TETHYS BLAST

21 November 2025

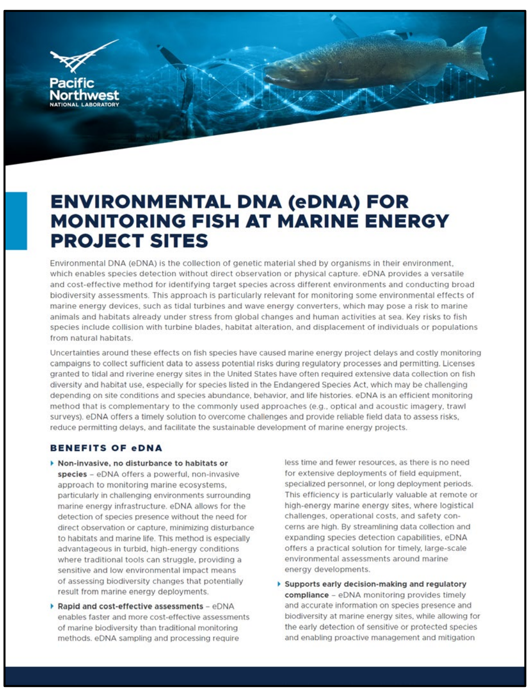
Tethys is a knowledge hub with information and resources on the environmental effects of wind and marine energy. The bi-weekly Tethys Blast highlights announcements and upcoming events; new documents in the Knowledge Base; and international energy news. ORJIP Ocean Energy has partnered with OES-Environmental to provide additional content. Email us to contribute!

Announcements	Marine Energy Documents	Marine Energy News
Upcoming Events	Wind Energy Documents	Wind Energy News

Announcements

New eDNA Fact Sheet

Pacific Northwest National Laboratory (PNNL) recently published a new factsheet, Environmental DNA (eDNA) for Monitoring Fish at Marine Energy Project Sites, on Tethys.



Pacific Northwest NATIONAL LABORATORY

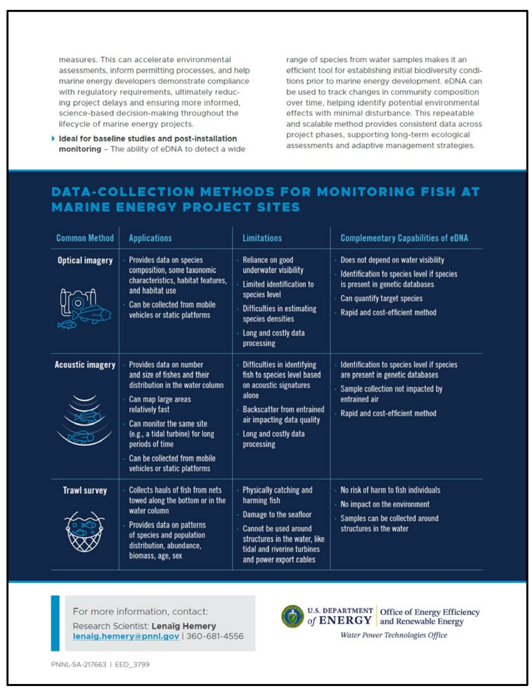
ENVIRONMENTAL DNA (eDNA) FOR MONITORING FISH AT MARINE ENERGY PROJECT SITES

Environmental DNA (eDNA) is the collection of genetic material shed by organisms in their environment, which enables species detection without direct observation or physical capture. eDNA provides a versatile and cost-effective method for identifying target species across different environments and conducting broad biodiversity assessments. This approach is particularly relevant for monitoring some environmental effects of marine energy devices, such as tidal turbines and wave energy converters, which may pose a risk to marine animals and habitats already under stress from global changes and human activities at sea. Key risks to fish species include collision with turbine blades, habitat alteration, and displacement of individuals or populations from natural habitats.

Uncertainties around these effects on fish species have caused marine energy project delays and costly monitoring campaigns to collect sufficient data to assess potential risks during regulatory processes and permitting. Licenses granted to tidal and riverine energy sites in the United States have often required extensive data collection on fish diversity and habitat use, especially for species listed in the Endangered Species Act, which may be challenging depending on site conditions and species abundance, behavior, and life histories. eDNA is an efficient monitoring method that is complementary to the commonly used approaches (e.g., optical and acoustic imagery, trawl surveys). eDNA offers a timely solution to overcome challenges and provide reliable field data to assess risks, reduce permitting delays, and facilitate the sustainable development of marine energy projects.

BENEFITS OF eDNA

- **Non-invasive, no disturbance to habitats or species** – eDNA offers a powerful, non-invasive approach to monitoring marine ecosystems, particularly in challenging environments surrounding marine energy infrastructure. eDNA allows for the detection of species presence without the need for direct observation or capture, minimizing disturbance to habitats and marine life. This method is especially advantageous in turbid, high-energy conditions where traditional tools can struggle, providing a sensitive and low environmental impact means of assessing biodiversity changes that potentially result from marine energy deployments.
- **Rapid and cost-effective assessments** – eDNA enables faster and more cost-effective assessments of marine biodiversity than traditional monitoring methods. eDNA sampling and processing require less time and fewer resources, as there is no need for extensive deployments of field equipment, specialized personnel, or long deployment periods. This efficiency is particularly valuable at remote or high-energy marine energy sites, where logistical challenges, operational costs, and safety concerns are high. By streamlining data collection and expanding species detection capabilities, eDNA offers a practical solution for timely, large-scale environmental assessments around marine energy developments.
- **Supports early decision-making and regulatory compliance** – eDNA monitoring provides timely and accurate information on species presence and biodiversity at marine energy sites, while allowing for the early detection of sensitive or protected species and enabling proactive management and mitigation



measures. This can accelerate environmental assessments, inform permitting processes, and help marine energy developers demonstrate compliance with regulatory requirements, ultimately reducing project delays and ensuring more informed, science-based decision-making throughout the lifecycle of marine energy projects.

- **Ideal for baseline studies and post-installation monitoring** – The ability of eDNA to detect a wide range of species from water samples makes it an efficient tool for establishing initial biodiversity conditions prior to marine energy development. eDNA can be used to track changes in community composition over time, helping identify potential environmental effects with minimal disturbance. This repeatable and scalable method provides consistent data across project phases, supporting long-term ecological assessments and adaptive management strategies.

DATA-COLLECTION METHODS FOR MONITORING FISH AT MARINE ENERGY PROJECT SITES

Common Method	Applications	Limitations	Complementary Capabilities of eDNA
Optical imagery	· Provides data on species composition, some taxonomic characteristics, habitat features, and habitat use · Can be collected from mobile vehicles or static platforms	· Reliance on good underwater visibility · Limited identification to species level · Difficulties in estimating species densities · Long and costly data processing	· Does not depend on water visibility · Identification to species level if species is present in genetic databases · Can quantify target species · Rapid and cost-efficient method
Acoustic imagery	· Provides data on number and size of fishes and their distribution in the water column · Can map large areas relatively fast · Can monitor the same site (e.g., a tidal turbine) for long periods of time · Can be collected from mobile vehicles or static platforms	· Difficulties in identifying fish to species level based on acoustic signatures alone · Backscatter from entrained air impacting data quality · Long and costly data processing	· Identification to species level if species are present in genetic databases · Sample collection not impacted by entrained air · Rapid and cost-efficient method
Trawl survey	· Collects hauls of fish from nets towed along the bottom or in the water column · Provides data on patterns of species and population distribution, abundance, biomass, age, sex	· Physically catching and harming fish · Damage to the seafloor · Cannot be used around structures in the water, like tidal and riverine turbines and power export cables	· No risk of harm to fish individuals · No impact on the environment · Samples can be collected around structures in the water

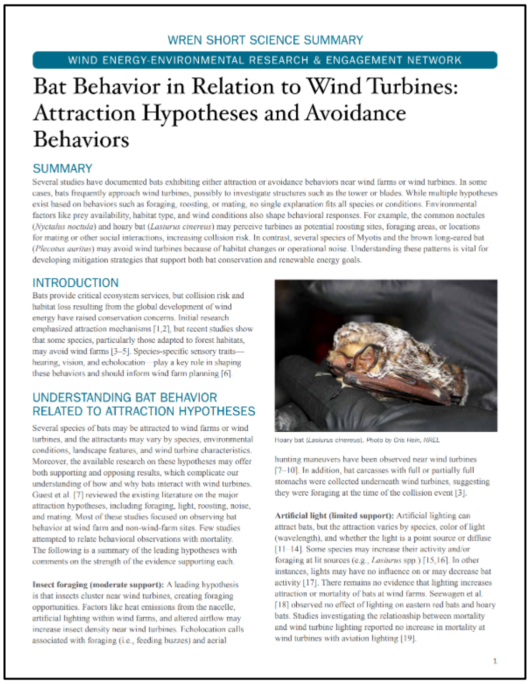
For more information, contact:
Research Scientist: **Lenaïg Hemery**
lenaig.hemery@pnnl.gov | 360-681-4556

U.S. DEPARTMENT of ENERGY | Office of Energy Efficiency and Renewable Energy
Water Power Technologies Office

PNNL-SA-217663 | EED_3799

WREN Short Science Summary

Wind Energy-Environmental Research & Engagement Network (WREN) recently published a new Short Science Summary, Bat Behavior in Relation to Wind Turbines: Attraction Hypotheses and Avoidance Behaviors, on Tethys.



WREN SHORT SCIENCE SUMMARY

WIND ENERGY-ENVIRONMENTAL RESEARCH & ENGAGEMENT NETWORK

Bat Behavior in Relation to Wind Turbines: Attraction Hypotheses and Avoidance Behaviors

SUMMARY

Several studies have documented bats exhibiting either attraction or avoidance behaviors near wind farms or wind turbines. In some cases, bats frequently approach wind turbines, possibly to investigate structures such as the tower or blades. While multiple hypotheses exist based on behaviors such as foraging, roosting, or mating, no single explanation fits all species or conditions. Environmental factors like prey availability, habitat type, and wind conditions also shape behavioral responses. For example, the common noctules (*Nyctalus noctula*) and hoary bat (*Lasiurus cinereus*) may perceive turbines as potential roosting sites, foraging areas, or locations for mating or other social interactions, increasing collision risk. In contrast, several species of Myotis and the brown long-eared bat (*Plecotus auritus*) may avoid wind turbines because of habitat changes or operational noise. Understanding these patterns is vital for developing mitigation strategies that support both bat conservation and renewable energy goals.

INTRODUCTION

Bats provide critical ecosystem services, but collision risk and habitat loss resulting from the global development of wind energy have raised conservation concerns. Initial research emphasized attraction mechanisms [1,2], but recent studies show that some species, particularly those adapted to forest habitats, may avoid wind farms [3–5]. Species-specific sensory traits—hearing, vision, and echolocation—play a key role in shaping these behaviors and should inform wind farm planning [6].

Hoary bat (*Lasiurus cinereus*). *Photo by Cris Hein, NREL*

UNDERSTANDING BAT BEHAVIOR RELATED TO ATTRACTION HYPOTHESES

Several species of bats may be attracted to wind farms or wind turbines, and the attractants may vary by species, environmental conditions, landscape features, and wind turbine characteristics. Moreover, the available research on these hypotheses may offer both supporting and opposing results, which complicate our understanding of how and why bats interact with wind turbines. Guest et al. [7] reviewed the existing literature on the major attraction hypotheses, including foraging, light, roosting, noise, and mating. Most of these studies focused on observing bat behavior at wind farm and non-wind-farm sites. Few studies attempted to relate behavioral observations with mortality. The following is a summary of the leading hypotheses with comments on the strength of the evidence supporting each.

Insect foraging (moderate support): A leading hypothesis is that insects cluster near wind turbines, creating foraging opportunities. Factors like heat emissions from the nacelle, artificial lighting within wind farms, and altered airflow may increase insect density near wind turbines. Echolocation calls associated with foraging (i.e., feeding buzzes) and aerial hunting maneuvers have been observed near wind turbines [7–10]. In addition, bat carcasses with full or partially full stomachs were collected underneath wind turbines, suggesting they were foraging at the time of the collision event [3].

Artificial light (limited support): Artificial lighting can attract bats, but the attraction varies by species, color of light (wavelength), and whether the light is a point source or diffuse [11–14]. Some species may increase their activity and/or foraging at lit sources (e.g., *Lasiurus* spp.) [15,16]. In other instances, lights may have no influence on or may decrease bat activity [17]. There remains no evidence that lighting increases attraction or mortality of bats at wind farms. Seewagen et al. [18] observed no effect of lighting on eastern red bats and hoary bats. Studies investigating the relationship between mortality and wind turbine lighting reported no increase in mortality at wind turbines with aviation lighting [19].

1

Water surface misinterpretation (limited support): The smooth surfaces of wind turbines present similar reflective echolocation signatures as water, which may confuse bats and prompt close investigative approaches [20,21].

Roost and landmark hypothesis (moderate support): Wind turbines may serve as landmarks in open habitats (e.g., agricultural landscapes, offshore) or potential roost sites. This hypothesis may be more relevant for long-distance migratory tree-roosting bats, including hoary bats and common noctules, that might orient on conspicuous features, especially in poor weather conditions [22]. In addition, the development of wind farms in forests creates gaps and edge habitat, which may attract some species. There are several unpublished accounts of bats roosting in wind turbines. Bennett et al. [23] observed bat guano on door slats, suggesting bats were roosting in the wind turbine, a hypothesis also suggested by Brabant et al. [24].

Bat specimens that were sighted on offshore wind farms (OWFs) in spring 2019. Left picture: bat sp. roosting in the grate floor of a turbine in the Belgian Nobelwind OWF (8 April 2019); right picture: bat sp. roosting on the foundation of a turbine in the Belgian C-Power OWF (30 April 2019). *Photos from Parkwind (left) and C-Power (right)*

Social aggregations (limited support): Wind turbines might be used as social aggregation points during migration or mating. Observations of *Lasiurus* spp. mating near turbines suggest this possibility [25], though overall support remains limited [2].

Olfactory cues (speculative): Some bats may be attracted by the odor of insect carcasses on the blades of wind turbines or odors from social scent-marking behaviors (i.e., the scents left by individuals making contact with a structure; see [7]). This hypothesis has been considered for hoary bats and Brazilian free-tailed bats, though direct evidence remains scarce [6] and has been met with skepticism. Clerc et al. [26] suggest that it is unlikely that scent markings on wind turbines could attract bats from more than a few meters away.

EMERGING EVIDENCE OF BAT AVOIDANCE BEHAVIOR

While attraction mechanisms can increase collision risk, emerging evidence shows that some species exhibit avoidance behavior. Several recent studies indicate reduced bat activity at varying distances from wind turbines, including 1,000 m [27], 600 m [28], 400 m [29], 300 m [30], and 200 m [31]. Potential avoidance mechanisms include:

Noise and vibration (moderate support): Operational noise and vibrations from wind turbines may cause distress or disorientation, particularly for species dependent on echolocation in forested habitats. Echolocation-reliant species such as *Myotis* spp. and western barbastelle (*Barbastella barbastellus*) may avoid wind turbines because of the noise generated during operation [32].

Habitat loss (moderate support): The removal of natural habitat during construction may result in abandonment of the area by some species [33,34]. Forest species, such as brown long-eared bats and Natterer's bats (*Myotis nattereri*), may abandon areas where wind turbines replace mature forest cover. Even after regrowth, simplified vegetation structures may be unsuitable for these species [31,33].

Visual disturbance (limited support): The presence of newly constructed wind turbines and associated infrastructure may trigger aversion by species not adapted to anthropogenic infrastructure [8]. To date, there are no field studies examining the visual effects of wind turbines on bats.

UNTANGLING THESE BEHAVIORS

There is no single hypothesis that explains either attraction or avoidance of wind turbines by bats. It is not surprising to see contradictory results given how complex these interactions are and how variable the circumstances can be. Sensory perception, echolocation characteristics, flight ecology, intensity and distance of stimuli, and habitat type can influence how bats respond to the presence of wind farms [6]. Understanding the driving factors that influence how bats perceive and navigate their environments may help explain attraction and avoidance behaviors and reduce risk. Key factors include:

Species-specific flight ecology: Fast, open-air foragers, such as *Nyctalus* spp., *Pipistrellus* spp., *Lasiurus* spp., and *Tadarida* spp., make up most bat fatalities in Europe and North America [35–37]. There is evidence that these species approach and spend time flying around wind turbines, including multiple passes across the rotor-swept area [8,38]. Conversely, fatalities of slower, more maneuverable bats such as *Myotis* spp., *Plecotus* spp., and *Barbastella* spp. are relatively rare. Their lower flight altitude, foraging near vegetative surfaces, and reduced activity in high-wind conditions may reduce their

2

INORE OES-BECS Applications Open

The International Network for Offshore Renewable Energy (INORE) has extended its Call for Applications for the Blue Energy Collaborative Scholarships (BECS), sponsored by Ocean Energy Systems (OES). This grant supports research projects that spark collaborations between INOREans or need access to facilities or travel support. Apply by 21 November 2025.

Supergen ORE Early Career Committee Call

The Supergen Offshore Renewable Energy (ORE) Hub is looking to expand its Early Career Committee, which plays a vital role in shaping the direction of its Early Career Network, with a new Deputy, Engagement Coordinator, and Industry Representative. These are 12-month, voluntary positions. Apply by 1 December 2025.

UMERC Call for Nominations

The University Marine Energy Research Community (UMERC) is now accepting nominations to fill upcoming vacant seats on their Board of Directors, which sets UMERC's primary direction, such as the structure and timing of conferences and workshops. These are 2-year, voluntary positions. Nominate yourself or a colleague by 7 December 2025.

ORISE Applications Open

The Oak Ridge Institute for Science and Education (ORISE) Marine Energy Fellowship Program, which offers graduate students and postgraduates the opportunity to engage in marine energy research while embedded at selected host facilities for up to 12 months, is now accepting applications for its Summer Cohort through 12 December 2025.

Calls for Abstracts

The Call for Abstracts for the 2nd Institute of Electrical and Electronics Engineers (IEEE) Subsea Innovation Technologies Workshop is open until 1 December 2025. The workshop will take place on 23-24 January 2026 in Aberdeen, Scotland.

The Call for Abstracts for the Environmental Interactions of Marine Renewables Conference (EIMR 2026) has been extended through 12 December 2025. EIMR 2026 will take place on 13-17 April 2026 at the Scottish Association for Marine Science in Oban, Scotland.

The Call for Abstracts for the 2026 State of the Science Workshop on Offshore Energy, Wildlife, and Fisheries is open until 12 December 2025. The Workshop will take place on 8-11 June 2026 at Stony Brook University in Long Island, New York, USA.

The Call for Abstracts for the Young Coastal Scientists and Engineers Conference (YCSEC 2026) is open until 19 December 2025. The conference will take place 13-14 April 2026 in Nottingham, England. Early bird registration is available through 16 January 2026.

The Call for Abstracts for OCEANS 2026 Sanya is open until 22 December 2025. OCEANS 2026 Sanya will take place 25-28 May 2026 in Sanya, China.

The Call for Speakers for All-Energy 2025 Exhibition and Conference show floor theatres is now open until 23 January 2026. All-Energy will take place 13-14 May 2025 in Glasgow, Scotland.

Funding & Testing Opportunities

The Offshore Renewable Energy Sustainability Alliance (ORESA) launched its first Accelerator Programme Innovation Call for small and medium enterprises across the North-West Europe region. The programme is seeking cutting-edge technologies that advance the field of offshore renewable energy, including wave, tidal, floating wind, offshore solar, and other emerging innovations. Apply by 30 November 2025.

The U.S. Testing Expertise and Access for Marine Energy Research (TEAMER) program, which supports marine energy testing and development projects, has extended the deadline for Request for Technical Support (RFTS) 17 applications until 6 February 2026. RFTS 18 applications will then be accepted until 5 June 2026. Open water support requests are accepted on a rolling basis. TEAMER recently added Commercialization Support to all future RFTS rounds as well.

Career & Internship Opportunities

Fundy Ocean Research Centre for Energy (FORCE) is seeking a Technical Project Manager to lead the planning, coordination, and delivery of technical projects that support tidal energy demonstration and facility operations, including FORCE's Ocean Sensor Innovation Platforms (OSIP) project.

Heriot-Watt University is offering a funded PhD project focused on Flow Interactions of Tidal Stream Energy: Understanding how large tidal farms will affect each other. International students are eligible. Apply by 28 November 2025.

The InDustrial Centre for Doctoral Training for Offshore Renewable Energy (IDCORE) has opened applications for its four-year, full-time, Engineering Doctorate, which involves 1 year of teaching after which students are physically based with their UK sponsoring company for 3 years. Apply by 30 November 2025.

William & Mary's Batten School of Coastal and Marine Sciences & Virginia Institute of Marine Science (VIMS) are hiring an Assistant Teaching Professor of Coastal and Marine Sciences, with expertise in coastal, estuarine, and marine biology and ecology. Apply by 1 December 2025.

NatureScot is hiring a Marine Ecology Adviser to provide specialist advice on the impacts from marine and coastal activities, including marine renewables and offshore wind energy, on marine mammals. Apply by 3 December 2025.

Ecodetect. advanced marine science and technology company specializing in the development of end-to-end, AI-driven, marine monitoring systems, is recruiting a Machine Learning Data Engineer and a Marine Systems Engineer. Apply by 19 December 2025.

The Gulf of Maine Research Institute (GMRI) is seeking a Climate-Ocean and Coastal Law & Policy Research Specialist to investigate and analyze how climate, ocean, and environmental science can inform and interact with legal, regulatory, and broader governance frameworks. Apply by 20 December 2025.

The University of East Anglia is offering a funded PhD project, Next-Generation Marine Ecosystem Indicators: Machine Learning for Smarter Marine Spatial Planning in a Changing Climate. Apply by 7 January 2026.

Dr. Linda D'Anna and Dr. Eric Wade are recruiting a PhD student to study the social dimensions of ocean energy. The student will be based at North Carolina State University and participate in Atlantic Marine Energy Center (AMEC) activities. Apply 31 January 2026.

Upcoming Events

The Tethys Events Calendar highlights key events from around the world related to wind and marine energy, including conferences, webinars, workshops, and more.

Upcoming Webinars

Marine Renewables Canada is hosting an Ask an Expert webinar, "From Planning to Power: Exploring Canada's Offshore Wind Regulatory Process with the Canada–Nova Scotia Offshore Energy Regulator", on 2 December 2025 from 2:00-3:00pm AST (6:00-7:00pm UTC).

Dutch Marine Energy Centre (DMEC) is hosting a Deep Dive webinar, "Offshore Charging", on 2 December 2025 from 10:00-11:00am CET (9:00-10:00am UTC). Led by DMEC, a panel of international experts will dive into real-world offshore charging use cases.

Clean Energy States Alliance (CESA) is hosting a webinar, "Offshore Wind Community Engagement: Recommendations for State Agencies", on 4 December 2025 from 1:00-2:00pm EDT (6:00-7:00pm UTC). The webinar will present the recommendations from a new report by CESA and Equinval Partners, *Strengthening Offshore Wind Community Engagement: Recommendations for State Agencies*, and discuss them alongside members of CESA's Offshore Wind and Equity Working Group.

Pacific Marine Energy Center (PMEC) is hosting a Marine Energy Fall Seminar Series for industry trailblazers to share stories from their journeys into marine energy and ocean engineering. The second seminar, on 10 December 2025 from 1:00-2:00pm PST (9:00-10:00pm UTC), will feature Grace Chang, Director of Research & Development at Integral Consulting.

RGI and Global Initiative for Nature, Grids and Renewables (GINGR) are hosting a webinar, "Connecting Pollinator Corridors Using evidence and monitoring to deliver a Nature-Positive grid", on 11 December 2025 from 2:00-3:30pm UTC. The second session of *Connecting Energies 2025: Civil Society Webinar Series* explores how electricity corridors can become ecological assets rather than interruptions in the landscape.

Upcoming Workshop

Join Sandia National Laboratories, the National Renewable Energy Laboratory, PNNL, Montana State University, Florida Atlantic University, and the Department of Energy's Water Power Technologies Office for a free virtual Synthetic Mooring Lines Workshop on 11 December 2025 from 8:30am-12:20pm PST (4:30pm-8:20pm UTC). This workshop will review and discuss the latest technological challenges in manufacturing, testing, characterization, and prediction of performance for synthetic mooring lines within marine energy applications, as well as identify key focus areas for future research, development, and collaboration.

New Documents on Tethys

Tethys hosts thousands of documents on the environmental effects of marine and wind (land-based and offshore) energy, including journal articles, conference papers, and reports.

Marine Energy

[Finding common ground: Assessing the Co-location potential of California's blue food and clean energy sectors]() – **Gonzales et al. 2025**

> California is striving to expand its 'blue economy' to meet growing demand for marine resources, including seafood and renewable energy. As a result, there has been a growing competition for ocean space. Co-location, multiple sectors (e.g., aquaculture and renewable energy) operating in the same ocean space at the same time, is one potential approach that can reduce competition amongst stakeholders. However, there has been limited quantitative investigation into the potential of co-located systems along the California coast. Using a combination of observation and model outputs across four ocean sectors (aquaculture, wave energy, wind energy and wild capture fisheries), we quantify the co-location suitability of at least two of the sectors along the California coast (0.0404° resolution) by calculating a Co-location Suitability (CLS) score (0 – no suitability to 1 – perfect suitability).

Geospatial analysis of the life cycle global warming impacts from marine renewables – Engelfried et al. 2026

> The deployment of marine renewables (MRE) is important for transitioning to a low-carbon energy system. However, their performance is highly dependent on the deployment location, making the selection of feasible sites critical for large-scale implementation. To contribute meaningfully to Europe's renewable energy strategy and support a carbon-neutral energy system by 2050, the environmental performance of MREs must be taken into account in site selection, beyond the typical economic and technical aspects. Therefore, this study presents a geospatial analysis of the climate change mitigation potential of two wave energy converters, floating offshore photovoltaics, and floating wind turbines in northern European coastal waters.

Minimizing environmental risks to progress the marine renewable energy industry – Garavelli et al. 2025

> As the marine renewable energy (MRE) industry continues to expand worldwide, challenges remain to consent projects. Deployment and consenting barriers of MRE devices are primarily due to insufficient information on the potential effects on marine animals, habitats, or ecosystem processes. Since 2010, Ocean Energy Systems (OES)-Environmental, an initiative under the International Energy Agency Ocean Energy Systems, has assessed what is known about the environmental effects of MRE and developed approaches to facilitate consenting. OES Environmental's goal is to mobilize information and international practitioners to coordinate scientific research that helps the industry progress in an environmentally responsible manner.

Wind Energy

Evidence Review Note: Environmental Impact Assessment – Offshore Wind Evidence Knowledge Hub (OWEKH) 2025

This Evidence Review Note (ERN) provides overarching guidance on Environmental Impact Assessment (EIA) for offshore wind development in the UK. It forms the foundation of the OWEKH ERN series, offering a consistent, strategic framework to support proportionate, transparent, and high-quality assessment practice across all environmental topics. Drawing on insights from 79 offshore windfarms (OWF) EIAs, sector guidance, and stakeholder consultation, this ERN addresses common weaknesses in current practice and proposes a shared approach to scoping, reporting, cumulative assessment, and post-consent delivery. It is designed to support developers and regulators to produce clearer, more consistent Environmental Statement (ES) to achieve more efficient consenting.

The emerging need for ecosystem restoration to mitigate the impacts of onshore wind energy – Seifert et al. 2025

This literature review synthesizes findings from 88 studies on the environmental impacts of onshore wind energy. Most concerned impacts on vegetation, followed by soil and hydrology. The nature and severity of impacts varied across ecosystems and geographic contexts, but despite the growing body of studies documenting impacts that lead to ecosystem degradation, only a few acknowledged the resulting need for mitigation (24) or restoration (23). To bridge this gap, a conceptual framework is presented that links the documented impacts to mitigation potential across all phases of onshore wind energy. This framework illustrates seven key actions to advance the mitigation of environmental impacts by reinforcing existing mitigation strategies or overcoming persistent knowledge gaps.

Projected changes to the extent and seasonality of seabird habitat in the California current and implications for marine spatial planning – Gasbarro et al. 2025

Climate-induced changes in ocean conditions are likely to affect species habitat use across current management boundaries (e.g., marine protected areas). Therefore, it is important to identify potential future risks that may reduce the effectiveness of fixed boundaries or cause negative interactions between wildlife and human ocean-use sectors. Here, we used presence and absence records from a compilation of > 132,000 ship-based and aerial at-sea visual survey transect segments collected from 1980-2017 to fit species distribution models (SDMs) for five abundant and ecologically important seabird species in the California Current Ecosystem (CCE), including both resident (common murre, Cassin's auklet, and rhinoceros auklet) and seasonal migrant (sooty shearwater, black-footed albatross) species with different life-histories.

News & Press Releases

Marine Energy

Canada's First Tidal Energy Array Authorized Using Adaptive Regulatory Framework – FORCE

Fisheries and Oceans Canada (DFO) has issued a Fisheries Act Authorization to Eauclaire Tidal Ltd. (Eauclaire) to deploy up to three Orbital Marine Power Ltd (Orbital) O2-X tidal energy devices at the Fundy Ocean Research Centre for Energy (FORCE). This marks the first project to proceed under Canada's revised, staged approach for tidal stream energy development – an adaptive regulatory framework designed to ensure both environmental protection and investor clarity. DFO's Staged Approach – resulting from the federal Tidal Task Force on Sustainable Tidal Energy Development led by DFO and Natural Resources Canada – enables projects to begin with a single device and monitoring, followed by additional deployments informed by ongoing environmental data collection, interpretation and analysis.

Dieseko Group and CorPower Ocean Join Forces on VibroDrive+ – CorPower Ocean

Dieseko Group and CorPower Ocean have entered into a strategic consortium agreement to launch VibroDrive+, a joint research project aimed at improving offshore anchor design and installation efficiency. The project, supported by €400,000 Eureka Eurostars funding, will combine advanced vibro hammer technology with next-generation anchor concepts to drive smarter and more sustainable offshore solutions. The project is essential for the future rollout of CorPower Ocean's wave energy arrays with the CorPower UMACK anchors providing the foundation for large scale electricity generation from ocean waves. The novel anchoring solution and installation via vibro hammer represents a step change in Levelized Cost of Energy (LCoE) for offshore foundations for wave, floating offshore wind and other floating structures projects around the globe.

Zoex Power completes third phase of wave energy trials (Video) – Offshore Energy

Aberdeen-based Zoex Power has concluded Phase III of its (Ordu) project, having collected three months of data and achieved technology readiness level (TRL) 7, with no incidents. The company said it retrieved the acoustic doppler current profiler (ADCP) from the seabed and lifted the arm, marking the completion of the current testing phase. Report writing is now underway ahead of the planned start of Phase IV next year. The project is supported by Innovate UK, Scottish Enterprise, and several industry partners, including Sealand Projects, UMBRAGROUP, the University of Strathclyde, and the Ordu Municipality. View the video on LinkedIn here.

Dolphin Activity Seen In a Global First for Marine Monitoring Technology – Marine Energy Wales

After seven months of data gathering, researchers have successfully recorded the first dolphin encounter using a pioneering combination of marine monitoring technologies. The minute long montage extracted from a half hour period of activity marks a significant milestone in efforts to safeguard marine wildlife during the development of Ynys Môn tidal energy scheme, Morlais. The breakthrough has come thanks to work carried out as part of the Marine Characterisation Research Project (MCRP), led by north Wales social enterprise, Menter Môn. For the first time sonar and audio equipment has been successfully combined with surface and underwater cameras to monitor marine mammals in real time. It is hoped that the technology, developed through a partnership between UK and US innovation teams and driven by Menter Môn, can now be prepared for commercial rollout.

Australian firm secures milestone payment under EuropeWave contract – Offshore Energy

Australian wave energy developer Carnegie Clean Energy has received a €351,471 payment under its EuropeWave contract, following the completion of the system integration review for the ACHIEVE program. The payment marks another milestone for Carnegie's work on wave energy technology development under the EuropeWave initiative. The ACHIEVE project is focused on developing Carnegie's fully submerged CETO wave energy converter (WEC), which captures energy from ocean waves through a tethered buoy system. EuropeWave integrates a pre-commercial procurement (PCP) program with the International Energy Agency's "stage-gate" process to optimize value for public procurement and accelerate wave energy technology development.

Wind Energy

The Crown Estate announces successful award to develop third floating wind farm in the Celtic Sea – The Crown Estate

Ocean Winds, the 50-50 joint venture between EDPR and ENGIE, is set to be awarded the rights for a third floating offshore wind site in the Celtic Sea by The Crown Estate, furthering the UK's clean energy transition and boosting the potential for new economic growth in the region. The news follows the Offshore Wind Leasing Round 5 auction in June which awarded rights for two of three sites for new floating wind farms to Equinor and Gwynt Glas, who both entered into agreements for lease for their respective floating wind farm projects in October. Following the auction, The Crown Estate stated it would ensure the delivery of the full potential capacity of up to 4.5GW available through Round 5 through deployment of a third site.

RWE completes installation of all recyclable blades at Sofia Offshore Wind Farm, and over half of all turbines – RWE

RWE has passed another major milestone at its Sofia Offshore Wind Farm, with the successful installation of all recyclable wind turbine blades. The completion of all 150 recyclable blades – 50 sets of three blades are installed per turbine - is a first in the UK, marking the first ever large-scale deployment of this innovative technology at an offshore wind farm in the UK. The milestone follows hot on the heels of another achievement, with the project having well passed the halfway point of offshore wind turbine installation 195km off the UK's East coast. So far, 62 of the project's 100 Siemens Gamesa 14 megawatts (MW) wind turbines have now been installed, each towering 252 metres above the waves. It means the project remains on track to reach commercial operation in September 2026.

Scotland's first commercial windfarm has been supercharged to deliver more clean energy and a bumper boost to community benefit funds. – **Scottish Power Renewables**

ScottishPower Renewables' Hagshaw Hill kickstarted Scotland's wind revolution when its turbines started turning in 1995. Thirty years on, it's undergone an upgrade that enables it to generate five times more clean power from fewer turbines. Repowering is the fastest, most efficient way to boost renewable capacity and hit Scotland's 2030 onshore wind targets by using sites that are already proven. The windfarm's 26 turbines have been replaced by 14 more powerful models, generating over 79MW of clean electricity – five times the output from just over half the number of towers - enough to power the equivalent of 57,000 homes. Every blade from the original turbines is being recycled by Plaswire into new materials for construction – replacing concrete, timber and plastics - proving renewable energy can be circular from start to finish.

Denmark Opens 2.8 GW CfD-Based Offshore Wind Tender – **Offshore Wind**

The Danish Energy Agency (DEA) has launched tenders for three offshore wind areas that can house a minimum of 2.8 GW of installed capacity. The process is based on a Contracts for Difference (CfD) model, which the DEA says will increase the likelihood of qualified bids, following the tender launched last year through which the state did not receive any bids for the first three of the six offered sites. The sites are North Sea Central (Nordsøen Midt), Hesselø in the Kattegat and North Sea South (Nordsøen Syd). The deadline for bids for the North Sea Central and Hesselø is in the spring of 2026. The deadline for the North Sea South is autumn 2028. The DEA is offering a two-sided capability-based Contract for Difference (CfD) for each of the three projects, following a dialogue with the industry.

The World's Largest Wind Turbine Will Smash Previous Records – **Scientific American**

The world's largest wind turbine—currently being tested off the coast of China—has blades that are more than twice as long as a Boeing 777's wingspan. It can generate 26 megawatts (MW) of energy, more than double the global average for individual turbines. But its record is about to be smashed to smithereens: another offshore wind turbine that is twice as powerful has been announced by Ming Yang Smart Energy, a company based in southern China. With a capacity of 50 MW, this supersized structure is designed to float on the ocean's surface and can withstand typhoons, according to the company, which plans to start making the turbine later this year and to deploy it next year. Its megamachine will have not one but two sets of engines and blades, each capable of generating 25 MW of energy.