



At *Hamer Environmental*, we use the latest in advanced technologies to study wildlife interactions for wind energy projects, transmission lines, and communication towers. Our combination of experience and the use of state-of-the-art technology enable us to provide our clients with the environmental solutions they need to successfully develop their projects while minimizing impacts to the environment.



## LOOK AT OUR SERVICES

### ★ Siting issues and project feasibility

*Early stages of project development:*

- Scientific research and literature reviews
- Federal and state environmental permitting
- Site screening
- Species inventories
- Stakeholder consultations
- Mitigation solutions

### ★ Technical and scientific surveys

*Overview of our multi-disciplinary skills:*

- Before-and-After-Control-Impact (BACI) studies
- Identification of migration flight routes
- Avian radar studies
- Bat echolocation surveys and studies
- Avian point counts
- Botanical surveys
- Night-vision and infra-red surveys
- Natural community and habitat assessments
- Assessment of impacts and disturbances to wildlife
- Mortality monitoring

### ★ Modeling and statistical analysis

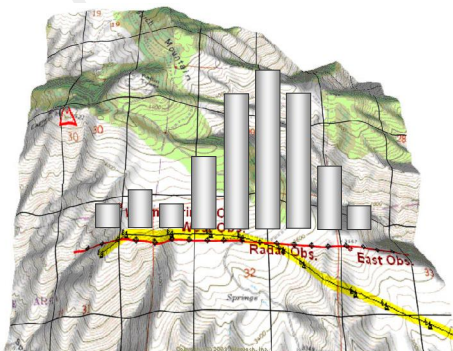
*Models and analyses are applied to assess:*

- Collision risk
- Survival rate
- Wildlife movements
- Habitat loss
- Habitat selection and suitability
- Model parameter sensitivity

### ★ Geographic Information System

*GIS and cartography are used in every step of our studies:*

- Aerial photo interpretation
- Habitat typing
- Habitat fragmentation analyses
- GPS data generation
- Migratory and flight path corridor mapping



Presentation of results on a map using GIS, showing bird passage rates at a proposed transmission line.





## Ornithological Radar

Wind turbines, cell towers, transmission lines and other man-made structures face increasing scrutiny regarding their potential impacts on bird and bat populations. To examine whether these projects have a significant biological effect on birds and bats, rigorous evaluations for these species are required. To assist clients in addressing these ecological concerns, we design and conduct avian and bat surveys along with other studies to meet permitting requirements and produce defensible results, using the latest research techniques, such as ornithological radar.



Our radar systems are fully adjustable and highly mobile. They can be set up almost everywhere, from a self-contained and climate-controlled lab to a 4WD vehicle.

*Hamer Environmental* is one of the pioneers using radar technology for avian and bat research. We have developed and refined our survey methods throughout the years with great success. Radar technology can be used in a variety of situations:

- Assess and monitor impacts to migratory birds, threatened seabirds.
- Examine population size and trends, densities and behaviors of seabirds at nesting colonies (for offshore and coastal sites).
- Identify flight corridors, nocturnal and diurnal migration rates, bird heights, ground speeds of birds and timing of migration.

## Examples of our radar experience

A sample of the ecological evaluations and avian impact assessment projects recently conducted by Hamer Environmental is listed below. Our latest avian impact studies include resident and migratory bird studies, breeding bird surveys, and rare species evaluations.

### Wind energy

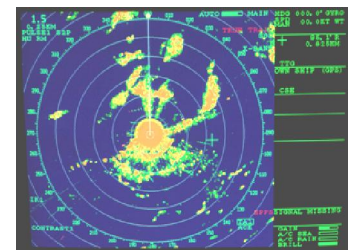
- 2009, Lake County (Oregon), GreenWing Energy
- 2008-2009, Pacific County (Oregon), INVEnergy
- 2007-2009, Oahu (Hawaii), Hawaii Electric Co., Shell WindEnergy
- 2007-2009, Pacific County (Washington), Energy Northwest
- 2007, Grayland (Washington), Coastal Community Action Program
- 2006-2008, Maui, Hawai'i (Hawaii), Shell WindEnergy
- 2005, Langlois (Oregon), Horizon Wind Energy
- 2001-2002, Wenatchee (Washington), Douglas County PUD

### Transmission lines and communication towers

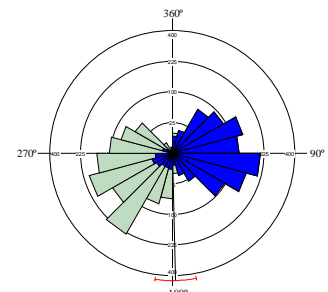
- 2008-2009, Clallam & Skagit Counties (WA), Verizon, Cascadia PM
- 2007-2009, Hawai'i, Oahu, Kauai (Hawaii), Verizon, DAGS
- 2007, Kauai (Hawaii), Kauai Island Utility Cooperative
- 2005-2007, Wenatchee (Washington), Chelan County PUD

### Conservation studies

- 2009, Fort Lewis, (Washington), The Nature Conservancy
- 1997-2009, Santa Cruz (California), California Department of Fish and Game
- 2003-2005, Eugene (Oregon), Bureau of Land Management
- 2002-2003, Grand Ronde (Oregon), Tribes of Grand Ronde
- 2000-2003, Channel Islands (California), American Trader Oil Spill Trustee Council
- 1997, Eureka (California), California Department of Transportation
- 1997, Darrington (Washington), US Forest Service
- 1992, Arcata (California), Simpson Timber



View of a radar screen displaying movements of birds on a horizontal cross-section.



Flight directions and abundance of birds at dawn (light green) and dusk (blue) at a proposed wind energy site.

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