Sustainability Issues of Permian Shale Production

Center for Strategic and International Studies
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Marilu Hastings
Cynthia and George Mitchell Foundation
m hastings@cgmf.org
Coordinated landscapes

Planned development
Strategic avoidance and offsetting
Coordinated decision-making

Uncoordinated landscapes

Unplanned development
Ad hoc project-level planning
Uncoordinated decision-making
Key Steps:

- Create a Conservation Vision
- Project Future Development
- Estimate Impacts
- Apply Appropriate Mitigation Actions
Example: Trend in Oil and Gas Production

Data from IHS Markit (through RRC)
Recent Exploration Activity Across the Permian Basin
Previous Oil and Gas Development Outside of Permian Basin
Projections of Wind Development

ERCOT Wind Additions by Year (as of Jan 31, 2019)

http://www.ercot.com/content/wcm/lists/167030/CapacityChangesbyFuelTypeCharts_January_2019.xlsx
Projections of Solar Development

ERCOT Solar Additions by Year (as of Jan 31, 2019)

http://www.ercot.com/content/wcm/lists/167030/CapacityChangesbyFuelTypeCharts_January_2019.xlsx
Wind Development Needs Windy Areas
Solar Development Needs Low Elevation, Gentle Slopes and Lots of Sun!
Wind and Solar Development Need Transmission Lines (and Service Roads)
Powerline and Pipeline Infrastructure
How We Will Use These Data
What’s at Risk?
“The Chihuahuan Desert’s habitats, plants, and animals are rapidly vanishing”
—World Wildlife Fund
Trans-Pecos Ecoregion
Perhaps the most complex of all Texas ecoregions

Desert Grassland

Desert Scrub

Mountain Ranges
Trans-Pecos Wildlife

>120 Mammal Species

>500 Migratory Bird Species

>170 Herptile Species
Light Pollution Threatens Science
Water Resources
Project Water Disposal Volumes

Projected Totals – Billion barrels

- **Midland Basin**: 113,000 wells
  - Water Disposal Volume: 78 billion barrels

- **Delaware Basin**: 207,000 wells
  - Water Disposal Volume: 68 billion barrels

- **Eagle Ford**: 105,000 wells
  - Water Disposal Volume: 270 billion barrels

- **Projected Totals**:
  - Hydraulically fractured: 7.7 billion barrels
  - Produced water: 4.0 billion barrels
  - Total: 68 billion barrels

Scanlon et al. (in prep)
What needs to change?

GO BIG
Site-based to landscape scale
Cumulative impacts

GO EARLY
Future potential development
Advance mitigation planning
DISCUSSION