



U.S. Department of the Interior  
Bureau of Land Management

March 2024

# Greater Sage-Grouse

Volume 2: Appendix 1. Maps

Part 6: Maps 3.1 – 3.23

Draft Resource Management Plan Amendment and Environmental Impact Statement





The Bureau of Land Management's multiple-use mission is to sustain the health and productivity of the public lands for the use and enjoyment of present and future generations. The Bureau accomplishes this by managing such activities as outdoor recreation, livestock grazing, mineral development, and energy production, and by conserving natural, historical, cultural, and other resources on public lands.

Cover Photo: Steve Ting

Lower Bar Photos (L to R):

US Fish and Wildlife, Rachel Woita, James Yule

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# Appendix I

## Maps

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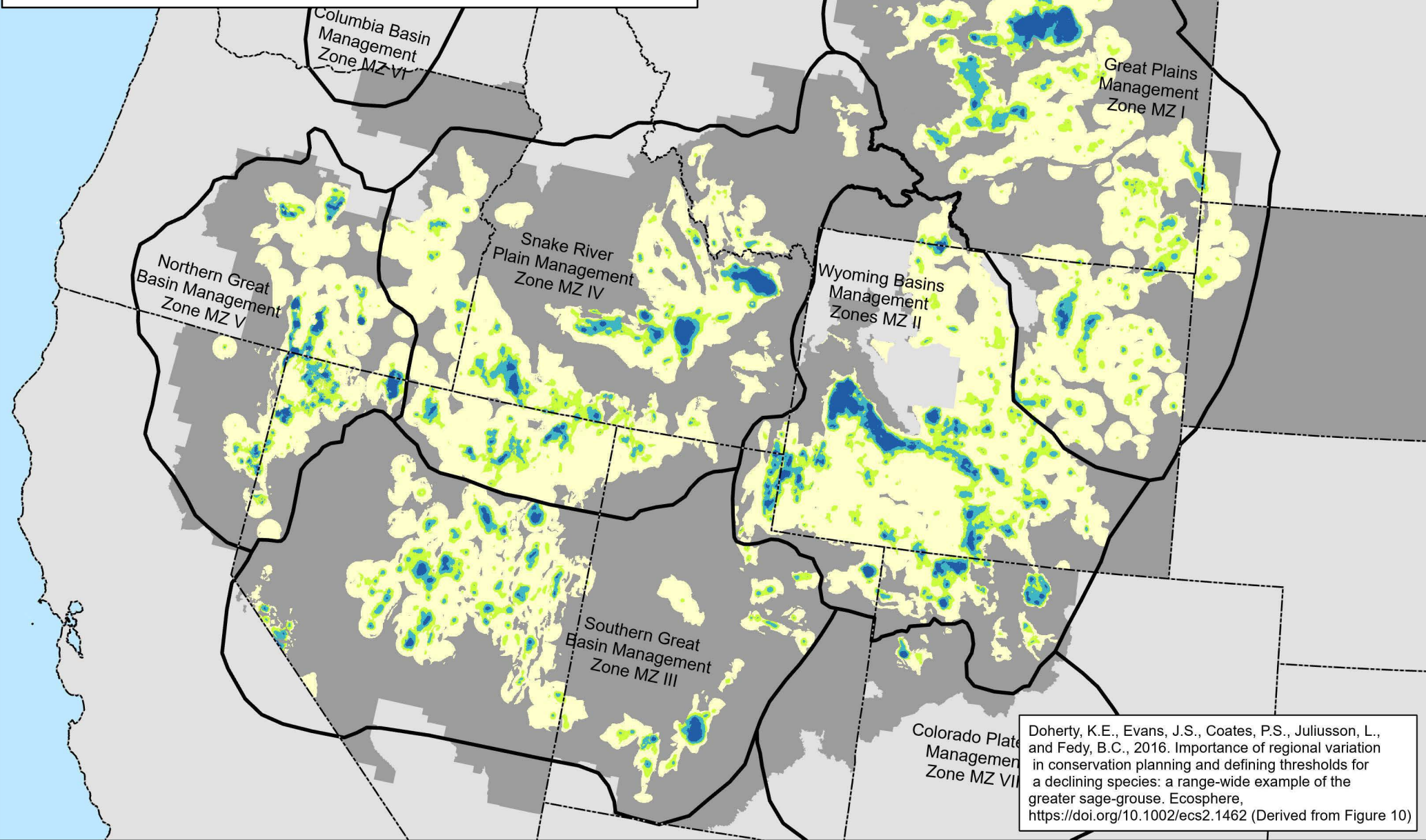


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# Greater Sage-Grouse Breeding Population Index Model within Greater Sage-Grouse Planning Areas



Map 3.1

## Legend

Relative Abundance - T25 Percent  
Relative Percent Population MZ VI

Relative Abundance

25% = "High"

50% = "Medium"

75% = "Low"

100% = "Very Low"

WAFWA Mgmt Zones

State Boundaries

Planning Area Extent



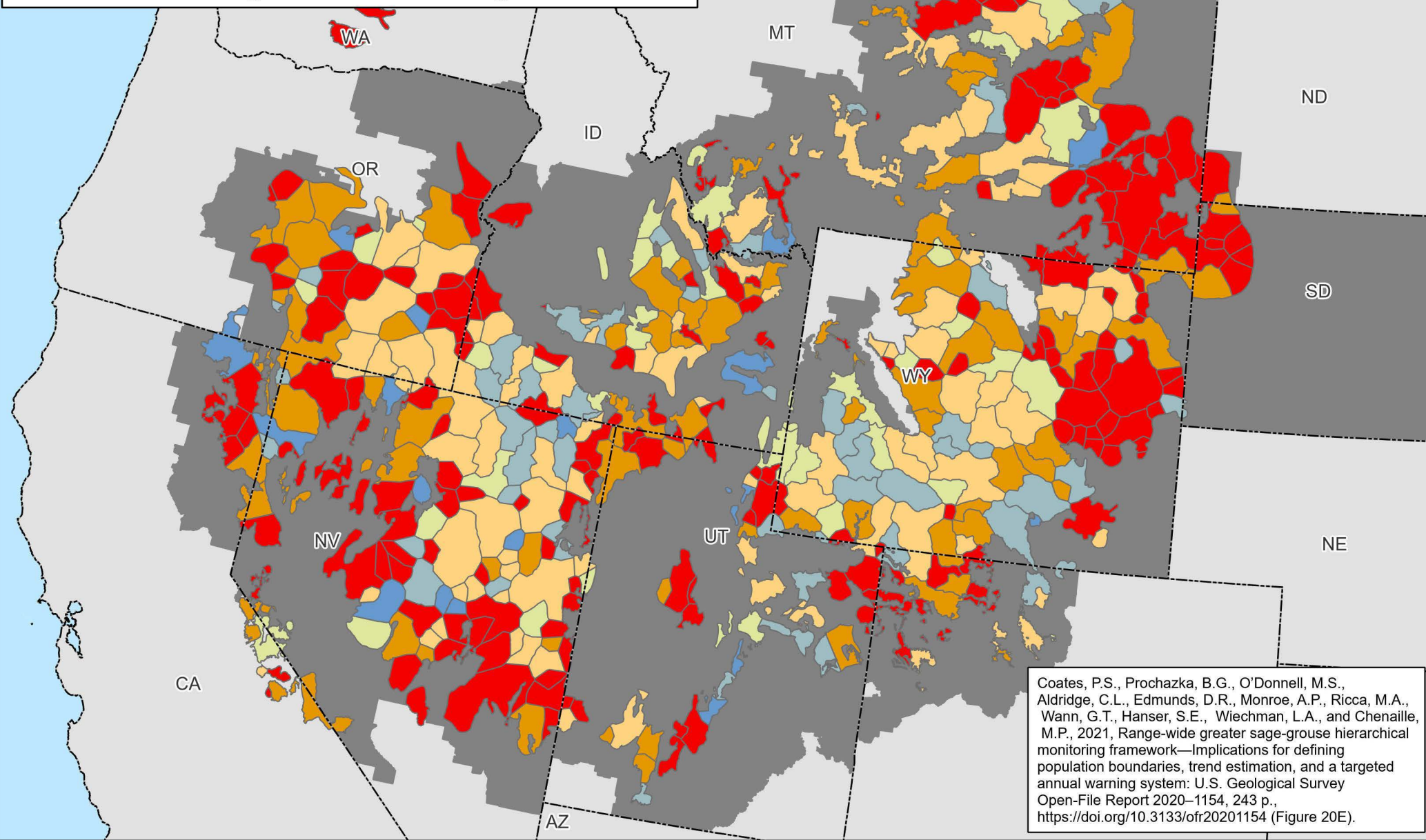
0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.





# **Average Annual Rate of Change in Greater Sage-Grouse Abundance (Short term - 2002-2021) within Greater Sage-Grouse Planning Areas**



Coates, P.S., Prochazka, B.G., O'Donnell, M.S., Aldridge, C.L., Edmunds, D.R., Monroe, A.P., Ricca, M.A., Wann, G.T., Hanser, S.E., Wiechman, L.A., and Chenaille, M.P., 2021, Range-wide greater sage-grouse hierarchical monitoring framework—Implications for defining population boundaries, trend estimation, and a targeted annual warning system: U.S. Geological Survey Open-File Report 2020–1154, 243 p., <https://doi.org/10.3133/ofr20201154> (Figure 20E).

**Map 3.2**

## **Legend**

Average annual rate of change in GRSG abundance (2002-2021)

Short Term (2 oscillations)

Red ≤ 0.95

Orange > 0.95 - 0.97

Yellow > 0.97 - 0.99

Light Green > 0.99 - 1.00

Blue > 1.00 - 1.03

Dark Blue > 1.03

Dashed Line State Boundaries

Solid Grey Planning Area Extent



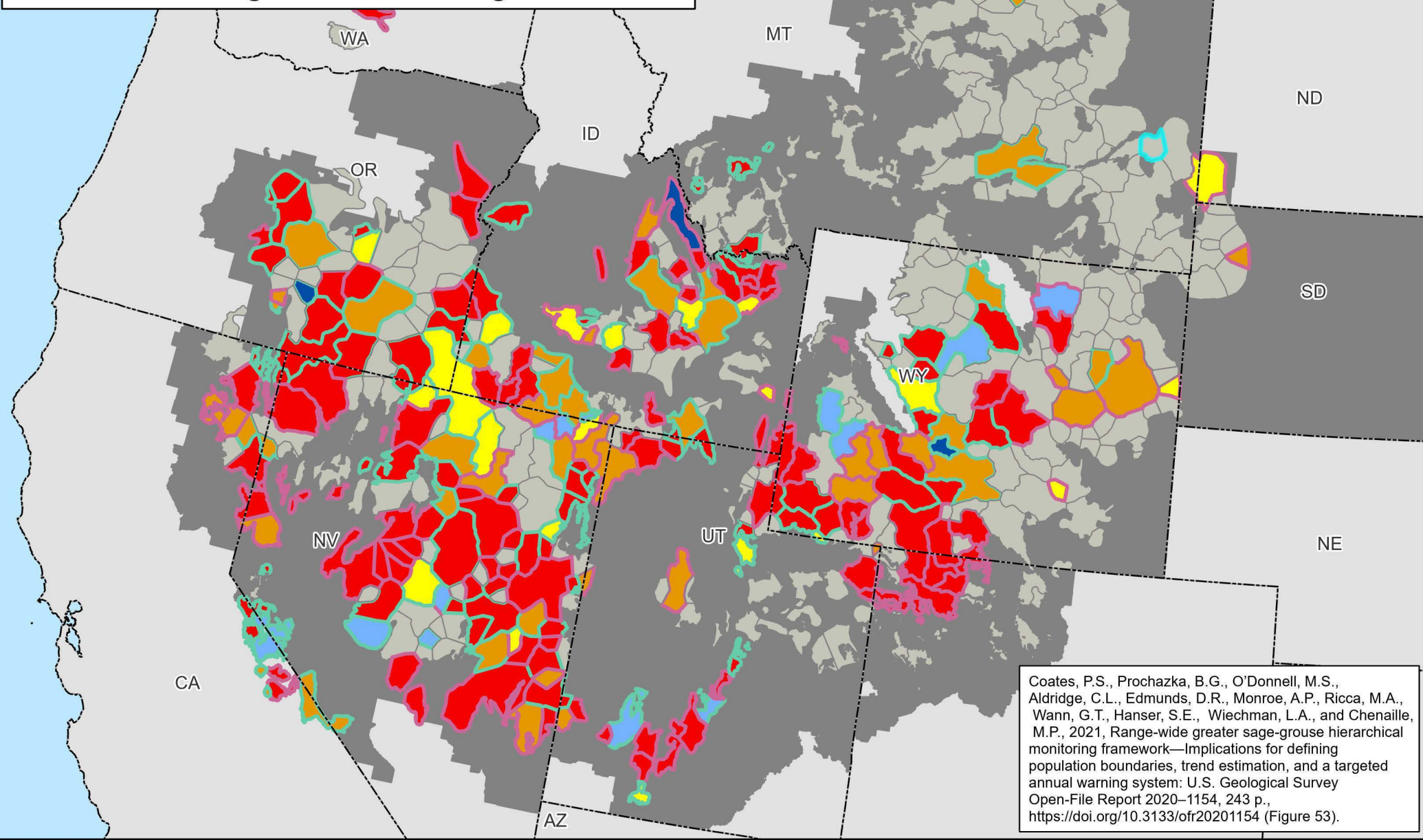
0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.





# Watch and Warning Signals for Greater Sage-Grouse Population Declines 1995-2021 within Greater Sage-Grouse Planning Areas



Coates, P.S., Prochazka, B.G., O'Donnell, M.S., Aldridge, C.L., Edmunds, D.R., Monroe, A.P., Ricca, M.A., Wann, G.T., Hanser, S.E., Wiechman, L.A., and Chenaille, M.P., 2021, Range-wide greater sage-grouse hierarchical monitoring framework—Implications for defining population boundaries, trend estimation, and a targeted annual warning system: U.S. Geological Survey Open-File Report 2020–1154, 243 p., <https://doi.org/10.3133/ofr20201154> (Figure 53).

Map 3.3

Most recent watch or warning

- 1995 - 1999
- 2000 - 2004
- 2005 - 2009
- 2010 - 2014
- 2015 - 2021

Legend

- No warning or watch
- Warning
- Watch

State Boundaries

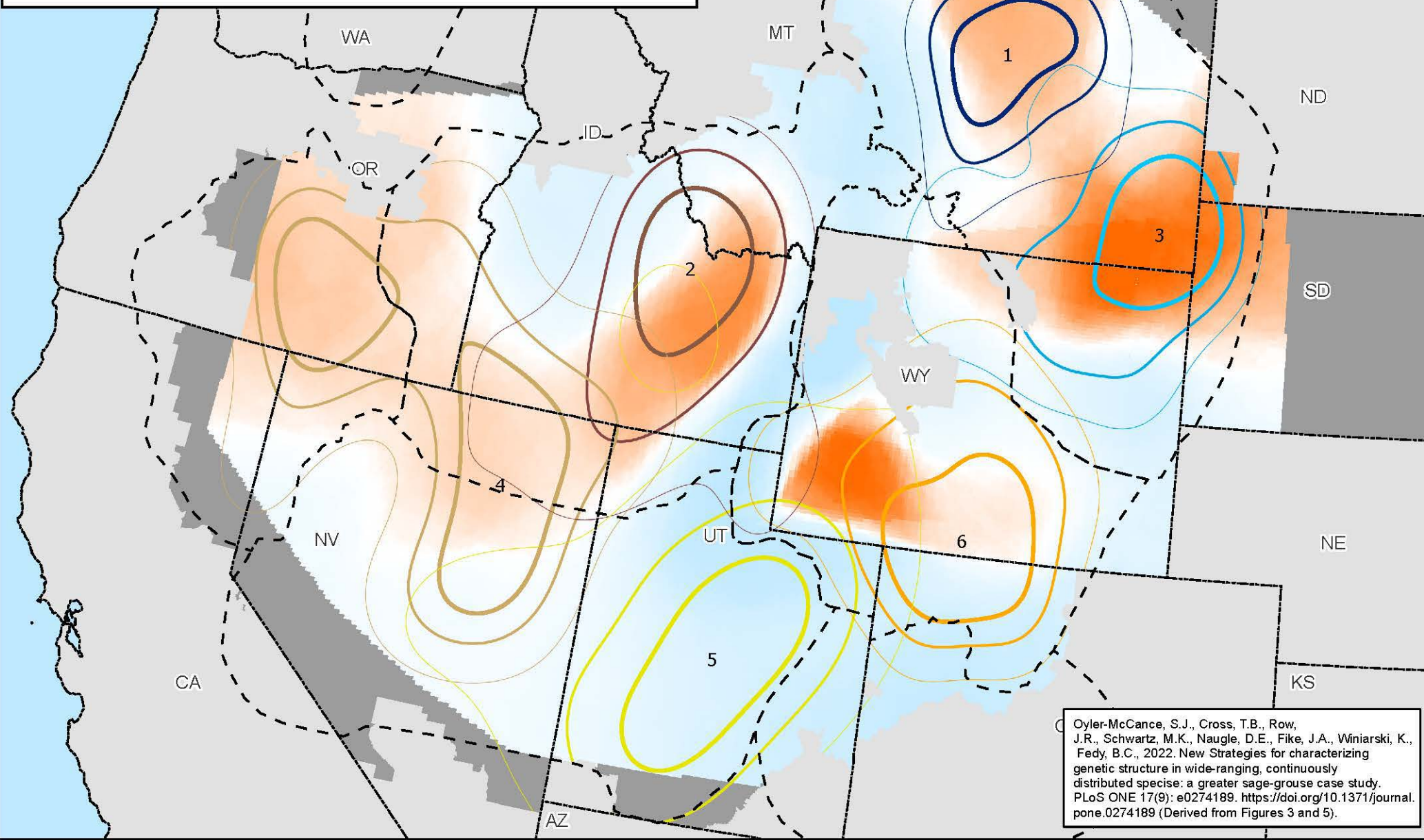
Planning Area Extent

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.

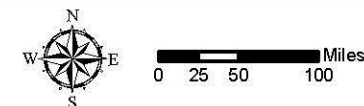




# Distinct Genetic Greater Sage-Grouse Groups within Greater Sage-Grouse Planning Areas



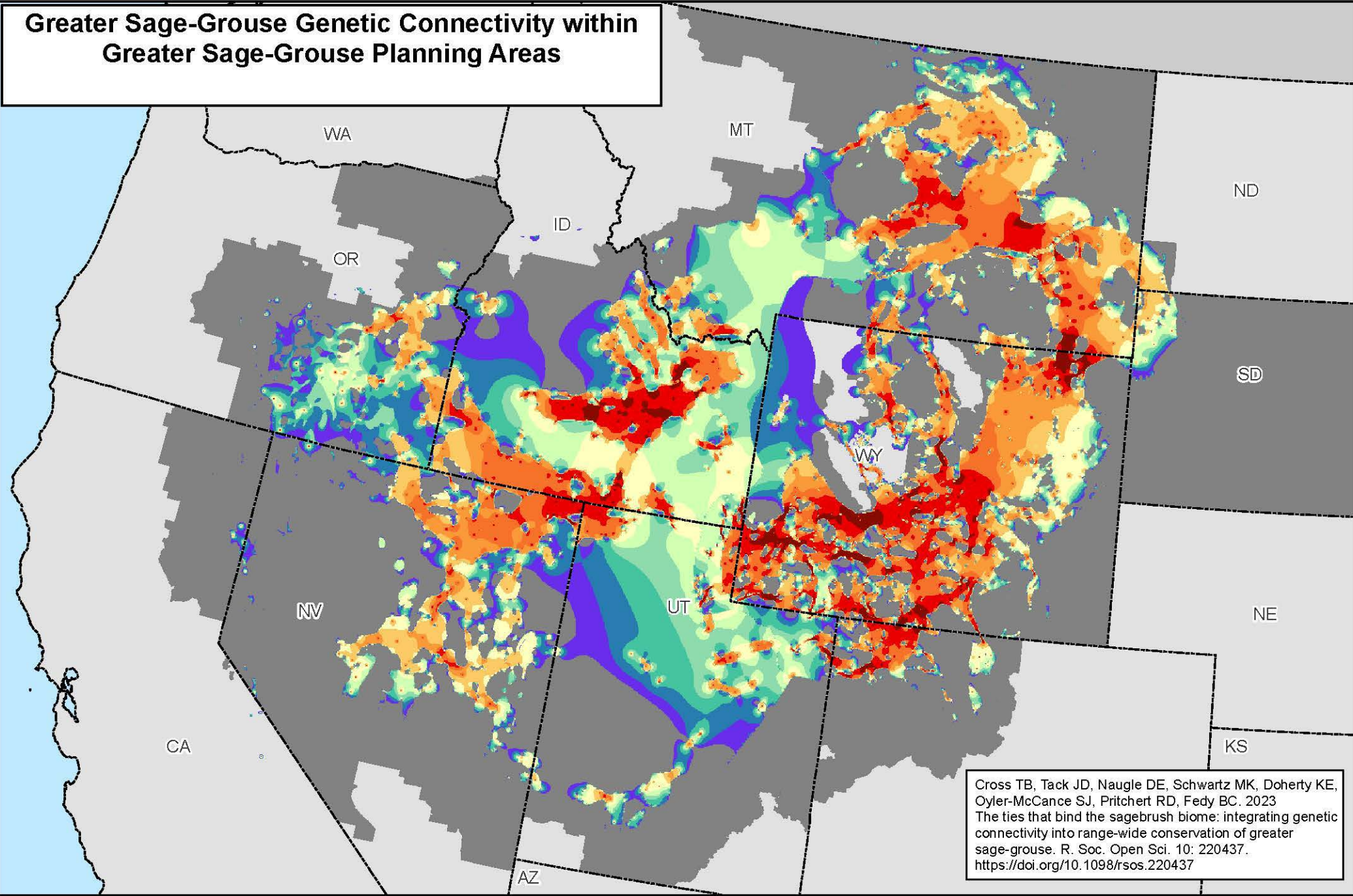
Map 3.4



No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.

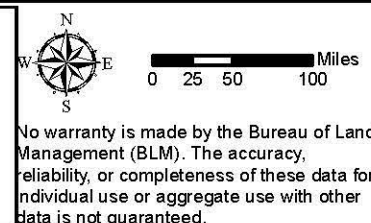
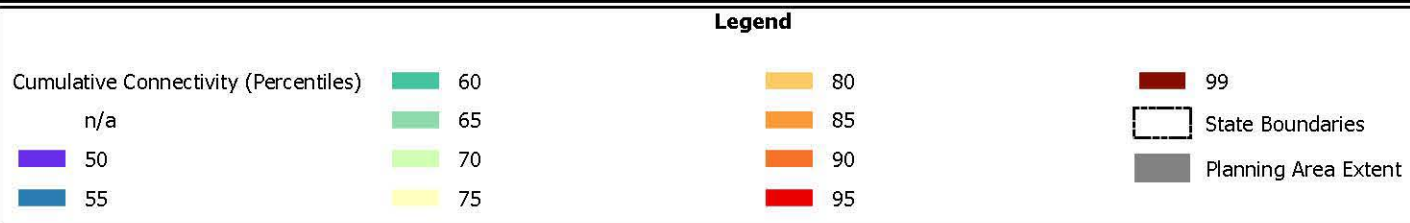


# Greater Sage-Grouse Genetic Connectivity within Greater Sage-Grouse Planning Areas



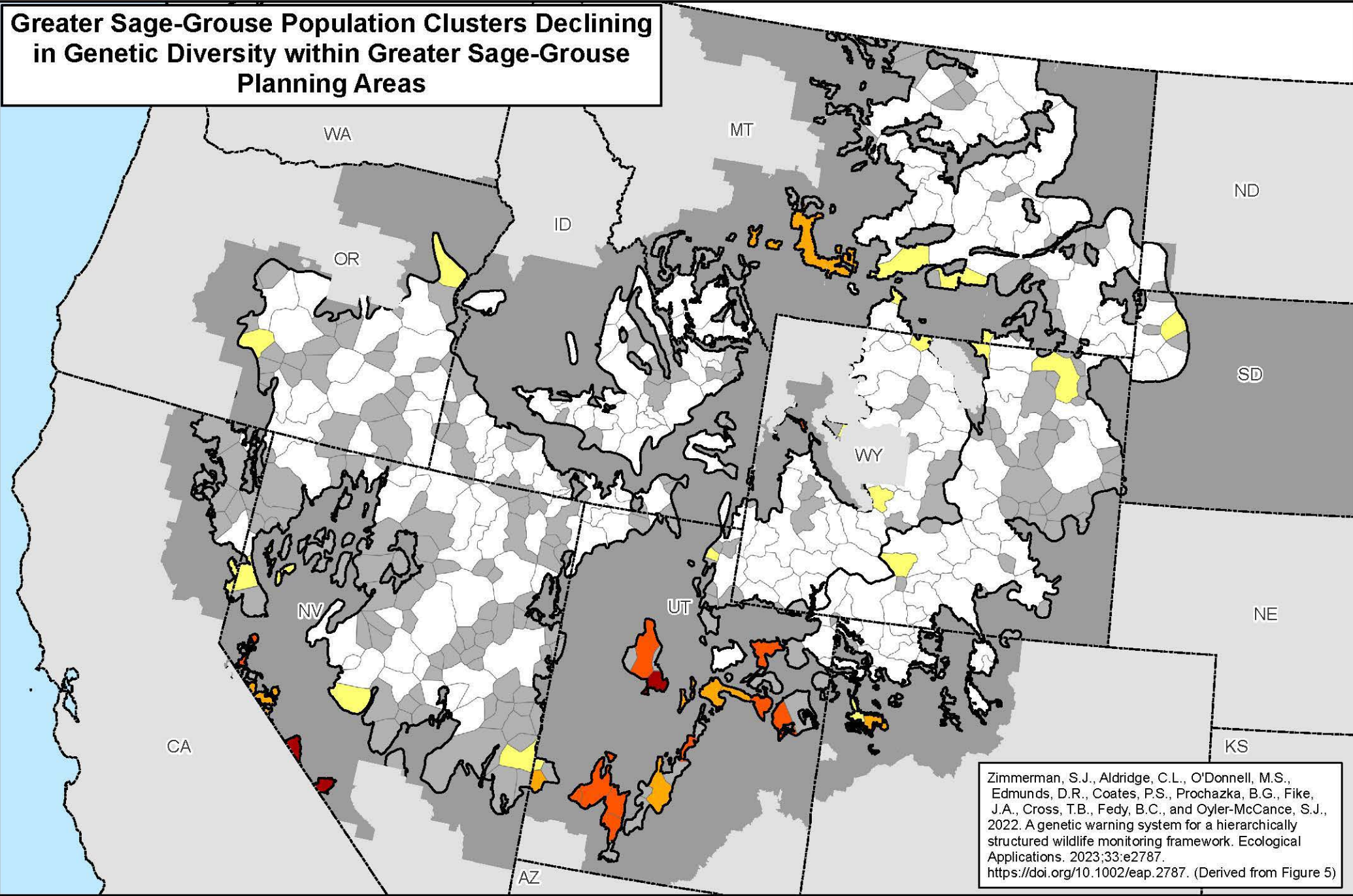
Cross TB, Tack JD, Naugle DE, Schwartz MK, Doherty KE, Oylar-McCance SJ, Pritchert RD, Fedy BC. 2023  
 The ties that bind the sagebrush biome: integrating genetic connectivity into range-wide conservation of greater sage-grouse. R. Soc. Open Sci. 10: 220437.  
<https://doi.org/10.1098/rsos.220437>

Map 3.5





# Greater Sage-Grouse Population Clusters Declining in Genetic Diversity within Greater Sage-Grouse Planning Areas



Map 3.6



Neighborhood Cluster - Genetic Watches & Warnings

- Watch 1
- Watch 2

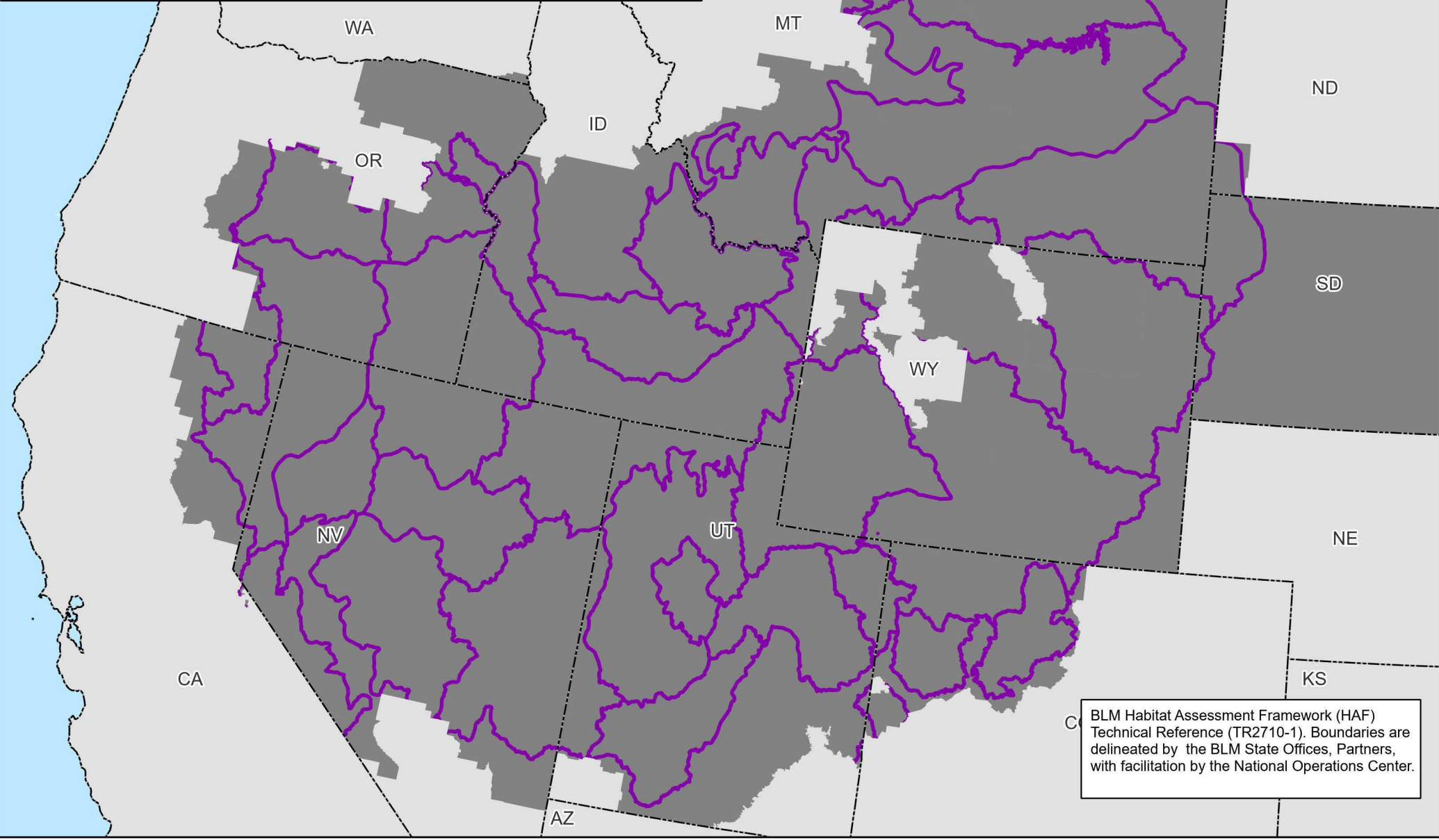
- Warning 1
- Warning 2
- None
- No Data

- Climate Clusters
- State Boundaries
- GRSG Planning Area 2022

0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.

# Greater Sage-Grouse Habitat Assessment Framework, Mid-Scale Areas (Level 2) and Greater Sage-Grouse Planning Areas



Map 3.7

Legend

HAF Mid-Scale Areas (Level 2)

State Boundaries

Planning Area Extent

N

E

S

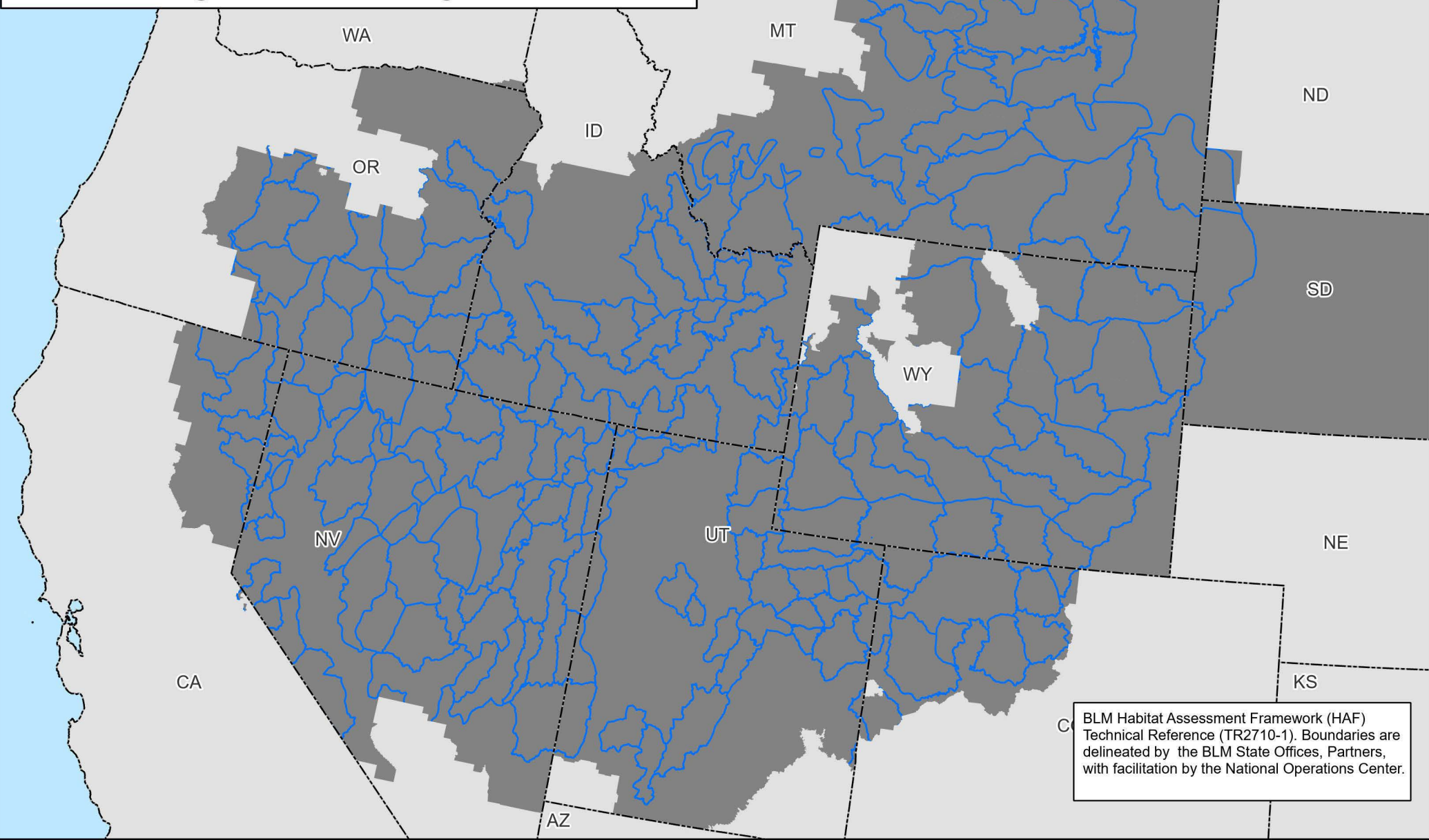
W

0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



**Greater Sage-Grouse Habitat Assessment  
Framework, Fine-Scale Areas (Level 3) and Greater  
Sage-Grouse Planning Areas**



BLM Habitat Assessment Framework (HAF)  
Technical Reference (TR2710-1). Boundaries are  
delineated by the BLM State Offices, Partners,  
with facilitation by the National Operations Center.

**Map 3.8**

**Legend**

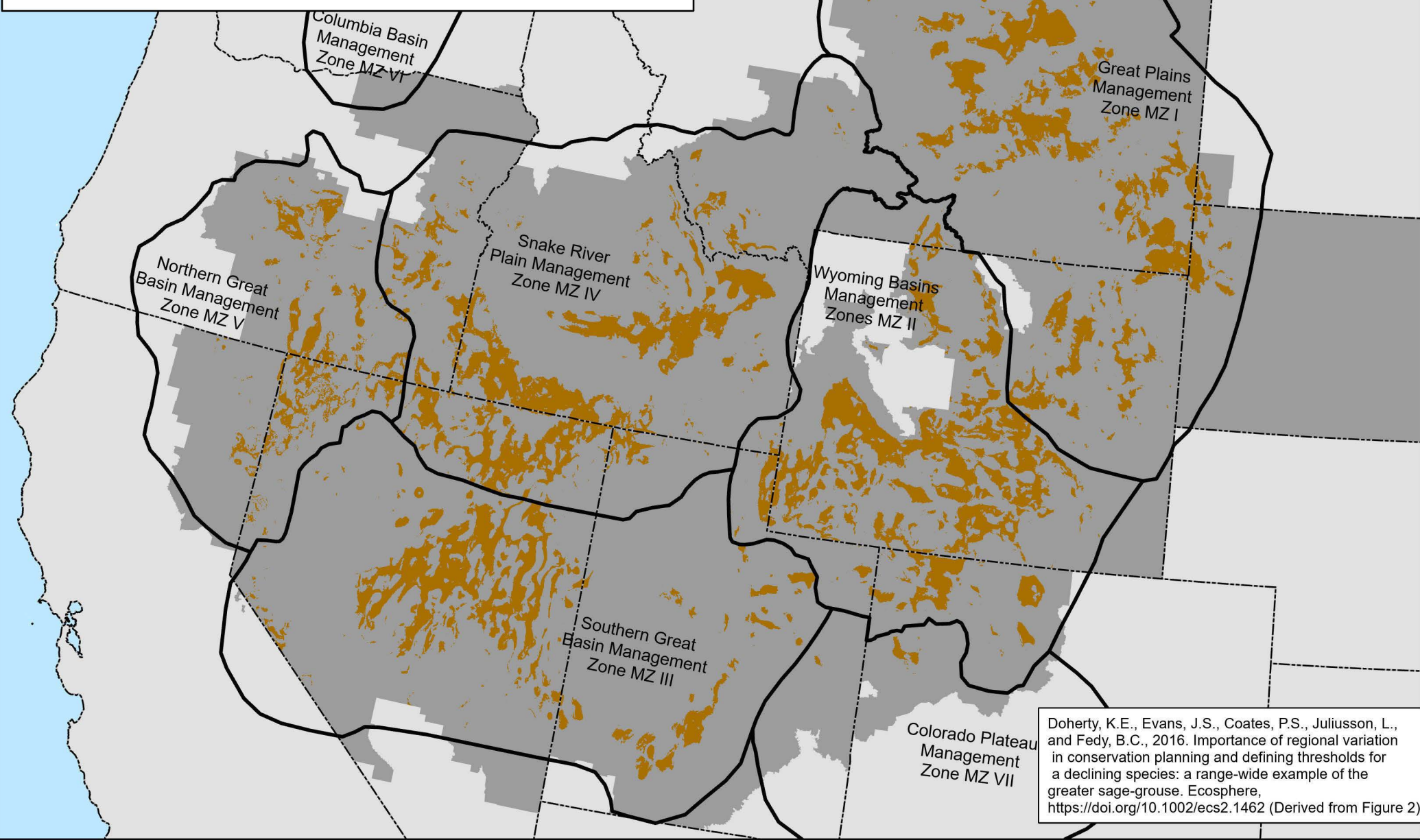
- HAF Fine-Scale Areas (Level 3)
- State Boundaries
- Planning Area Extent

0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



# Greater Sage-Grouse Breeding Habitat Model within Greater Sage-Grouse Planning Areas



Doherty, K.E., Evans, J.S., Coates, P.S., Juliusson, L., and Fedy, B.C., 2016. Importance of regional variation in conservation planning and defining thresholds for a declining species: a range-wide example of the greater sage-grouse. *Ecosphere*, <https://doi.org/10.1002/ecs2.1462> (Derived from Figure 2)

Map 3.9

## Legend

- Probability of Breeding Habitat > 0.65
- State Boundaries
- WAFWA Mgmt Zones
- Planning Area Extent

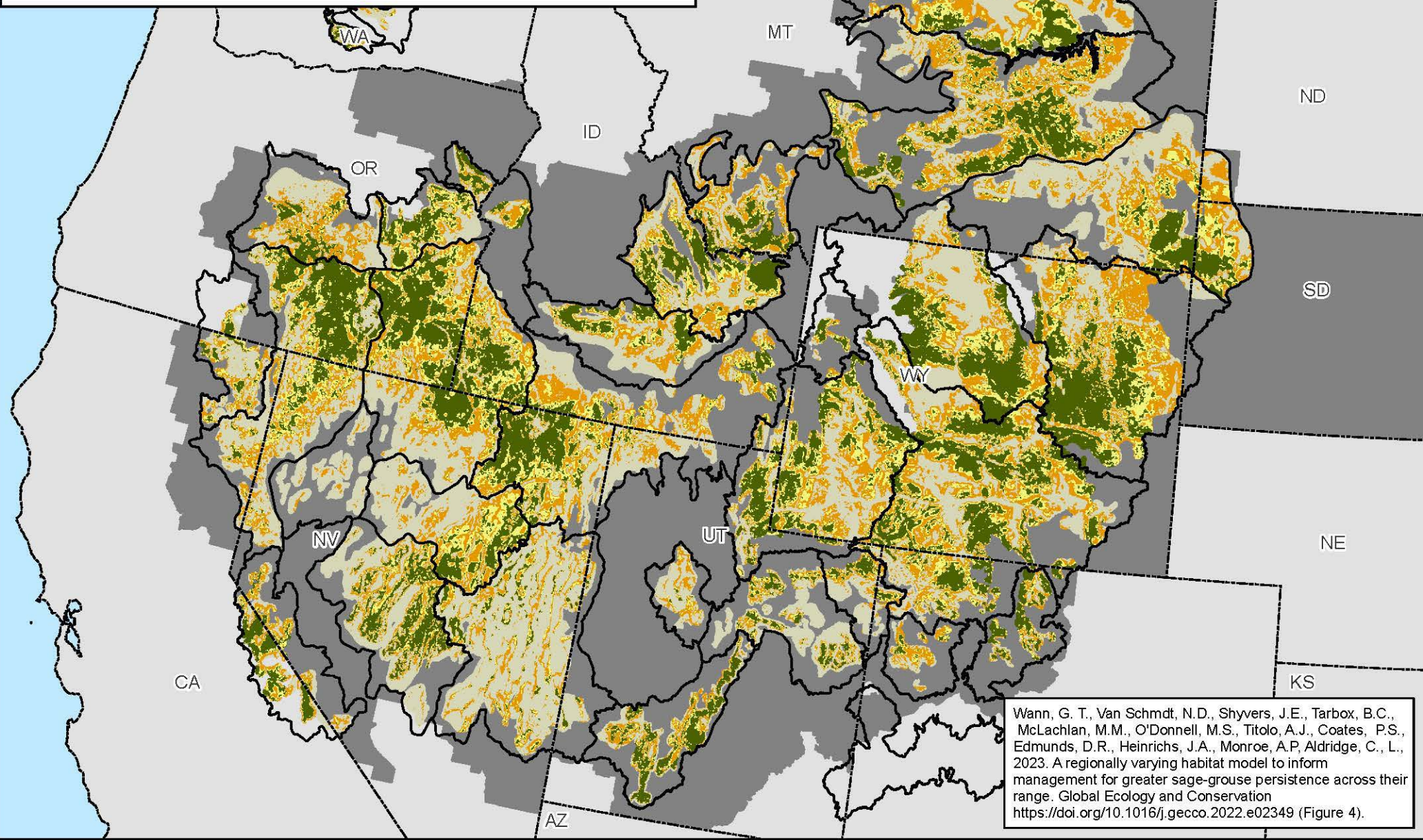


No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.





# Probability of Greater Sage-Grouse Lek Persistence within Greater Sage-Grouse Planning Areas



Map 3.10

Lek Persistence Probability

High

Medium

Low

## Legend

Marginal

State Boundaries

HAF Mid-Scale Areas (Level 2)

Planning Area Extent

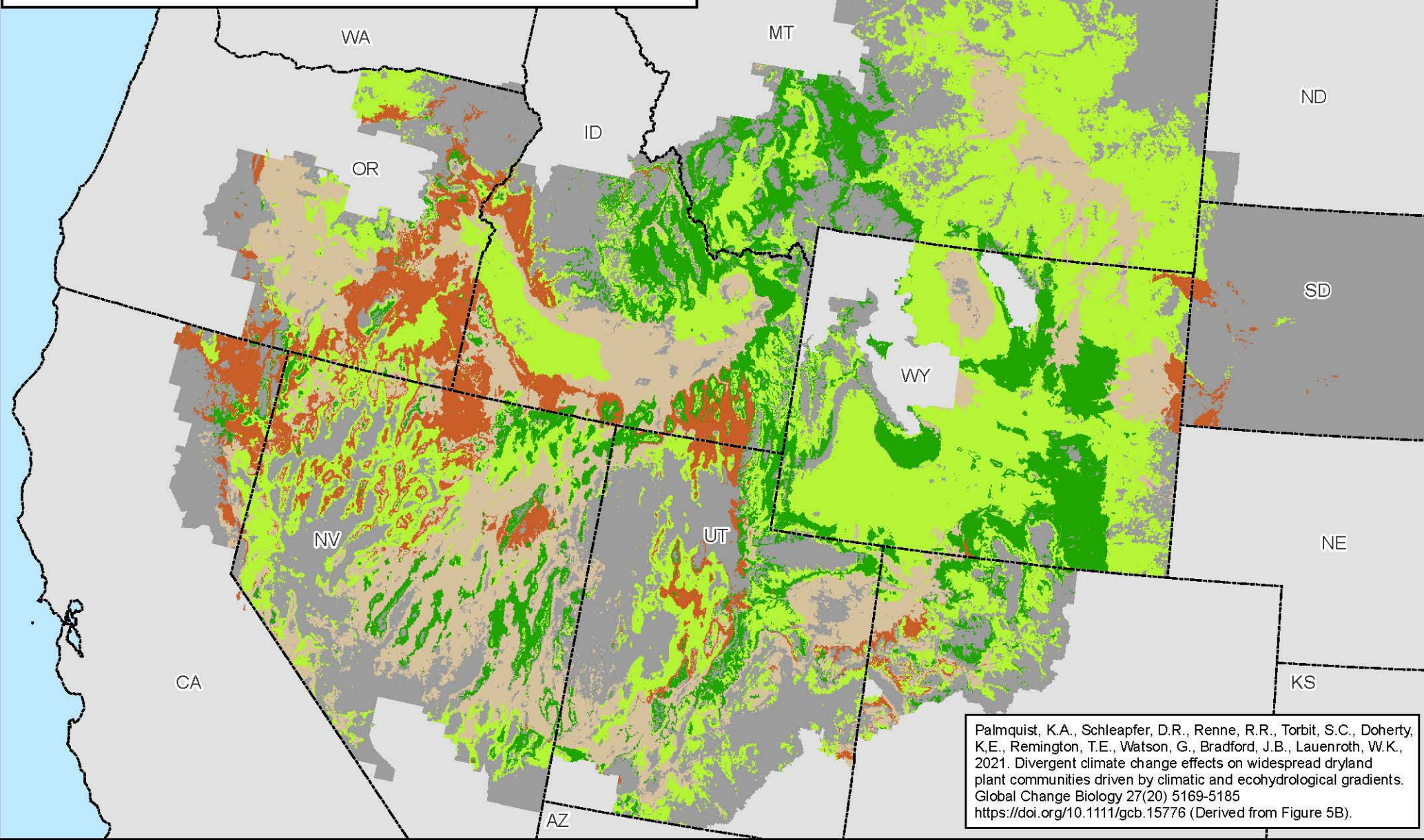


0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



# Modeled Potential Change in Sagebrush Biomass (2030-2060) within Greater Sage-Grouse Planning Areas



Map 3.11

Change in Sagebrush Biomass (g/m<sup>2</sup>)  
2030 to 2060

Highest Decrease

Low to Moderate Decrease

Low to Moderate Increase

Highest Increase

State Boundaries

Planning Area Extent



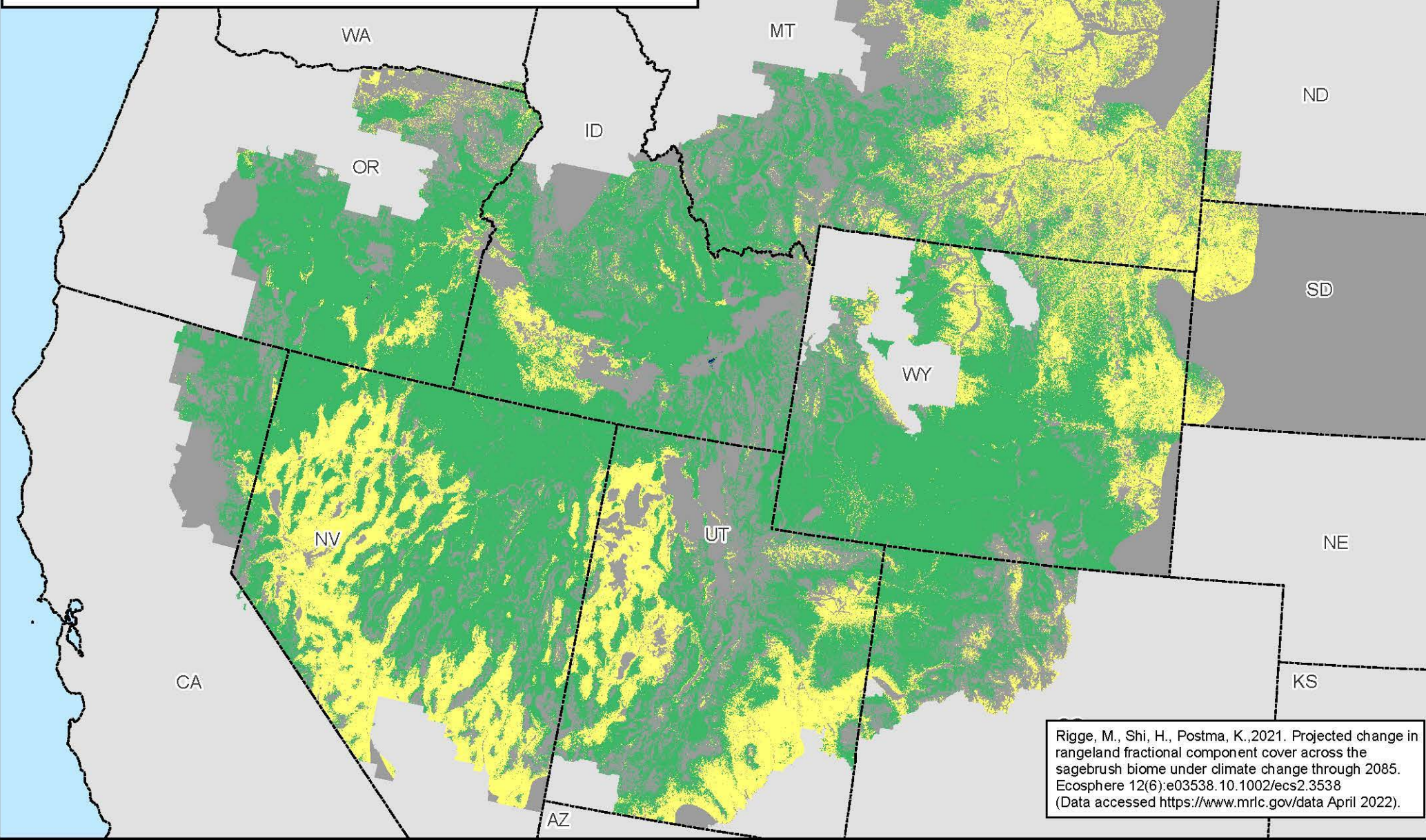
0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.





# Modeled Potential Sagebrush Cover (2011-2040) within Greater Sage-Grouse Planning Areas



Map 3.12

% Cover

0 - 4

4 - 25

25 - 58

## Legend

State Boundaries

Planning Area Extent



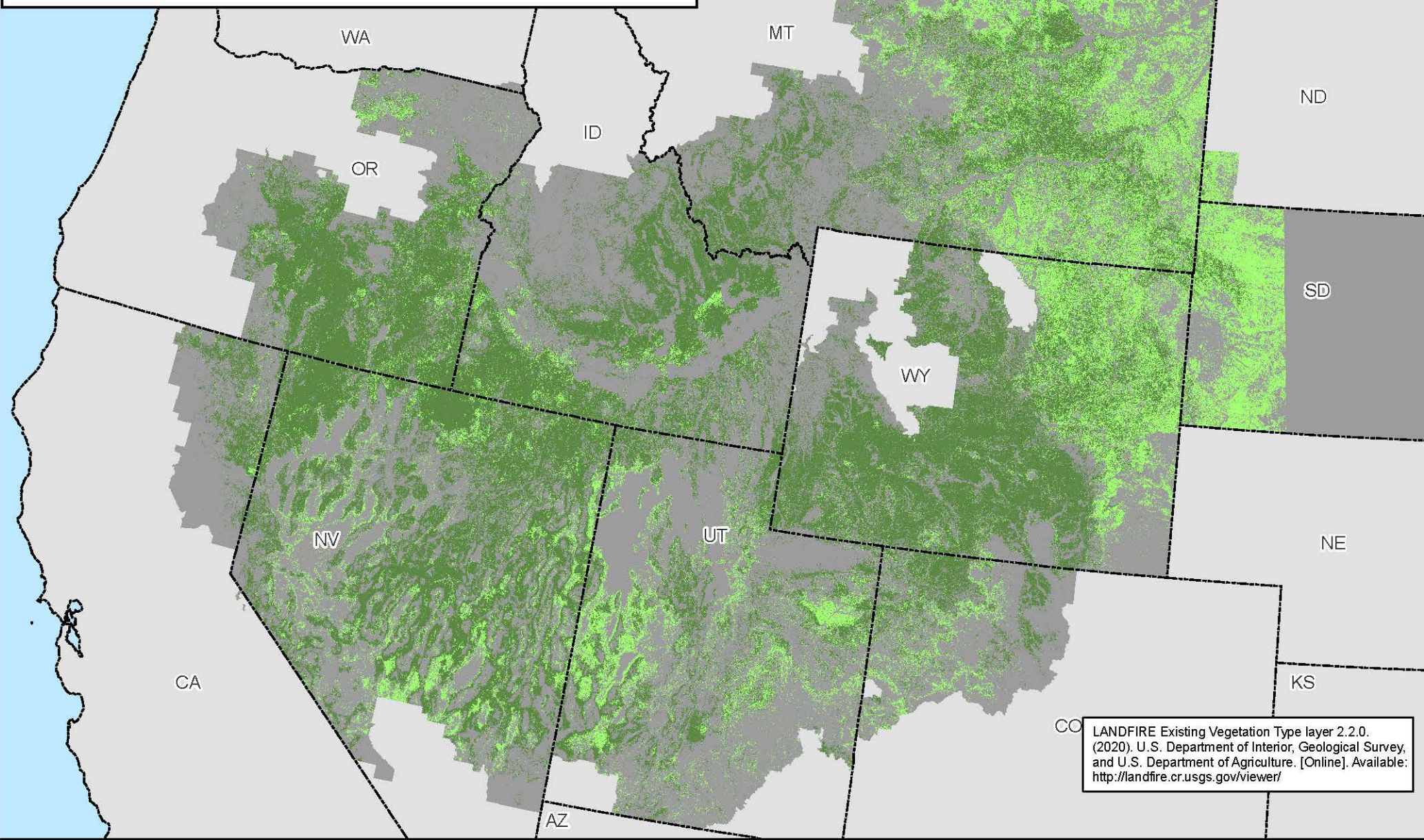
0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.





# Vegetation Communities within Greater Sage-Grouse Planning Areas



Map 3.13

Reclassified Landfire EVT220

Existing Sagebrush

Existing Sagebrush Associated

## Legend

Non-Sagebrush in Planning Area

State Boundaries



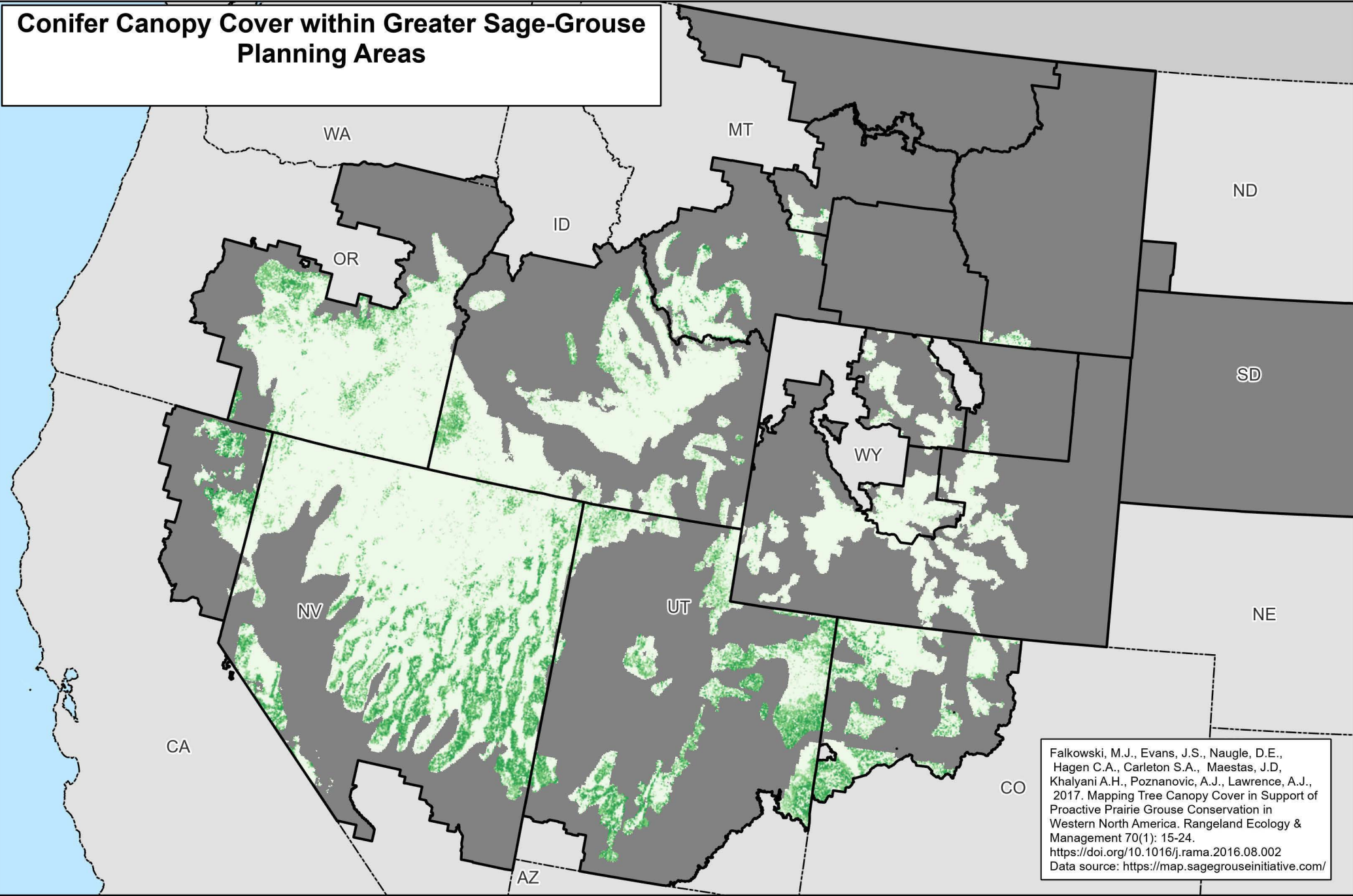
0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.





# Conifer Canopy Cover within Greater Sage-Grouse Planning Areas



Falkowski, M.J., Evans, J.S., Naugle, D.E., Hagen C.A., Carleton S.A., Maestas, J.D., Khalyani A.H., Poznanovic, A.J., Lawrence, A.J., 2017. Mapping Tree Canopy Cover in Support of Proactive Prairie Grouse Conservation in Western North America. *Rangeland Ecology & Management* 70(1): 15-24.  
<https://doi.org/10.1016/j.rama.2016.08.002>  
 Data source: <https://map.sagegrouseinitiative.com/>

Map 3.14

Tree canopy cover (%)

- < 1
- 1 - 4
- 4 - 10

Legend

- 10 - 20
- 20 - 50
- > 50
- State Boundaries

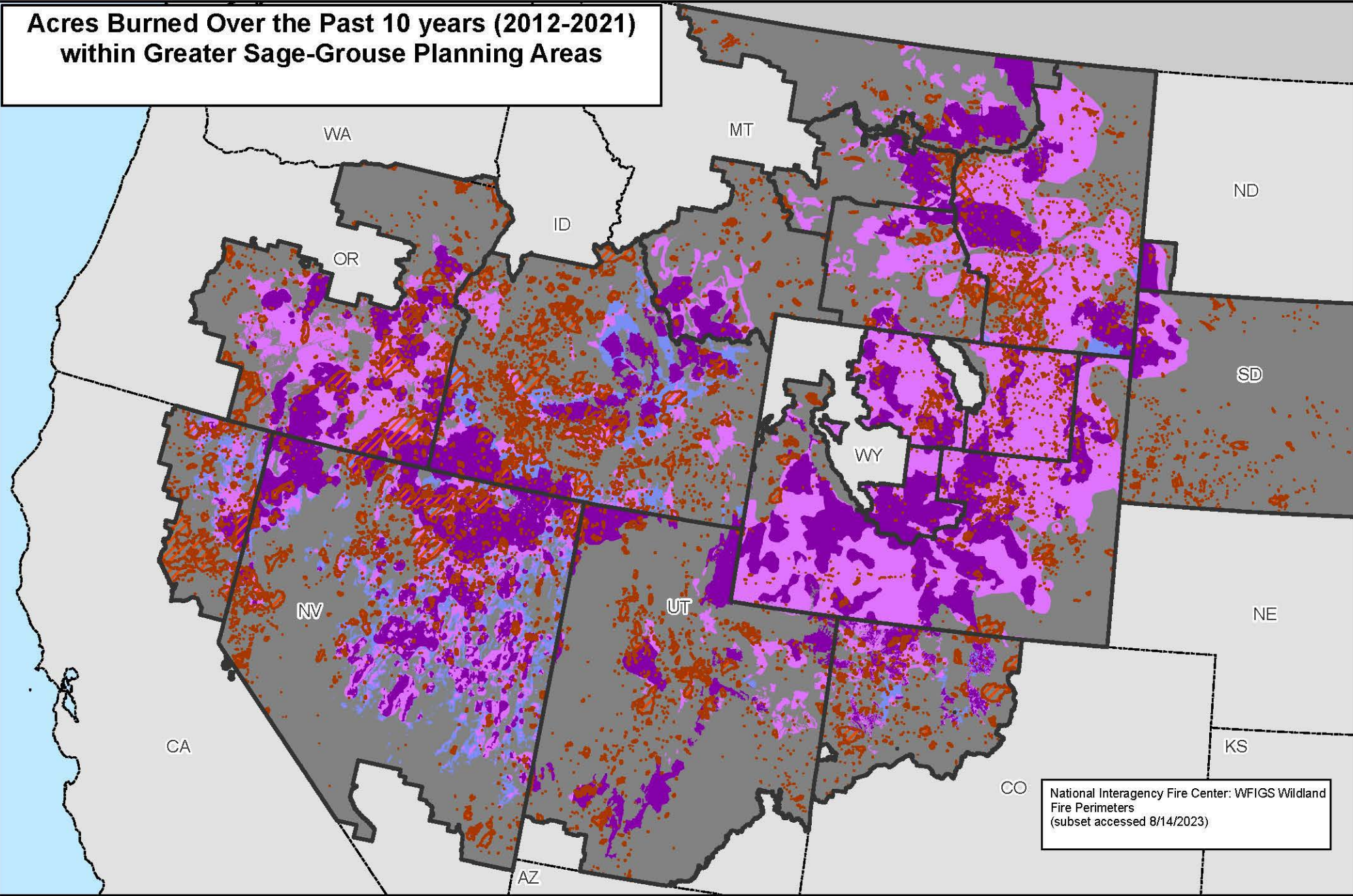
Planning Areas not Mapped for Canopy Cover

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.






# Acres Burned Over the Past 10 years (2012-2021) within Greater Sage-Grouse Planning Areas



National Interagency Fire Center: WFIGS Wildland Fire Perimeters  
(subset accessed 8/14/2023)


Map 3.15

 Fires 2012-2021

Habitat\_Type

 PHMA

 GHMA

 Anthro Mtn

 IHMA

 LCHMA


 OHMA

## Legend

 RHMA

 UDH

 State Boundaries

 Planning Area Boundaries

 Planning Area Extent



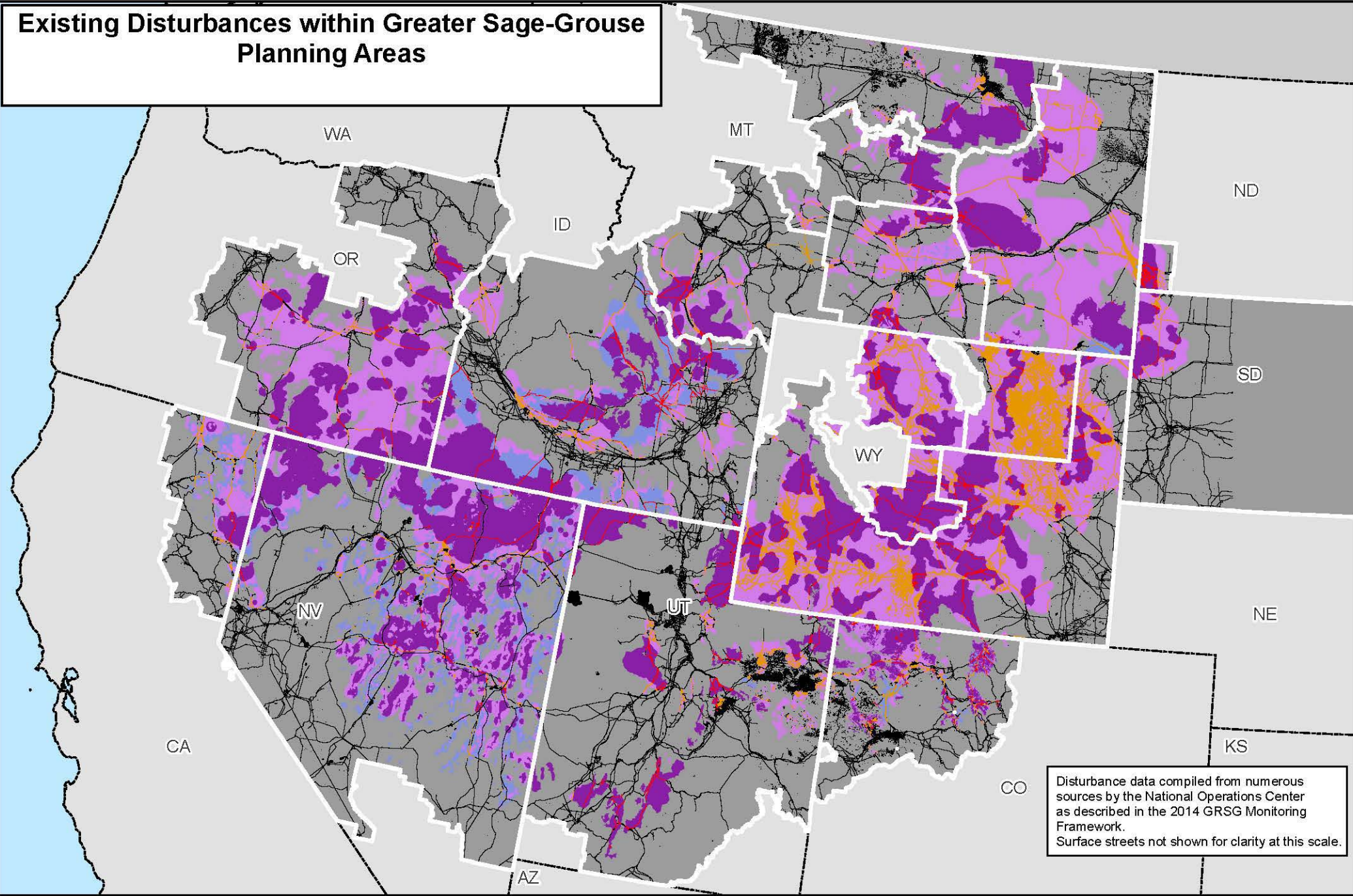
0 25 50 100 Miles

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# Existing Disturbances within Greater Sage-Grouse Planning Areas



Disturbance data compiled from numerous sources by the National Operations Center as described in the 2014 GRSG Monitoring Framework.  
Surface streets not shown for clarity at this scale.

Map 3.16

Disturbance in Habitat Type - no Surface Streets

IHMA; PHMA

Anthro Mtn; GHMA; LCHMA; OHMA; RHMA; UDH

NA

Habitat\_Type

PHMA

GHMA

## Legend

Anthro Mtn

IHMA

LCHMA

OHMA

RHMA

UDH

State Boundaries

Planning Area

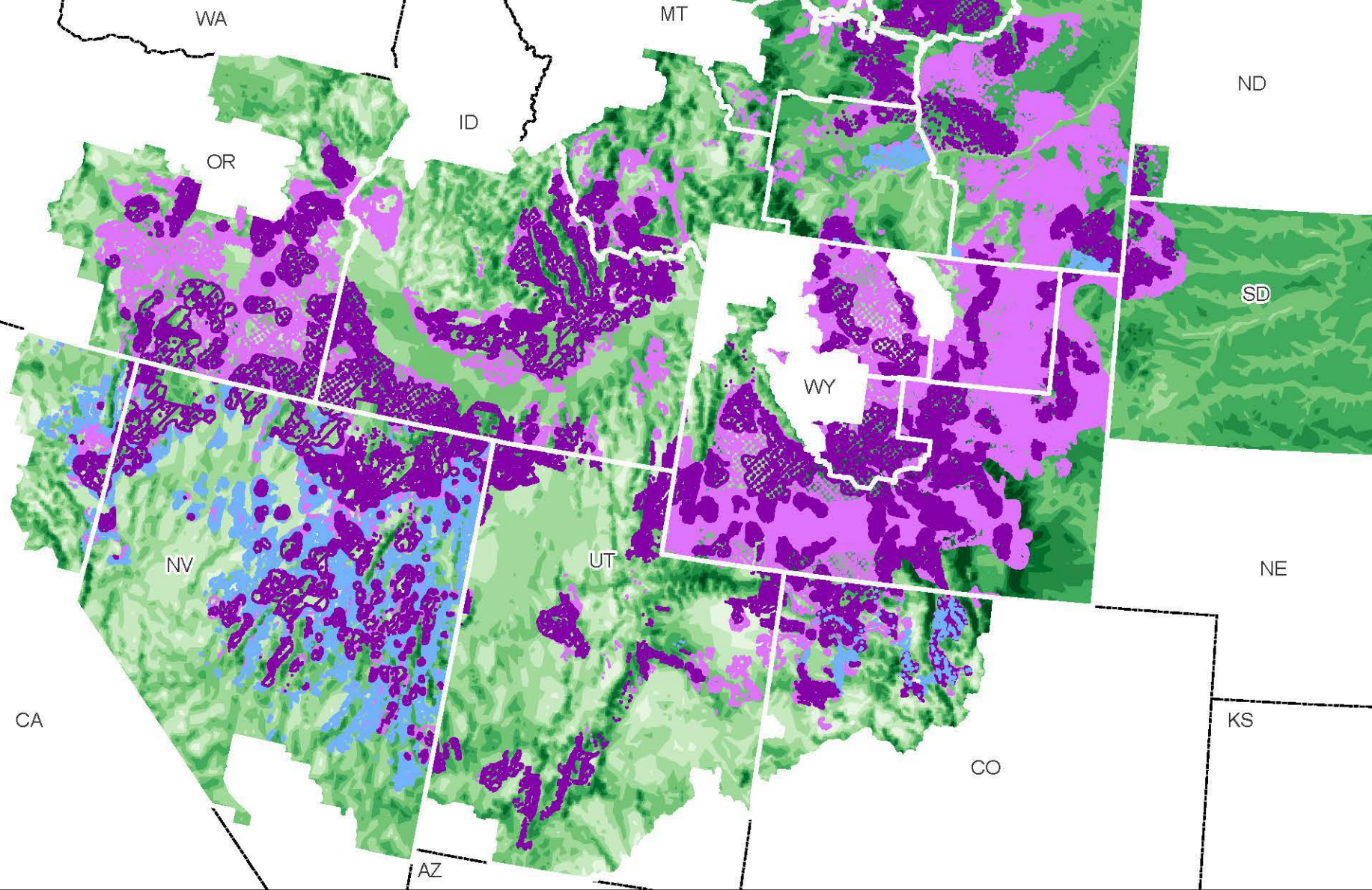


0 25 50 100 Miles

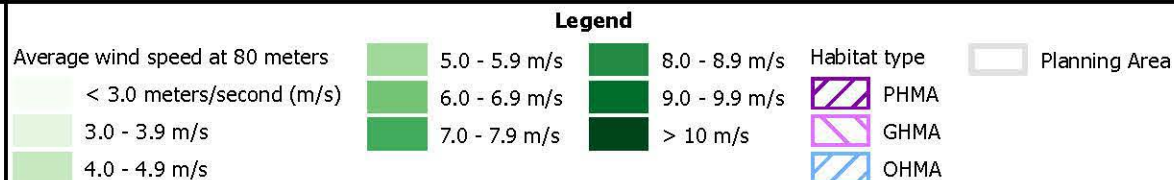
No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



# Wind Potential



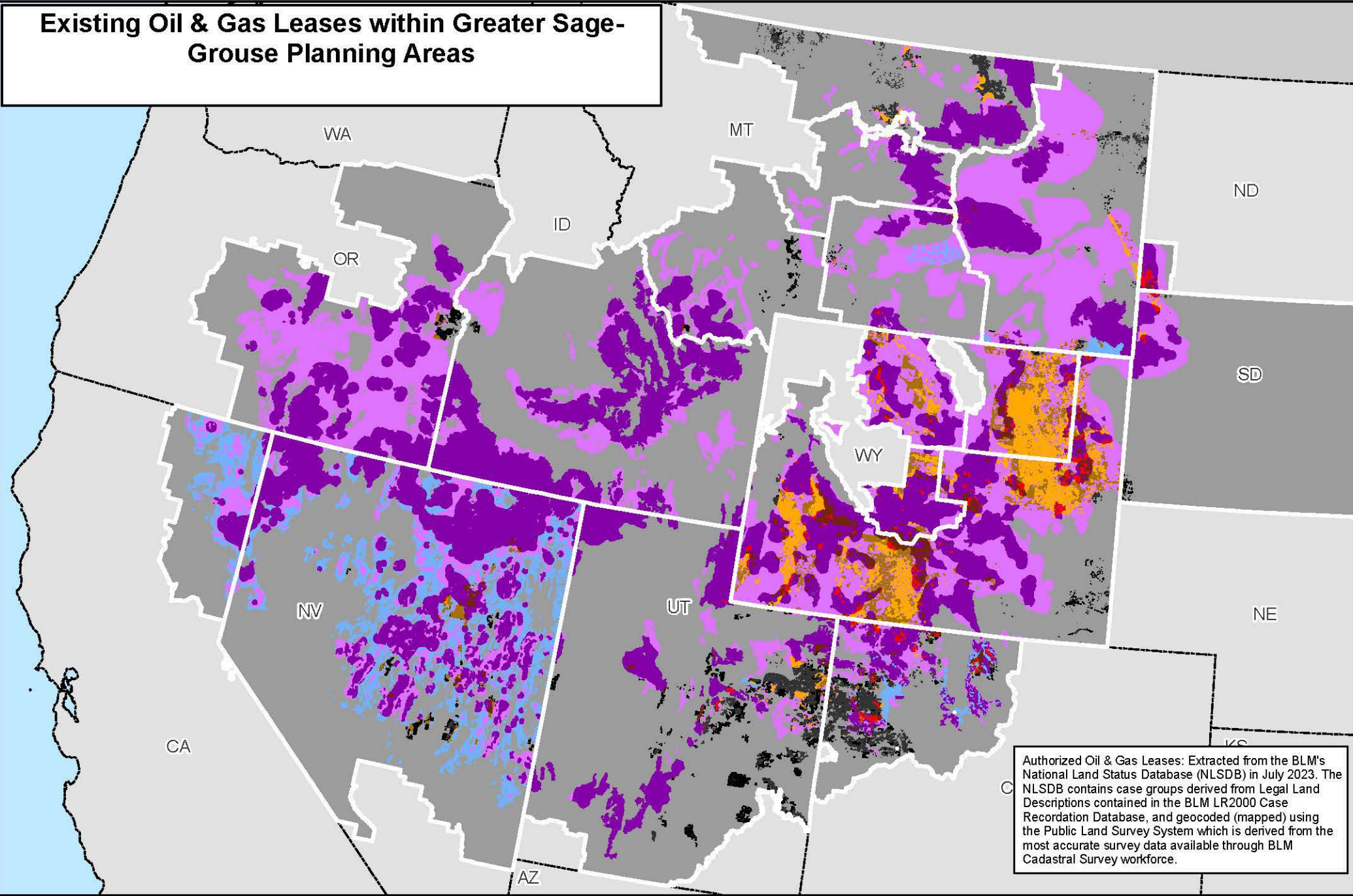
Map 3.17



No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



# Existing Oil & Gas Leases within Greater Sage-Grouse Planning Areas



Authorized Oil & Gas Leases: Extracted from the BLM's National Land Status Database (NLSDB) in July 2023. The NLSDB contains case groups derived from Legal Land Descriptions contained in the BLM LR2000 Case Recordation Database, and geocoded (mapped) using the Public Land Survey System which is derived from the most accurate survey data available through BLM Cadastral Survey workforce.

Map 3.18

**Authorized Oil and Gas Leases - Producing**

Habitat Type

- PHMA
- Anthro Mtn; GHMA; LCHMA; OHMA; RHMA; UDH
- Non-HMA

**Authorized Oil and Gas Leases - Non-Producing / Unknown Production**

Habitat Type

- PHMA
- Anthro Mtn; GHMA; LCHMA; OHMA; RHMA; UDH
- Non-HMA

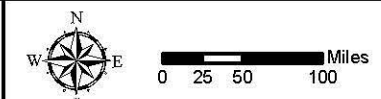
**Legend**

**Habitat Type**

- PHMA
- GHMA
- Anthro Mtn; LCHMA; OHMA; RHMA; UDH

State Boundaries

Planning Area

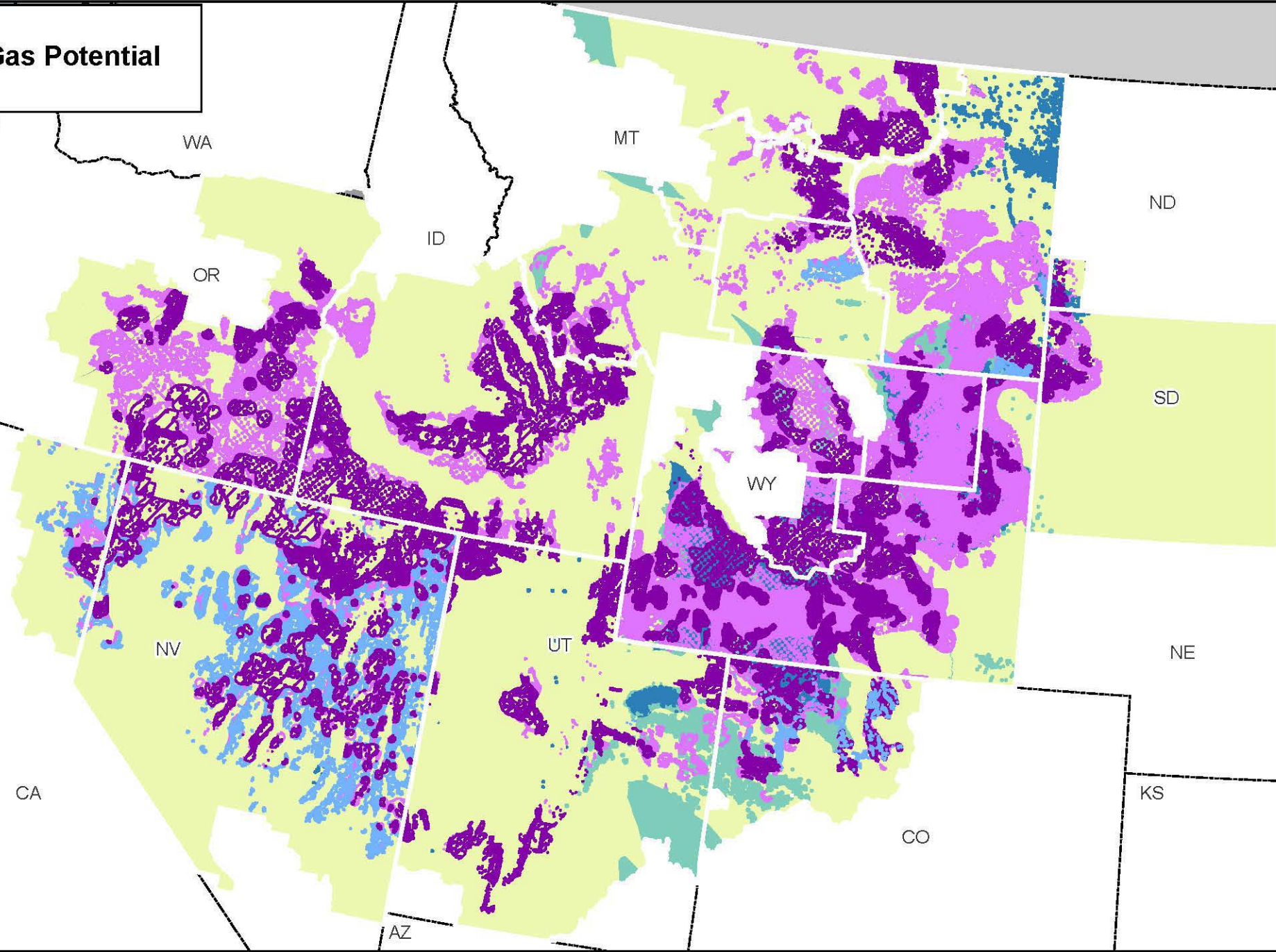


No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.

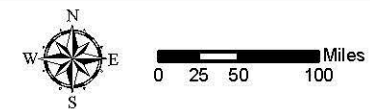
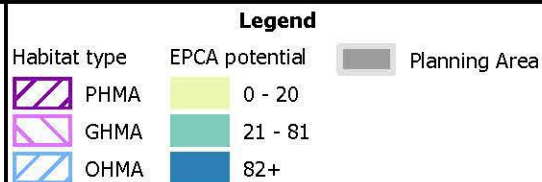




# Oil and Gas Potential



Map 3.19

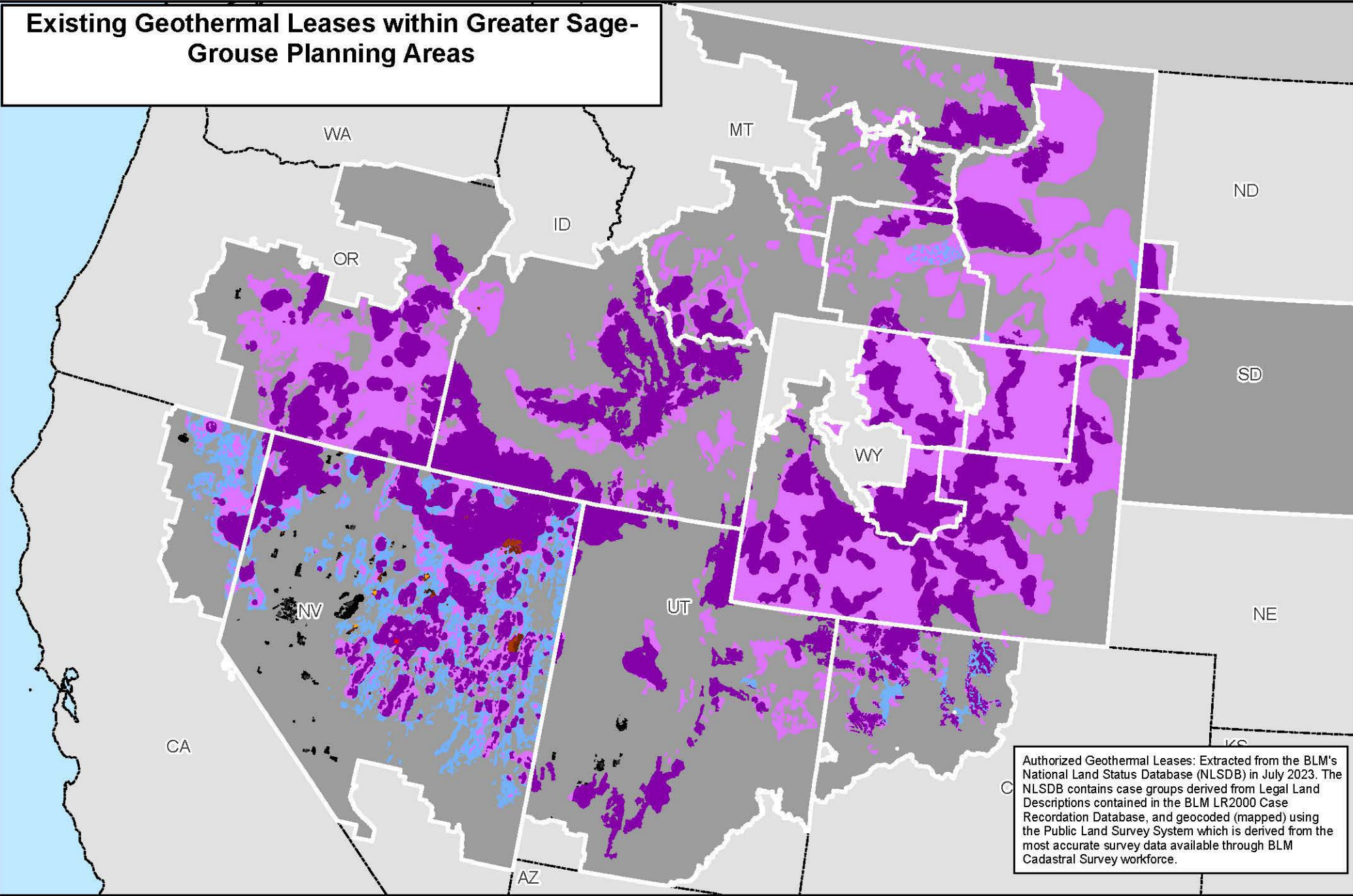


No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.





# Existing Geothermal Leases within Greater Sage-Grouse Planning Areas



Authorized Geothermal Leases: Extracted from the BLM's National Land Status Database (NLSDB) in July 2023. The NLSDB contains case groups derived from Legal Land Descriptions contained in the BLM LR2000 Case Recordation Database, and geocoded (mapped) using the Public Land Survey System which is derived from the most accurate survey data available through BLM Cadastral Survey workforce.

Map 3.20

Approved / Authorized Geothermal Leases - Producing

Habitat Type

- PHMA
- GHMA; OHMA
- Non-HMA

Approved / Authorized Geothermal Leases - Non-Producing

Habitat Type

- PHMA
- GHMA; OHMA
- Non-HMA

Legend

Habitat Type

- IHMA; PHMA
- GHMA
- Anthro Mtn; LCHMA; OHMA; RHMA; UDH

State Boundaries

Planning Area

North Arrow

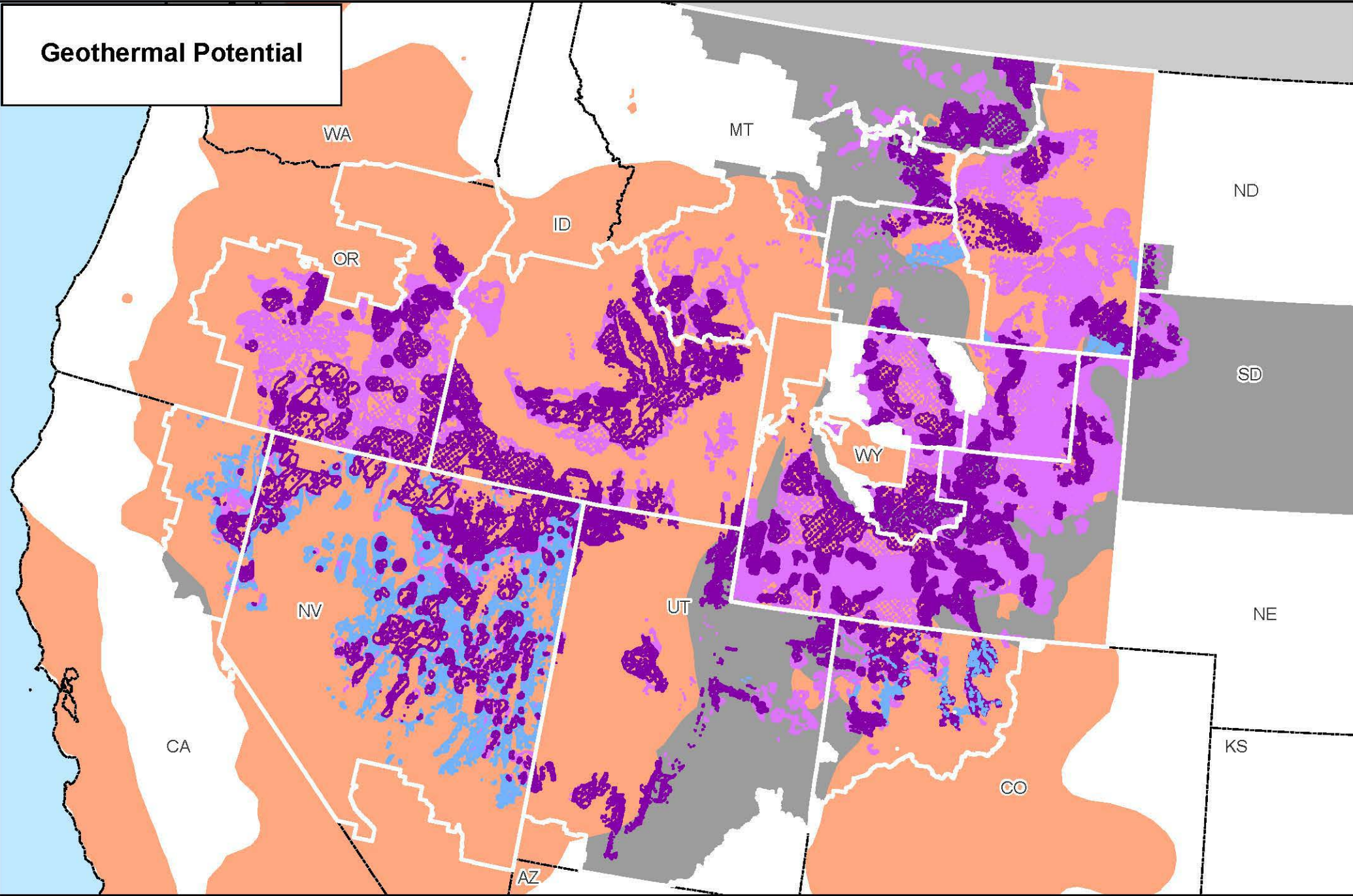
Scale: 0 25 50 100 Miles

No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



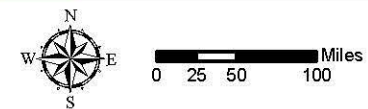


# Geothermal Potential



Map 3.21

- Legend**
- |              |                           |
|--------------|---------------------------|
| Habitat type | Geothermal potential area |
| PHMA         | Geothermal potential area |
| GHMA         | Planning Area             |
| OHMA         |                           |

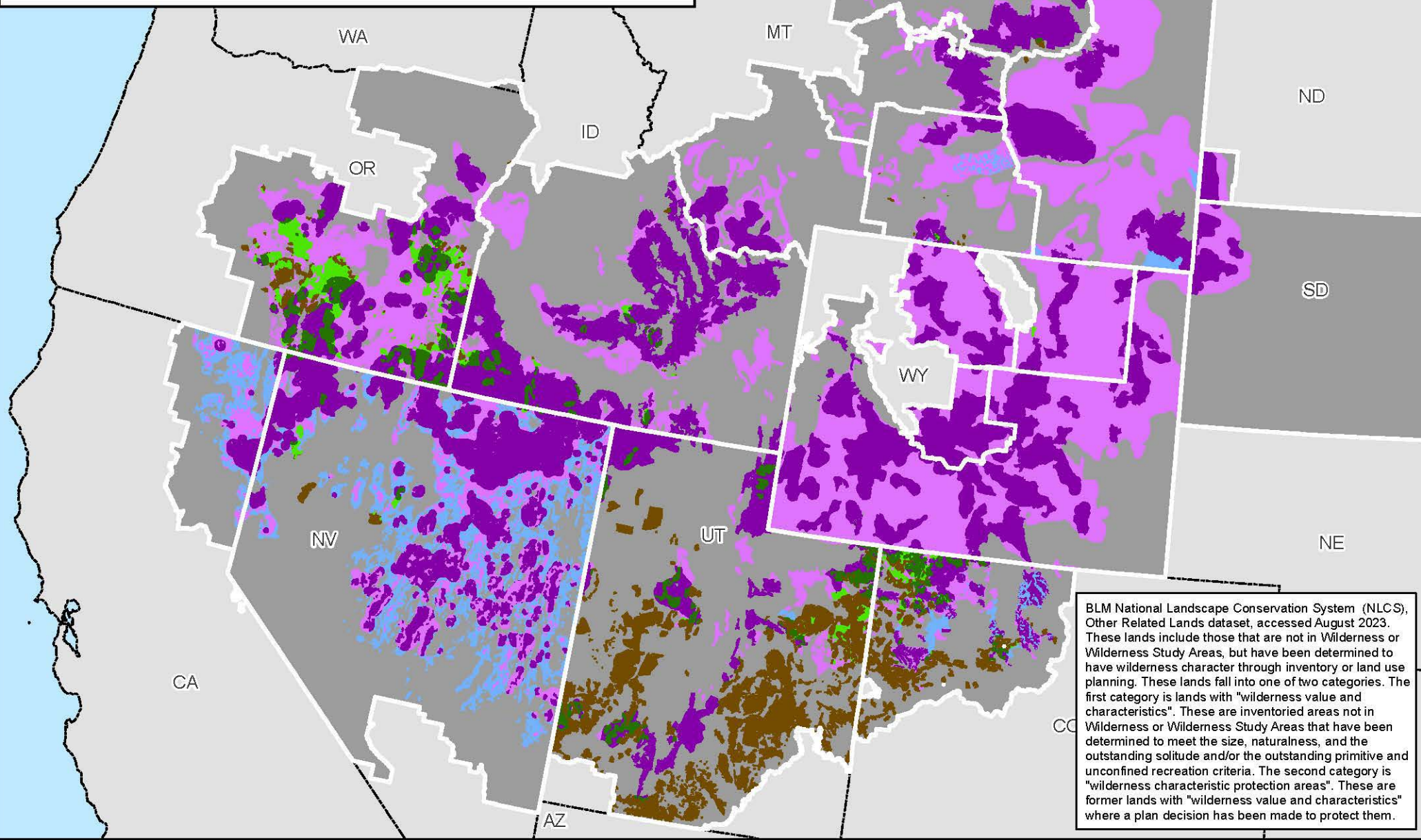


No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.





# BLM National Landscape Conservation System (NLCS), Other Related Lands within Greater Sage-Grouse Planning Areas



BLM National Landscape Conservation System (NLCS), Other Related Lands dataset, accessed August 2023. These lands include those that are not in Wilderness or Wilderness Study Areas, but have been determined to have wilderness character through inventory or land use planning. These lands fall into one of two categories. The first category is lands with "wilderness value and characteristics". These are inventoried areas not in Wilderness or Wilderness Study Areas that have been determined to meet the size, naturalness, and the outstanding solitude and/or the outstanding primitive and unconfined recreation criteria. The second category is "wilderness characteristic protection areas". These are former lands with "wilderness value and characteristics" where a plan decision has been made to protect them.

Map 3.22

Other Related NLCS Lands

Habitat Type

- PHMA; IHMA
- Anthro Mtn; LCHMA; GHMA; OHMA
- Non-HMA

Habitat Type

- PHMA; IHMA
- GHMA
- Anthro Mtn; LCHMA; OHMA; RHMA; UDH

## Legend

- State Boundaries
- Planning Area

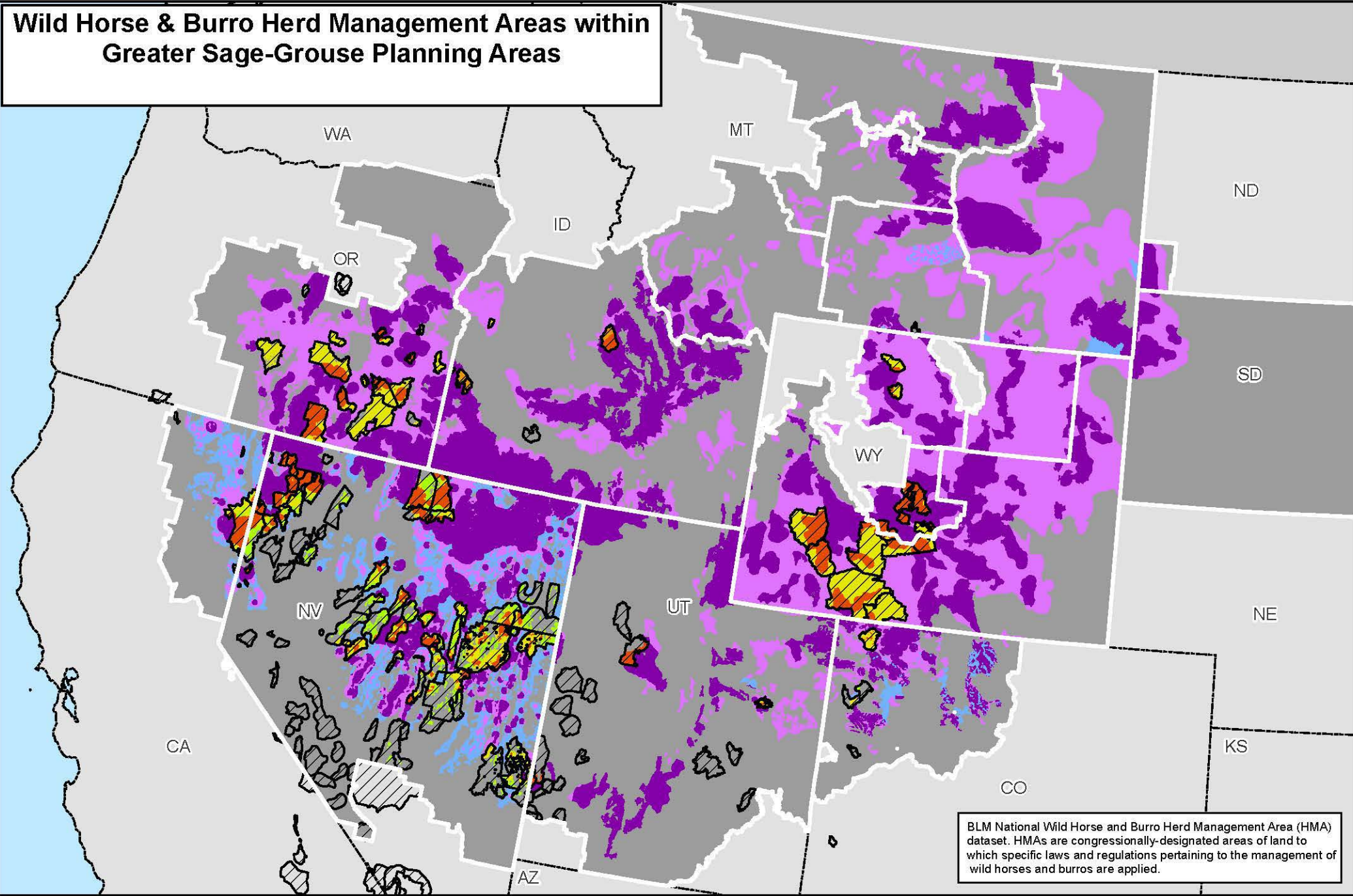


0 25 50 100 Miles

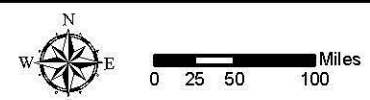
No warranty is made by the Bureau of Land Management (BLM). The accuracy, reliability, or completeness of these data for individual use or aggregate use with other data is not guaranteed.



# Wild Horse & Burro Herd Management Areas within Greater Sage-Grouse Planning Areas



Map 3.23



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