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# An Integrated Population Model for Assessing Greater Sage-Grouse Trends in the Bi-State DPS

The Bi-State DPS of the Greater Sage-Grouse (*Centrocercus urophasianus*) exists along the eastern side of the central Sierra Nevada in California and into western Nevada. Genetic research has indicated isolation and potential conservation risk for this DPS, as well as different patterns of habitat selection and vital rates relative to the range-wide population.

To shed light on the conservation needs of the Bi-State DPS, advanced Bayesian modeling is being explored to calculate trends in population change. The initial findings of this approach are published in USGS Open-File Report 2014-1165.

USGS researchers developed an Integrated Population Model (IPM) to estimate population growth rate for six primary subpopulations within the Bi-State DPS: Pine Nuts, Desert Creek, Fales, Bodie Hills, Parker Meadows, and Long Valley.

Using empirical field data collected from 2003 to 2012 by WERC with state and university partners, the researchers developed the IPM based on 1) lek count models, and 2) demographic data models that consist of nest attempt rate, clutch size, egg hatchability, nest survival, and chick, juvenile, yearling, and adult survival.

The IPM indicates that the Bi-State DPS overall is stable, but among subpopulations, evidence suggests Parker Meadows exhibited a declining trend.

WERC is now conducting a retrospective analysis on the model data to assess which life stage most strongly influenced population change. Then a prospective sensitivity/elasticity analysis will further reveal the critical components of grouse life-history driving population change.

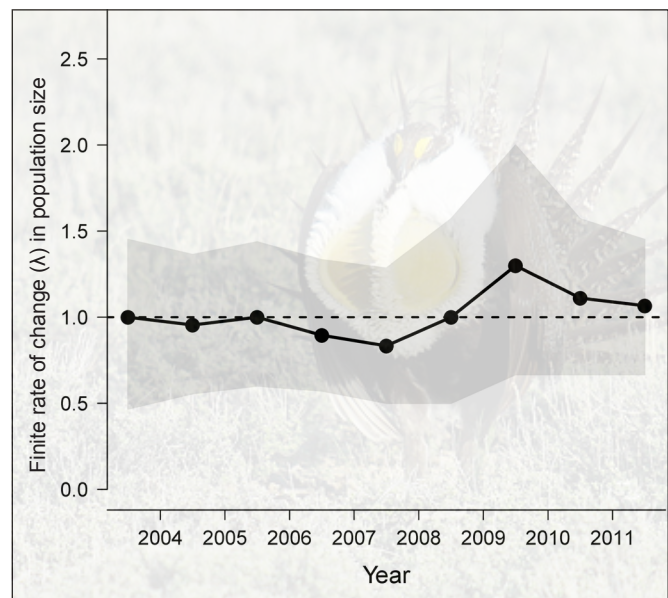
## Management Implications

- The IPM indicates the Bi-State DPS overall is stable, but among subpopulations, evidence suggests Parker Meadows exhibited a declining trend.
- With refinement, this Integrated Population Modeling (IPM) approach could be adapted to assess population trends for Greater Sage-Grouse at other regional and landscape scales.

### THIS BRIEF REFERS TO:

Coates, PS, BJ Halstead, EJ Blomberg, B Brussee, KB Howe, L Wiechman, J Tebbenkamp, KP Reese, SC Gardner, ML Casazza. 2014, A hierarchical integrated population model for greater sage-grouse (*Centrocercus urophasianus*) in the Bi-State Distinct Population Segment, California and Nevada: U.S. Geological Survey Open-File Report 2014-1165, 34p. doi: 10.3133/ofr20141165

<http://www.werc.usgs.gov/ProductDetails.aspx?ID=5044>  
<http://www.werc.usgs.gov/sagegrouse>



Finite rate of change in population size across all six Bi-State DPS study area sites in California and Nevada, 2003–12. Gray shading represents the 95% credible interval. The dashed horizontal line represents a stable population. Photo: Tatiana Gettelman.