Solar Power and Wildlife/Natural Resources SYMPOSIUM

DECEMBER 1–3

PRESENTED BY AWWI

Presented by AWWI
in collaboration with Champions and Planning Committee Members

Call for Abstracts

Released July 6, 2021

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The Solar Power and Wildlife/Natural Resources Symposium is organized and presented by AWWI in consultation with a Planning Committee and 4 Subcommittees comprising representatives from the solar industry, environmental and conservation NGOs, public agencies, and topic experts. See page 5-6 for Committee Members.

Thank you to the Committee Members for their time and dedication to the Solar Symposium!

Call for Abstracts

Submission Deadline: Friday, August 20, 11:59 PM ET

Background

The Solar Power and Wildlife/Natural Resources Symposium will be held **virtually from December 1-3, 2021**, with a meeting schedule that provides flexibility for both presenters and participants. The Symposium will provide a forum for researchers, conservationists, industry representatives, consultants, state and federal agency staff, and other solar-wildlife stakeholders to view research presentations and listen to panels that address the most recent wildlife and natural resources research related to solar energy. The Symposium will include a 'Solar 101' primer on the first day, followed by two days of live presentations and panel discussions. In addition, the Symposium will include a wealth of on-demand content in the form of pre-recorded presentations and posters, which Symposium participants will be able to view at their convenience. The American Wind Wildlife Institute[1] (AWWI) releases this Call for Abstracts for presentations and posters to be presented as on-demand content at the Symposium. Live sessions are being planned by a multi-stakeholder planning group of more than 40 representatives.

We will continue to share additional details as planning for the meeting progresses. Please watch for updates by email and on the Symposium website:

- If you are not registered to receive email updates about the Symposium please email solar@awwi.org.
- For the latest details, visit https://awwi.org/solar-symposium.

This meeting is organized and presented by AWWI in consultation with a Planning Committee and 4 Subcommittees comprising representatives from the solar industry, environmental and conservation NGOs, public agencies, and topic experts.

Context

The development and operation of solar energy systems, especially solar photovoltaics, is expanding rapidly within the United States and around the world. The science, policy, and technology related to solar energy's interactions with wildlife, wildlife habitat, and natural resources are also developing quickly. This Symposium seeks to address the current state of the science, as well as share knowledge about current and emerging policies, management practices, technologies, and economics as they relate to solar and wildlife/natural resources interactions.

Topics of Interest

This Call for Abstracts solicits proposals for presentations and posters related to assessing and managing the interactions of solar energy development with wildlife and natural resources. The primary focus of the Symposium will be on large-scale, ground-mounted solar photovoltaic (PV) systems, although proposals specific to emerging PV technologies (e.g., floating PV systems) or concentrating solar power (CSP) will also be considered. We are seeking a diverse range of presentations addressing issues at both

[1] AWWI is an independent 501(c)3 entity created and sustained by a unique collaboration of leaders in the energy industry, wildlife management agencies, and science and conservation organizations who share a mission: to facilitate timely and responsible development of renewable energy while protecting wildlife and wildlife habitat. The Symposium scope was developed through a consensus-based collaborative facilitated by AWWI and co-funded by Champions; see page 7 for details.

the national and regional scale; we expect to present a range of regional perspectives in most topic areas to address geographic differences in patterns of solar development and operation, ecological context, and effects on wildlife and natural resources. While the focus of the Symposium will be on solar and wildlife/natural resources issues within the United States, we welcome submissions providing data on international studies with findings of direct relevance to U.S. facilities.

Proposals should provide objective research and information addressing one or multiple stages of solar facility development and operation, including siting, design, construction, operation, and decommissioning. Proposals may present data, findings, best management practices, lessons learned, data gaps, and identified research needs garnered from case studies, pilot projects, experiments, field studies, and/or modelling efforts, based on published or unpublished literature, and compiled by scientists, researchers, engineers, environmental professionals, and other stakeholders. We encourage presentations to address questions of scale, and how impacts, effects, or best management practices may vary across project size (e.g., 1 MW vs. 20 MW vs. 100 MW). Addressing how the issues discussed relate to community acceptance, environmental justice, and equitable access to natural resources and clean energy is also encouraged.

Proposals addressing wildlife and related natural resources/environmental issues will be considered. Specific areas of interest include but are not limited to the list below. For more detailed descriptions of topics of interest, please see the *Detailed Topics List*, provided on page 8 and also available on the Solar Symposium website: https://awwi.org/solar-symposium.

I. Evaluating and Mitigating Impacts on Wildlife and Their Habitats[2]

- Risks of direct injury or mortality
- Potential habitat loss, degradation, displacement, and fragmentation
- Population-level or cumulative impacts
- Monitoring techniques, study design, data management and accessibility
- Siting strategies and planning processes to avoid impacts (including case studies/lessons learned on how to address and balance competing interests)
- On-site strategies to minimize impacts or provide habitat value (e.g., array design, native vegetation management, fencing)
- Compensatory mitigation strategies

II. Land Management and Wildlife Compatibility

- Vegetation compatibility with different array designs, operations, and maintenance regimens
- Effective vegetation preservation, establishment, or management practices
- Ecosystem services associated with different management strategies (e.g., carbon sequestration, pollinator services)
- Dual-use solar and agriculture systems
- Economic and regulatory considerations and feasibility

[2] *Mitigation defined as avoid, minimize, and/or compensate (https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf)*

III. Water Resource Management

- Water use and conservation
- Short and long-term effects on hydrology, water quality, groundwater, surface waters, and wetlands
- Stormwater best management practices and regulation

IV. Solar Life-Cycle and Natural Resource Considerations

- Life-cycle analyses of solar energy systems (e.g., net greenhouse gas emissions, extraction of components)
- Composition of solar panels and associated energy storage components, materials classification, and consequences for end-of-life management (e.g., recycling, disposal)
- Long-term effects of solar development on soils, groundwater, and surface waters
- Environmental costs/benefits and best management practices associated with land use conversion to solar (e.g., re-development of brownfields, conversion of agricultural land)
- End-of-life management of solar facility sites (e.g., re-powering, decommissioning, site remediation, habitat restoration)

Presentation Options

This Call for Abstracts is soliciting proposals for presentations and posters to be presented as on-demand content during the virtual Symposium. Respondents can choose one of the following formats for their content:

- **Video Presentation** – This can consist of a video or a slideshow with recorded audio. Presentations may be up to 15 minutes in length.
- **Poster or Slide Deck –** This can consist of a poster (single image) or slide deck (multiple images) without audio.
- **On-Demand Panel –** Major topic areas of general interest will be included in live panels broadcast during the Symposium itself, but respondents to this Call for Abstracts are welcome to propose ideas for on-demand panels, which may be longer than a 15-minute video presentation. A panel might consist of several short presentations followed by a group discussion in one, pre-recorded video.

Presenters will also be able to submit 1-2 pieces of supplementary content, such as a published paper, research summary, or list of citations.

Questions associated with on-demand content will be handled asynchronously through the virtual meeting platform. AWWI will provide detailed guidelines, but presenters will be responsible for preparing their own content.

Submission Instructions

Submissions in response to this call for abstracts should include the following information:

- Presentation title (using sentence case)
- Author(s), including affiliation(s) and email address(es)
    - Submitters must designate one presenting author as the primary representative for the abstract; other presenters and co-authors can be included in the submission and will be listed on the virtual meeting platform.
- Abstract (500-word maximum) including:

    - Research motivations and objectives, including hypotheses being tested
    - Research setting
    - Methodology, statistical analyses, timeframe, and range of applicability/scope of inference
    - Brief summary of results, indicating whether they are preliminary or final
    - Management implications of the findings
- Intended presentation format:
    - Video Presentation
    - Poster or Slide deck
    - On-Demand Panel

Submission Deadline: Submissions will be accepted until August 20, 2021.

Submission Process:

- To respond to this Call for Abstracts, please visit https://solar-symposium2021.exordo.com. Once you've set up an account and logged in, click "Submit a Paper" at the top of the screen to get started. Follow the instructions provided to submit your abstract.

Late Abstracts: Submissions received after the deadline may be considered depending on availability of reviewers and planning progress. Please contact solar@awwi.org with inquiries regarding late submissions.

Abstract Review and Selection Process: Acceptance of submissions is not guaranteed. Abstract selection will be based on multiple, anonymous expert reviews, and adherence to meeting themes and purpose.

Approximate Timeline for Review and Selection Process:

- **August 20, 11:59 PM ET**: Abstracts due
- **Early October 2021:** Submitters notified of abstract selection or rejection
- **Early November 2021:** On-demand content due for loading onto virtual meeting platform

Questions?

Please contact AWWI at:

solar@awwi.org

Solar Symposium Planning Committee

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- Ray Kelly, Clearway Energy Group
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Thank You Champions

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Solar Power and Wildlife/Natural Resources Symposium

Topics List

A brief list of topics appropriate for presentation and poster proposals is provided in the Call for Abstracts. The following list provides greater detail on the breadth and depth of topics of interest for inclusion in the Solar Symposium. Please note that the focus of the Symposium will be on large, ground-mounted solar PV systems, although proposals relevant to emerging solar photovoltaic (PV) technologies (e.g., floating systems) or concentrating solar power (CSP) will also be considered.

(Please note that the sub-bullets below each heading provide examples of the types of research of interest within each category; these should not be considered exclusive of other relevant issues within each category not explicitly described.)

I. Evaluating and Mitigating Impacts on Wildlife and Their Habitats[3]

*A. **Assessing Risk and Estimating Impacts***

- **Identifying species or their habitats at potentially greater risk of impacts from solar facilities:**
  - Species at potentially greater risk, such as species currently undergoing population declines, habitat-sensitive species, or other species of conservation concern
  - Community types/landscapes at potentially greater risk and attributes which place them at greater risk
  - Potential for disruption to special status species recovery or reintroduction efforts

- **Assessing population-level or cumulative impacts:**
  - Population data, genetic information, modelling tools, and evaluation frameworks to assess potential population-level effects
  - Potential cumulative impacts of multiple solar projects and other foreseeable anthropogenic activities
  - Available frameworks to evaluate cumulative impacts, including costs and benefits of solar development to wildlife, e.g., increases in pollinator foraging habitat vs. loss of forest
  - Significance of potential solar impacts to species' sustainability, relative to or in context of other threats to these species

- **Potential sources of direct mortality at solar facilities and supporting infrastructure:**
  - Risk to birds, bats, insects, or other species
  - Risk of direct collisions, attraction, e.g., "lake effect," etc.
  - Comparison to background mortality

- **Potential effects on wildlife habitat:**
  - Loss of habitat for foraging, nesting/breeding, movement, and migration stopovers

[3] Mitigation defined as "avoid, minimize and compensate" (https://www.fws.gov/ecological-services/es-library/pdfs/WEG_final.pdf)

- Habitat degradation leading to reductions in foraging efficiency, increased predation pressure, non-native plant invasion, etc.
- Behavioral habitat avoidance – identification of disturbance/displacement thresholds
- Habitat fragmentation and effect on vital rates
- Habitat connectivity, e.g., avoidance of stopover sites by migratory birds or preventing wildlife access to movement corridors and winter range
- Risk of habitat impacts from associated infrastructure, e.g., project-related transmission lines, roads
- Wildlife use of solar arrays as habitat;
- Potential for sites to act as ecological sources/sinks ***(*see also *Land Management and Wildlife Compatibility****)***
- Potential for habitat creation or improvements associated with re-development of agricultural land or degraded land, including brownfields and former landfills
- Lessons learned from other forms of anthropogenic development

- **Considerations for novel and emerging technologies:**
  - Effects of floating PV systems on water quality, nutrient cycling, algae, aquatic plants and wildlife, reservoir water health, and aquaculture production
  - Unique impacts of CSP facilities and associated energy storage systems, including feather singeing, burns, and fatalities

- **Monitoring of impacts:**
  - Monitoring timelines for different scales (time, spatial, intensity) of impact
  - Study design; needs for pre- and post-construction data collection
  - Appropriate techniques to monitor for species presence, movement, behavior, and other changes, as well as mitigation efficacy
  - Available monitoring methods and technologies; emerging monitoring technologies; opportunities for cost reductions
  - Investing in monitoring versus offsetting potential impacts

B. ***Mitigation for Wildlife Impacts: Avoidance, Minimization, and Compensation***[1]

- **Solar siting strategies and tools:**
  - Guidelines, including resources, strategies, and decision support tools to inform planning and siting practices that identify least-conflict areas and avoid impacts to natural landscapes; and how guidelines and utility of guidelines can be improved.
  - Interactions between siting to avoid impacts to natural landscapes and other siting considerations (including avoidance of high-quality agricultural areas or other working landscapes, zoning, public acceptance, access to markets, transmission, and economic feasibility)
  - Strategies to maintain the value and status of working lands, e.g., agricultural land, timber production forests
  - Characteristics of low-impact development, including site characteristics, proximity to existing infrastructure, placement relative to migration corridors, project scale

- **On-site mitigation options and best management practices:**
  - Solar array design and configuration within a site to minimize impacts

- Avoidance of soil compaction
- Native vegetation preservation, restoration and/or management **(see also *Land Management and Wildlife Compatibility*)**
- Management of invasive plants and other "nuisance" species, e.g., ravens acting as predators of rare species
- Fencing options
- Creation of pollinator nesting habitat, artificial burrows, or creation/maintenance of other wildlife habitat (**see also *Land Management and Wildlife Compatibility***)
- Stormwater retention basin design to benefit wildlife
- Strategies to minimize direct mortality, e.g., collisions, potential "lake effect"
- Lessons learned from other forms of anthropogenic development
- Evaluation of efficacy of on-site mitigation measures; evaluation of how well they reduce impacts

- **Compensatory mitigation options**:
  - Accurate quantification of impacts for appropriate scale of mitigation
  - Applicability of mitigation strategies drawn from other forms of anthropogenic development
  - Challenges associated with finding and procuring mitigation acreage
  - Evaluation of efficacy of compensatory mitigation measures

C. Organization of Solar/Wildlife Data

- **Data management:**
  - Identifying data needs and appropriate monitoring protocols
  - Developing standardized data collection and submission methods pre- and post-construction
  - Ensuring data collected contribute to advancing the state of the science

- **Data availability and accessibility:**
  - Increased efforts to improve data transparency and availability from collecting entities
  - Creating a standardized, central document library as well as a data repository, e.g., a solar equivalent to American Wind Wildlife Information Center (AWWIC).

II. Land Management and Wildlife Compatibility

- **Habitat value for native species at solar facilities**:
  - Relative habitat value of different vegetation regimes, including turfgrass, naturalized species, non-native pollinator mixes, native vegetation, or maintaining existing vegetation during installation
  - Research on habitat value of differing vegetation regimes for pollinators, birds, or other native species
  - Construction techniques to maintain existing vegetation, soil biomes, and seed banks
  - Consequences of various vegetation management regimes (e.g., mowing schedules, herbicide use) on habitat value
  - Opportunities for habitat management within and around the facility, including in undeveloped portions of a leased property

- Potential for solar sites to serve as ecological sources/sinks **(see also *Assessing Risk and Estimating Impacts*)**
- Lessons learned from other forms of anthropogenic development
- Changes to vegetation communities under solar arrays over time

- **Vegetation management considerations for solar developers and operators**:
  - Implications of different solar array designs, construction techniques, and operations/maintenance regimens for vegetation options
  - Choice of seed mixes and plant species compatible with solar arrays, including within the array and throughout the project footprint
  - Availability of native seed
  - Practices for the maintenance of existing vegetation, soil biomes, and seed banks
  - Establishment and maintenance practices, including methods to remove or maintain existing vegetation, seeding techniques, time of year, mowing regimens, control of invasive species and weeds
  - Wildfire threats and fuel management
  - Erosion and dust/sediment control
  - Economic considerations, including establishment and maintenance costs for different types of management; economic feasibility
  - Regulatory implications regarding potential creation of rare species habitat or presence of rare species on-site

- **Costs/benefits to ecosystem services associated with different land management strategies:**
  - Greenhouse gas emissions
  - Pollination services
  - Carbon sequestration
  - Fertilizer, herbicide, and other chemical run-off
  - Stormwater management

- **Dual-use or "co-location" of agricultural production and solar:**
  - Agricultural co-location options, including livestock grazing and beekeeping
  - Guidance in siting, planning, design, and construction of solar facilities with agricultural use in mind
  - Costs/benefits of dual-use systems for wildlife, natural resources, and ecosystem services

III. Water Resource Management

- **Stormwater management; erosion and run-off issues:**
  - BMPs for construction and operation (including site stabilization, sedimentation and erosion controls, and stormwater retention basins/ponds)
  - Land management to prevent erosion and run-off (including avoidance of soil compaction, maintenance of existing vegetation, and vegetation management)

- **Regulation of stormwater management:**
  - Data on the efficacy of stormwater and erosion controls

- Characterization of solar facilities as impervious/pervious surfaces, and how this relates to stormwater regulation

- **Effects on, and how to address, impacts to water quality, groundwater, surface waters, and wetlands associated with:**
  - Use of greywater or chemical solutions for panel cleaning and maintenance
  - De-icing compounds, dust suppressants, and other chemicals
  - Greases/oils
  - Herbicides and pesticides
  - Run-off water flowing into wetlands or surface waters (especially cold-water fisheries)
  - Leakage/fires from energy storage systems
  - (For leaching of components, see ***Solar Lifecycle and Natural Resource Considerations***)

- **Short and long-term effects on natural hydrology**

- **Effects on agricultural drain tiles and how to address them:**
  - Available technologies and sources of information to identify drain tile locations and minimize risk of damage
  - Solar array design and construction Best Management Practices to minimize risk of impact
  - Effects of damaged tiles on drainage, ponding/flooding risk, and run-off issues
  - Strategies to restore drainage following agricultural tile damage
  - Potential for re-creation of wetlands where impacts had been allowable for historic farming use, but new impacts may be restricted/prohibited by environmental regulations (e.g. Regulatory and state law)

- **Water use and conservation at solar facilities, including use of robotics, water collection, and grey water systems**

IV. Solar Life-Cycle and Natural Resource Considerations

- **Life-cycle analysis:**
  - Net direct and indirect GHG emissions
  - Net effects on other types of emissions/run-off (e.g., particulates, SO_2, fertilizer, pesticides)
  - Net energy production
  - Other environmental metrics

- **End-of-life management of solar array components:**
  - Fate of decommissioned panels (e.g., recycling, reuse, disposal)
  - Potential design considerations to encourage recycling (e.g., modularized construction)
  - Classification of solar panel materials and consequences for recycling **(see next bullet)**
  - End-of-life management of energy storage components

- **Composition of solar panels, materials classification, and toxicity:**
  - Materials found in solar panels

    - Material classification of solar panels (i.e., as hazardous or non-hazardous waste); solar panel toxicity
    - Standardized testing (e.g., ASTM standards, Toxicity Characteristic Leaching Procedure, Synthetic Precipitation Leaching Procedure), variability in results, and improvements in testing
    - PFAS and other chemical concerns

- **Potential for leaching/leakage of solar array or energy storage components during operation or disposal into**:
    - Soils
    - Groundwater
    - Surface waters, water bodies, and wetlands

- **Site treatment at end of facility life**:
    - Potential for decommissioning vs. re-powering (i.e., panel replacement)
    - Site remediation, reclamation, and habitat restoration
    - Long-term effects on soil chemistry, soil fertility, soil microbes caused by the array or change from the previous land use

- **Re-development of brownfields and/or closed landfills:**
    - Environmental benefits
    - Construction challenges; integrating site clean-up efforts with solar facility installation
    - Risk mitigation strategies

- **Conversion from agriculture to solar and environmental costs/benefits:**
    - Changes in soil health, water quality, and nutrient loads/inputs
    - Reductions in pesticide use
    - Changes in soil carbon sequestration
    - Changes in access to green space
    - Legal and regulatory considerations associated with changes in land use