Nevada Greater Sage-grouse Habitat Suitability Index, Habitat Suitability Map, and Management Categories

Prepared by the Sagebrush Ecosystem Technical Team - August 2014

The following outlines the habitat suitability index, habitat suitability mapping, and management categories as developed by the State of Nevada Sagebrush Ecosystem Program for State of Nevada Greater Sage-grouse Plan and for the State Alternative (E) of the Nevada and Northeastern California Greater Sage-grouse Sub-Regional LUPA and EIS. Additional detail may be found in *Spatially explicit modeling of greater sage-grouse (*Centrocercus urophasianus*) habitat in Nevada and northeastern California: a decision-support tool for management* (Coates et al. 2014).

Habitat Suitability Index for Greater Sage-grouse in Nevada

This map presents the Nevada Habitat Suitability Index that provides a relative suitability of greater sage-grouse habitat in Nevada on a scale of 0 to 1 (excluding the Bi-State DPS). These data were developed in collaboration with the U.S. Geological Survey.

General Methods

Resource Selection Functions (RSFs) were used to develop habitat suitability indices that rank areas based on a continuum of highly used to strongly avoided. This modeling is driven by actual location data obtained using radio-telemetry information. RSFs were developed by modeling the relative probability of occurrence as a function of different environmental factors which consisted of vegetation types, pinyon-juniper cover classes, agriculture, elevation, ruggedness, slope, and water sources. These factors were measured at multiple spatial scales that reflect movement patterns of sage-grouse. The modeling process contrasted these environmental factors for sites used by sage-grouse (>31,000 sage-grouse telemetry locations; >10 years of telemetry data) to available sites (randomly generated locations). Contrasting the environmental factors of used versus available sites provided information about what factors were correlated with greater sage-grouse selection or avoidance (e.g., streams, pinyon- juniper).

RSFs were applied to the map layers developed above to calculate an overall probability of use per pixel. This created a single greater sage-grouse habitat suitability index and resulted in a surface of predicted use by sage-grouse across Nevada. This surface is represented by probability values that ranged across a continuous spectrum of 0.0 to 1.0.

Suitable Habitat for Greater Sage-grouse in Nevada

This map displays the extent of suitable habitat for greater sage-grouse in Nevada (excluding the Bi-State DPS). The Sagebrush Ecosystem Program developed this map using the Habitat Suitability Index developed above.

General Methods

To identify suitable habitat, the habitat suitability index described above was reclassified to binary values (suitable habitat and non-suitable habitat) by choosing suitability values above a cutoff value based on the mean of the index values minus 1.5 standard deviations. This cut-off point was also validated by a cost-benefit ratio looking at the trade-off between additional area to telemetry points. The equalization point occurs at 1.5 standard deviations. The binary map was then aggregated at the 1 km scale to account for corridors and smoothed at the 1.2 km scale to remove "islands".

Management Categories for Greater Sage-grouse in Nevada

The Sagebrush Ecosystem Program developed the management categories using the Habitat Suitability Index developed above as well as modeled space use by greater sage-grouse. These categories were developed to be used with the management criteria outlined in Table 3-1 of the State of Nevada Greater Sage-grouse Plan.

The Nevada Sage Grouse Management Area (SGMA) encompasses the general range of greater sage-grouse in the state of Nevada (excluding the Bi-State DPS). Proposed anthropogenic disturbances within the SGMA will trigger consultation with the SETT for assessment of impacts to sage-grouse and their habitat and compliance with SEC and other relevant agency policies. Please note that the express purpose of the SGMA is to trigger consultation with the SETT; specific area or project habitat determinations must be conducted in accordance with established scientific protocol. The SGMA should not be used for any other purpose.

Within the SGMA are four management categories that are defined below.

The Core Management Areas encompass areas of high estimated sage-grouse use in suitable habitat in the State of Nevada. These areas represent the strongholds (or "the best of the best") for sage-grouse populations in the State of Nevada and support the highest density of breeding populations.

The Priority Management Areas encompass areas that are determined to be highly suitable habitat for sage-grouse that are not contained within the Core Management Areas.

The General Management Areas encompass areas determined to be suitable habitat for sage-grouse, though less suitable than Priority Management Areas and are not contained within the Core Management Areas.

The Non-Habitat Management Areas encompass areas determined to be unsuitable for greater sage-grouse.

General Methods

Habitat suitability categories – these categories are based on the habitat suitability index

High suitability habitat – mean index values minus 0.5 standard deviation (~70% sage-grouse use)

Moderate suitability habitat – mean index values minus 1.5 standard deviations (~93% sage-grouse use)

Non-suitable habitat – mean index values minus greater than 1.5 standard deviations

Space use index - these categories are based on (1) density of sage-grouse leks coupled with attendance at leks and (2) distance sage-grouse are found from leks based on telemetry data

High use areas – greater than or equal to 85th percentile of the space use index

Low use areas– less than 85th percentile of the space use index

The intersection of the 3 suitability definitions and the 2 space use definitions were developed into the four management categories.

Core Management Area – areas of suitable sage-grouse habitat use found within areas of estimated high space use.

Priority Management Area – high suitability habitat that is found in areas of estimated low space use, and areas of non-habitat that overlap with areas of estimated high space use

General Management Area – moderate suitability habitat that is found in areas of estimated low space use.

Non-habitat Management Area – non-suitable habitat that is found in areas of estimated low space use.

References

Coates, P.S., Casazza, M.L., Brussee, B.E., Ricca, M.A., Gustafson, K.B., Overton, C.T., Sanchez-Chopitea, E., Kroger, T., Mauch, K., Niell, L., Howe, K., Gardner, S., Espinosa, S., and Delehanty, D.J. 2014, Spatially explicit modeling of greater sage-grouse (*Centrocercus urophasianus*) habitat in Nevada and northeastern California—A decision-support tool for management: U.S. Geological Survey Open-File Report 2014-1163, 83 p., http://dx.doi.org/10.3133/ofr20141163.

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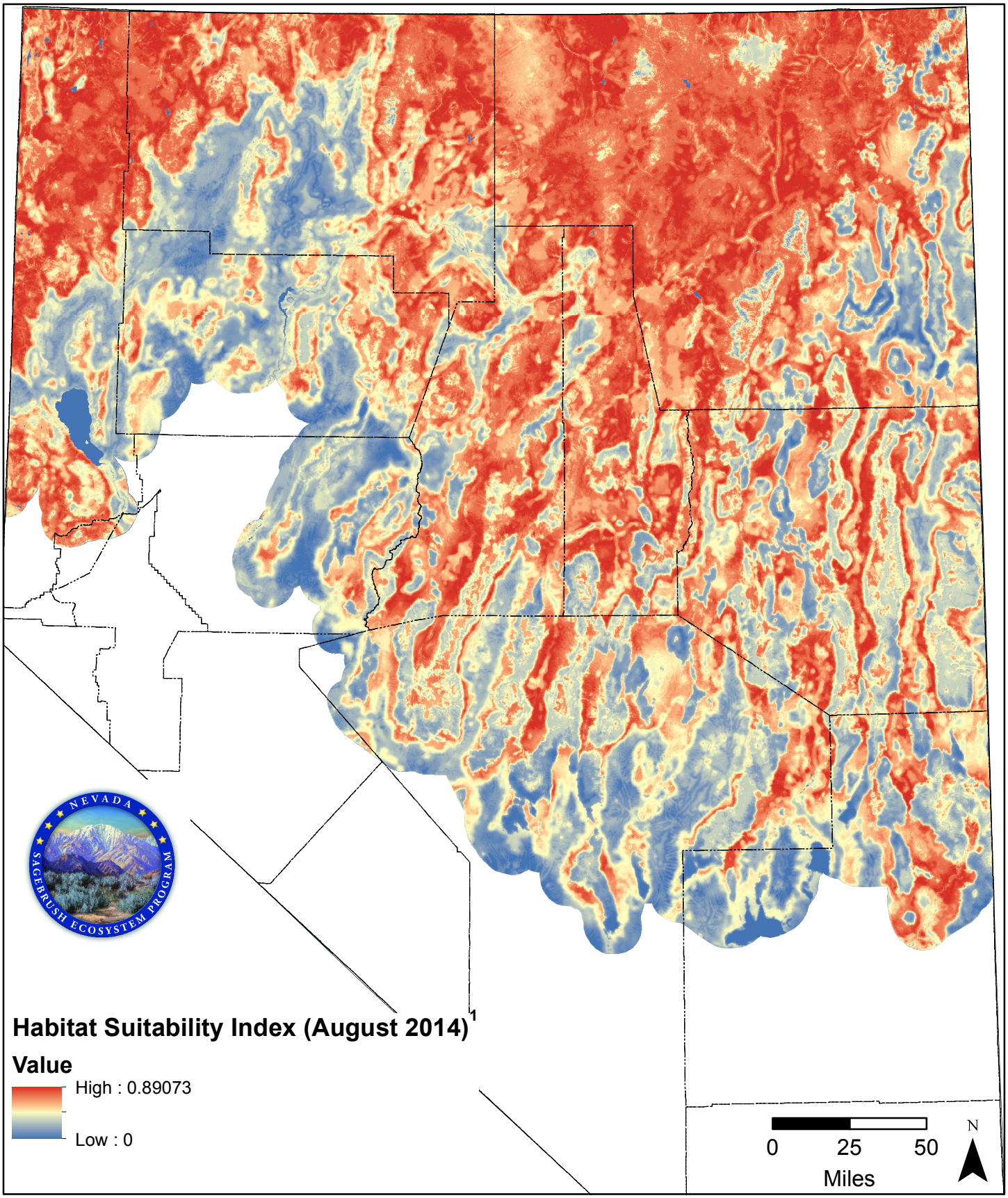

Figure 5. Habitat Suitability Index

1. Coates et al. 2014

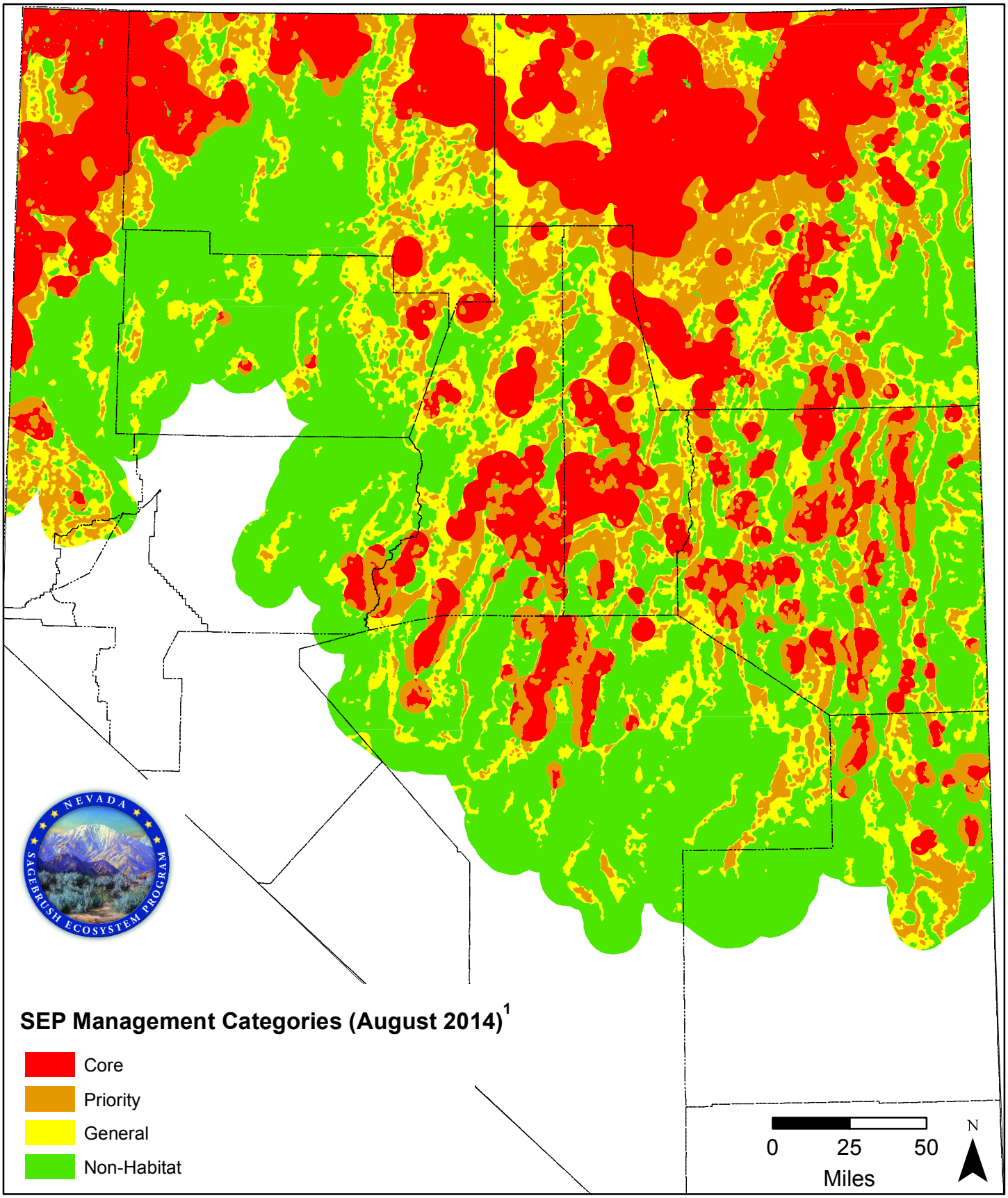

Figure 4. Management Category Map

1. Coates et al. 2014