

# Effects of truck noise from natural gas development on Greater Sage-Grouse



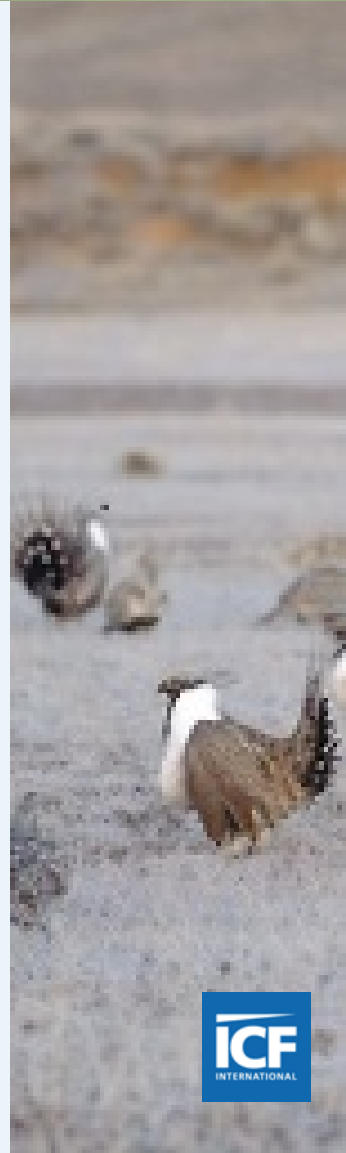
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**July 21, 2014**



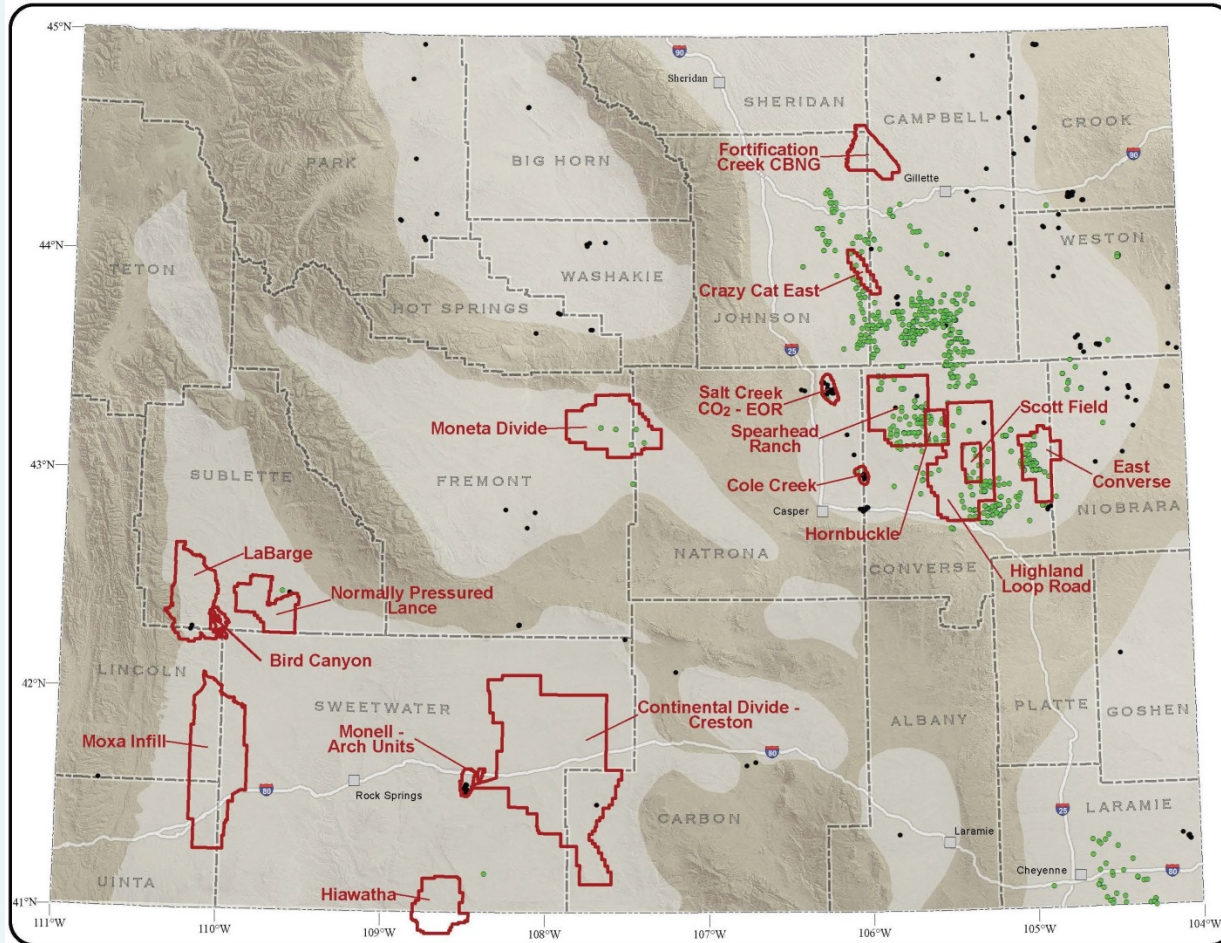
# Presentation Topics

- Natural Gas Development in the Mountain West states (esp. Wyoming)
- Greater Sage-Grouse response to noise, and why it is seen as a significant environmental issue
- Approach to Noise Analysis: impact thresholds, mitigation measures

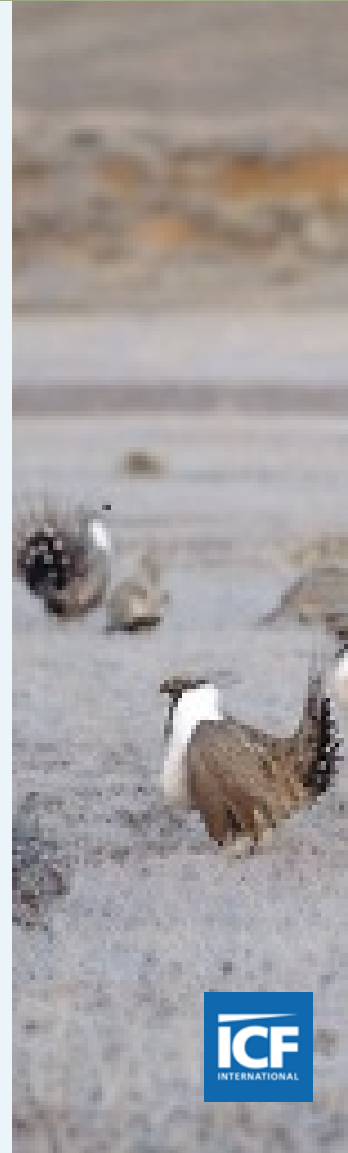




# Natural Gas Well Drilling in the Mountain West



Oil and Gas Development in Wyoming



# Natural Gas Well Drilling in the Mountain West



Heavy trucks on  
gas development  
access roads

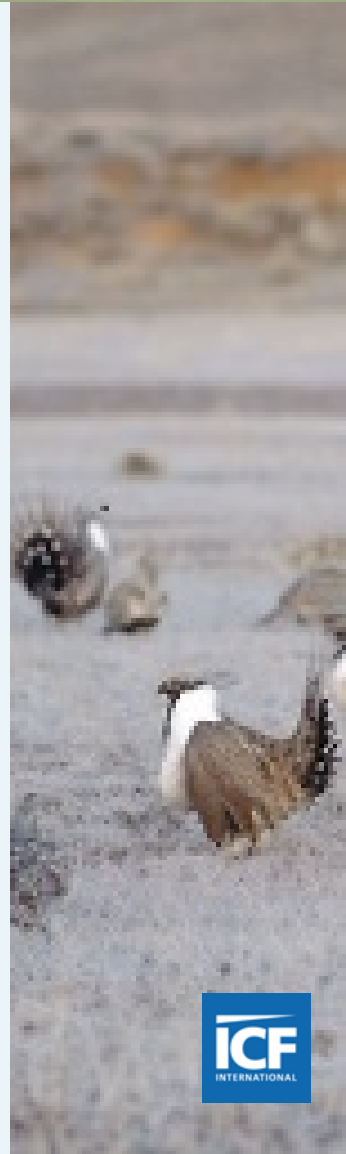


Compressor  
Stations



Well  
Pads

Flaring

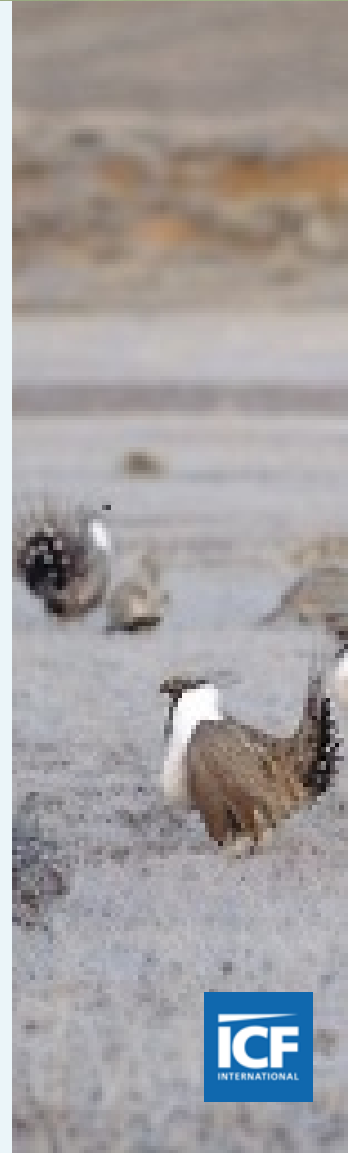
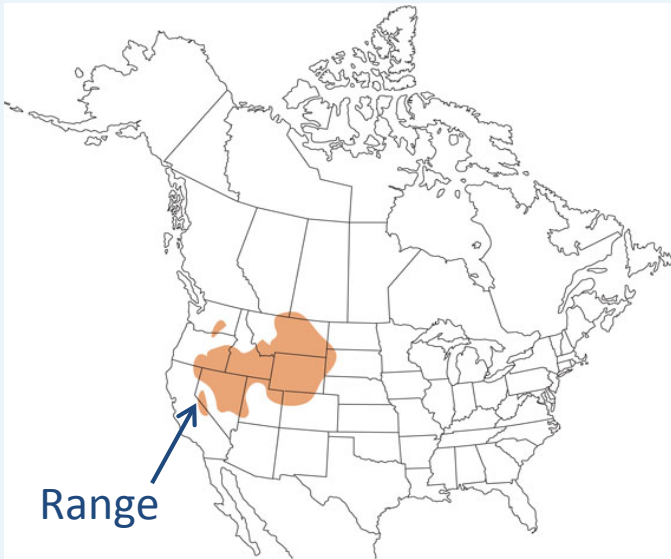




# Greater Sage-Grouse



- Numbers have declined due to loss and fragmentation of sagebrush habitat
- Status is threatened; candidate for Endangered Species Act (ESA) listing
- Considered an indicator species for health of sagebrush-steppe ecosystem



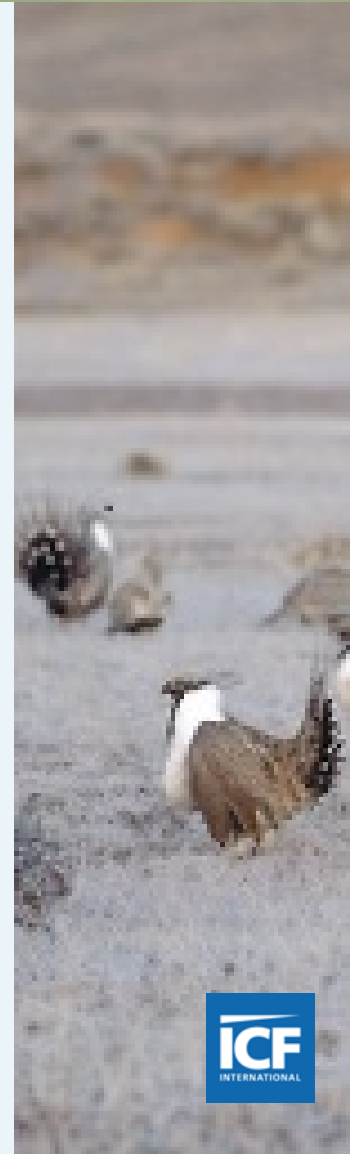
# Greater Sage-Grouse response to noise



Lek = Sage-Grouse  
Mating Grounds

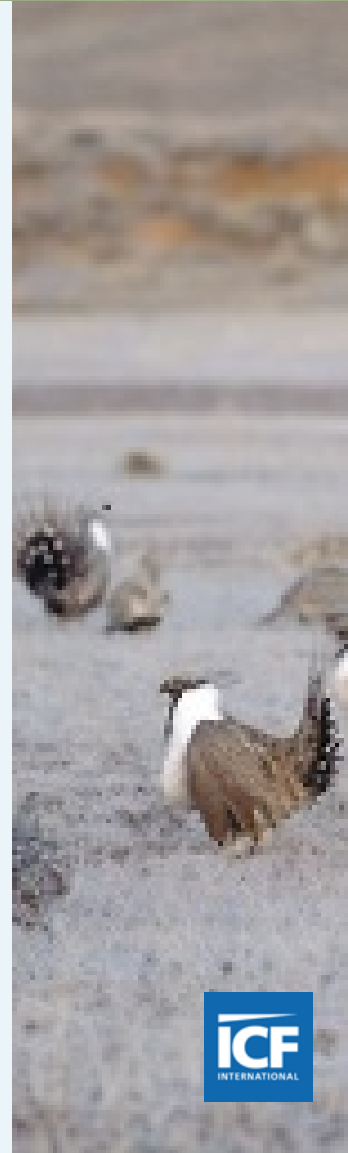


Strut Display for mate  
attraction



# Greater Sage-Grouse response to noise

- Greater Sage-Grouse mating display sequence range has most sound energy in the range of 300 to 3200 Hz
- Sounds produced by a lekking male allow females to locate leks and select mating partners
- Introduction of noise associated with oil and gas development resulted in an immediate and sustained decrease in lek attendance (UC-Davis 2012)
- Intermittent noise sources such as heavy truck traffic on haul roads have a greater negative effect on lek attendance than continuous noise





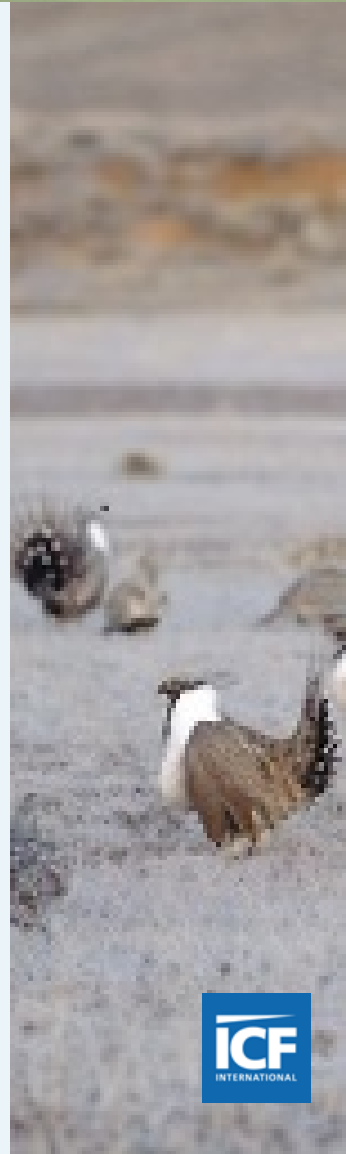
# Greater Sage-Grouse

## Wyoming Executive Order 2011-5

- Noise Stipulations:

*New noise levels, at the perimeter of a lek, should not exceed 10 dBA above ambient noise (existing activity included) from 6:00 p.m. to 8:00 am during the initiation of breeding (March 1- May 15).*

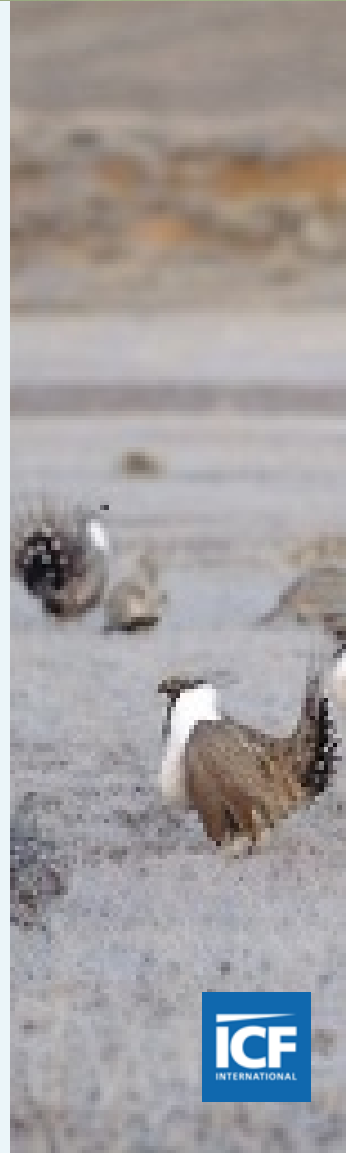
*Ambient noise levels should be determined by measurements taken at the perimeter of a lek at sunrise.*





# Project Approach

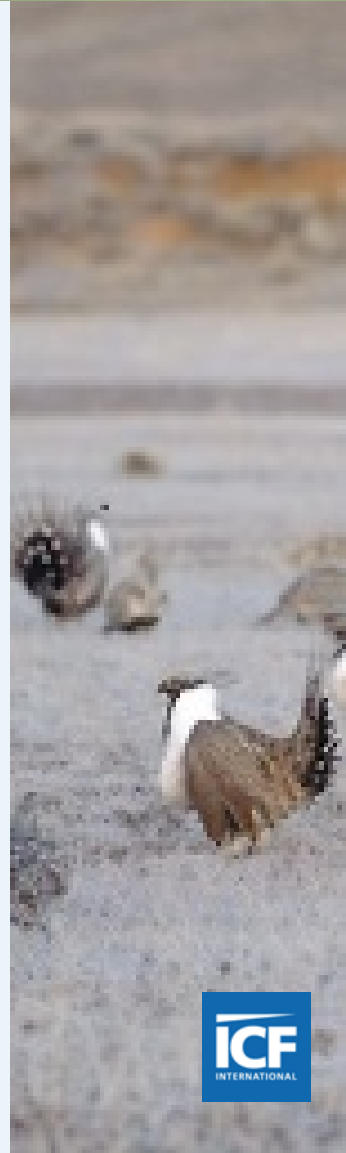
- Conduct noise monitoring and apply Executive Order 2011-5 to determine threshold of noise impact (10 dB above ambient levels)
- Focus analysis on heavy truck traffic, because intermittent noise ( $L_{\max}$ ) has been shown to have a greater negative effect on lek attendance, compared to continuous noise ( $L_{\text{eq}}$ )



# Project Approach

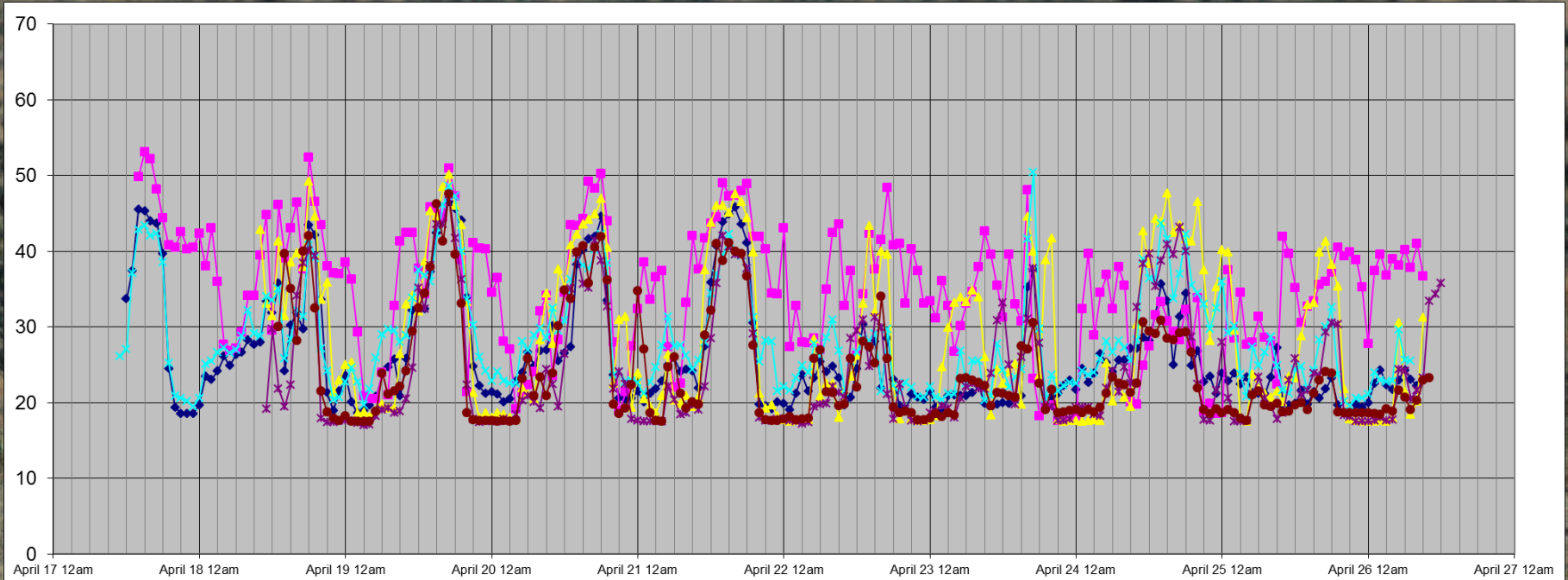
- Program-level analysis
- Construction equipment source levels based on FTA Manual

*FTA reference level for heavy trucks = 88 dBA*
- Project Operation assumes regular heavy truck traffic would continue
- Project Equipment source levels based on available data from similar drilling projects





# Noise Monitoring

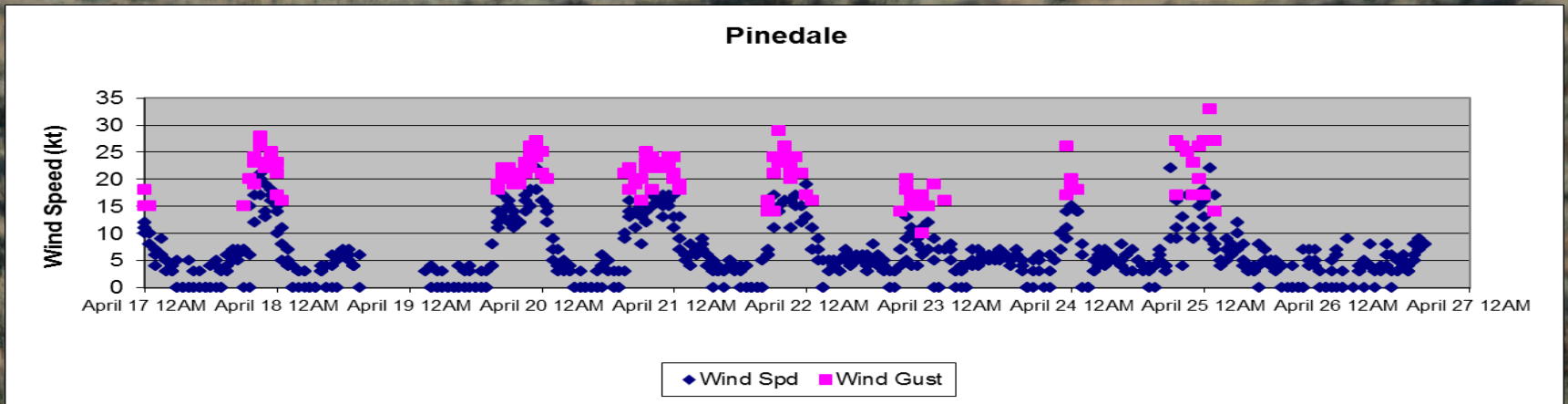


50 min. high from 5 p.m. to 8 a.m.:

Average  $L_{50}$  = 28 dBA



# Noise Monitoring



An ambient noise level of 25 dBA is used to  
Therefore, an adverse noise impact is  
characterize existing ambient noise conditions  
considered to occur if project noise levels at  
at lek perimeter locations  
the perimeter of a sage-grouse lek would  
exceed 35 dBA  $L_{max}$ .



# Noise Modeling

- Attenuation of sound levels from operations and heavy trucks modeled using ISO 9613
- Ground effect and atmospheric conditions parameters in the propagation model are based on an assumed source center frequency of 250 Hz.



# Noise Modeling

Construction/Operation Phase	Combined Construction Site Source Noise Level	Distance to 35 dBA Noise Contour
Truck Traffic on access roads (all construction phases)	88 dBA at 50 feet	6,225 feet (1.18 miles)
Road Construction	91 dBA at 50 feet	8,250 feet (1.56 miles)
Well Pad Construction	92 dBA at 50 feet	9,350 feet (1.77 miles)
Well Pad Drilling	88 dBA at 50 feet	6,350 feet (1.20 miles)
Pipeline Construction	89 dBA at 50 feet	6,825 feet (1.29 miles)
Well Pad Operation	70 dBA at 255 feet	8,550 feet (1.62 miles)
Flaring	55 dBA at 3,500 feet	20,500 feet (3.88 miles)
Compressor Facility Operation	93 dBA at 50 feet	7,900 feet (1.50 miles)





# Noise Impacts from Construction and Operation

- Noise from one heavy truck accessing development sites would result in a noise level of at least 35 dBA  $L_{\max}$  at a distance of up to 6,225 feet (1.18 mile)
- Noise levels from multiple trucks operating in the same location would result in cumulatively higher noise levels
- Noise levels at sage-grouse leks located within one to two miles from an access road or construction site would likely result in an adverse impact



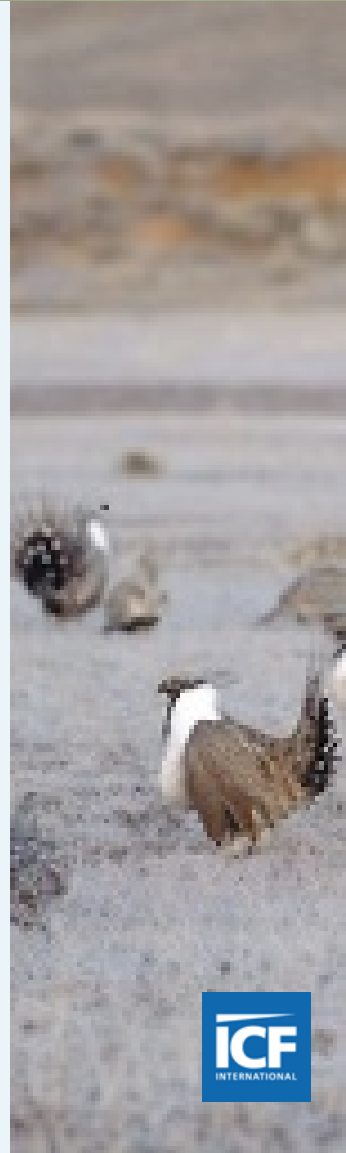
# Mitigation Measures

- Prohibit Heavy Truck Traffic within 2-mile Sage-Grouse Lek Buffers between the Hours of 6:00 p.m. and 8:00 a.m. during Sage-Grouse Mating Season (March 1 to May 15)
- Implement a Noise Monitoring Program to Verify Noise Levels from Construction, Operation, and Truck Traffic do not Exceed 35 dBA  $L_{\max}$  at Sage-Grouse during sensitive breeding hours
- Best Practices during Construction and Operation



# What's next?

- *Senate Majority could rest on the sage grouse* (Associated Press, July 2014)
- Wyoming Executive Order 2011-5 will be reevaluated in August 2015
- U.S. Fish and Wildlife Service will decide on ESA listing by September 2015





# Thanks!



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