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[Tethys](#) is an online knowledge base that facilitates the exchange and dissemination of information on the environmental effects of wind and marine renewable energy (MRE). The bi-weekly *Tethys Blast* highlights new publications in the [Tethys Knowledge Base](#); relevant announcements, opportunities, and upcoming events; and news articles of international interest. [ORJIP Ocean Energy](#) has partnered with OES-Environmental to provide additional content. If you have specific content you would like circulated to the greater wind and MRE communities, please send it to tethys@pnnl.gov for consideration.

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Announcements

WPTO-MHK Graduate Student Research Program

The Oak Ridge Institute for Science and Education (ORISE) is now accepting applications for the [WPTO-MHK Graduate Student Research Program](#), which is designed to provide graduate thesis research opportunities in marine and hydrokinetics (MHK) at U.S. Department of Energy (DOE) laboratories and other Water Power Technologies Office (WPTO) approved facilities. Applications are due by 5:00pm EST (10:00pm UTC) on 4 December 2020.

Collegiate Wind Competition

The U.S. DOE's National Renewable Energy Laboratory (NREL) recently released a request for proposals for student teams interested in competing in the [Collegiate Wind Competition \(CWC\)](#) in May 2022. The competition challenges students to design, build, and test a model wind turbine, and plan and financially analyze a wind power plant. Applications are due by 4:00pm MST (11:00pm UTC) on 8 December 2020.

BOEM Harnessing Citizen Science with New Ocean Alert Mobile App

The Bureau of Ocean Energy Management (BOEM), in partnership with the National Oceanic and Atmospheric Administration (NOAA), has released [a new mobile data collection app](#) for marine megafauna sightings. Data collected through Ocean Alert will help BOEM plan offshore energy development in ways that lessen the potential impacts to species such as sea turtles, sharks, and whales, and their habitats.

Calls for Abstracts

The University of Plymouth has extended the abstract submissions for the [14th European Wave and Tidal Energy Conference \(EWTEC 2021\)](#) until 1 December 2020. EWTEC 2021 will be held in Plymouth, UK from 5-9 September 2021.

Abstract submissions for the [International Conference on Ocean Energy \(ICOE 2021\)](#) are being accepted until 18 December 2020. ICOE 2021 will be held online from 28-30 April 2021.

Calls for Papers

The *Journal of Marine Science and Engineering* is accepting submissions for the Special Issues, "[Understanding Impacts of Marine Renewable Energy Structures on Nearshore Dynamics and/or the Environment](#)" (due 15 January 2021) and "[Offshore and Onshore Wave Energy Converters: Engineering and Environmental Features](#)" (due 31 January 2021).

Marine Pollution Bulletin is accepting submissions for a [Special Issue on Multiple Stressors in Marine Ecosystems](#) until 31 May 2020.

Funding/Testing Opportunities

The U.S. Testing Expertise and Access for Marine Energy Research ([TEAMER](#)) Program is now accepting applications for the second round of Requests for Technical Support (RFTS). Applications are due by 18 December 2020.

The TEAMER Network Director is also accepting applications for additional facilities to join the [TEAMER Test Facility Network](#) for RFTS round 3 and beyond. Potential facilities (both physical infrastructure as well as expertise capabilities, such as modeling and analysis services) can apply by 4 December 2020.

Innovate UK has announced an upcoming [Smart Grants funding competition](#) for UK registered organizations to apply for a share of up to £25 million to deliver disruptive research and development innovations. The competition closes at 11:00am UTC on 20 January 2021.

The U.S. DOE's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs recently announced the [FY 2021 Phase I, Release 2 topics](#), which include several wind and MRE-related topics. DOE plans to issue the [SBIR/STTR Funding Opportunity](#) Announcement on 14 December 2020. An informational webinar will be held at [3:00pm EST \(8:00pm UTC\) on 3 December 2020](#).

Student/Employment Opportunities

MaREI, the Science Foundation Ireland Research Centre for Energy, Climate and Marine at University College Cork, has a [PhD Research Position](#) available on Change in Coastal and Marine Systems: Using the Ecosystem Based Approach in Regulatory Environments to Underpin the Blue Economy. Applications are due 27 November 2020.

The University of Manchester's Department of Mechanical, Aerospace, and Civil Engineering has a vacancy for a [PhD Candidate](#) interested in modelling the environmental impact of offshore wind farms. Applications are due by 31 December 2020.

Australia's Blue Economy Cooperative Research Centre has launched a [PhD Scholars Program](#) with PhD topics available across its five research programs, including offshore renewable energy systems and sustainable development. Applications are due by 10 January 2021.

Upcoming Events

Upcoming Workshop

As part of the National Wind Coordinating Collaborative's (NWCC) [13th Wind Wildlife Research Meeting \(WWRM\)](#), the U.S. Fish & Wildlife Service (USFWS) and the American Wind Energy Association (AWEA) will be hosting a virtual [USFWS Land-Based Wind Energy Guidelines Workshop](#) from 12:00-3:00pm EST (5:00-8:00pm UTC) on 1 December 2020. The workshop is open to all WWRM 2020 registrants to join through the virtual meeting platform.

Upcoming Webinar

NREL and Defenders of Wildlife will be hosting the final webinar in their nine-part *Wildlife & Wind Energy Webinar Series* from 3:00-4:45pm EST (8:00-9:45pm UTC) on 8 December 2020. Register [here](#) for "Future Priorities for Wildlife and Wind Energy – Multi-stakeholder perspectives on challenges and opportunities". Recordings from the first 8 webinars are now available on *Tethys* [here](#).

Upcoming Conferences

[WindEnergy Hamburg](#) will be held online from 1-4 December 2020. Following its launch, the digital platform will remain online all the way up to the next WindEnergy Hamburg in September 2022. Register for free [here](#).

The [WavEC Annual Seminar 2020](#), Portugal and Canada: Advancing the Blue Economy through Intercontinental Collaboration, will be held online from 9-10 December 2020. The conference will feature updates on MRE projects such as HiWave-5 and Waveroller. Register for free [here](#).

New Documents on *Tethys*

Marine Renewable Energy

[Wave and Tidal Stream Critical Evidence Needs](#) – Offshore Renewables Joint industry Programme Ocean Energy (ORJIP Ocean Energy) 2020

This document follows on from the ORJIP Ocean Energy Forward Look and sets out the critical outstanding evidence needs for wave and tidal stream energy in the UK, grouped into ten strategic topics. The ten topics provide an overall perspective on research priorities and their importance for effective decision-making, by linking research needs to the practical application of outputs. Presenting the critical evidence needs in this way is intended to help deliver solutions-orientated research with high practical impact for more effective decision-making by Consenting Authorities. This document has been aligned with the State of the Science 2020 report, which is produced under the OES-Environmental initiative of 15 countries.

[Ocean renewable energy development in Southeast Asia: Opportunities, risks and unintended consequences](#) – Quirapas and Taeihagh 2020

The Southeast Asian region (SEA) is surrounded by ocean space, from which there is a vast potential to harness energy. Wave, tidal energy, and ocean thermal energy conversion could be tapped, to provide alternative sources of clean and dependable energy in the region. This article contributes to the growing academic literature on ocean renewable energy (ORE) in SEA by improving understanding of the opportunities and challenges of ORE development in the region, beyond its technical aspects. It conducts a critical analysis of the socio-political aspects of ORE development at a regional scale, which have been less studied in the existing literature.

[Optimizing image-based protocol to monitor macroepibenthic communities colonizing artificial structures](#) – Taormina et al. 2020

Underwater imagery is increasingly used as an effective and repeatable method to monitor benthic ecosystems. Nevertheless, extracting ecologically relevant information from a large amount of raw images remains a time-consuming and somewhat laborious challenge. Thus, underwater imagery processing needs to strike a compromise between time-efficient image annotation and accuracy in quantifying benthic community composition. Designing and implementing robust image sampling and image annotation protocols are therefore critical to rationally address these trade-offs between ecological accuracy and processing time. The aim of this study was to develop and to optimize a reliable image scoring strategy based on the point count method using imagery data acquired on tide-swept macroepibenthic communities.

Wind Energy

Enabling Renewable Energy While Protecting Wildlife: An Ecological Risk-Based Approach to Wind Energy Development Using Ecosystem-Based Management Values – Copping et al. 2020

Acceptance of wind energy development is challenged by stakeholders' concerns about potential effects on the environment, specifically on wildlife, such as birds, bats, and (for offshore wind) marine animals, and the habitats that support them. Communities near wind energy developments are also concerned with social and economic impacts, as well as impacts on aesthetics, historical sites, and recreation and tourism. Lack of a systematic, widely accepted, and balanced approach for measuring the potential damage to wildlife, habitats, and communities continues to leave wind developers, regulators, and other stakeholders in an uncertain position. This paper explores ecological risk-based management in wind energy development for land-based and offshore wind installations.

Cumulative effects of marine renewable energy and climate change on ecosystem properties: Sensitivity of ecological network analysis – Noguès et al. 2020

In an increasingly anthropogenic world, the scientific community and managers have to take interactions between the drivers of ecosystems into consideration. Tools like ecological network analysis (ENA) indices offer the opportunity to study those interactions at the ecosystem level. However, ENA indices have never been used to test the incidence of cumulative drivers. The present study uses models combining the effects of (i) the reef caused by the future offshore wind farm of Courseulles-sur-Mer and (ii) climate change on species distribution, to test the response of multiple ENA indices. ENA indices proved sensitive to this cumulative impact, displaying a wide variety of cumulative effects.

On a collision course? The large diversity of birds killed by wind turbines in South Africa – Perold et al. 2020

We summarise the diversity of birds killed by turbine collisions at 20 wind energy facilities (WEFs) across southwest South Africa. Monitoring from 2014 to 2018 recovered 848 bird carcasses across all WEFs, at a crude rate of 1.0 ± 0.6 birds turbine⁻¹ y⁻¹ at 16 WEFs with at least 12 months of postconstruction monitoring. However, mortality estimates adjusted for detection and scavenger bias were appreciably higher: 4.6 ± 2.9 birds turbine⁻¹ y⁻¹ or 2.0 ± 1.3 birds MW⁻¹ y⁻¹, which is slightly lower than mean rates reported in the northern hemisphere, but still well within range. A striking result was the high diversity of birds killed: 130 species from 46 families, totalling 30% of bird species recorded at and around WEFs.

News & Press Releases

Marine Renewable Energy

U.S. Department of Energy Announces \$35 Million in Funding for Hydrokinetic Turbine Development – U.S. Department of Energy (DOE)

The U.S. DOE recently announced \$35 million in funding for 11 projects as part of the Advanced Research Projects Agency-Energy's (ARPA-E) Submarine Hydrokinetic And Riverine Kilo-megawatt Systems (SHARKS) program. SHARKS teams will develop new economically competitive Hydrokinetic Turbines (HKT) designs for tidal and riverine currents. Projects are encouraged to apply concurrent design methodologies (control co-design, co-design, and designing for operation and maintenance) which will significantly decrease the levelized cost of energy (LCOE) of the final HKT design. Projects will work to reduce the LCOE through multiple approaches, including lowering operation and maintenance costs and minimizing potential impacts on the surrounding environment.

Building confidence in marine energy technology through certification – IEC 62600-4 Technical Specification reduces risk in marine energy converters through technology qualification – International Electrotechnical Commission (IEC)

Technological innovation can often lead to the development of novel designs and concepts that cannot be certified against existing normative rules or international codes and standards. Hence, in the absence of any such benchmarks, these technologies require a different systematic verification and validation process to identify, quantify, analyze and manage operational risks that may arise. Although international standards specifically tailored for the marine energy sector are fast emerging, in the interim, how does one reduce risk associated with the deployment of marine energy converters (MECs)? The process of technology qualification (TQ) provides a starting point for achieving certification.

RESOURCECODE Bank One Year of Hindcast Data for Marine Toolbox – European Marine Energy Centre (EMEC)

The RESOURCECODE project, funded by Ocean Energy Era-Net Cofund, has made a significant step forward with the first year of hindcast data being produced for the project's marine data toolbox and the development of the new online platform. RESOURCECODE aims to support the investment and growth in the wave and tidal energy sector through the creation of an integrated marine data toolbox. The toolbox is due to be launched in 2021 using 28 years of hindcast wave data from across North West Europe. It will provide technology developers and supply chain companies with world leading resource characterisation, enabling them to improve designs, optimise operations in demanding marine environments, and increase investor confidence.

Orbital unveils futuristic tidal and river turbines in strategic design partnership with Designworks, a BMW Group Company – Orbital Marine Power

UK based Orbital Marine Power and Designworks, BMW Group's Advanced Design Company, have collaborated to produce a striking vision for Orbital's floating energy generation technology, with the utility scale Orbital OA model and a smaller Riverkinetic

model included in the line up. The collaboration uniquely combines Orbital's deep engineering and marine experience, with Designworks expertise in design strategy and advanced simulation modelling. Starting with large utility turbines, the two teams looked at how advancements in hydrodynamic performances, cost engineering and advanced production methods will influence the design of tidal turbines in the future.

International consortium unveils plans for Grevelingendam tidal plant – Offshore Energy

A new consortium of international companies has been established under the name of Climate Power Plant Zeeland with the aim of building and operating a tidal power plant in the Dutch province of Zeeland. Led by Director of MET-Support, Peter Scheijgrond, the consortium brings together the Australian investment bank Macquarie, engineering firm Antea Group, contractor Van der Straaten, and turbine technology manufacturers Pentair, and Water2Energy. The initial goal of the consortium is to build a 1.6 MW tidal power plant at a set of discharge gates in the Grevelingendam – a dam forming a part of the Dutch flood defense system in Zeeland, and at the same time to improve the water quality of the Grevelingen Lake.

Wind Energy

Flying colours – Using colour-ringing on birds to improve our understanding of the impact of offshore wind developments on kittiwakes – Joint Nature Conservation Committee (JNCC)

A feasibility study to better understand how Black-legged Kittiwake populations will respond to potential mortality induced by offshore windfarms will kick-off this autumn. The project, funded by the offshore wind developer Vattenfall and delivered by JNCC, was identified as a priority by the Offshore Wind Strategic Monitoring and Research Forum (OWSMRF) Pilot Year, an industry-led collaborative partnership developing research on the effects of offshore wind development on marine birds. Kittiwakes are a long-lived species, spending most of their time foraging at sea and nesting on steep coastal cliffs. This means that acquiring sufficient knowledge on how their colonies and populations are faring can be challenging.

ORE Catapult to Advance Next Generation Blade Manufacture – Offshore Renewable Energy (ORE) Catapult

ORE Catapult has outlined its ambition to boost the wind turbine blade designs of the future with investment in a state-of-the-art prototype blade manufacturing facility. The Additive Manufacturing for Wind Blades project will install an advanced manufacturing cell at ORE Catapult's National Renewable Energy Centre in Blyth, capable of proving technologies which can reduce blade manufacturing costs, increase production speeds and explore the potential for new materials with a reduced environmental impact. The blade facility will challenge traditional blade manufacturing processes by using sophisticated 3D robotic printing techniques, investigating the use of sustainable materials, as well as flexible and more productive manufacturing methods.

IRENA and GWEC Enhance Cooperation to Scale Up Renewables Globally – Global Wind Energy Council (GWEC)

The International Renewable Energy Agency (IRENA) and GWEC recently signed a cooperation agreement in order to join efforts aimed at increasing the adoption and deployment of wind and renewable energy worldwide. Among other areas, the enhanced cooperation between IRENA and GWEC will focus on: strengthening wind energy project facilitation in the Climate Investment Platform; engaging the wind industry in Industry-Government Dialogues, Investment Forums and other arenas for knowledge exchange; and exploring open-source agreements and project templates for wind projects in emerging markets in order to mitigate legal risks and barriers.

Governor Mills Announces Intent to Expand Research and Development of Floating Offshore Wind in Maine – State of Maine, U.S.

To solidify Maine's leadership in floating offshore wind energy and collaborate with Maine's fisheries on the industry's development, Governor Janet Mills recently announced the State's plan to create the country's first floating offshore wind research array in the Gulf of Maine. Due to its deep waters, generating wind energy in the Gulf of Maine will likely come from floating offshore wind turbines, a technology still under development in the U.S which requires additional scientific study about its potential effects on fisheries and the marine environment. Designating a small-scale research array in the Gulf of Maine represents a measured, deliberative approach that allows the State to engage the fishing industry's expertise to minimize potential harms and maximize the benefits to Maine people from offshore wind.

Ørsted aims to develop offshore wind projects in South Korea – Ørsted

Ørsted recently announced its intention to develop South Korean offshore wind projects with a potential capacity of up to 1.6 GW off the coast of Incheon City. Earlier this year, Ørsted achieved an important milestone by deploying four floating lidars off the coast of Incheon and has progressed well in collecting all relevant data for securing the potential 1.6 GW offshore wind sites. Ørsted's offshore wind projects will be located more than 70 km from the main parts of Incheon City and have relatively shallow water depths at the target project site to allow for a cost-effective development. Subject to permits, off-take agreement with a Korean energy utility, and final investment decision, the projects could be commissioned from 2026 onwards.