

# ACOUSTIC THERMOGRAPHIC OFFSHORE MONITORING (ATOM™)

## Core Values

Results-oriented environmental services

Respect for stakeholders, the public and our natural environment

Ethical work conduct and scientific integrity at all times

Safe and positive work environment

Pride, investment, and accountability through employee ownership

## Corporate Office

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## Nationwide Offices

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Vermont  
Washington

[www.normandeau.com](http://www.normandeau.com)

Data on birds and bats in the offshore environment is scarce, creating large data gaps for researchers and regulators. This results in uncertainty about the type and level of potential impacts on these species from offshore energy development, which creates challenges for environmental assessment and permitting.

ATOM™ was designed for offshore studies of birds and bats. It enables the species-level identification that is essential for species-specific regulatory drivers such as the Endangered Species Act and the Migratory Bird Treaty Act. ATOM™ can be used for preconstruction studies and postconstruction monitoring.

### What is ATOM™?

ATOM™ is a monitoring system for birds and bats at offshore project sites. It is designed for remote, self-powered operation on a large marine buoy or fixed platform, such as a wind turbine or meteorological tower.

ATOM™ collects thermographic, ultrasonic, and acoustic data and can be designed to continuously collect data, day and night, in all weather conditions, and in all seasons.

### ATOM™ Specifications

- Marine weatherized—Rugged housing and camera wiper system
- Multiple sensors—Two stereoscopic thermal cameras, acoustic microphone, and ultrasonic microphone
- Data storage—Single solid-state hard drive system with a compression system that can store one year of data
- Data transmission—Live data streaming and review within cellular network coverage
- System health checks—Status messages report on hard drive space, detectors, voltage, and temperature
- Remote login—Enables modification of data collection parameters

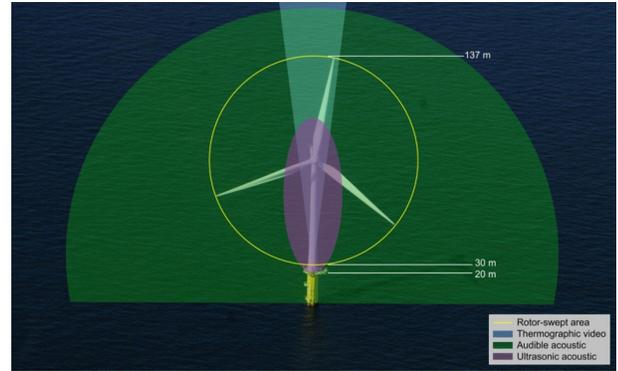


ATOM installed on a buoy

# (ATOM™), cont.

## Field of Detection

Originally designed to detect within the rotor swept zone of wind turbines (typically 200 m), ATOM™ collects acoustic data within that entire area and beyond as well as ultrasonic and thermographic data in a significant portion of that area. Thermographic images can be detected at greater distances depending on the size of the wildlife.

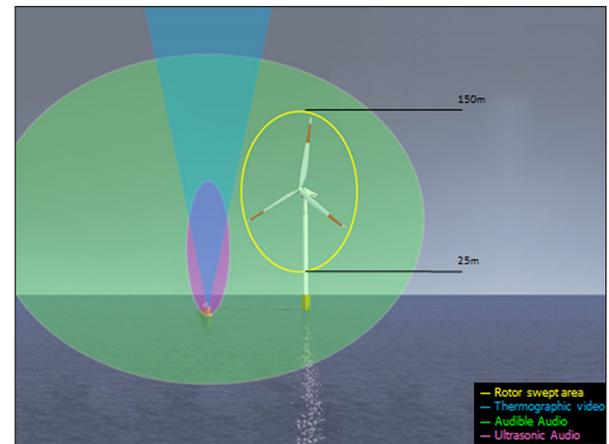


ATOM™ field of detection on a turbine

## Data Collection and Species Identification

For bats, the species, direction, speed, and altitude can be determined with the thermographic and acoustic data collected by ATOM™.

For birds, the species is identified by sound and measurements taken from the thermographic data. Each thermographic record includes the month, timestamp, altitude, direction, and speed. The thermographic and acoustic data together can determine how many birds are in a flock along with the date, time, and season.



ATOM™ field of detection on a buoy or platform

## Type of Information Collected by ATOM

	Thermographic (Birds and Bats)	Ultrasonic (Bats)	Audible (Birds)
Nightly Passage Rate of:			
Targets	Yes	Yes	Yes
Species or Taxon	Possible <sup>(a)</sup>	Yes <sup>(b)</sup>	Yes <sup>(b)</sup>
Daily Passage Rate of:			
Targets	Yes	NA	Yes
Species or Taxon	Possible <sup>(a)</sup>	NA	Yes <sup>(b)</sup>
Altitude	Yes	No	No
Speed	Yes	No	No
Direction	Yes	No	No
Size	Yes	No	No
Seasonal Variation	Yes	Yes	Yes

(a) Species or taxon specific identification may be possible when thermographic and sound time-stamps overlap or when species or taxon have distinct body forms and sizes.

(b) Species identification based on acoustics depends on call quality and ability of software or analysts to differentiate between similar calls of different species.