

# TECHNICAL DATA SHEET

## MERLIN SCADA Avian Radar Mortality Risk Mitigation System



### SUMMARY SPECIFICATIONS

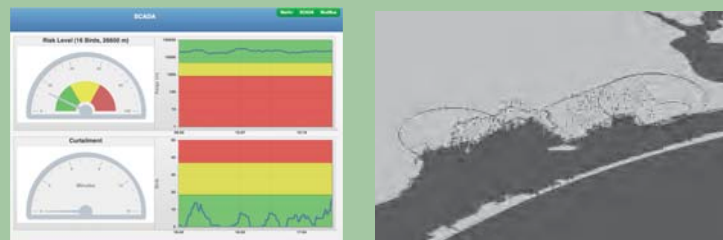
*subject to change without notice*

<b>Model:</b>	E-Series (Environmental)
<b>Application:</b>	Real-Time, radar-activated bird & bat mortality risk mitigation
<b>Configuration:</b>	Fixed or mobile radar installation with MERLIN SCADA wind farm control system interface
<b>Sensors:</b>	200 watt solid state Doppler Horizontal Surveillance Radar (HSR) & 25 kW Vertical Scanning Radar (VSR); Frequency Diversity processing option
<b>Operation:</b>	Simultaneous horizontal and vertical bird detection of migratory birds, raptors & bats with real-time analysis of flight paths, altitude, characteristics, passage rates and environmental conditions against mitigation rule sets
<b>Operating Range:</b>	HSR 2-6 miles, 360 degrees around the site with 24 degree AGL detection from ground level & above; VSR 0.75-3 miles with 24 degree beam width & detection from ground level to 15,000 ft AGL
<b>Power:</b>	110/220 vAC, 60/30 amps service with UPS back-up & power conditioning (30 minutes); optional auto-start single or dual 6 kW diesel generator & fuel tank to support 10-20 days 24-7 operation
<b>Network:</b>	TCPIP with MODBUS & OPC protocols via fiber optic network for windfarm system control via interface with Supervisory Control and Data Acquisition (SCADA) system



**ABOVE:** MERLIN SCADA installation at the Iberdrola Penascal wind farm in Texas, USA (operating since 2009)

**MERLIN SCADA-M** for coastal migratory bird risk mitigation (below right); Operator user interface with current risk status (below, left)



**(Right) MERLIN SCADA-R** interface for raptor mitigation using turbine centric model that idles individual turbines when proximate risk is detected; each turbine is assigned a color-coded risk value (El Pino wind farm, Spain)



MERLIN SCADA is the world's only radar-based wind farm risk mitigation system and provides continuous monitoring and automatic activation of mitigation measures to reduce mortality risk for migratory birds, resident birds, raptors and bats. The system applies rule sets programmed to respond to a variety of risk conditions in real-time activating mitigation measures that include operator alerts, turbine idling and activation of deterrent devices (long range bioacoustic and laser based).



DeTect provides advanced radar technologies and expert support to wind energy developers, owners and consultants for bird and bat survey, mortality risk assessment, monitoring and risk mitigation for projects worldwide that includes:

- NEXRAD pre-screening site assessment
- Bird & bat radar systems - terrestrial and offshore
- Data processing, analysis & reporting
- Bird & bat mortality risk analysis
- Risk mitigation radar systems
- Public meeting support & technology consulting

### Bird & Bat Radar Technologies from DeTect:

DeTect is the developer and manufacturer of the most advanced and proven radar systems available for wind energy project bird and bat survey, risk assessment, monitoring and realtime risk mitigation with over 90 systems operating worldwide. The technology was originally developed for the US Air Force and NASA and is highly automated providing unattended 24-7 collection of high quality data on bird and bat activity at proposed windfarm sites that can be used to develop detailed preconstruction risk projections and mitigate risk at operating wind farms. DeTect provides full operational and technical support to wind farm owners and consultants that includes system deployment, operation, user training, data processing, analysis, reporting and QA/QC. Staff specialists include highly experienced radar ornithologists, avian biologists and statisticians that comprise the most experienced team of experts in remote sensing of birds and bats in the world with specific expertise in design, construction and operation of bird/wildlife detection systems for realtime risk management.

### BirdMap™ NEXRAD Pre-screening Risk Assessment:

BirdMap™ is a GIS-based system that uses processed radar data from the US NEXRAD weather radar network to provide current and historical avian population density and seasonality data for the continental US, Alaska and Hawaii, including most coastal and offshore resource areas. BirdMap incorporates public and proprietary databases on habitat, threatened and endangered species, roost sites, hibernacula, bird and bat distribution, and refuges

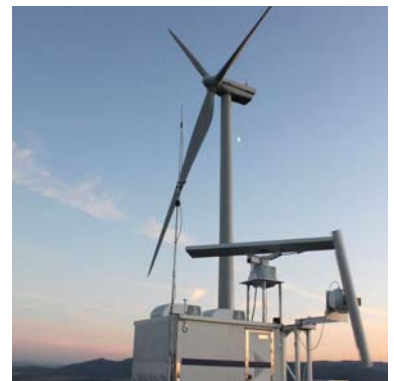


along with relevant correlation issues such as wetlands, weather and visibility to provide preliminary evaluation of a proposed windfarm site. DeTect maintains the largest database in the world on bird and bat activity that includes over ten years of bird density and migratory data for the US. BirdMap™ provides a unique

resource for conducting a low cost “screening” assessment of proposed wind energy development sites to assist in site selection prior to investment in long term planning studies, radar and field studies, and design.

### MERLIN Avian Radar System:

MERLIN surveys provide the most cost effective, scientifically sound, and conclusive method for collection of high quality, statistically superior data on bird and bat movements at proposed wind turbine project locations for both onshore and offshore wind turbine installations. DeTect has extensive expertise and experience that includes the only staff with experience on conducting major multiyear, continuous avian radar studies for landbased and offshore windfarms. MERLIN uses state-of-the-art radar and computer techniques developed specifically for detecting and tracking the unique behavioral characteristics of birds and bats to collect data continuously and automatically generate highly accurate, detailed datasets for quantitative analysis. MERLIN is fully remotely viewable and controllable and operates 24-7 unattended. Data is also archived providing a permanent record for each project. MERLIN's options for real time display and the automatic reporting feature generate detailed data in both tabular and graphical formats quantifying the numbers of birds passing through the rotor swept area allowing precise calculation and determination of bird and bat mortality risk.



### MERLIN SCADA Mortality Risk Mitigation System:

For operating windfarms, MERLIN SCADA™ functionality allows the MERLIN system to provide advance “early” warning to windfarm operators of approaching migratory or resident birds and bats under mortality risk conditions. MERLIN SCADA™ can operate autonomously, automatically sending requests to idle turbines when risk conditions are detected by the system, and sending requests to restart the turbines when the risk has abated. The MERLIN SCADA™ system can also be configured to mitigate mortality risk for raptors by monitoring the airspace above turbines, evaluating the risk of collision for each target and automatically stopping the turbines when raptor activity consistent with mortality risk is detected. The MERLIN SCADA™ operating software is fully compatible with most wind farm SCADA (Supervisory Control and Data Acquisition) systems.