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Wildlife and the Siting of Renewable Energy Facilities: Current Tools and Ongoing Challenges

ESIP Meeting January 4-5, 2012

U.S. Department of the Interior
U.S. Geological Survey

Wind Energy Impacts on Ecosystems

- **Impacts can occur in all phases: Construction, operations, infrastructure, transmission**
  - **Mortality and injury of multiple wildlife species (birds and bats)**
  - **Displacement from essential habitat (e.g. sage grouse)**
  - **Behavioral changes**
  - **Alteration of critical habitat (e.g. sage grouse, black bears)**
  - **Impacts from noise, vibrations, and electromagnetic influences (e.g. ground dwelling mammals, reptiles)**

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Potential Solar Energy Impacts on Ecosystems

- **Impacts can occur in all phases: Construction, operations, infrastructure, transmission**
  - **Impacts wildlife movements and genetic exchange, soils, vegetation, ecosystem processes and microclimate**
- **Emphasis on desert ecosystems already burdened with water availability problems**
- **Species include mammals, birds and reptiles**

Desert tortoise

Jeff Lovich, USGS

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Tool Development and Availability OSTP Ad Hoc Committee (2011)

- Wide range of decision tools in development
- Transparency and quality control an issue
- Collaboration essential- fed, state, private
- Assessment of activities underway

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Tool Development and Availability OSTP Ad Hoc Committee (2011)

- Coordination in progress
  - Guidelines to aid proponents in meeting laws/regs re: project siting
  - Compilation of available wildlife and habitat assessment data
- More coordination needed
  - Decision tool development and validation
  - Data compilation
  - Tool/data access
  - Adaptive management

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Tool Development and Availability OSTP Ad Hoc Committee (2011)

- Data compilation examples
  - LCCs
  - BLM Rapid Ecological Assessments
  - WGA-Crucial Habitat Assessment Tools
  - NPS Inventory & Monitoring Landscape Dynamics
  - FWS NR Program Center of NW Refuge System
- Issues
    - Massive undertaking, merging assessment data
    - Solutions being discussed

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Tool Development and Availability OSTP Ad Hoc Committee (2011)

- USGS Examples
  - Crosswalk for Renewables Assessment
  - Integrated assessment for SW Wyoming (WLCI)
  - Habitat prioritization models
  - Wind energy and transmission development WY
  - Golden Eagle Occupancy
  - RAM
- FWS Examples
  - FWS Reg 6 Landscape scale Energy Action Plan
  - FWS ECOS-IPaC

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Tool Development and Availability OSTP Ad Hoc Committee (2011)

- Non Government examples
  - AWWI Landscape Assessment Tool
  - Transmission Siting Decision Support (Idaho and Boise State , U of ID
  - Pandion/Normandeau Habitat Based Wind-Wildlife Risk tool
  - NatureServ Vista
  - TNC Ecological Risk Assessment Wind

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A Rapid Assessment Method (RAM) to assess site suitability for wind energy development: BCR 11 pilot

The overall purpose of a RAM is to determine in a short time frame whether wind development at a proposed site:

1) **likely poses appreciable risks to wildlife or their habitats,**
2) **appears not to pose significant risks to wildlife or their habitats, or**
3) **requires further investigation to determine whether the site falls into category 1 or 2.**

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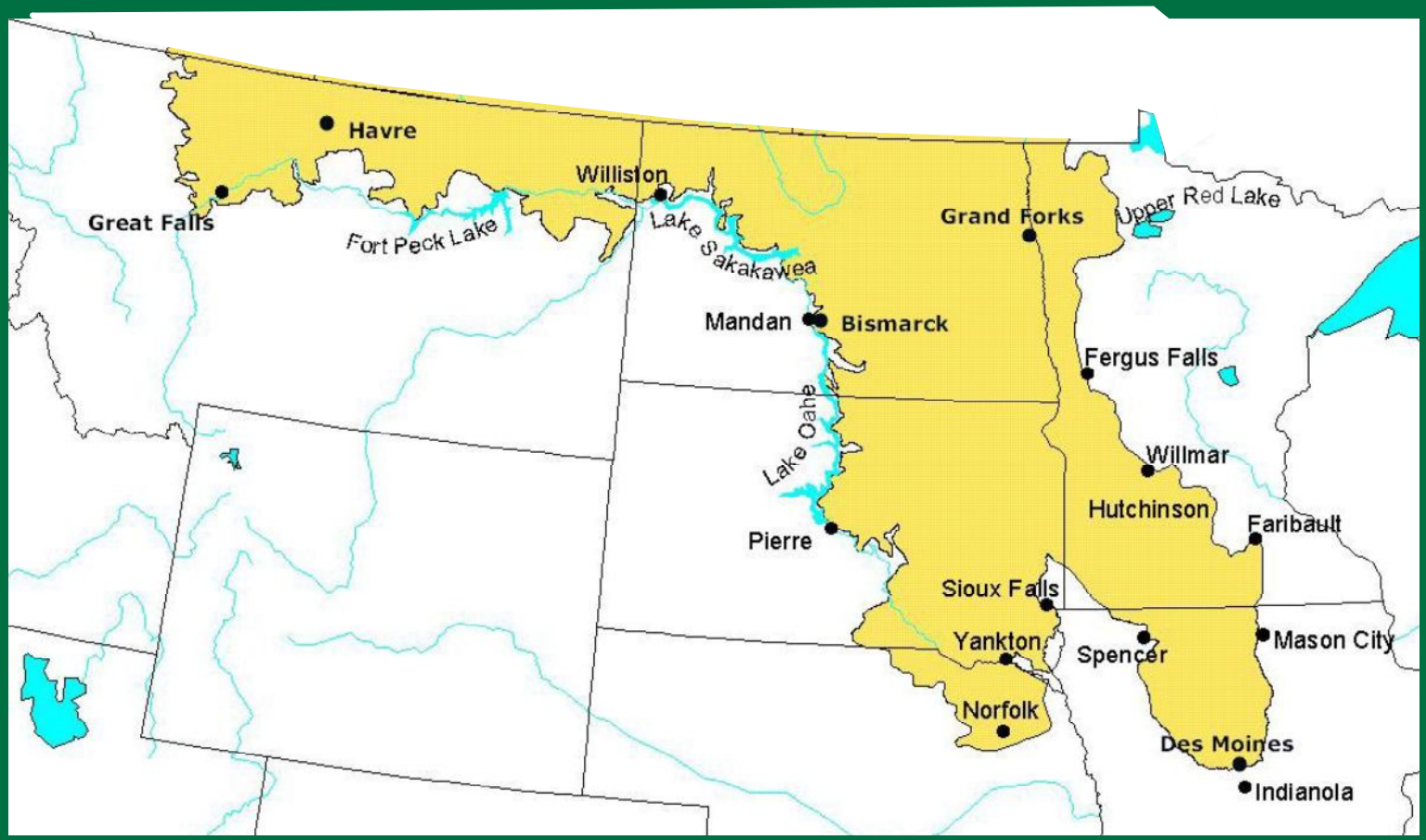
RAM

Principal Investigator: Douglas H. Johnson, USGS NPWRC

Primary Author: Courtney Amundson, University of Minnesota
Contributor: Meghan Sandlowski, USFWS
Collaborators: Al Manville, FWS; Jim Perry, University of Minnesota
Funding: Plains and Prairie Potholes LCC, USGS NPWRC

BCR 11: the Prairie Potholes (U.S.)



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RAM Objectives

- **Primary Objectives:**
  - **Identify the important natural resources in BCR 11 re: siting wind energy facilities**
  - **Identify and evaluate relevant sources of data about those resources**

- **Secondary objectives:**
  - **Identify critical information gaps**
  - **Provide information that takes into consideration natural resources and their risk from wind development and that align with related federal and state guidance documents**
  - **Define the assumptions that form the basis for our assessment; assess the strength of evidence supporting assumptions**
  - **Discuss methodologies, tools, and data available or needed to address information gaps**

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Links to Existing Tools

- American Wind and Wildlife Institute's Landscape Assessment Tool (LAT)
  - Information gathered for BCR 11 could feed in
  - Can identify species of concern at a site finer scale than RAM pilot
- US Fish and Wildlife Service – Information, Planning, and Conservation system (IPaC)
  - Incorporating a RAM into IPaC facilitates identifying characteristics and species of concern at a site by implementing relevant spatial layers into an online interface
- NOAA Habitat Priority Planner (HPP)
  - Could provide a vehicle for assessing habitat characteristics at a proposed development site using GIS depending on available data layers
  - Can be incorporated into a RAM to provide site-specific, detailed habitat information.

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Contrasts with Existing Tools

- RAM is driven by data needs, not data availability
- RAM is bottom-up, not top-down, that is, based on regional assessments
- RAM focus is on content, not delivery, of information

Therefore: RAM is complementary to other tools

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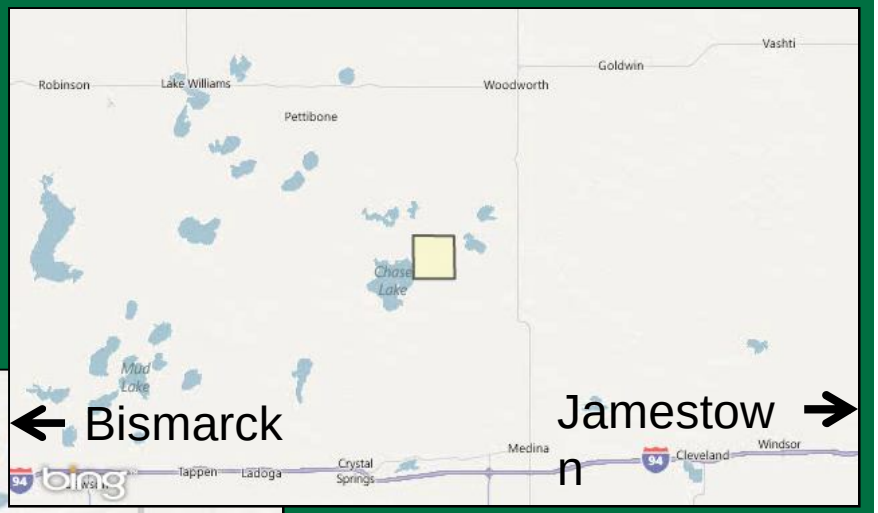
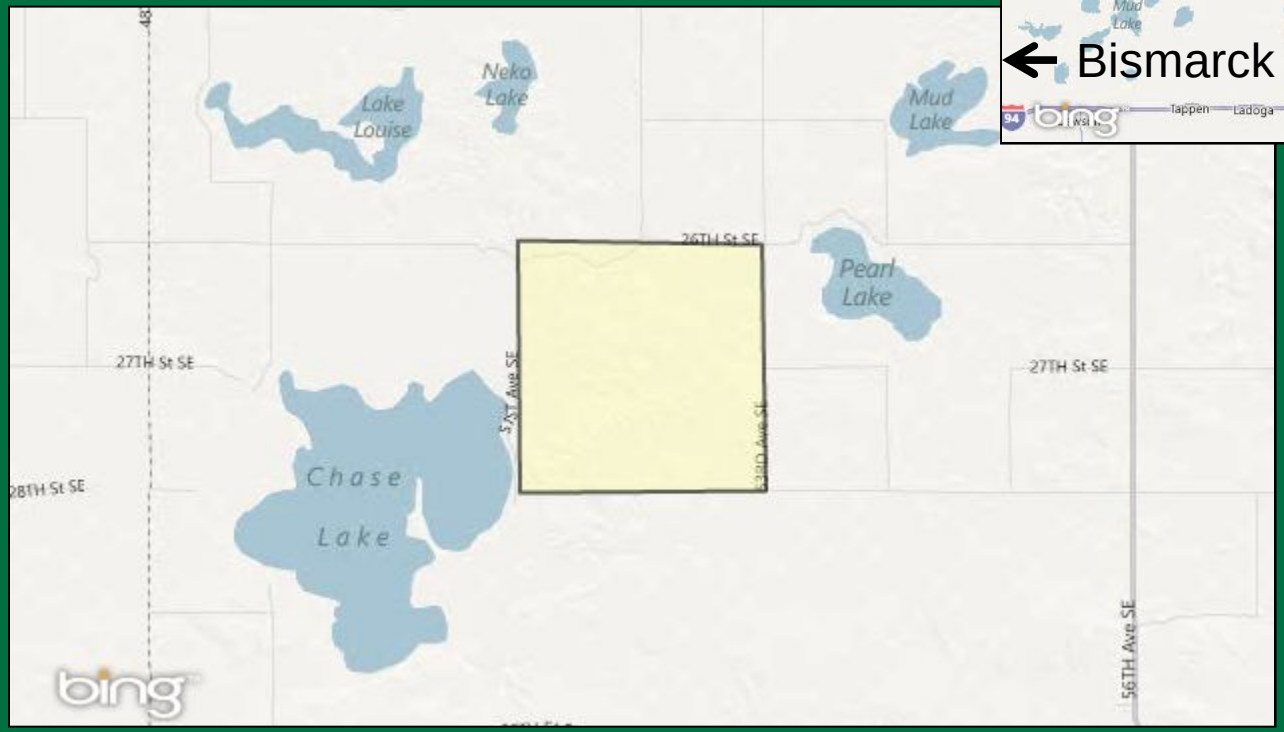
Example Comparison: RAM, IPaC and LAT

- Proposed site between Chase and Pearl Lakes, North Dakota





IPaC Output

- Currently limited to ESA listed species and overlap with National Wildlife Refuges

Project Counties:
Stutsman, ND

Project type: Power Generation

Endangered Species Act Species-list
There are a total of 5 species in your species-list

Species that may be affected by your project:

Birds			
Piping Plover (*Charadrius melodus*) Population: except Great Lakes watershed	Threatened	species info	North Dakota Ecological Services Field Office
Sprague's Pipit (*Anthus spragueii*)	Candidate	species info	North Dakota Ecological Services Field Office
Whooping crane (*Grus americana*) Population: except where EXPN	Endangered	species info	North Dakota Ecological Services Field Office
Insects			
Dakota Skipper (*Hesperia dacotae*)	Candidate	species info	North Dakota Ecological Services Field Office
Mammals			
Gray wolf (*Canis lupus*) Population: Lower 48 States, except MN, MT, ID, portions of eastern OR, eastern WA, north-central UT, and where EXPN. Mexico.	Endangered	species info	North Dakota Ecological Services Field Office

Don't see a species you expect to see?

FWS National Wildlife Refuges
There are no refuges found within the vicinity of your project.

FWS Migratory Birds
Not yet available through IPaC.

FWS Delineated Wetlands
Not yet available through IPaC.

Back Continue...

Last updated: December 30, 2011

IPaC Output

Currently limited to ESA listed species and overlap with National Wildlife Refuges

ESA Species

Piping Plover
Sprague's Pipit
Whooping Crane
Dakota Skipper
Gray Wolf

National Wildlife Refuges

"There are no refuges within the vicinity of your project"

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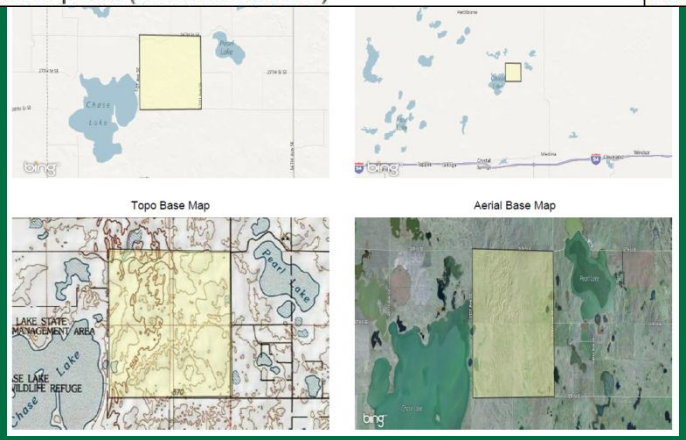
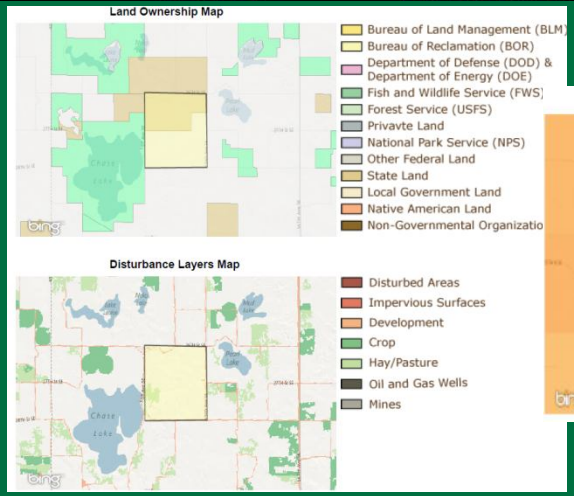
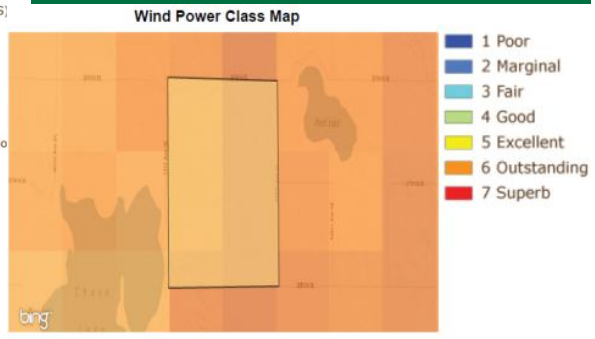
LAT Output

- List of species of concern with overlapping distributions,
- Conservation status,
- General issues with wind development, and
- Migratory Bird Treaty Act?
- Maps including location, topography, aerial images, land ownership, disturbance, and wind power class

Speices Name	Informal Taxonomy	Issue	NatureServe Status	Endangered Species Act Status	Migratory Bird Treaty Act
Eastern Red Bat (Lasiurus borealis)	Bat	Mortality Concern	Secure	None	No
Hoary Bat (Lasiurus cinereus)	Bat	Mortality Concern	Secure	Endangered	No
Little Brown Myotis (Myotis lucifugus)	Bat	Mortality Concern	Secure	Species of Concern	No
Silver-haired Bat (Lasionycteris noctivagans)	Bat	Mortality Concern	Secure	Species of Concern	No
Baird's Sparrow (Ammodramus bairdii)	Bird	Vulnerable	Apparently Secure	None	Yes







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RAM Output

Known Issues

Grassland birds: Baird's Sparrow, Sprague's Pipit, and others nest nearby

Proximate to Chase Lake National Wildlife Refuge

- One of world's largest American White Pelican colony
- Nesting Piping Plovers
- Several other waterbird species nest there
- Whooping Cranes and many Sandhill Cranes migrate through

Uncertainties

Grassland birds: migration routes, staging areas

Effects on Sprague's Pipit's extended aerial display

Shorebird, colonial waterbird, and marshbird migration routes and stopover sites

- Especially Piping Plover, Least Tern

Susceptibility of Sandhill Cranes to collision during migration

Use of area by bats

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Other Agencies Developing Tools, Assessments

- Department of Energy
- USDA Forest Service
- Department of Defense
- NOAA
- State and Local Governments

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USGS Basic and Applied Research: Wind & Solar Energy, Wildlife & Habitats

- new tools and techniques
  - Acoustic, thermal imaging and infra-red videography
  - Weather radar
  - Multi scale mapping, forecasting
- modeling complex ecosystems interactions with development and operations, optimization studies
  - Facility footprints & localized changes
  - Habitat use modeling, seasonal distributions, susceptibility,regional patterns

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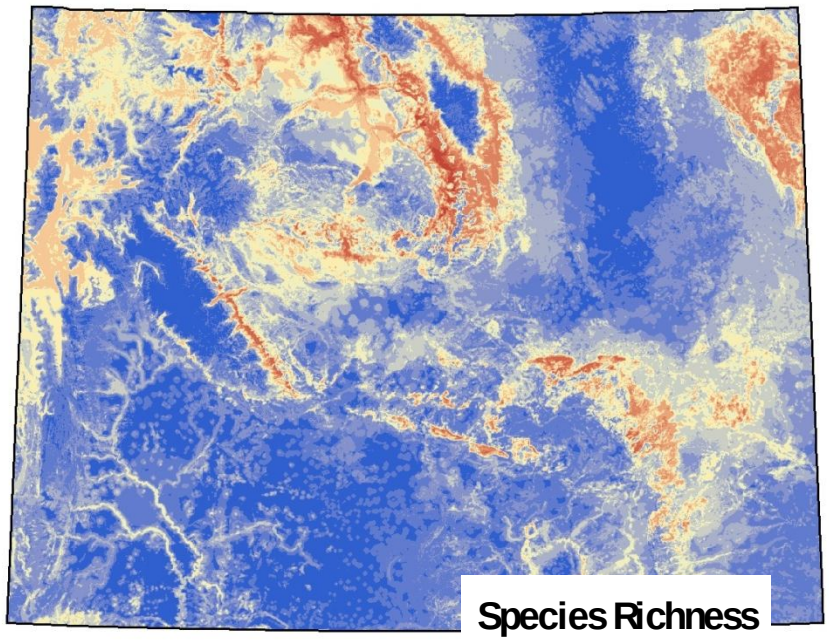
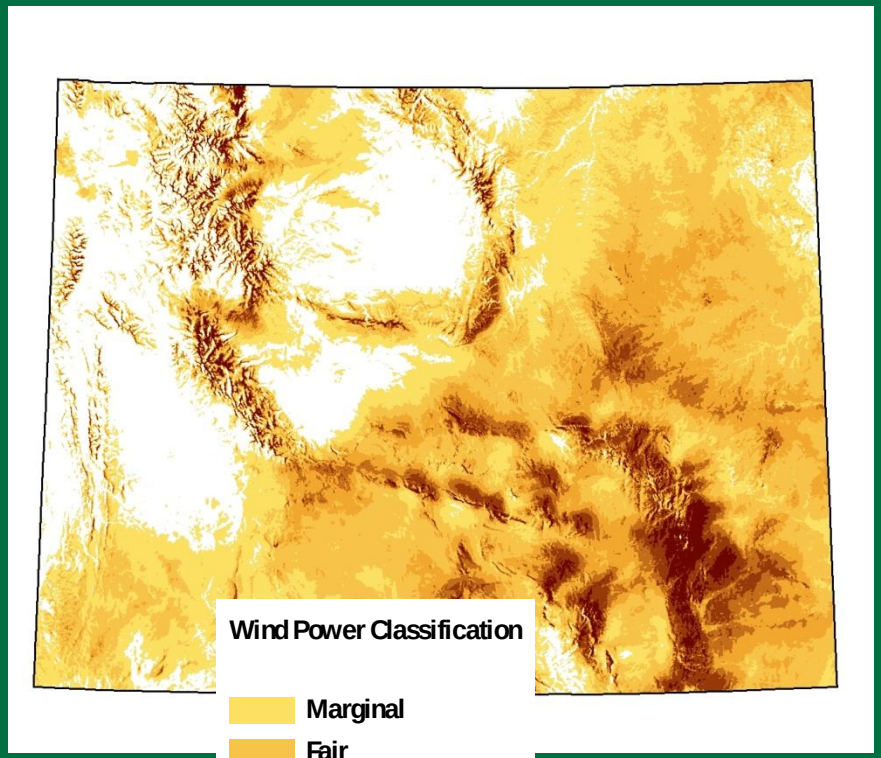
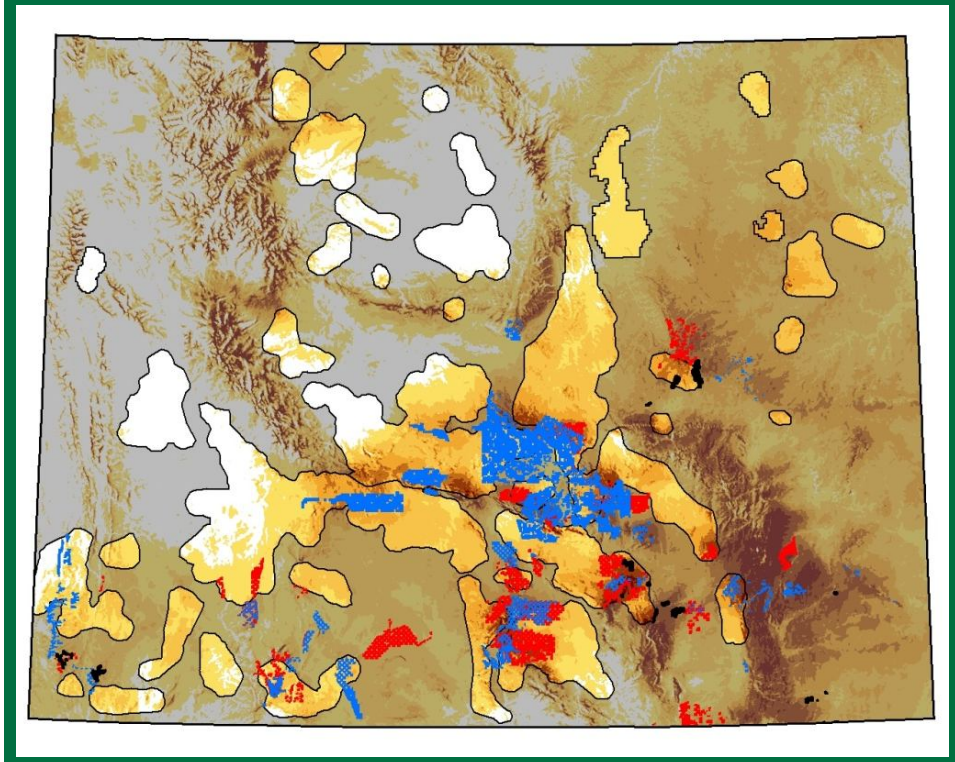


Species Richness (13 bat spp.)



% of Wyoming with Bat spp. richness >= 6	14%
% of Bat spp. richness >=6 AND Wind Rating >= 4	10%
Authorized Wind Leases with Bat spp. richness >= 6	164 ha. (<1% of total auth. wind leases)
Pending Wind Leases with Bat spp. richness >= 6	1,108 ha. (<1% of total pending wind leases)

Wind Energy Development & Sage Grouse



Red - authorized leases
Blue - pending leases
Unshaded - SG core areas

- Geographic extent of active leases for wind development in the region of the Greater Sage Grouse Conservation Area (BLM land) is significant.

- Wyoming 2010:
  - Authorized Wind Leases 847,345 ha. (17% total leases in SG core areas)
  - Pending Wind Leases 1,283,920 ha. (24% total leases in SG core Areas)

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Prepared by Zach Bowen, USGS Fort Collins

Eagle Research Plan

- Population Assessment
- Predicting Golden eagle occurrence
- Mortality estimation
- Habitat mapping
- Adaptive management

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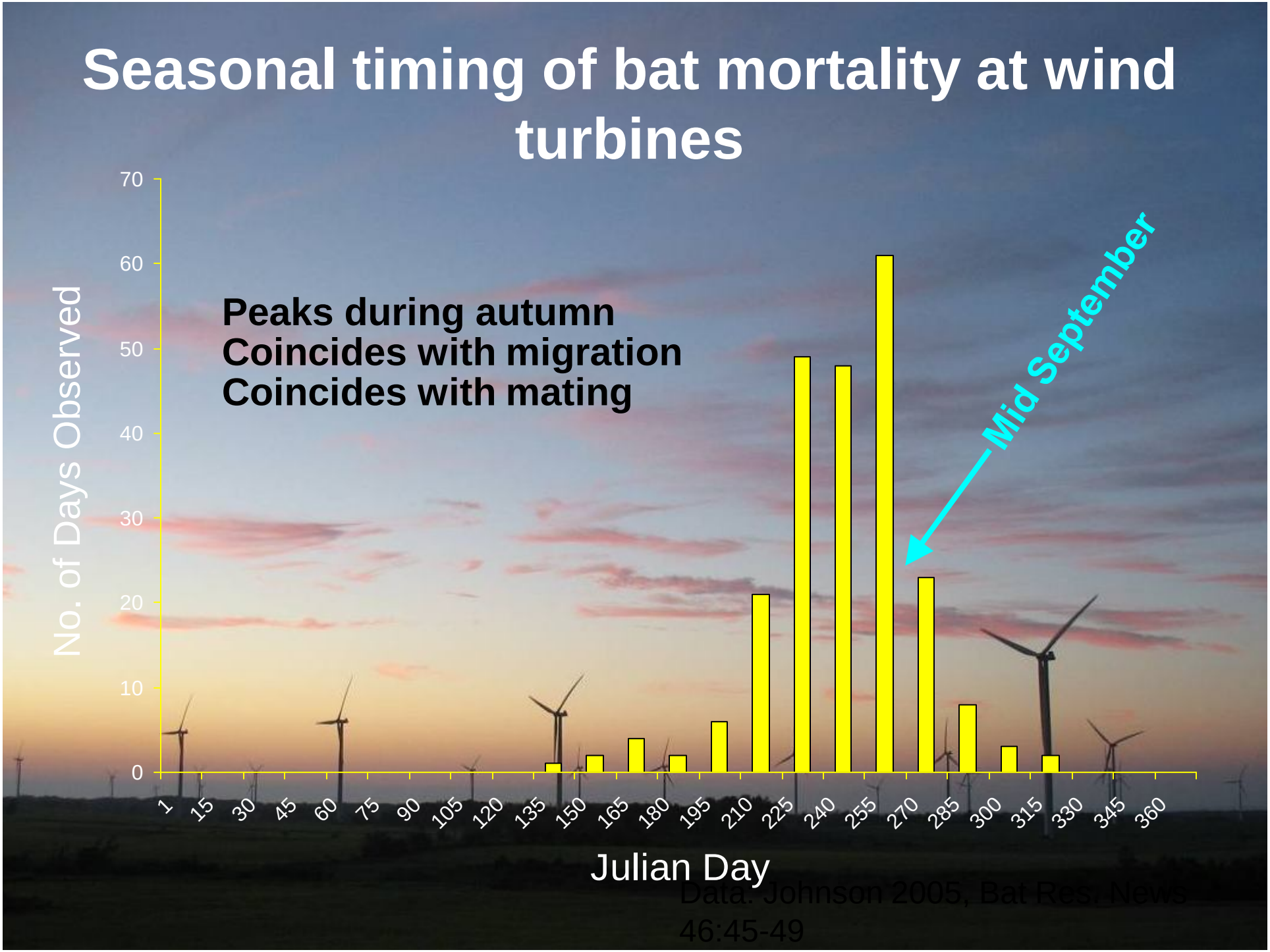
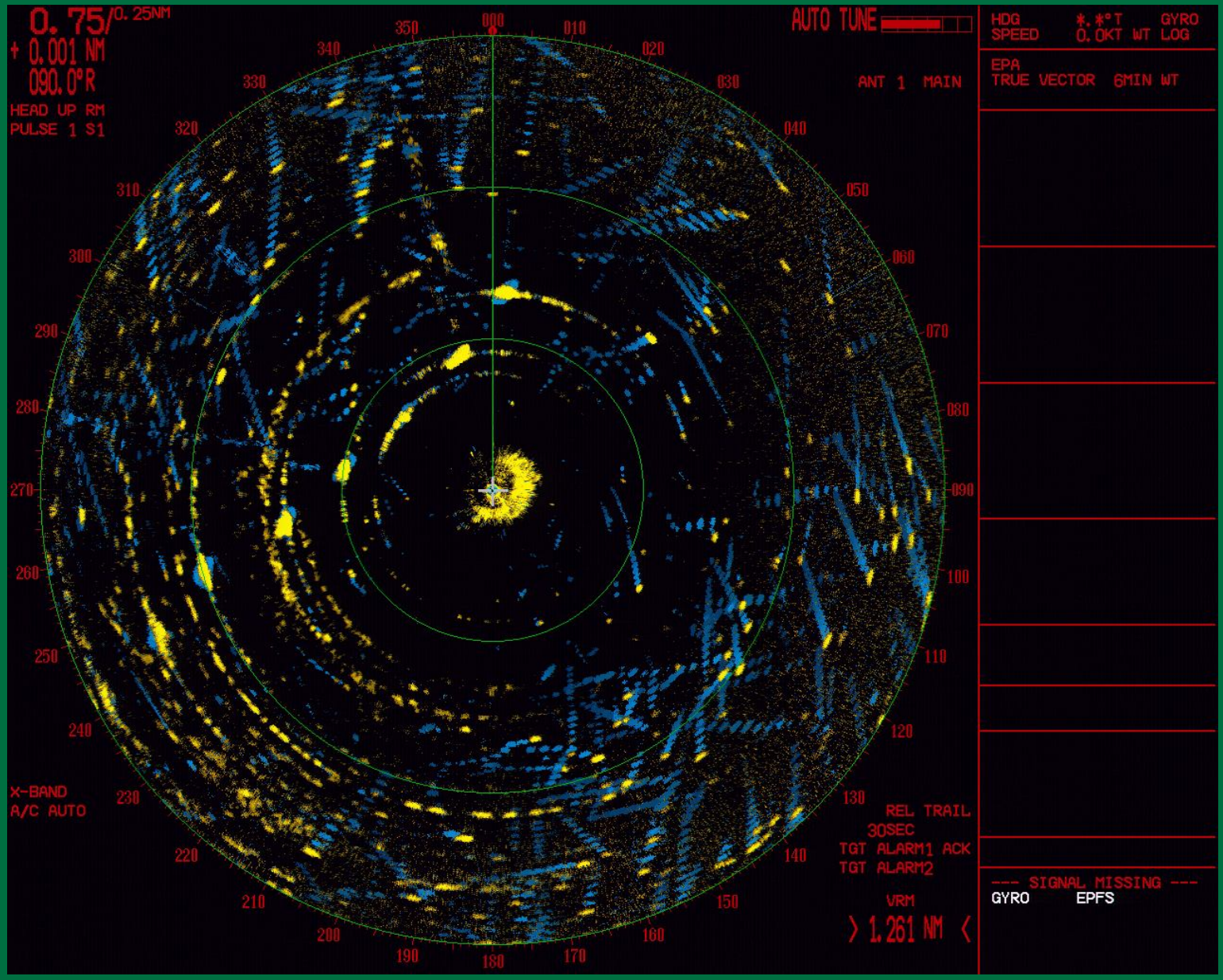
Seasonal timing of bat mortality at wind turbines



Data: Johnson 2005, Bat Res. News 46:45-49


0.75/0.25NM
+ 0.001 NM
090.0°R
HEAD UP RM
PULSE 1 S1
AUTO TUNE
ANT 1 MAIN
HDG *.*°T GYRO
SPEED 0.0KT WT LOG
EPA
TRUE VECTOR 6MIN WT
X-BAND
A/C AUTO
REL TRAIL
30SEC
TGT ALARM1 ACK
TGT ALARM2
VRM
1.261 NM
--- SIGNAL MISSING ---
GYRO EPFS

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Summary

- Basic and applied research, modeling and mapping underway at multiple scales and locations
- Guidance, scientific research, data compilation and decision tools

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Future Needs

- Consistent framework for agencies and developers where risks are identified
- Jointly identified data gaps, research priorities set in structured process
- Find comfortable risk level for stakeholders
- Identify existing capacity
- Be realistic about costs, how to get the job done?
- Focus on best siting, but also on possible mitigation
- Data and decision tool access and quality control

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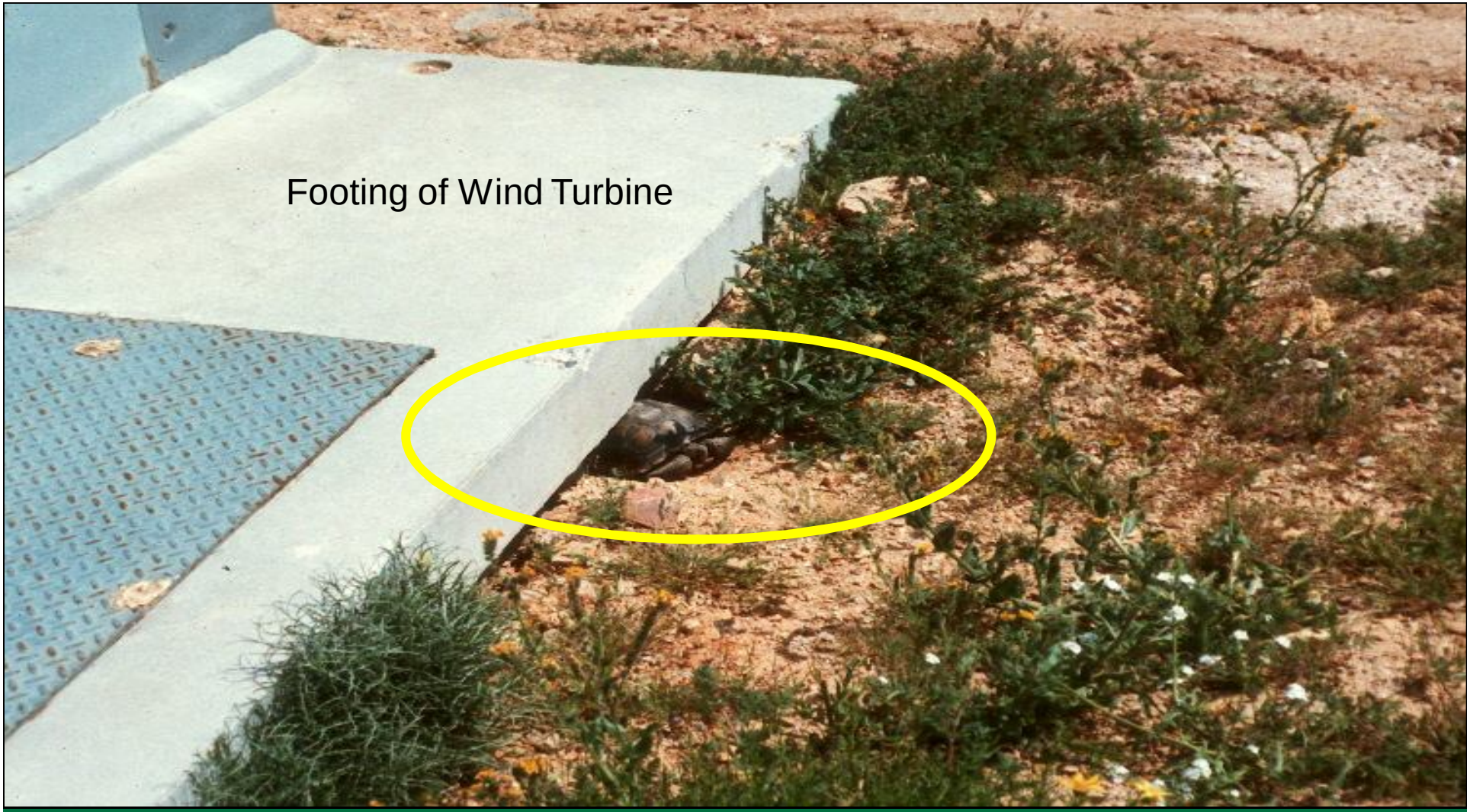

Tortoise Habitat?

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