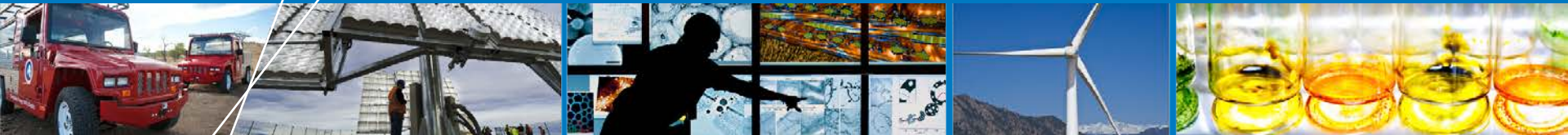


Non-Economic Obstacles to Wind Deployment: Issues and Regional Differences



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What Are the National Obstacles to Wind Deployment?

- Market conditions (low demand, low wholesale energy costs, expiring PTC)
- Transmission/grid interconnection
- Public impacts (sound, flicker, visual impacts) and related perceptions, including the prevalence of inaccurate information on impacts and benefits
- Environmental impacts (birds, bats, and habitat fragmentation)
- Aviation, radar, and national security
- Lack of stable policy (federal) and varying state policy.

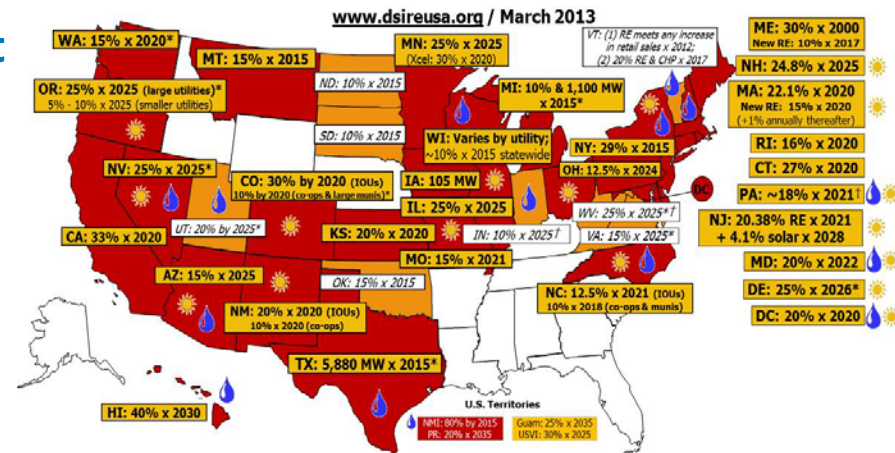
Other than being able to sell power and the transmission to transport energy to market, the real deployment obstacle is **risk**.

Regional Stakeholder Assessments

In 2011, six regional focus group meetings were convened to explore wind deployment obstacles and allow open discussions.

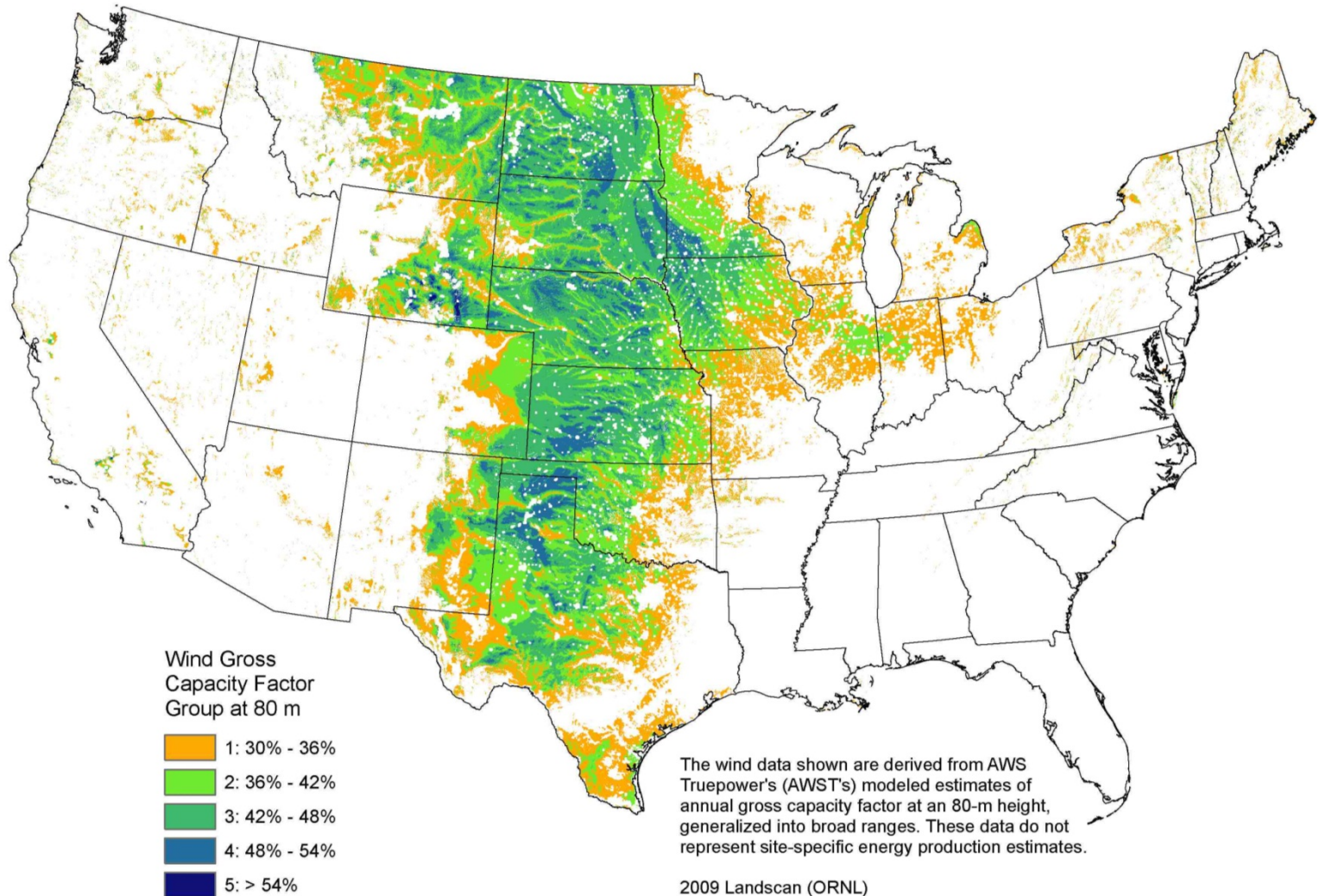
The 200 wind industry participants representing 35 states and territories identified the following challenges:

- Lack of state markets motivating expanded wind deployment (15%)
- Permitting and zoning issues (15%)
- Transmission issues (13%)
- Social acceptance issues (11%)
- Lack of funding for outreach activities (7%)
- Barriers to community and distributed wind (6%)
- Utility wind integration (5%)
- Permitting and access to federal lands/water(4%)
- Technical and regional competition (3%)
- Environmental impacts (2%)
- Poor understanding of wind resource (2%).



State Renewable Portfolio Standards that are built out or watered down combined with no national policy and low natural gas costs weaken the markets for even very low-cost wind.

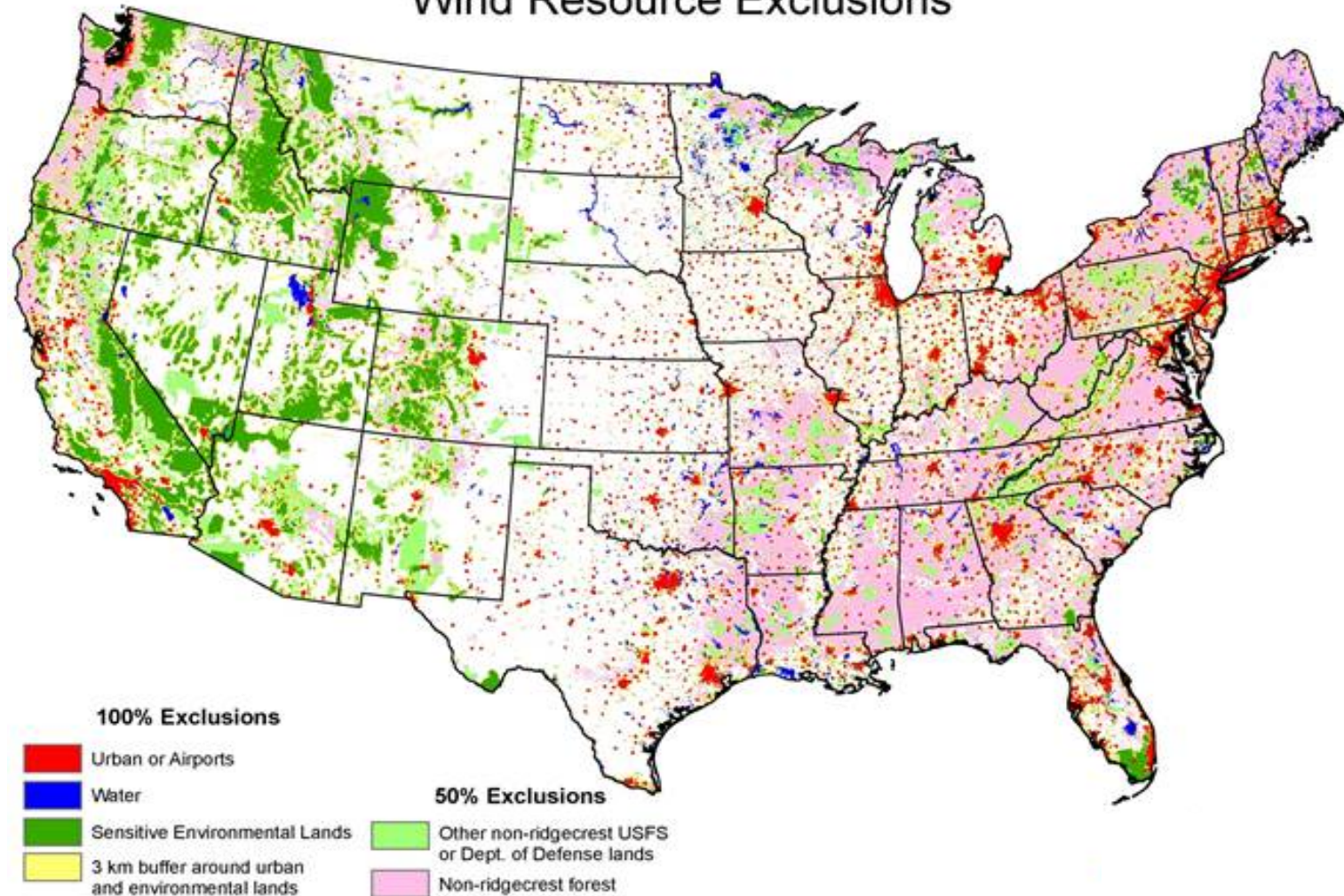
Baseline Capacity



10,500 GW of total available capacity using standard set-asides and restrictions based on Class II wind turbines

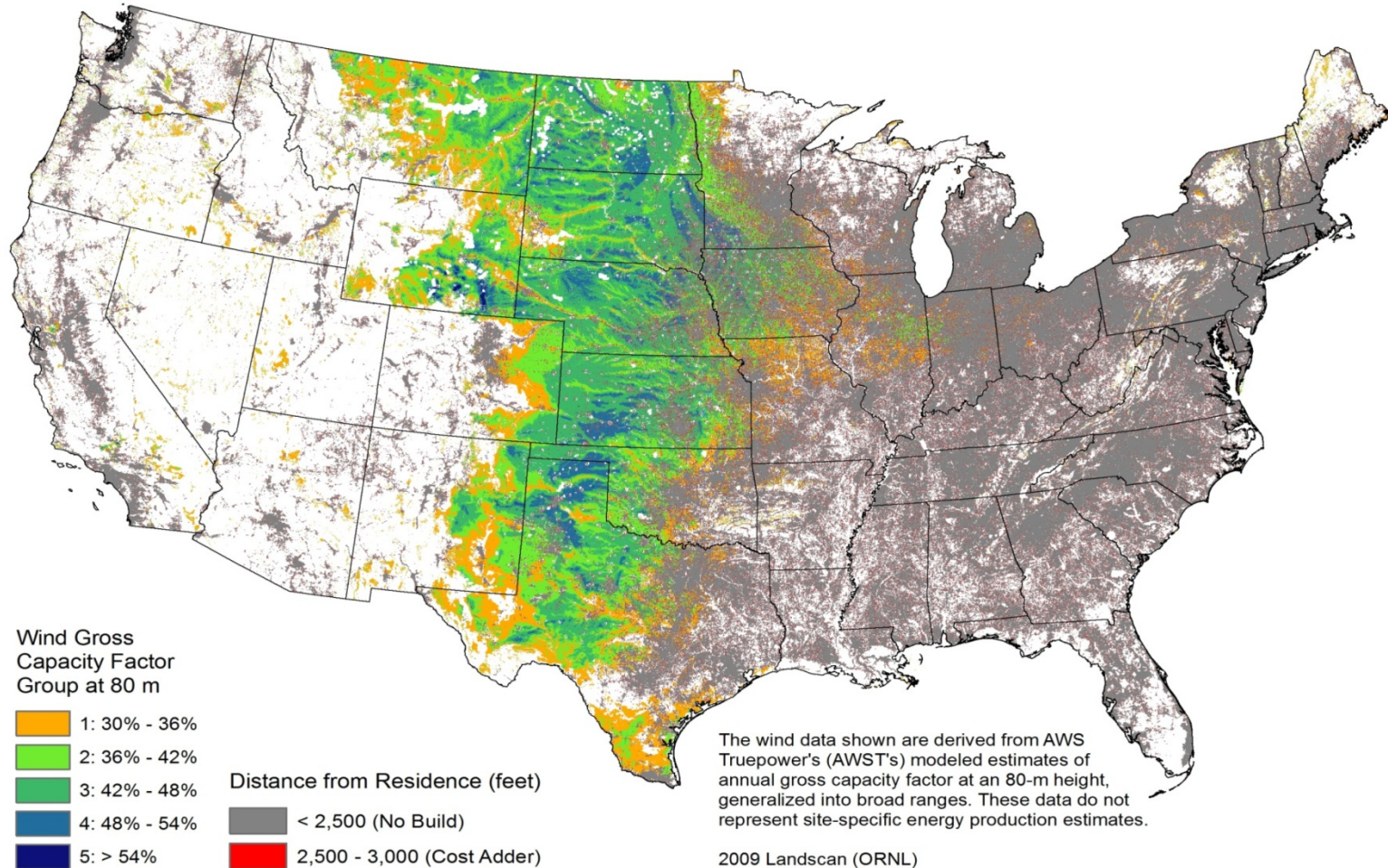
Standard NREL Wind Exclusions

Wind Resource Exclusions



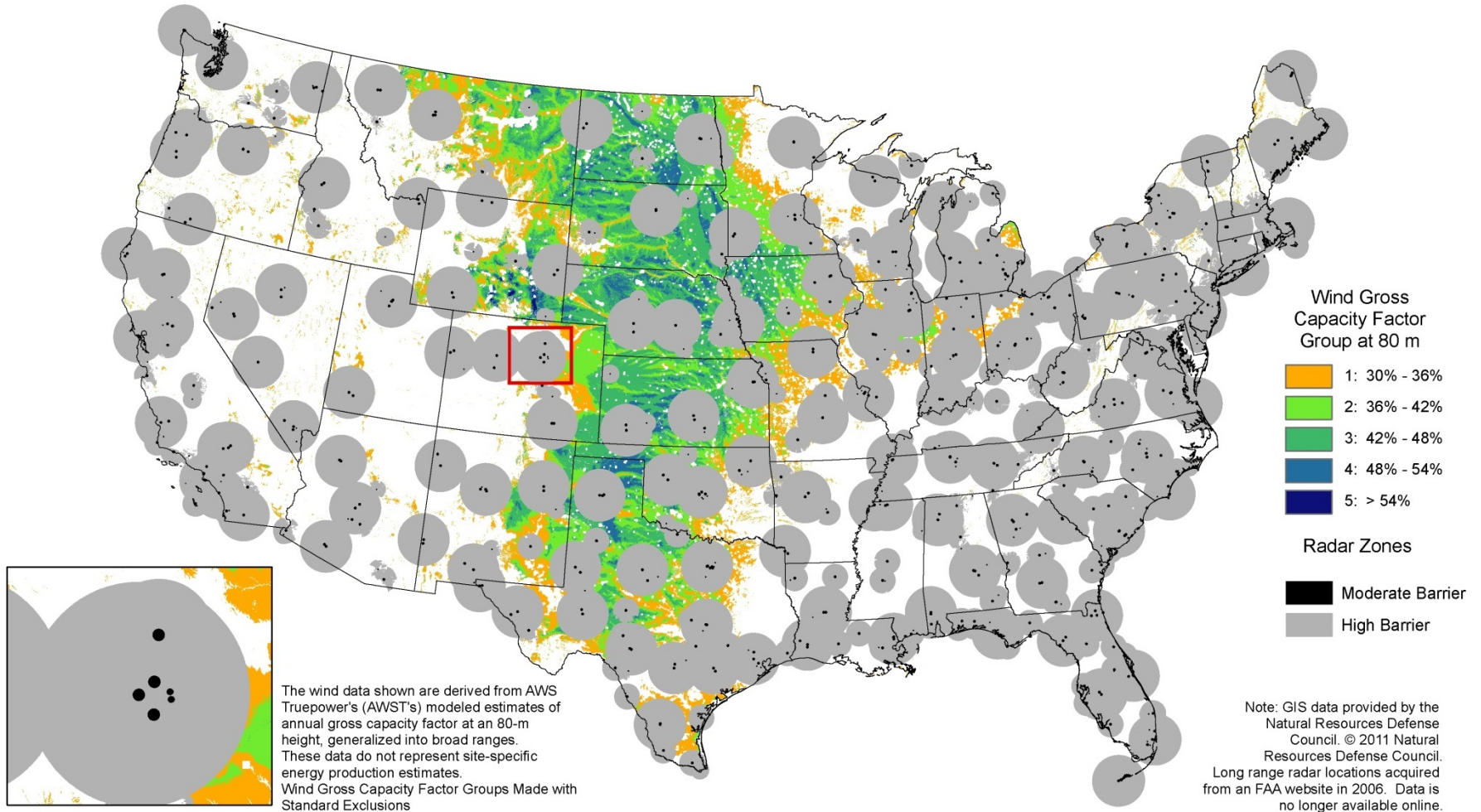
Although areas exist where wind development is not possible, there are competing uses almost everywhere. The issues are the cost and risk to address the competing use.

Public Engagement “High Impact”



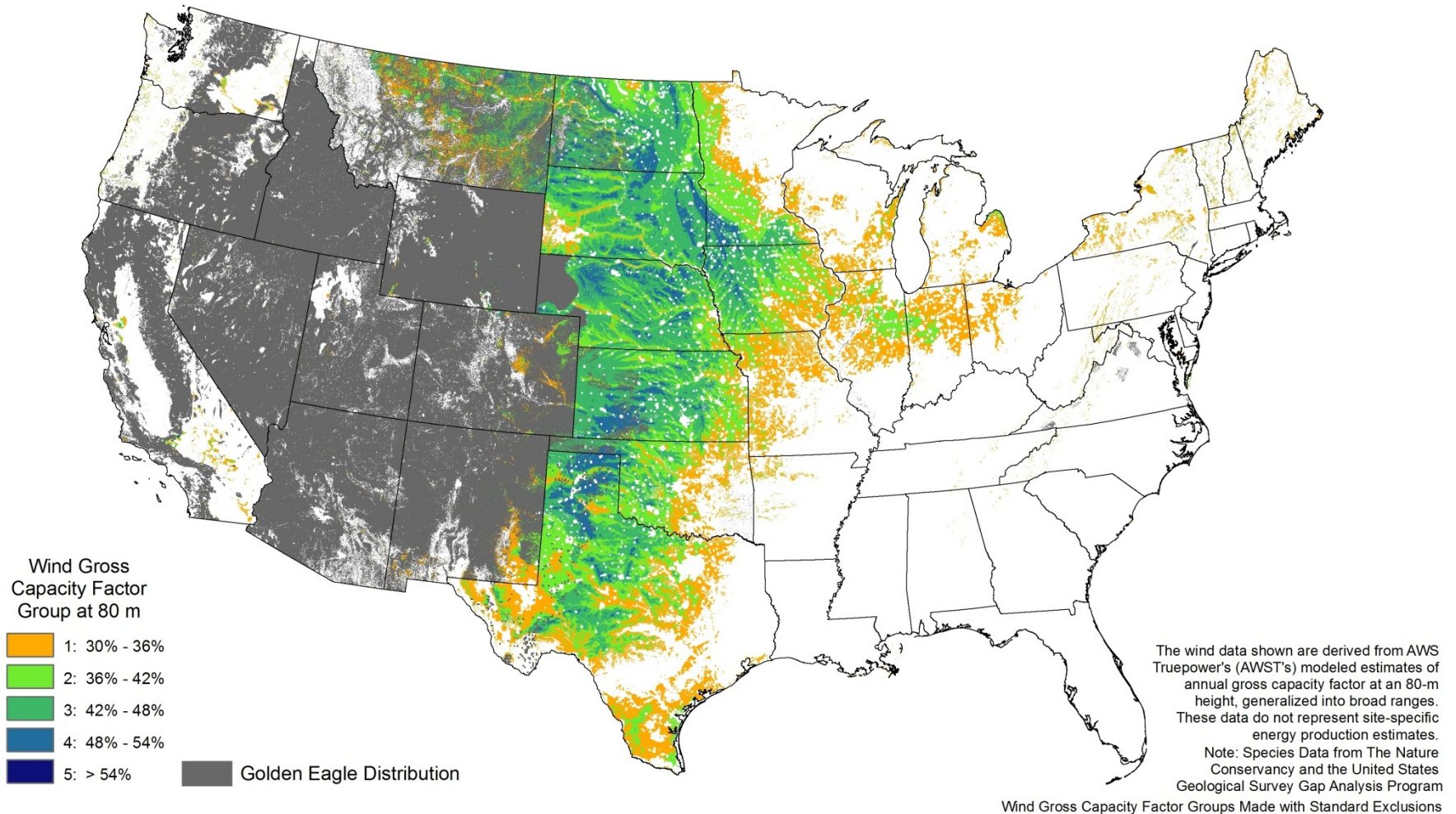
Gray areas represent locations within 2,500 feet of two homes to account for sound, visual impact, safety, and other issues.

Military and Flight Radar “High Impact”



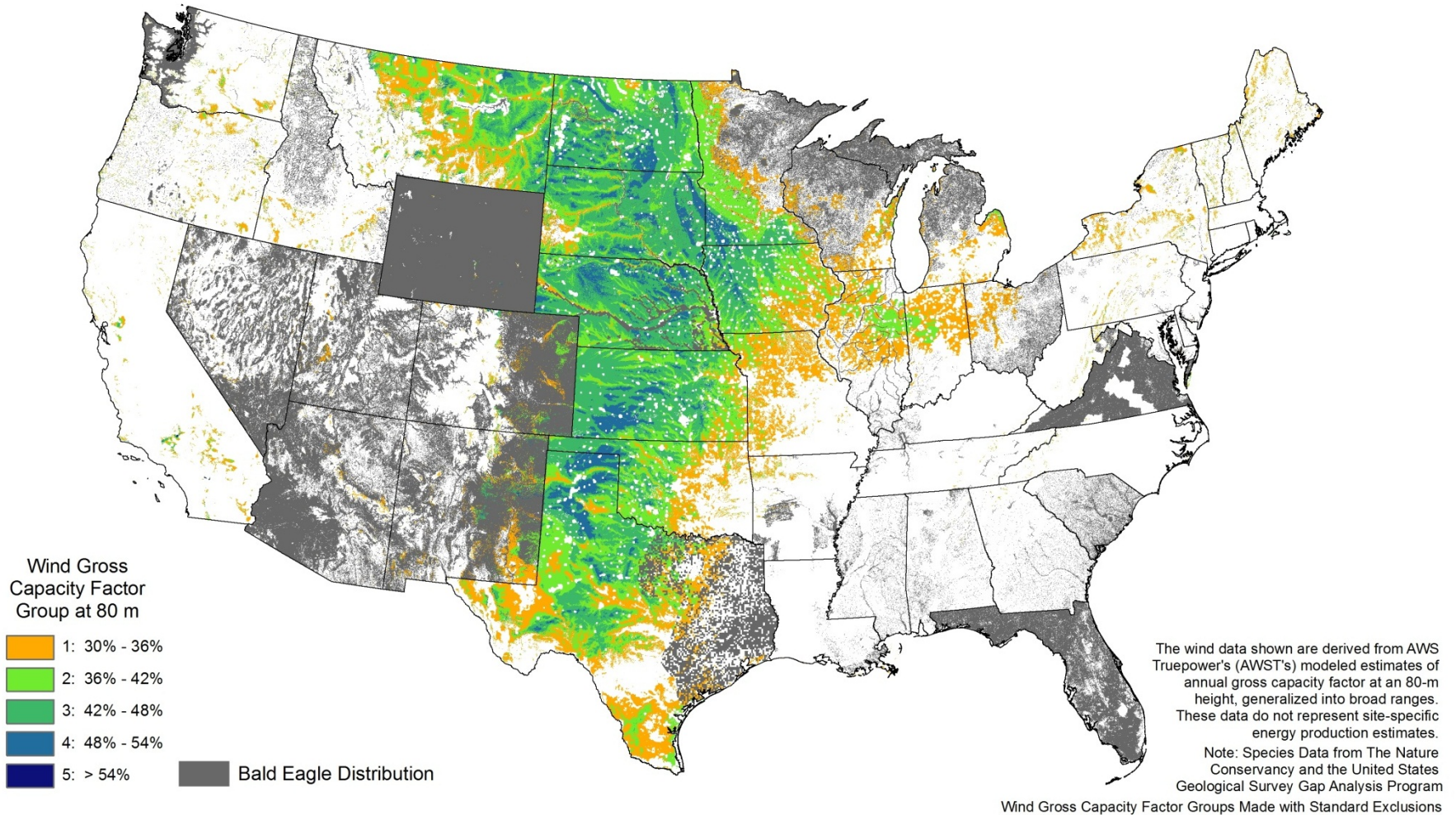
No-build and mitigation areas for radar systems based on READ Geodatabase and FAA public listings (controlled airspace and weather radar are not included).

Wildlife: Golden Eagle Habitat



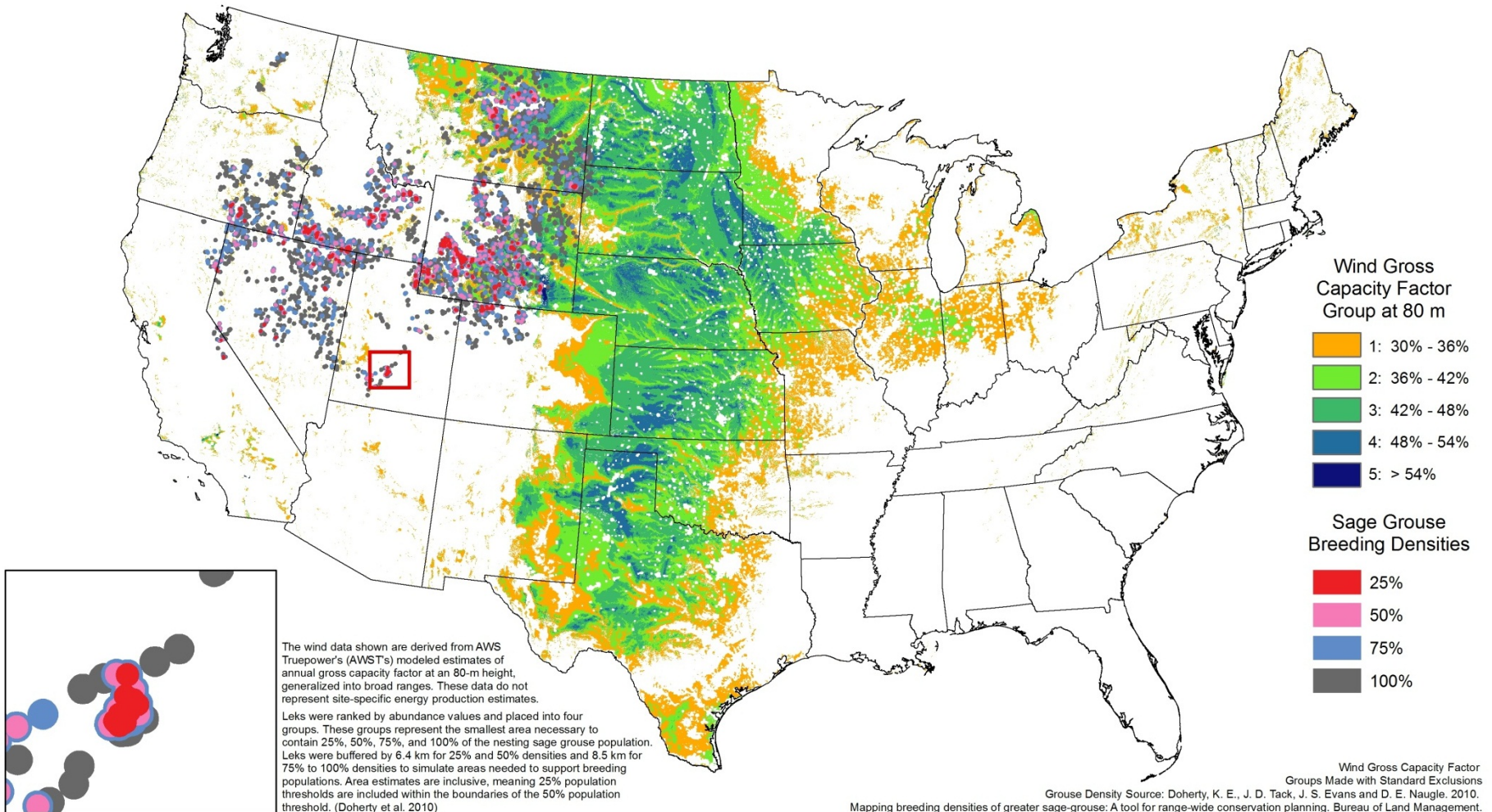
Golden eagle habitat: areas requiring additional consideration

Wildlife: Bald Eagle Habitat



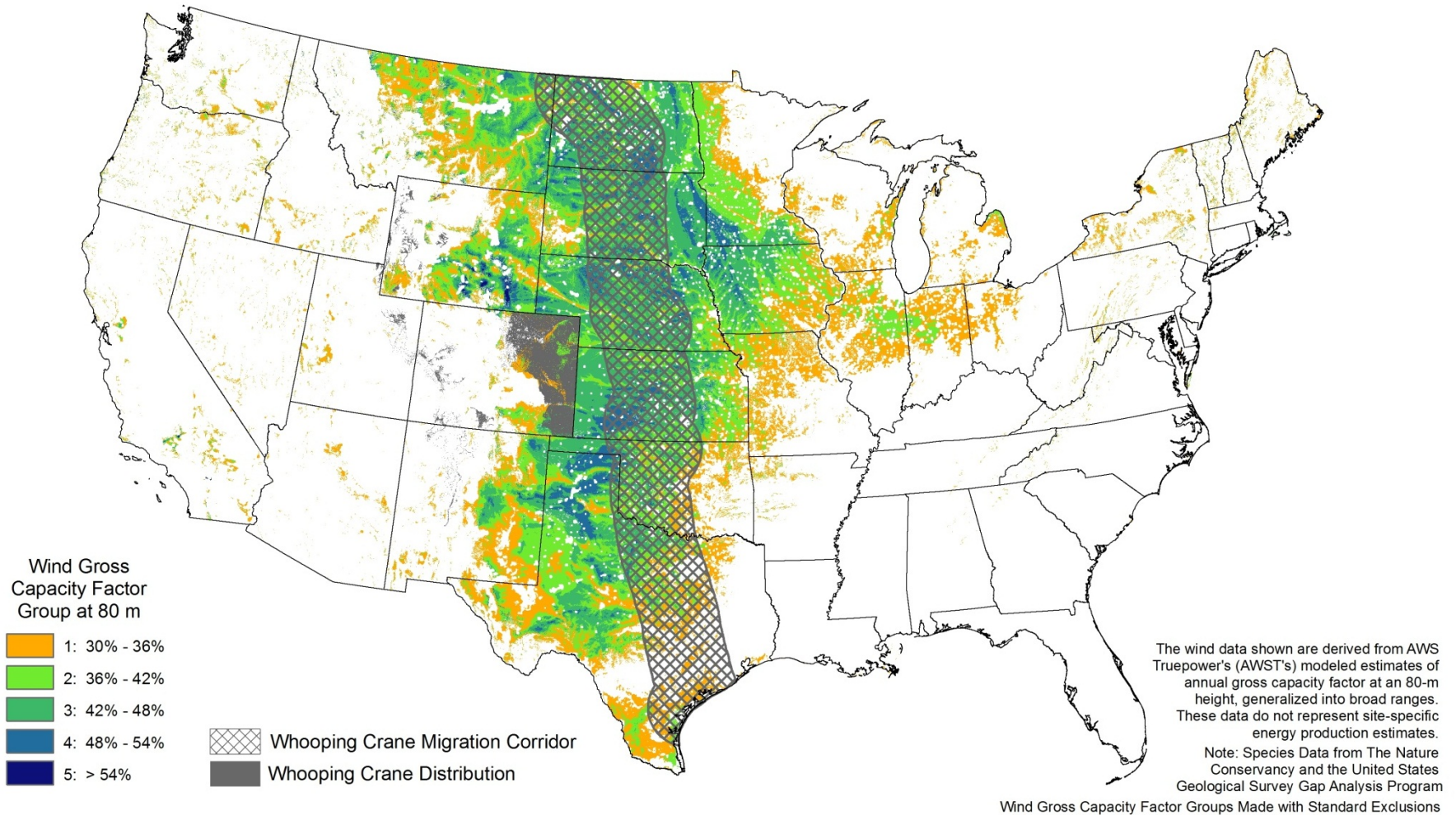
Bald eagle habitat: areas requiring additional consideration

Wildlife: Sage Grouse Habitat & Breeding Sites



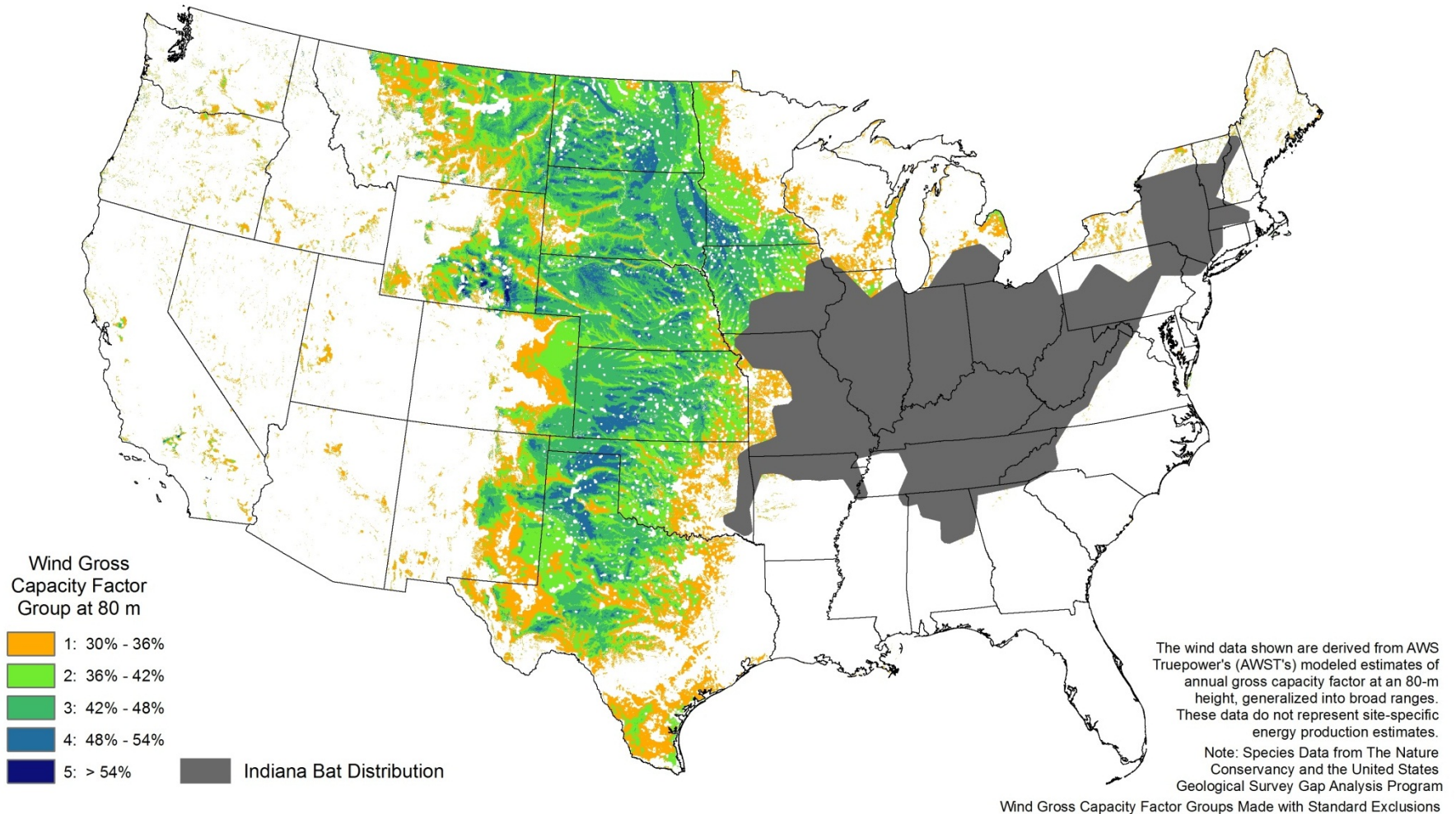
Sage grouse habitat and breeding sites: areas requiring additional consideration

Wildlife: Whooping Crane Habitat



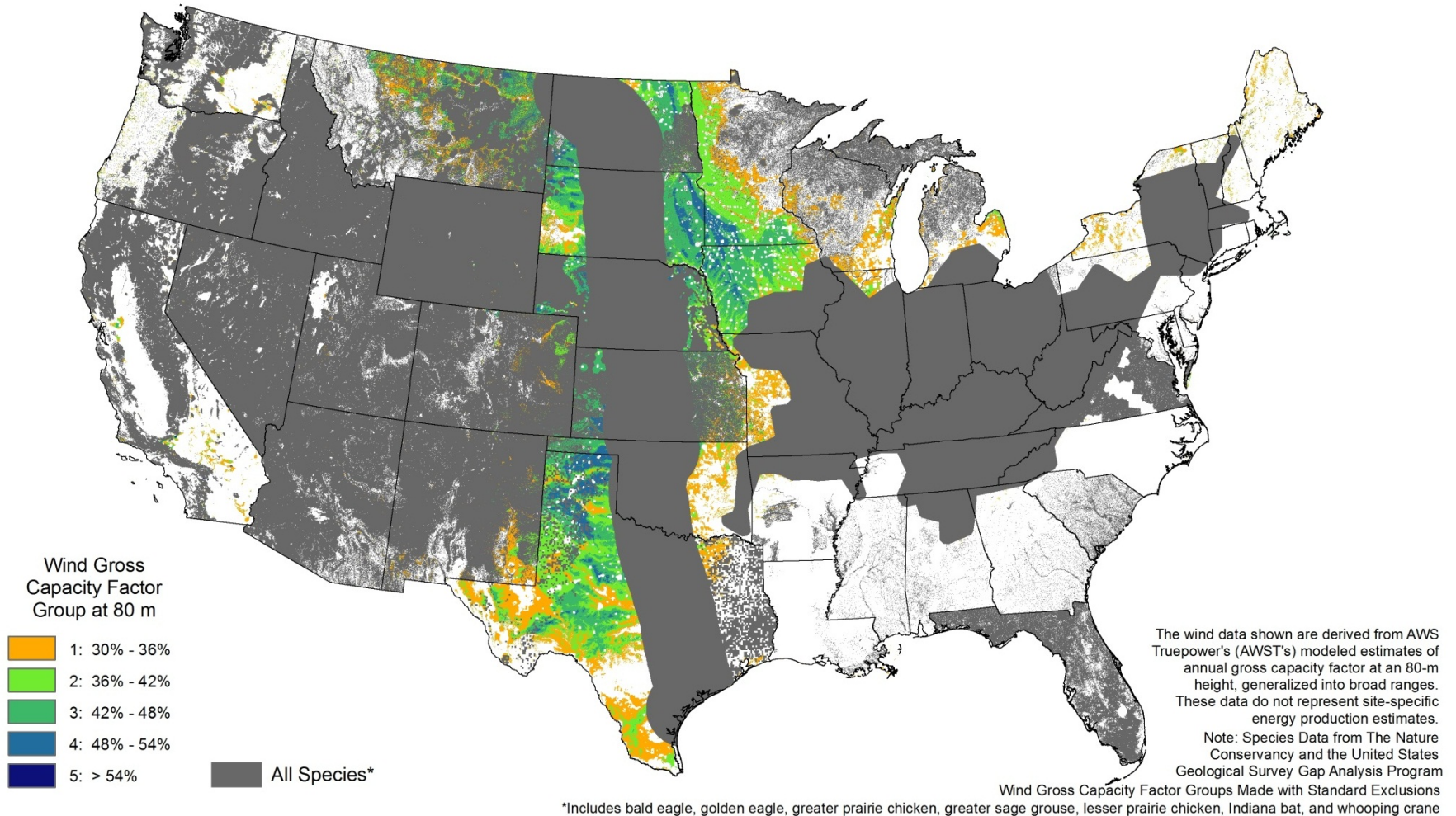
Whooping crane habitat and migratory corridor: areas requiring additional consideration

Wildlife: Indiana Bat Habitat



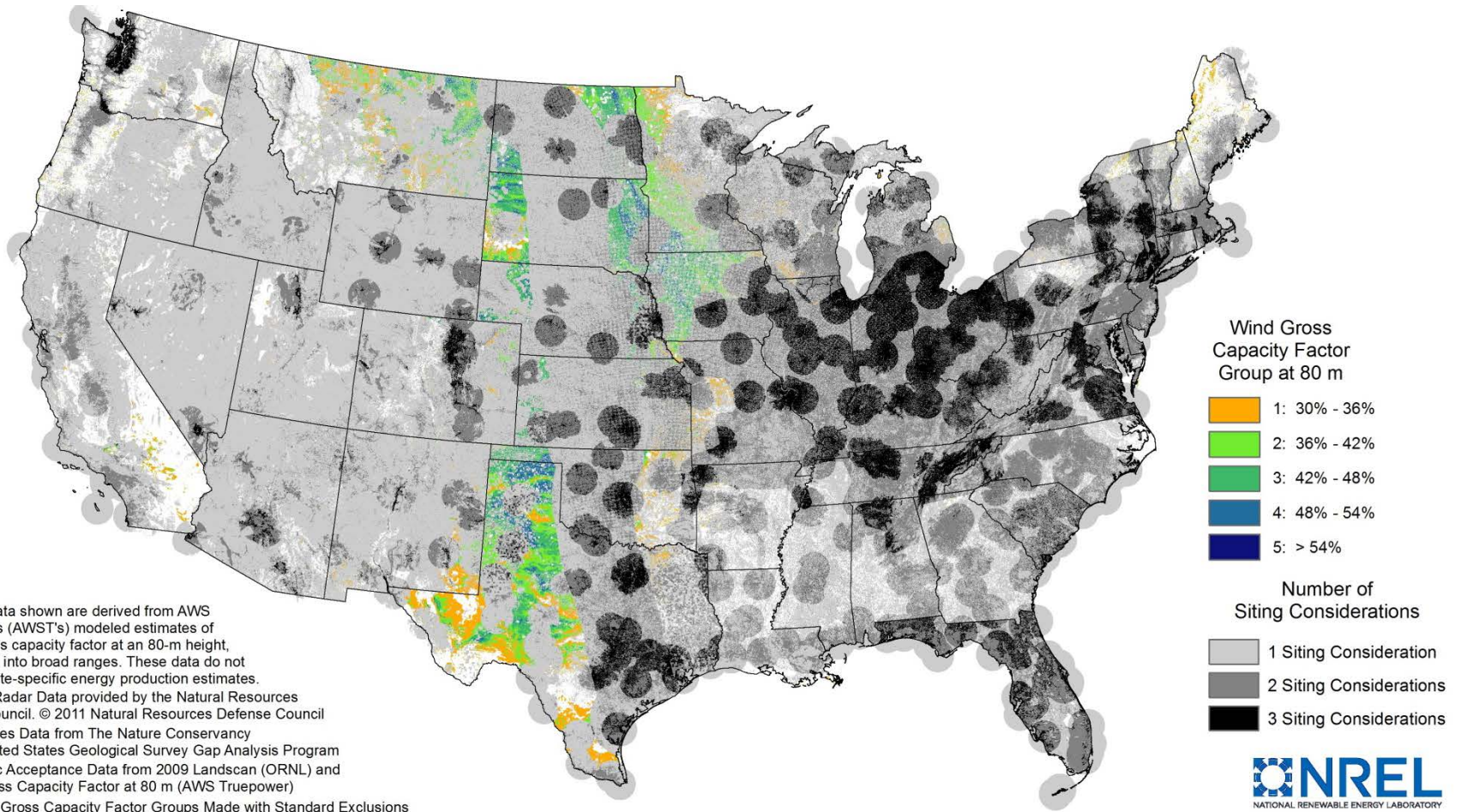
Indiana bat habitat distribution: areas requiring additional consideration

Wildlife Barriers: All Species



Combined wildlife impacts: areas requiring additional consideration

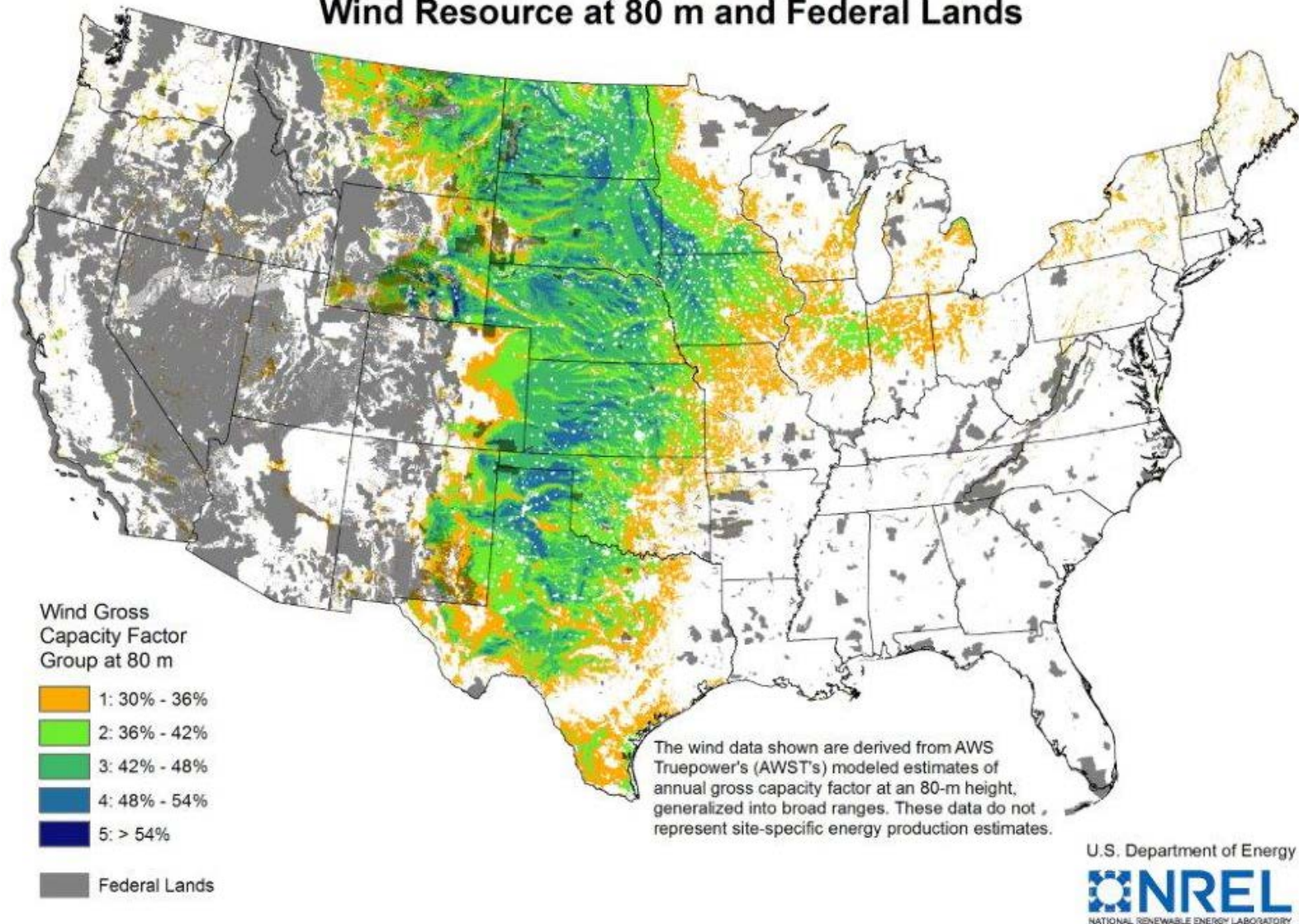
“High Impact” Cumulative Land Use Conflicts



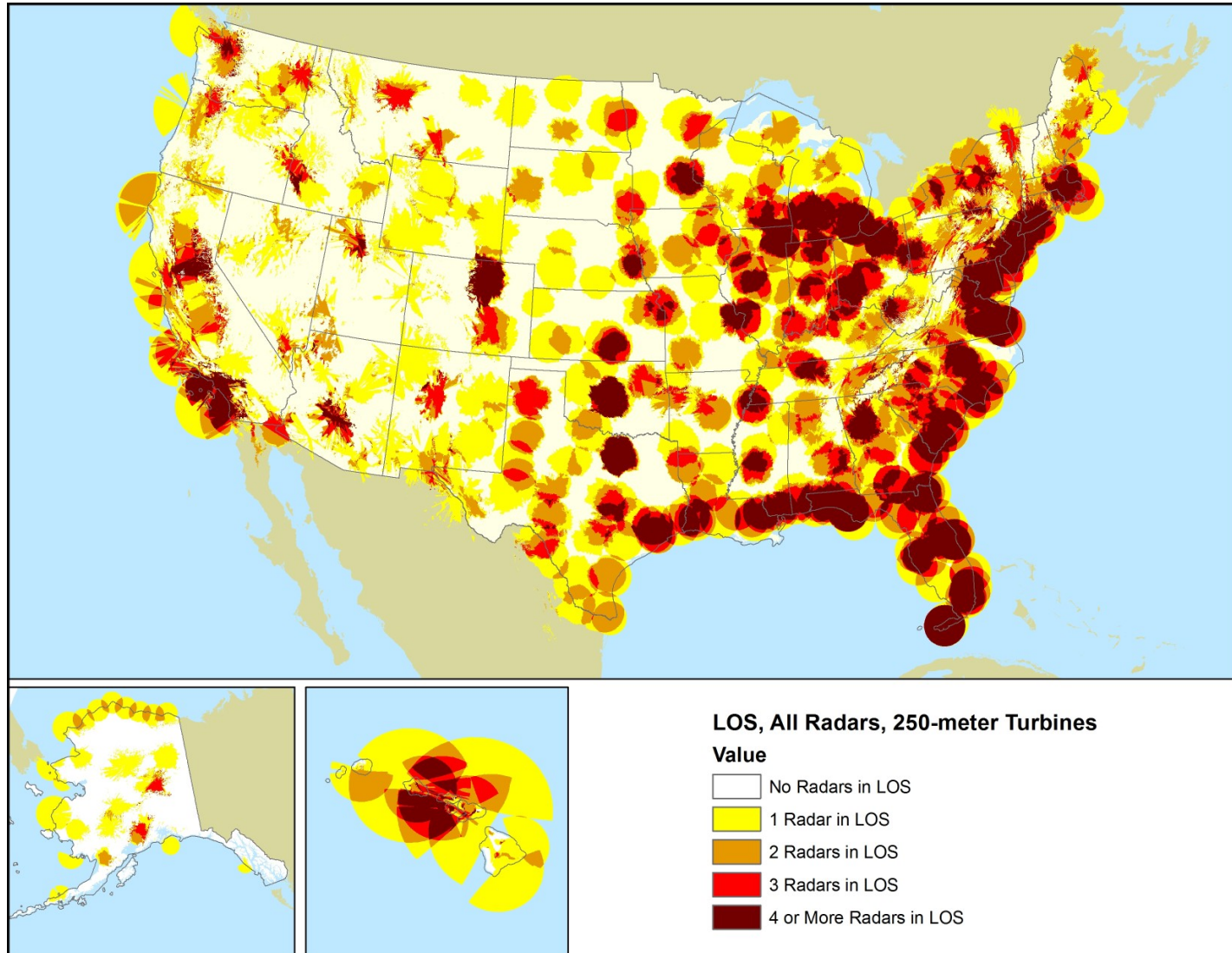
- Public engagement, radar, and initial wildlife considerations influence more than half of the available wind resource.
- These considerations don't necessarily stop deployment; they add risk, can drive up the cost for project development, can expand curtailment, and reduce the availability of good wind resource areas.

Public Lands Add Additional Complications

Wind Resource at 80 m and Federal Lands

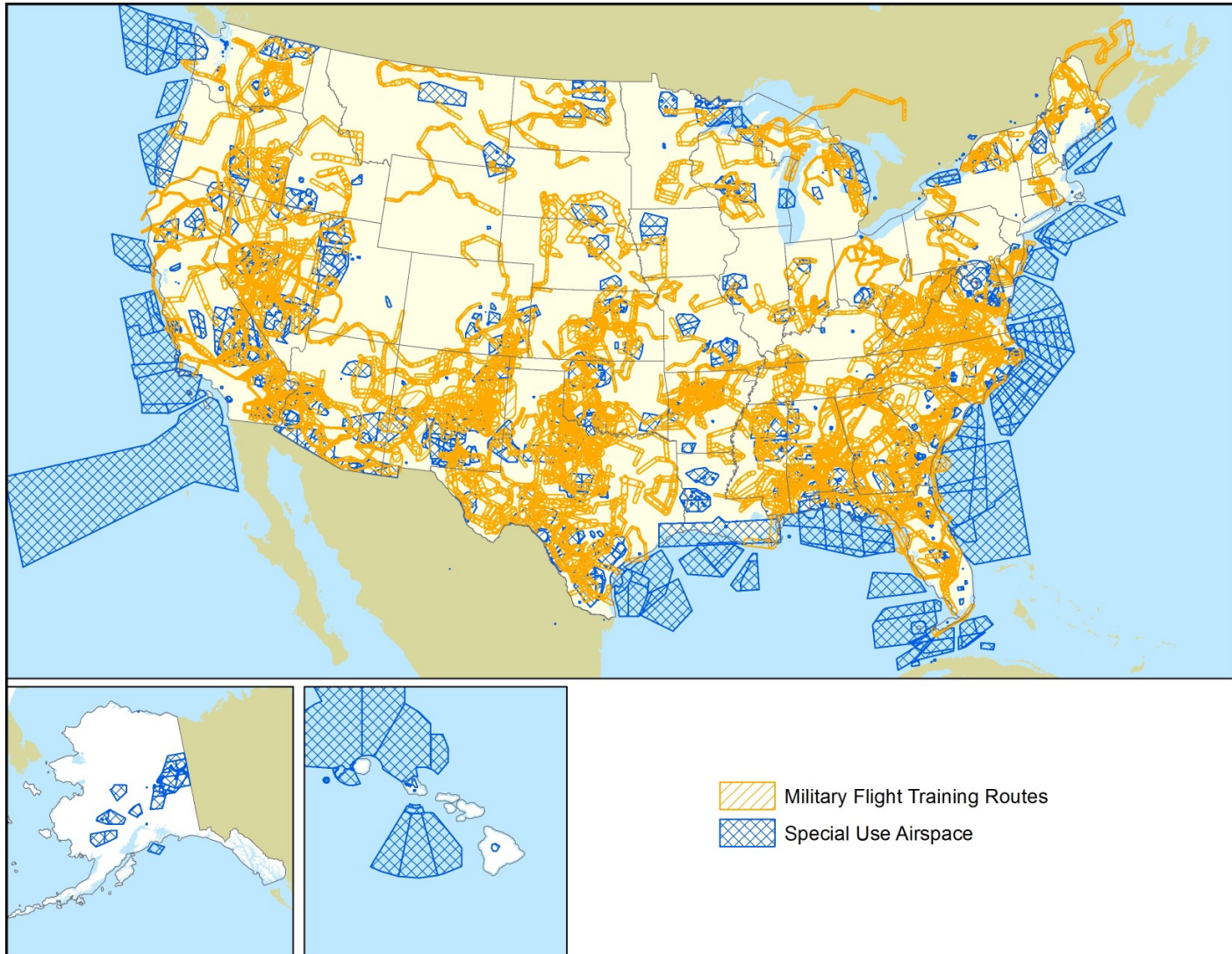


“All” Radar Locations (Military and Other)



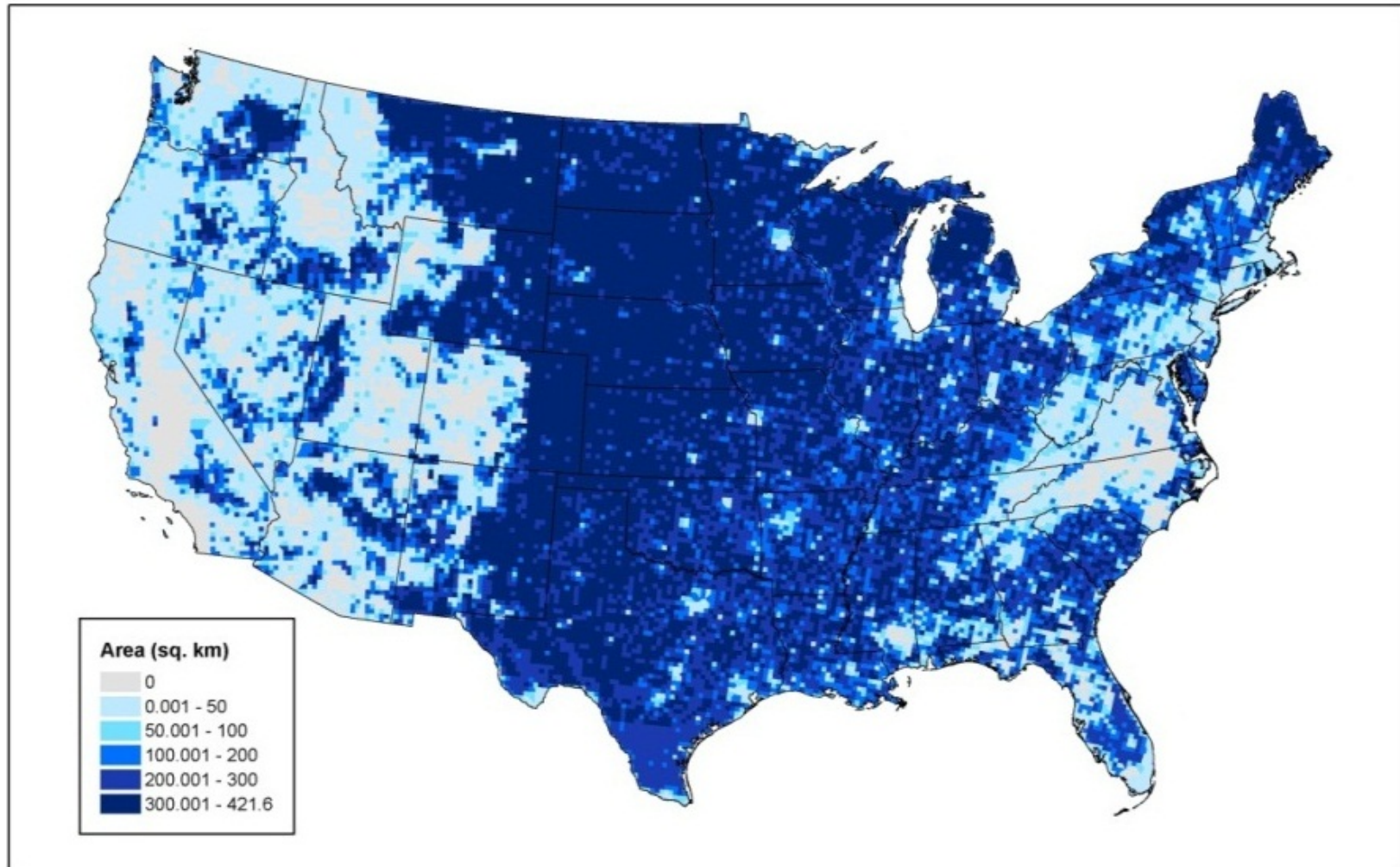
Additional radar systems may also impact future wind deployment.

Military Flight Training and Restricted Use



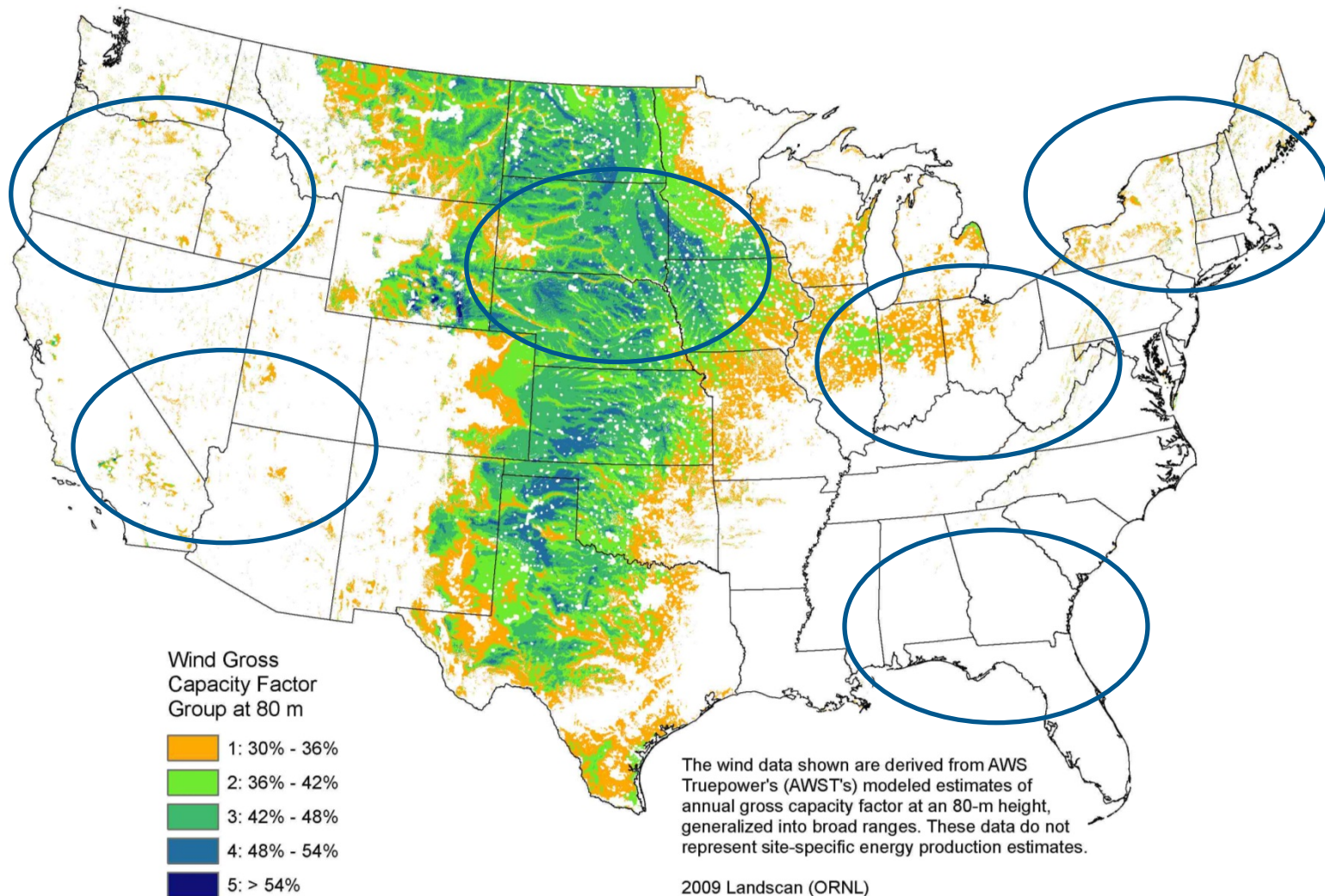
Some military flight areas, such as low-topology flight, provide additional restrictions.

Expanded Potential with Class III Turbines



**Use of Class III turbines could greatly expand potential development areas
(30% CF land area for a Class III turbine, 117-m rotor on a 140-m tower)**

Regional Deployment Challenges



Regional variations in common wind deployment challenges are observed, but approaches to addressing them also change regionally.

Offshore Wind Deployment Challenges

- High cost
- Actual and perceived technology risk
 - Floating turbines in the West, Hawai'i, and Northeast
 - Freshwater ice in the Great Lakes
 - Hurricanes in the Southeast and Gulf of Mexico
- Regulatory policy / permitting uncertainty
- National incentives/energy policy
- Environmental impacts
- Social acceptance
- Potential conflicts with competing uses including fishing, coastal tourism, viewshed, and other lifestyle impacts.



Photo from HC Sorensen, NREL 17856

Distributed Wind Deployment Challenges

- Inconsistent, unclear zoning
- Unpredictable permitting process
- Lack of financing options
- Low power-purchase rates
- Inconsistent and changing national and state incentives and policy
- Technology availability and reliability
- Lack of general awareness of technology as an option
- Small number of poor examples for community projects poisoning markets
- Lack of community understanding of the positive impacts that community-scale projects can bring
- Lower-cost solar options with better financing schemes.



Photo from Southwest Windpower, NREL 15030

A New Focus for the Current Market

In the early 2000s, the DOE deployment focus was to introduce a technology that had become mainstream in other parts of the world to an American energy market that had little experience – essentially “bringing wind power to America.”

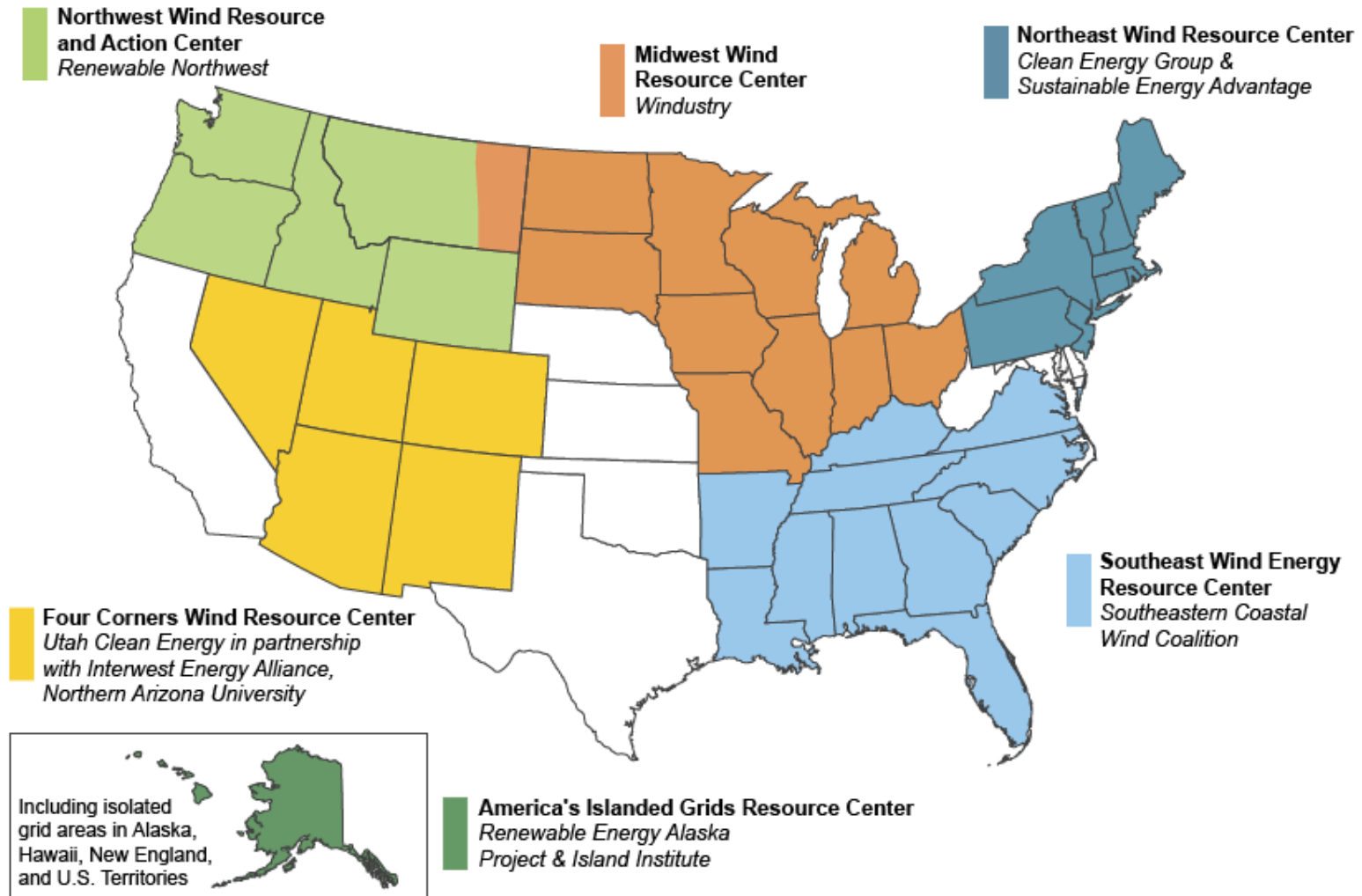
The need for a source of independent, fact-based information about wind deployment warranted a change in the initiative's focus, to providing a wind energy information network.



Provides wind energy information that is fact-based, relevant, and actionable so that:

- Individuals and communities can make informed decisions about the benefits and impacts of wind energy
- Decision-makers involved in wind energy planning and permitting are supported with current and credible information.

Regional Resource Centers



DOE-funded Regional Resource Centers are being implemented to work with state and other regional organizations to ensure that project decisions are made with the best available information on project impacts and benefits.



Photo by Ruth Baranowski, NREL 21205

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