

# Using Public Data and Satellite Imagery to Construct Natural Resources Management Databases: Wind Turbine Installations in Nevada and California



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## Introduction:

- US Department of Energy aims to reach 20% (300 GW) of domestic energy needs through wind by 2030 (DOE, 2008).
- To meet this goal, related infrastructure needs to expand by 400% (DOE, 2013).
- Turbine related avian mortalities are estimated to be between 140,000 - 328,000/year (Loss, 2013).
- Resource managers require accurate spatial information to advance research on how turbine placement affects natural resources & wildlife.
- Public databases of energy developments (e.g., FAA-DOF, FAA OE/AAA, BLM listings) are often inaccurate or incomplete and need to be quality controlled.
- Our goal was to develop an up-to-date, complete and quality-controlled database of industrial wind turbine locations in California & Nevada.

## Datasets used:

- FAA Digital Obstacles File (DOF): federally managed database with spatial & attribute information for known obstacles to aviation users (FAA, 2013).
- FAA Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) archive: another FAA maintained aviation obstacles database.
- Bureau of Land Management (BLM) priority wind energy facilities: posted on BLM website, contains links to proposed project descriptions.

## Methods:

Initial turbine locations obtained from the FAA & BLM datasets.

Turbine locations exported as KML files & visually checked for accuracy using google earth imagery.

Inaccuracies were corrected in the base dataset of turbine locations

Corrected dataset was then exported as a feature class to it's state database.

Database posted for public use at: [www.katznerlab.com/wind-energy](http://www.katznerlab.com/wind-energy)

## Results:

- We validated locations of 11,180 turbines in CA and 83 turbine in NV.
- Visual inspection showed that the FAA DOF, FAA OE/AAA & BLM databases were incomplete and that many individual coordinate sets were inaccurate.
- Errors:
  - Large spatial shifts (up to 100 m) evident in some turbine locations.
  - Presence/absence errors of individual turbines due to oversight or incomplete information.
- We geocoded thousands of additional turbines that appear to have an above ground height of less than 200' (~61m).
  - FAA datasets only include potential flight obstructions >200'



Study Area: Our team created wind turbine databases for both California and Nevada



The purple points above mark the original locations of the FAA DOF file turbines. The orange points show our corrections.



White Tailed Sea Eagles (*Haliaeetus albicilla*) flying near wind turbines

## Conclusion:

- As energy development grows, resource managers require a better understanding of wind turbine impacts on wildlife ecology.
- This requires accurate spatial information describing currently active sites.
- Quality controlled databases will require continual maintenance as new information and updated imagery become available.
- Existing databases (FAA, BLM) are an important foundation for this work, but need to be quality controlled.

## Data Hosting:

The Nevada and California datasets are available for use in research and review. They can be found on Todd Katzner's lab webpage [[www.katznerlab.com/wind-energy](http://www.katznerlab.com/wind-energy)]. The data are in the NAD83 (EPSG:4269) geographic coordinate system and are stored in two state specific spatial databases each containing multiple subsets of wind turbine entries.

## Acknowledgements:

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