

Using GIS to calculate surface disturbance

- FWP Strawdog
- Available data
- Demonstrate calculation technique
- Examples
- Data characteristics and requirements

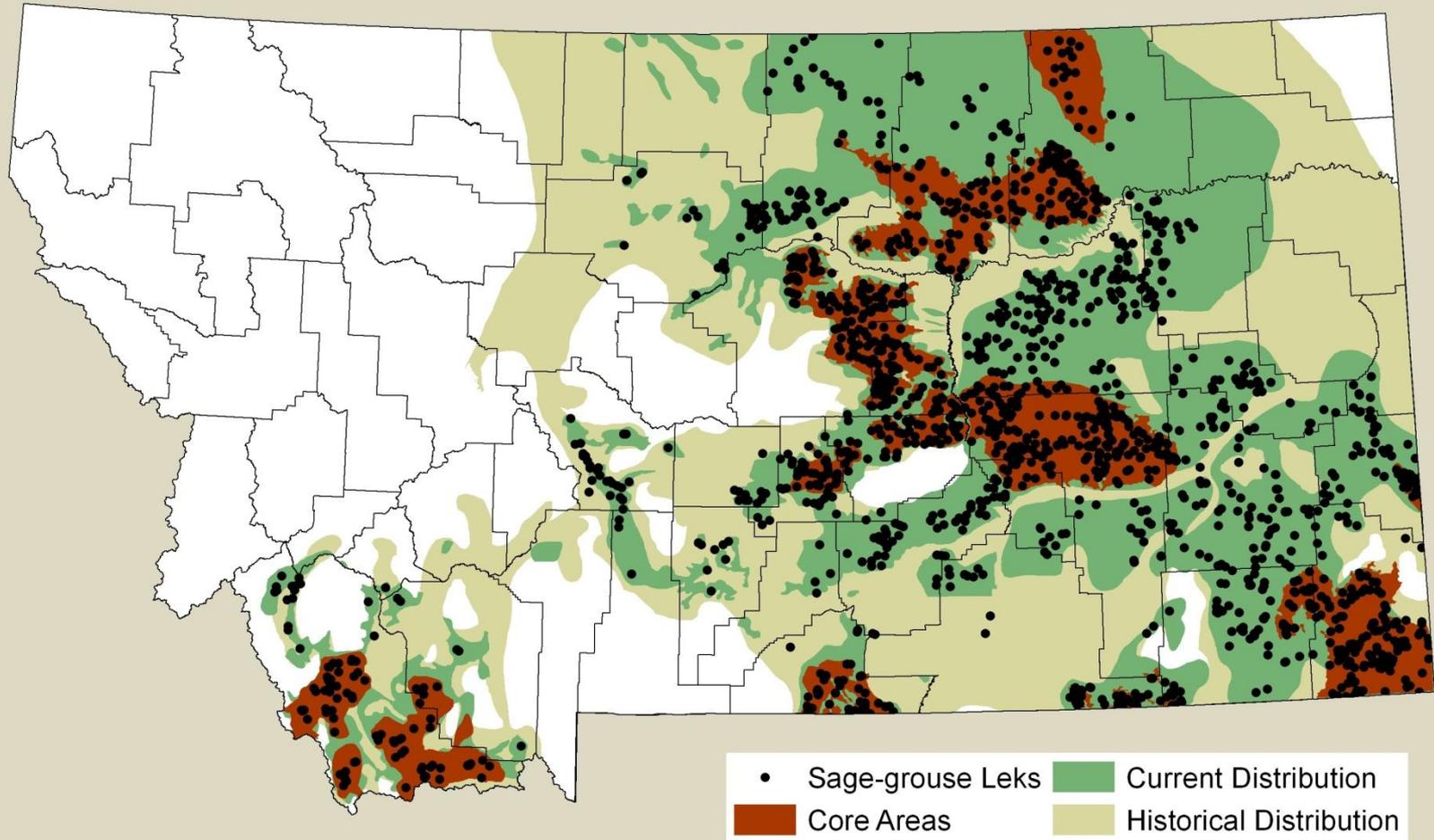
FWP Strawdog

- Within Sage-grouse core areas
 - Surface disturbance limited to 3% of suitable sage-grouse habitat within project area
 - No surface occupancy within 3.8 miles of active leks
- Outside of Sage-grouse core areas
 - Surface disturbance limited to 5% of suitable sage-grouse habitat within project area
 - No surface occupancy within 1.8 miles of active leks
- General
 - Project area is 3.8 mile buffer from proposed surface disturbance
 - Surface disturbances will contribute to % limit if it occurs after 2005

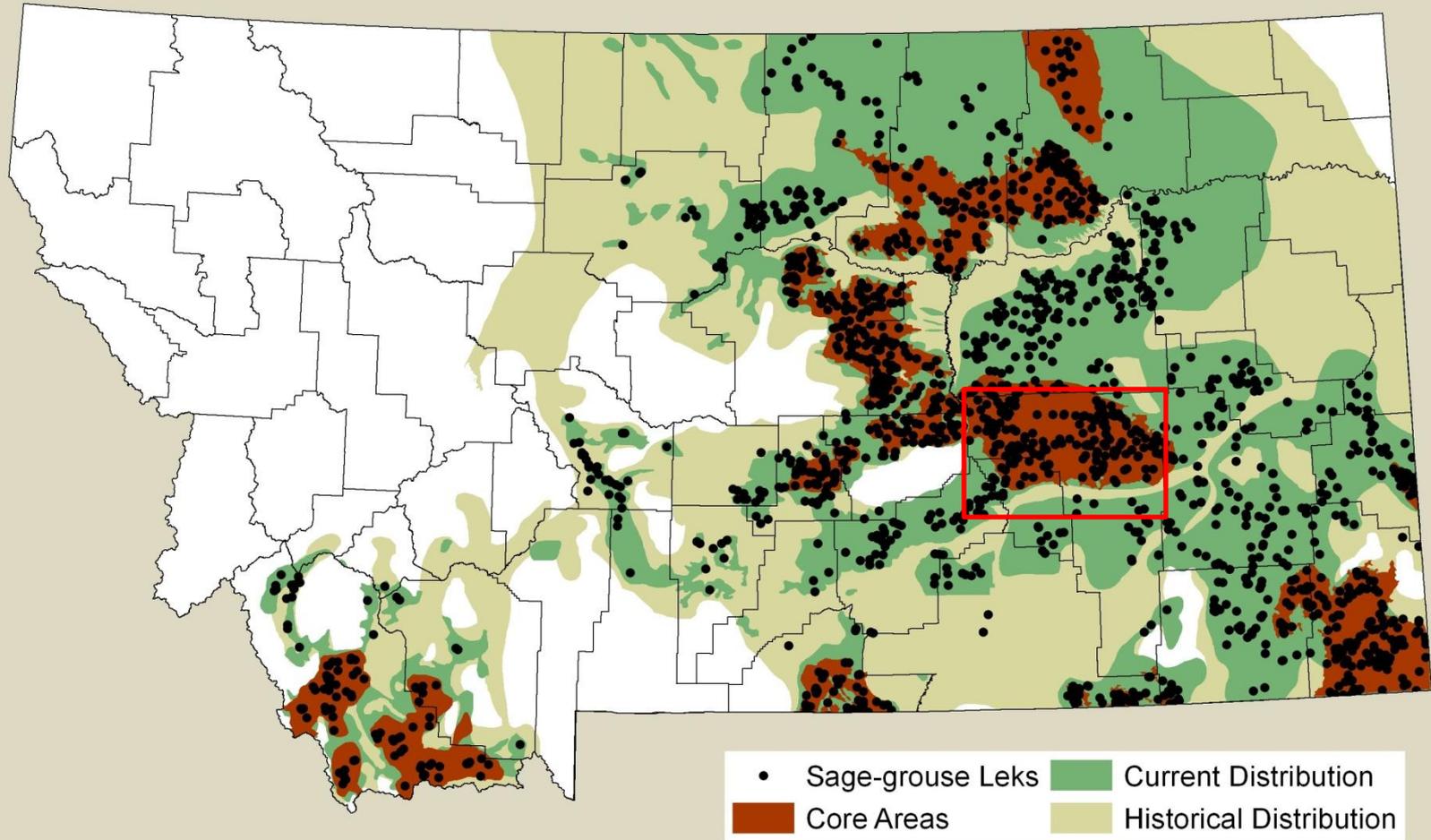
Calculation requirements

- Data required within the project area:
 - Sage-grouse
 - Leks and core areas
 - Suitable habitat
 - Defined by landcover data
 - Existing surface disturbances
 - Those in place prior in 2005
 - Proposed disturbance areas
 - Those in suitable habitat since 2005 are used to evaluate the percent disturbance

Sage-grouse data

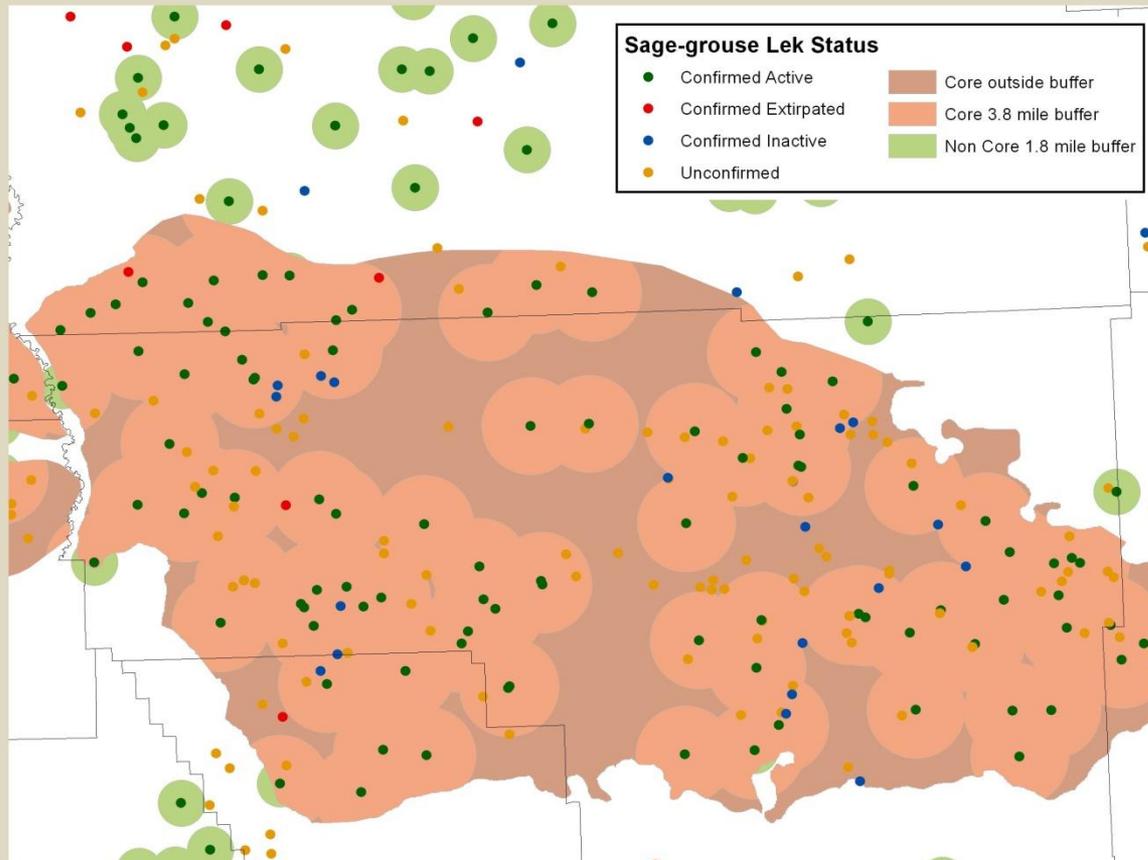


Sage-grouse data

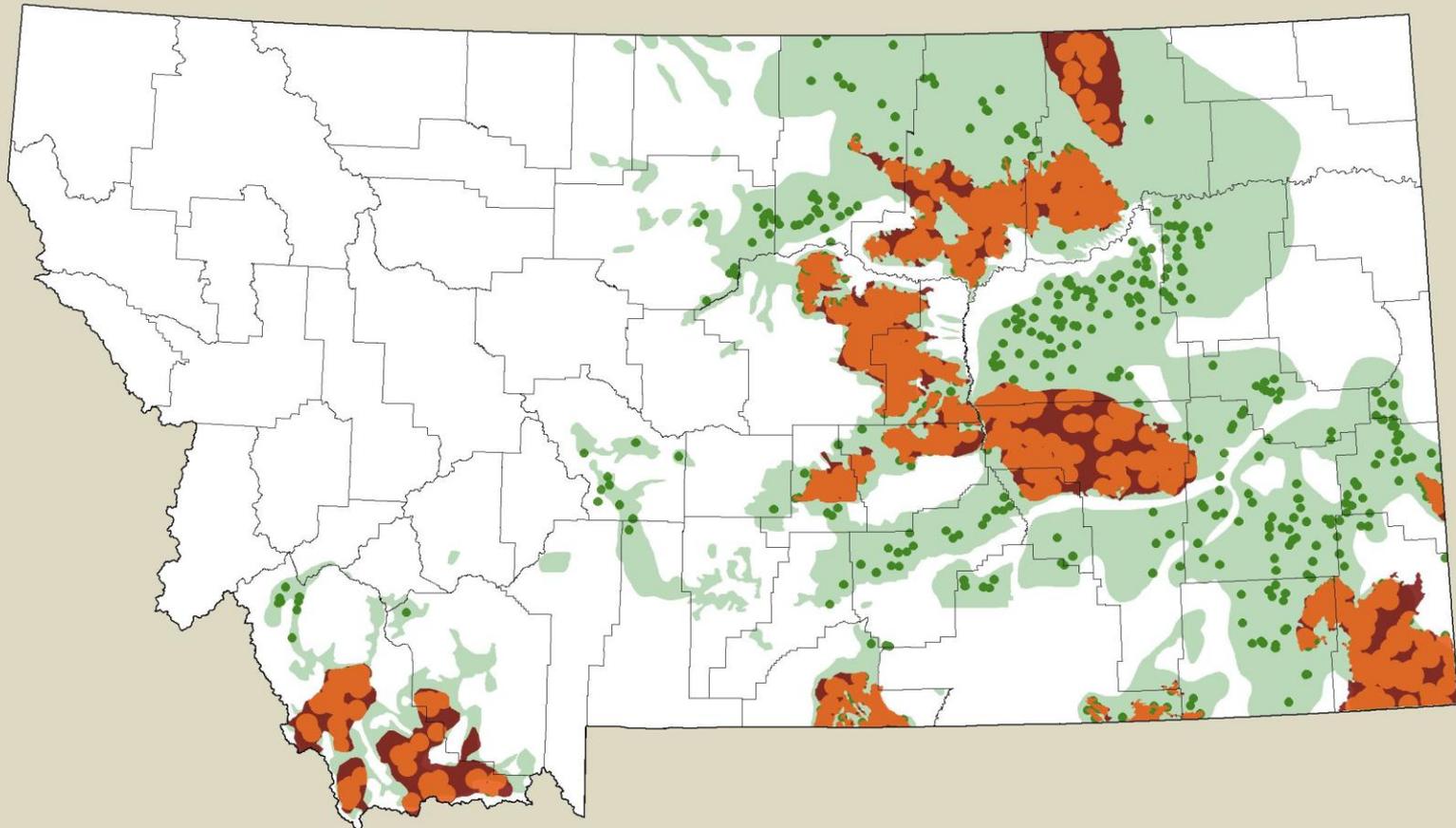


Core areas and lek buffers

- No surface occupancy
 - within 3.8 miles of active leks inside core areas
 - within 1.8 miles of active leks outside core areas



Core areas and lek buffers

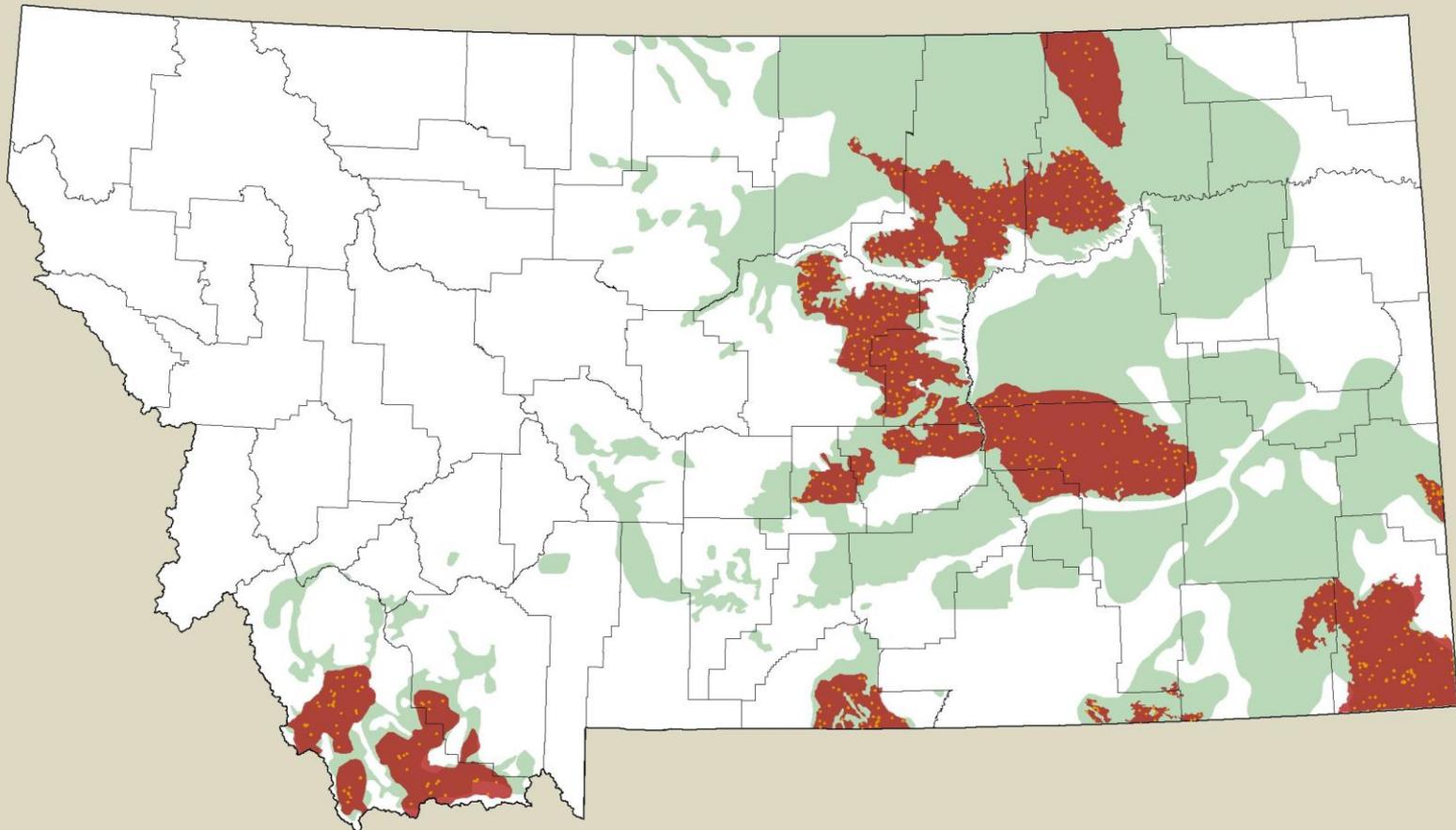


Core areas and lek buffers

Current Distribution 33 million acres

Core 0.6 mile buffer 423,000 acres

Core outside buffer 8.6 million acres



Suitable habitat data

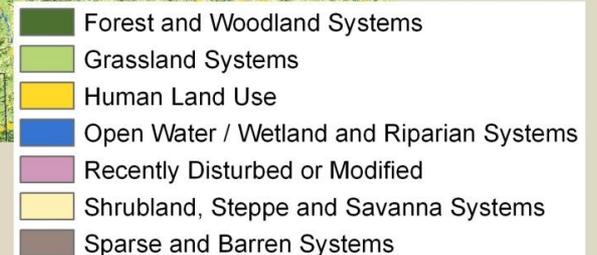
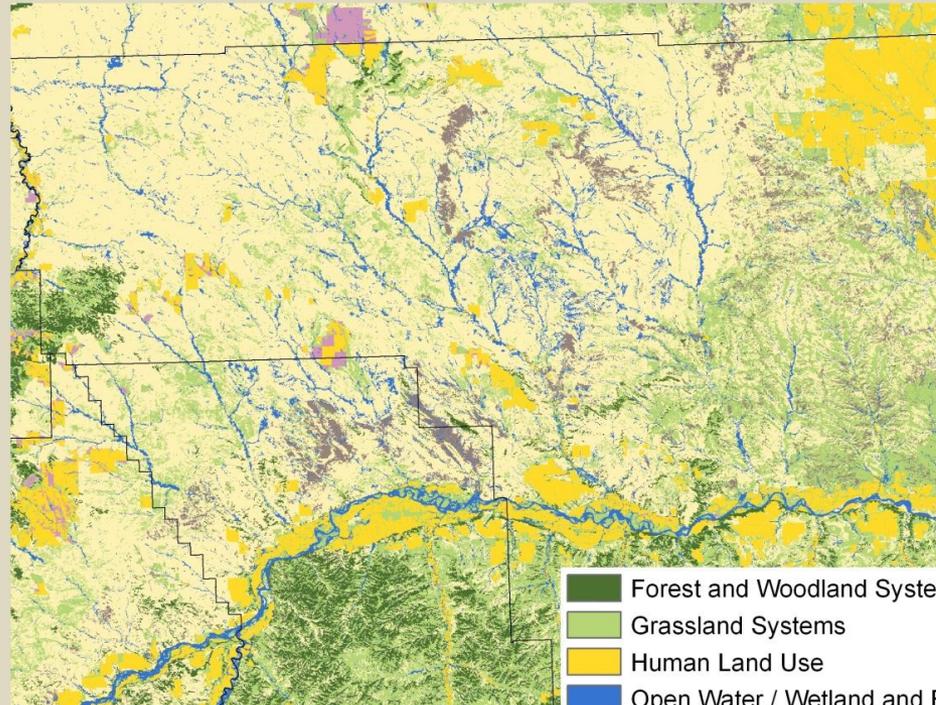
- Sagebrush habitat which meets a canopy cover threshold and including nearby riparian areas
- Montana Landcover Mapping - Ecological Systems
 - Note: this layer does not include canopy cover

Potential suitable habitats:

- Shrubland
- Riparian

May contain sagebrush:

- Grassland
- Sparse

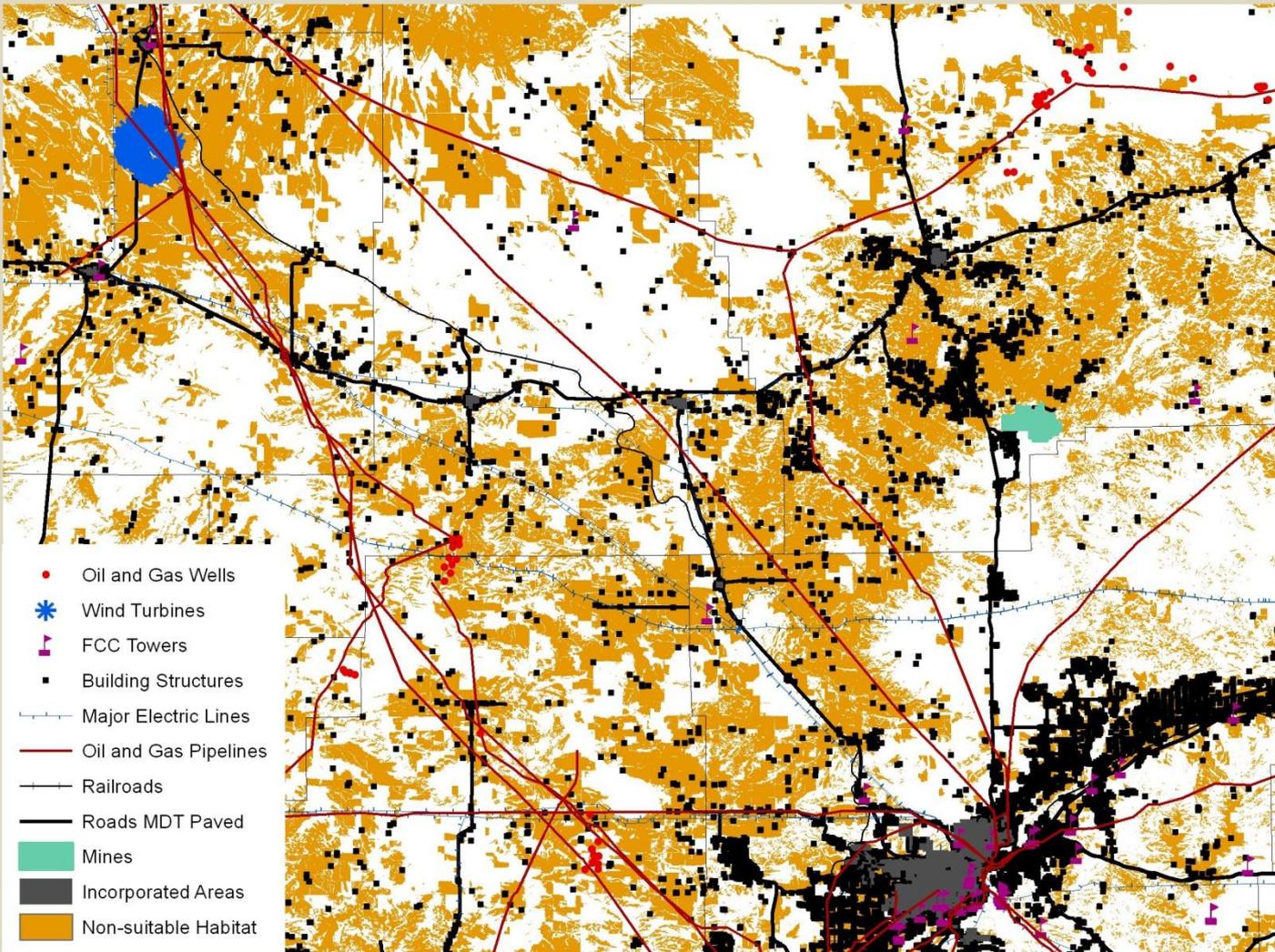


Existing surface disturbances

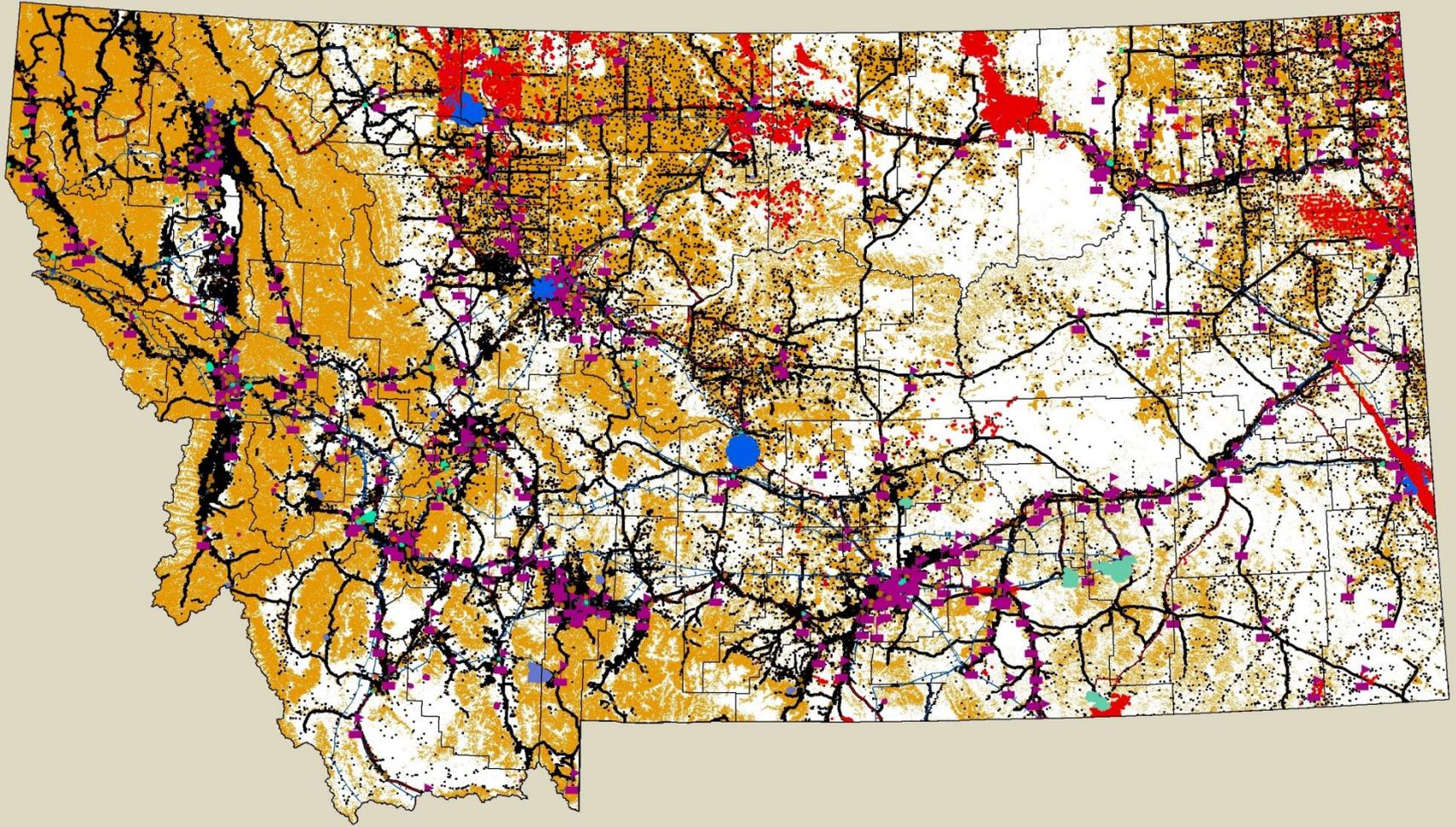
Surface development and civil infrastructure

- Pipelines
- Wells
- Wind Turbines
- Mines
- Landfills
- Ski Areas
- Buildings
- Incorporated Areas
- FCC Towers
- Major Electrical Lines
- Railroads
- Highways and Roads
- Reclamation Sites (superfund)

Existing disturbances and non-suitable habitat



Existing disturbances and non-suitable habitat

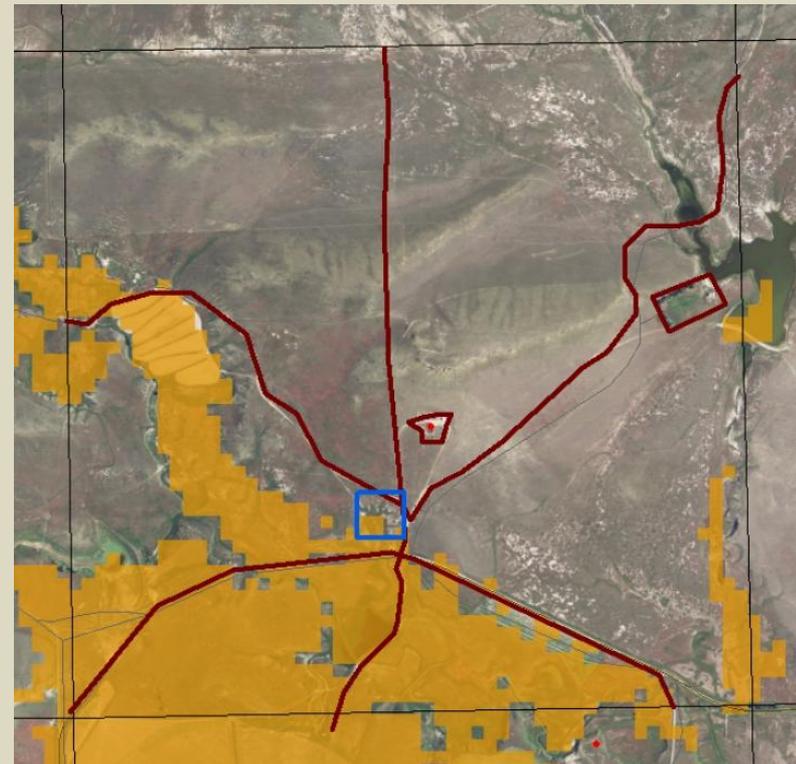


Calculating surface disturbance

- Assuming overall project area is 640 acres
 - Inside core: 3% of 640 = 19.2 acres
 - Outside core: 5% of 640 = 32 acres

- Example (in acres):

- Non-suitable habitat 100 
- Existing disturbances 40 
- Suitable habitat
 - $(640 - 100 - 40) = 500$
- Proposed disturbances 10 
- % Surface disturbance
 - $(10/500) = 2\%$



Calculating surface disturbance

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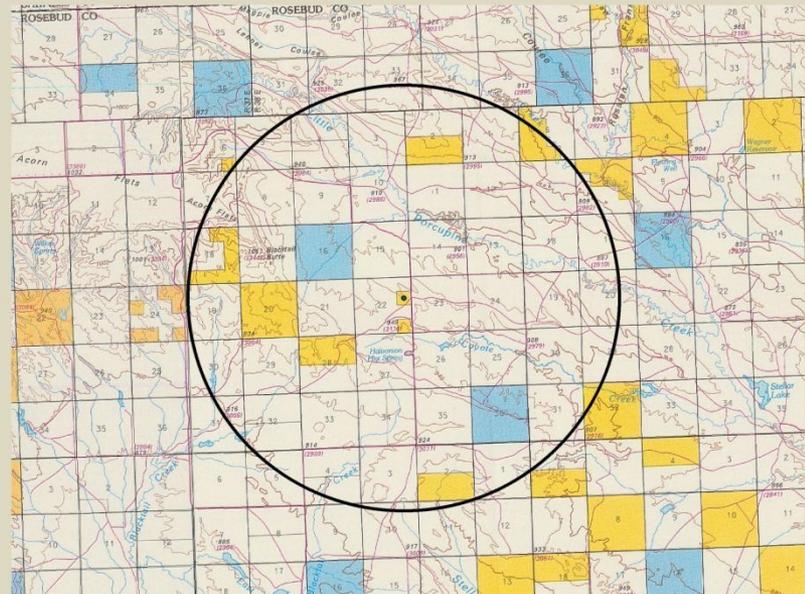
- Example (in acres):

		(A)	(B)
– Non-suitable habitat	100	300	100
– Existing disturbances	40	40	40
– Suitable habitat	500	300	500
– Proposed disturbances	10	10	25
– % Surface disturbance	2%	3.3%	5%

- (A) An decrease in suitable habitat or (B) an increase in proposed disturbance will result in higher % surface disturbances

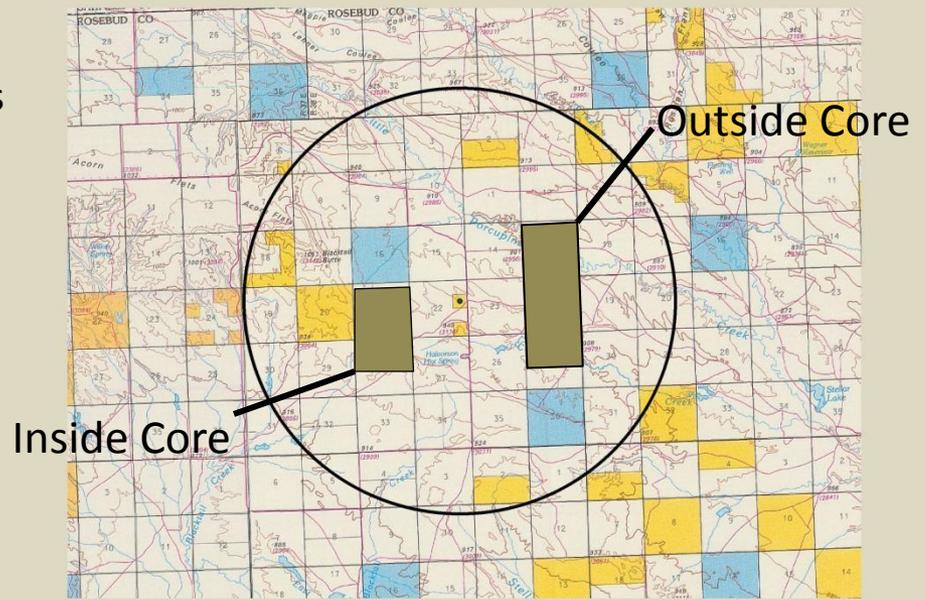
Calculating surface disturbance

- Project area is 3.8 mile buffer from proposed surface disturbance
 - Approximate area: 45 sq miles or 30,000 acres
 - Assuming 100% suitable habitat, surface disturbance totals:
 - Inside core: 3% = 900 acres
 - Outside core: 5% = 1500 acres



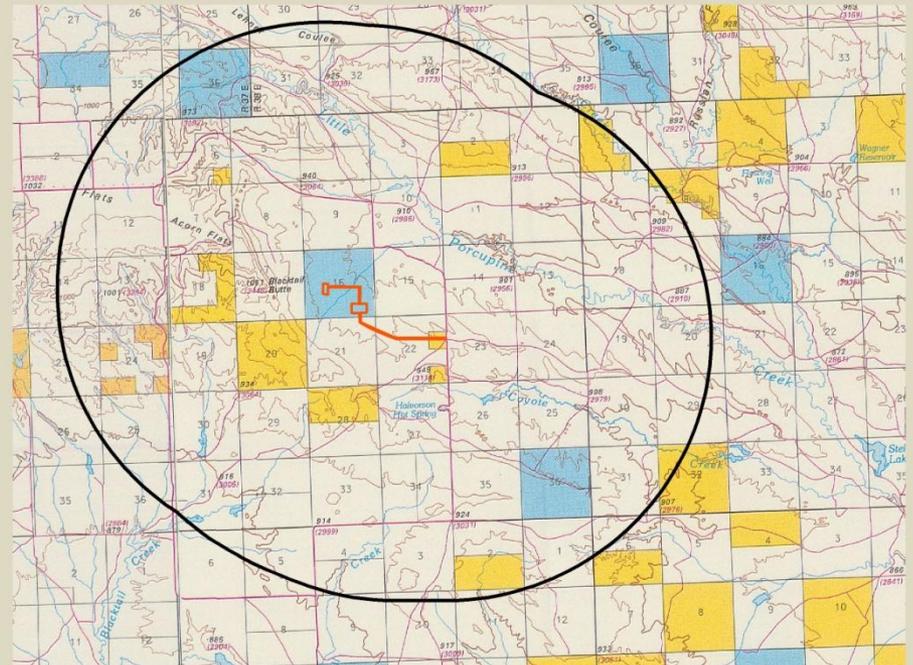
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Calculating surface disturbance

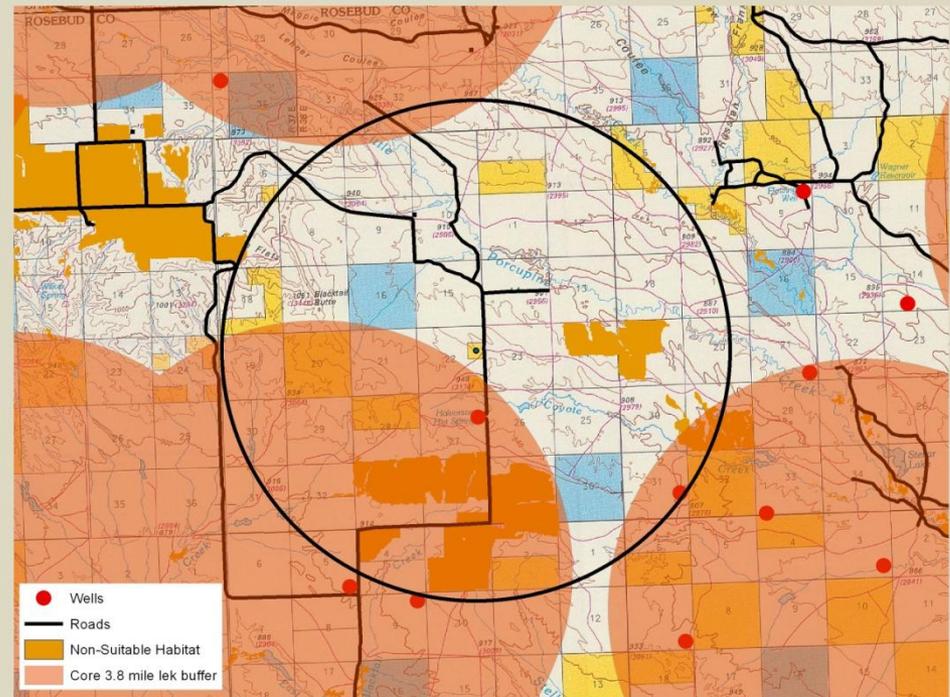
- For example purposes, single point locations are used, however most surface disturbance projects are likely a combination of features such as roads, well pads, power lines
 - Project disturbance: 50 acres
 - Project evaluation area: 39,342 acres
 - 3% = 1,180 acres
 - 5% = 1,967 acres



Calculating surface disturbance

- Project evaluation area of 30,000 acres

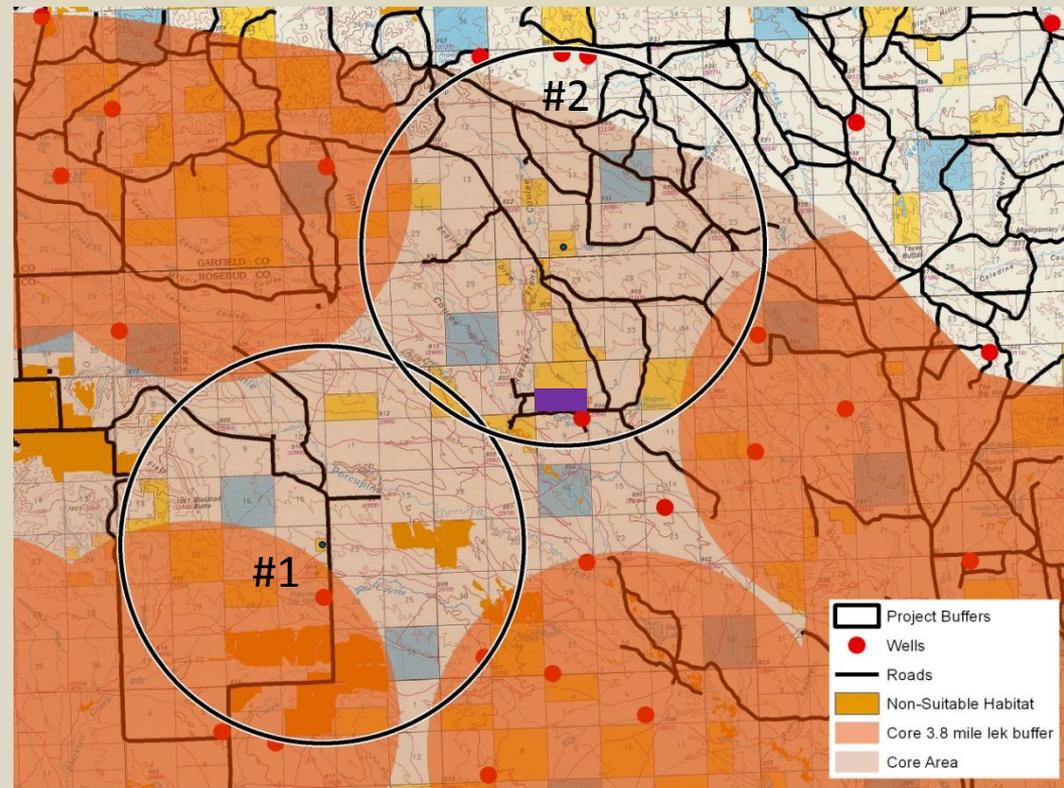
– Non-suitable habitat	2800
– Existing disturbances	
– Roads	55
– Wells	10
– Suitable habitat	27,135
– 3% of suitable habitat	814
– Proposed disturbances	20
– % Surface disturbance	0.06 %



Calculating surface disturbance

- Project evaluation area #2

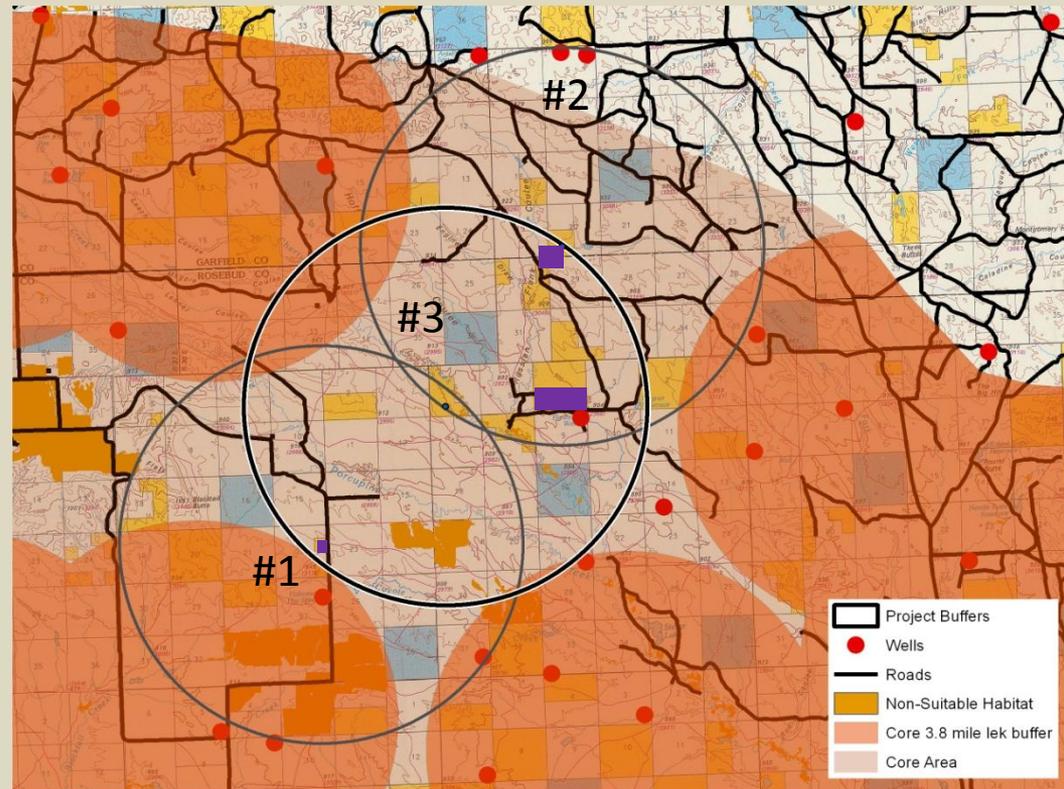
– Non-suitable habitat	100
– Existing disturbances	
– Roads	150
– Wells	15
– Suitable habitat	29735
– 3% of suitable habitat	892
– Disturbances since 2005	320
– Proposed disturbances	160
– Total disturbances	480
– Total % Surface disturbance	1.6 %



Calculating surface disturbance

- Project evaluation area #3

– Non-suitable habitat	640
– Existing disturbances	
– Roads	70
– Wells	5
– Suitable habitat	29285
– 3% of suitable habitat	878
– Disturbances since 2005	500
– Proposed disturbances	320
– Total disturbances	820
– Total % Surface disturbance	2.8 %



Data Characteristics

- Disturbance and habitat acres can not be mapped accurately using existing data
 - The examples show Roads, Wells, and Non-suitable habitat, however, these features are not all mapped with the detail required to accurately calculate acres and thereby get accurate percentages
- Investment is required to map the actual disturbance area, or to verify that what is mapped is accurate
 - Roads GIS data are centerlines, not road surface or right of way
 - Oil well GIS data are points, not the well pad
- Sage-brush canopy cover is not widely available
 - Would need to be measured within the project area
 - Examples presented assumed suitable habitats met the canopy cover threshold
- Wyoming tool requires that area measurements for suitable habitat, existing and proposed disturbance are provided during proposal submission