicking on the "Tethys Story" link on the next page.
- Each WREN member is asked to write (or engage a colleague to write) a minimum of one Tethys Story over the next two years.
- WREN members are asked to provide suggested stories to PNNL for planning purposes by January 15th 2017, along with an estimated timeframe for production.

ACTION: Send Tethys Story ideas to Andrea.

***Tethys* Blasts**

Tethys Blasts are sent bi-weekly to a distribution list of approximately 1200. The Blasts describe upcoming events, new information available on Tethys, new features of Tethys, and current news articles of international interest on wind and marine renewable energy. ACTION: Send information to Andrea on an as-available basis, and encourage your stakeholders to sign up for Tethys Blasts.

Conference on Wind and Wildlife Impacts

- WREN members should consider submitting abstracts to the conference. ACTION: Let Karin know if you will submit an abstract and what the topic is. Abstracts are due February 15.
- WREN should consider holding a workshop in conjunction with the CWW.
- An in-person WREN meeting will be held in conjunction with the CWW.

UPDATE: Miguel Repas, WREN representative from Portugal, is on the CWW organizing committee and will assist coordinating a workshop and the WREN meeting.

Ambassador activities

The IEA Wind ExCo is interested in the networks each country is distributing information about WREN to. Karin will need to report on this at the next ExCo meeting in May. ACTION: Each country to send Karin details on their networks, organizations or other opportunities that WREN member could work with to disseminate information. A few that were discussed in the meeting included:

- Scottish Natural Heritage
- Netherlands Political Declaration
- Sweden: Annika edits a newsletter, and includes WREN-related information as appropriate. There are 1500 subscribers to this newsletter. There is a separate newsletter from the research program Vindval. Vindvals newsletter has about 400 subscribers.

http://www.energimyndigheten.se/om-oss/press/prenumerera/prenumerera-pa-vara-nyhetsbrev/nyhetsbrev-vindkraft/

http://www.idrelay.com/v4_idrarchive.asp?q=9E4-5993-35

http://www.anpdm.com/newsletterweb/44475B447346475D4277404659/414B5B4370404159477746455D4271

Expert Forums

WREN will hold expert forums on issues identified during the November meeting. The process for choosing specific forum topics will include:

- Determining a challenging technical topic that is the focus of research groups in more than one nation.
- Forum will be researcher driven, focused on issues that are still in discussion/debate.
- Identifying a lead researcher with an interest in the topic and the process.
- Identifying the appropriate participants (with the goal of having 8-10 on the forum).
- Providing the contacts, topic, and date (or approximate date) to PNNL to issue the forum invitation.
- Holding the invitation only (plus WREN members) forum.
- Mounting the presentations and audio recordings of the forum on WREN Hub.

ACTION: All WREN members are encouraged to identify expert forum topics and leaders at any time.

We determined that white papers were not suitable for expert forums because the topics are not narrow enough. However, there may be subtopics within the white paper that could be appropriate. Some topics we discussed, and a vote to help rank them, are below.

- Collision – raptors, passerines, bats, (LB=2; OS=3)
- Displacement (LB=0; OS=2)
  - Definitions…. displacement versus barrier effect
  - How do you measure? How do you model? Vote=5
    - E.g. Marine Scotland energetic cost model

- Effects on terrestrial mammals (elk, deer, wolves) – vote=4
- Effects on upland birds (vote=2)/ effects on grouse (vote=1)
- Bats (vote=1)
- Auks/loons/divers
- Mitigation/deterrents versus informed curtailment (vote=3)

WREN Google Drive

- Just a reminder that we have a dedicated Google Drive for WREN that can be used for sharing materials and producing collaborative pieces (such as white paper drafts).
- The drive can be accessed from the WREN members page on Tethys: https://tethys.pnnl.gov/wren-members-page
- Folders for each white paper are already on the drive, however, any organization of folders and files that are of help to the WREN participants can be added.

There were a number of outreach and engagement products and processes discussed during this meeting. ACTION: Provide feedback on missing information to Andrea (andrea.copping@pnnl.gov) and Karin.

Other topics discussed

2017/2018 WREN meetings

June 12 – 14, 2017: Sweden. Meeting will be held on Gotland (1 hour flight from Stockholm). Annika is leading the coordination for this meeting and has booked a meeting room. Host countries and appropriate dates for future meetings include:

September 2017: Estoril, Portugal	Miguel
May or June 2018: Netherlands	Marijke
Fall 2018: United Kingdom	Finlay

Review/finalize current IEA work plan – sections 4 through 8 of the work plan were reviewed. Items discussed during this meeting were used to update the final work plan for the 2016 – 2020 timeframe. Information from several countries is needed to complete Table 3, which requires estimates of labor commitments to contribute directly and indirectly to WREN activities, for each year in the plan. ACTION: Missing input to be provided by WREN members to Karin by December 16, 2016. Karin will complete work plan and submit to IEA Wind Secretary for distribution to ExCo members and vote on acceptance.

Attachment 1

WREN Meeting
November 28 – 29, 2016
National Wind Technology Center
Broomfield, Colorado, US
Agenda – REVISED DRAFT

Expected outcome of meeting:

1. **Determine next steps for Cumulative Effects Assessment white paper**
2. **Determine next steps for Green versus Green white paper**
3. **Determine next steps for environmental risk based management white paper**
4. **Finalize Individual Effects to Population-Level Effects manuscript**
5. **Update on WREN Hub expansion and determination of next steps**
6. **Identify outreach and engagement activities**
7. **Continued planning for next in-person meetings**

Day 1		Lead/Facilitator
8:00	Welcome Introductions Review meeting agenda	Karin
8:30	Discussion of Cumulative Effects Assessment paper (WP1) Overview of progress made to date Plans for next steps Schedule for completion and publication	Marijke
9:30	Discussion of Green versus Green paper (WP1) Overview of progress made to date Plans for next steps Schedule for completion and publication	Annika/Åsa
10:15	Break	
10:30	Discussion of Environmental Risk Based Management paper (WP1) Overview of progress made to date Plans for next steps Schedule for completion and publication	Elise/Andrea
11:30	State of Science Synthesis (WP3)	Karin/Andrea/All
12:15	Lunch (provided by NREL)	
1:00	Tour of NWTC	

iea wind

2:30	Individual Effects to Population-Level Impacts (WP1) Overview of progress made to date Plans for completion and submittal to journal Schedule for development of 2-pager	Finlay/Roel
3:00	Adaptive Management White Paper (WP1) Update and overview of progress Schedule for development of 2-pager	Andrea
3:30	Overview of progress on WREN Hub (WP2) New features added since April meeting in Dublin Statistics on use patterns, other information on Hub Discuss/determine next steps	Andrea
4:30	Adjourn	
6:00	Group dinner (pay for your own meal); location and logistics to be provided	

Day 2

8:00	Review Day 1	Karin
8:30	Outreach and Engagement Webinar Series (WP4) 2-pagers (WP4) *Tethys* Stories (WP4) Conference on Wind and Wildlife Impacts (WP4) Ambassador activities (WP4) Expert Forums (WP4) Other	Karin/Andrea, All Elise
10:00	Break	
10:15	2017 WREN meetings June 12 – 14, 2017: Sweden September 2017: Estoril, Portugal May or June 2018: Netherlands Fall 2018: United Kingdom	 Annika Karin Marijke Finlay
10:30	Review/finalize current IEA work plan – sections 4 through 8	
11:30	Lunch (provided by NREL)	
12:15	Depart for International Workshop (Omni)	
6:00	Group Happy Hour in Boulder. Location and logistics will be provided. Dinner on your own.	