REGION 2 SENSITIVE SPECIES EVALUATION FORM

Species: *Phacelia scopulina* (A. Nels.) J.T. Howell var *submutica* (J.T.Howell) Halse / Debeque phacelia / PHSCS3
[aka *Phacelia lutea* var. *submutica* / PHLUS2 or *Phacelia submutica* J.T. Howell / PHSU6]

Criteria	Rank	Rationale	Literature Citations
1 Distribution within R2	A	Considered rare throughout its range, PHSCS3 occurs only on adobe substrates of the Shire and Atwell members of the Wasatch Formation on Colorado's Western Slope, near the town of DeBeque: ▪ approximately 30 documented occurrences representing "3 meta-populations" from Mesa and Garfield Counties, mostly on BLM land and six reported occurrences from USFS lands, including the Rifle RD of the White River NF and the Grand Valley RD of the Grand Mesa NF (Burt & Spackman). ▪ the related species--*Phacelia lutea* and *Phacelia scopulina*--are geographically disjunct (Burt & Spackman), which appears to be relevant considering taxonomic differences of opinion, including Halse 1981, who place PHSCS3 among the latter group (as currently reflected in the PLANTS database); this disjunct occurrence for two closely related, arguable species determinations forms p[art of the criteria for the isolation of *Phacelia submutica* as its own species by several Colorado researchers, including Weber and Wittman (2001) and the CNHP. ▪ Burt & Spackman note a total range of less than 17 X 17 sq. miles for the species. ▪ Within the Rocky Mountain Region, this endemic species occurs on BLM lands in the Uinta Basin; Roan Creek and Colorado River physiographic provinces. Confidence in Rank High	• USDA PLANTS database 2002 • O'Kane 1987 • Burt & Spackman 1995 • CU Herbarium research 5/02 • CONPS 1997 • Spackman et al. 1997 • Weber and Wittman 2001
2 Distribution outside R2	A	Severely restricted distribution for an annual with wide population variation from year to year, which is important to discussing the entire range of the species, since it may not occur in any given year during any particular field survey, including areas of known habitat. For an accurate determination of species range, several annual surveys timed appropriately and occurring in the same potential habitat zones would be necessary. Although listed as a reported species by the State of Arizona (status SR), the 100+ year-old specimen is considered "dubious" by all Colorado taxonomic and field verified literature. Confidence in Rank High	• NatureServe 2001 • Halse 1981 • O'Kane 1987 • Weber and Wittman 2001

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Criteria	Rank	Rationale	Literature Citations
3 Dispersal Capability	D	Unknown. While purely speculation resulting from a single, annual survey for the plant, O'Kane (1987) theorized the role of that the species relies on naturally occurring cracks in the adobe clays for dispersal, which is probably aided by water movement. The plant has highly specific site requirements, including reliance on perpetual pioneer stage (see Criterion 8 for further discussion) and must successfully disperse to the Atwell and Shire members of the Wasatch formation in order to establish. Confidence in Rank High	• O'Kane 1987
4 Abundance in R2	D	PHSCS3 is an annual plant with few populations with highly variable numbers of individuals from year to year. Due to its geologic specificity, new occurrence reports would not be expected to increase the range of this species. Confidence in Rank High	• O'Kane 1987 • Burt & Spackman 1995

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5 Population Trend in R2	A	▪ Negative population trends were identified due to trampling impacts and drought, with the result in White River NF management decision to eliminate surface-disturbing activities near the Horsethief Mountain occurrences. No trend information available for the Grand Mesa NF occurrences. ▪ This species is considered globally imperiled due to significant decline in numbers surveyed, including more than 40% fewer populations noted between the 1987 and 1995 status report summaries. While these declines could reflect the drought occurrences in this 8-year time-frame, or even the survey timing/coverage, the plant has been ranked G2/S2 by the Colorado Natural Heritage Program (Burt & Spackman 1995, **PAGE 5**) data and was recommended as a candidate for listing under the US Endangered Species Act. As the species has been reviewed for listing by various sources over more than a decade, several rankings have been assigned, all of which reflect some degree of vulnerability which places it in sensitive status. While I will not list each rank here, including category rankings no longer part of the USFWS system, the CNHP and ESA candidacy seem most relevant to this evaluation based on current research available for the plant. ▪ Part of the negative population trend is a factor of species biology, since the plant is an annual with highly restricted site and reproductive requirements, relies on "perpetual pioneer" conditions (though listed as within the Piñon-Juniper Potential natural vegetation type, it only occurs on erosive early stages); all population occurrences have been termed episodic by O'Kane, who cites the species' dependence on climate as a major factor in its population biology. Confidence in Rank HIGH	• Burt & Spackman 1995 • O'Kane 1987 • NDIS / ScoP (CNHP) 2002

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Criteria	Rank	Rationale	Literature Citations
6 Habitat Trend in R2	A	An overall negative trend in habitat has been identified due to the following: ▪ While this species has unknown, highly variable patterns in population biology, some extirpation from soil compaction--the species relies on the naturally occurring cracks in the adobe clays for dispersal, seedling establishment, and survival--has been surmised by O'Kane for one site, singling out grazing allotments on USFS land as a negative impact. ▪ Burt and Spackman note that only trespassing domestic grazing now occurs in the vicinity of the USFS occurrences on the White River NF, though the management decision not to lease the area for grazing came during an identifiable DOWNWARD TREND IN HABITAT for the species. ▪ Throughout its range, particularly on BLM lands, a number of factors have caused a downward trend in habitat for the species, which are discussed under HABITAT VULNERABILITY, Criterion 7. Oil and gas development--including CURRENTLY ACTIVE OIL SHALE EXPLORATION IN THE NEAR VICINITY--are among the largest contributors to the fragmenting of an already restricted, patchy habitat (personal communication, Carla Scheck of the BLM Glenwood Springs office and Jeff Troeger, observer of shale liquification extraction 7-02). During field surveys for rare and sensitive species for the BLM, I have personally witnessed oil and gas development in the vicinity of the habitat since at least 1994, when wellpads, access roads, and pipelines were among the significant impacts being INSTALLED and CONSTRUCTED. This information, please note, is several years more current than speculations in previous studies that oil shale and oil and gas development were not expected to occur in the area, along with speculation that these activities would not be profitable. But they have continued as subsidized for more than 8 years, and new technology is being used to liquefy the shale in place before pumping down water to extract it (creating the further negative habitat trend of water pumping and associated additional pipelines). Also, the price of crude oil is much higher than when the early PHSCS3 studies were done (note that the US has fought a war that partly relied on this fact, at which point the BLM lands supporting PHSCS3 habitat belonged to the US Naval Oil Shale Reserves). Confidence in Rank High	• O'Kane 1987 • Burt & Spackman 1995 • Scheck, pers. comm.. 5-02 • Troeger, pers. comm.. 7-02

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Criteria	Rank	Rationale	Literature Citations
7 Habitat Vulnerability or Modification	A	High habitat vulnerability in Colorado/Region 2 for the following reasons: ▪ Identified as the greatest risk to the species, extensive oil shale mining operations and their associated impacts--pipelines, well-pads, roads and other surface disturbances--are scheduled to occur in the immediate future on BLM locations. ▪ New, approved dam project expected to flood 2 known occurrences and threatening one additional population in the Roan Creek area. [I was unable to determine the status of this reservoir's construction and/or current use.] ▪ Trampling by livestock remains an issue, with the 2002 drought having caused Congress to approve opening additional lands in Garfield and Mesa Counties to grazing without the earlier range restrictions (though possibly the species will have completed its life cycle before much of this impact may occur; the cracks in the adobe substrate would still be affected, thus possibly restricting future seed germination and dispersal to suitable establishment sites). ▪ Additional risks identified in the two status reports for the species include increased Off-Highway Vehicle (OHV) impacts observed in areas of known habitat (Burt & Spackman, 1995), continued drought over several successive annual cycles, and further impacts to known populations from livestock trampling (cited by both O'Kane and Burt & Spackman for several occurrences). ▪ Occurring on the Atwell (gray) and Shire (purple-brown) members of the Wasatch Formation, DeBeque Phacelia tends to be among the only vegetative cover for the Atwell clay, where it occurs sparsely, with tremendous seasonal variability, while the Shire occurrences also include other forbs, including several additional endemic and/or rare plant species, such as *Sclerocactus glaucus, Lomatium eastwoodiae,* and *Astragalus debequaeus.* This indicates the tremendous vulnerability of PHSCS3 AND FOUR ASSOCIATED RARE PLANTS to habitat modifications, which represent the potential loss of communities currently ranked B1 and B2 for biodiversity globally (Lyon et al. 2001). Confidence in Rank High	• Burt & Spackman 1995 • O'Kane 1987 • Lyon et al. 2001

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Criteria	Rank	Rationale	Literature Citations
8 Life History and Demographics	D	Unknown responsiveness to disturbances other than theorized decrease following successive drought and trampling. Not well studied, though the following observations of the species life history have been made: ▪ O'Kane notes that while "precise germination requirements are not known, wetter years seem to produce more individuals" ▪ Burt & Spackman note the occurrence of many plants in 1995, a "very wet year" ▪ The species biology renders the plant susceptible to extirpation due to the following factors: its annual life form, variable numbers of individuals, and the small acreage of known occurrences ▪ Burt & Spackman write: "Its limited distribution is a natural threat. Unforeseen catastrophic environmental events such as several consective dry years or consecutive late hard freezes could affect survival and reproduction in many occurrences and lead to the species extinction." (p. 34, referring to Menges 1991 theories of rare plant population genetics) ▪ CNHP surveyors cited drought conditions for early May 2000 disappearance of the species from known occurrence sites, further noting that no plants were found in their 2001 survey of Garfield County (adding that it is possible they never germinated). ▪ Self-pollination has been considered "likely" based on the geographic isolation, specific requirements, and research on other *Phacelia* species. ▪ O'Kane theorizes water-based dispersal through rills in naturally occurring cracks in clay soils, gravity along slopes and ridges, and possible seed transportation by ants Confidence in Rank High	• O'Kane 1987 • Burt & Spackman 1995 • Lyon et al. 2001

Evaluator(s):	Date:
Sylvia Dennis Gindele	7/08/02, rev. 8/04/02

NOTE: Most of the literature, with the exception of Halse 1981, argues for the nomenclature of *Phacelia submutica* as a separate species (including Weber &Wittman 2001 and others), rather than the *Phacelia scopulina* var. *submuitca* used in the PLANTS database.

National Forests in the Rocky Mountain Region where species is KNOWN (K) or LIKELY (L)[1] to occur:

Species Name: *Phacelia scopulina* (A. Nels.) J.T. Howell var *submutica* (J.T.Howell) Halse / Debeque phacelia / PHSCS3

Colorado NF/NG	Known	Likely	**Kansas NF/NG**	Known	Likely	**Nebraska NF/NG**	Known	Likely	**South Dakota NF/NG**	Known	Likely	**Wyoming NF/NG**	Known	Likely
Arapaho-Roosevelt NF			Cimarron NG			Samuel R.McKelvie NF			Black Hills NF			Shoshone NF		
White River NF	K					Halsey NF			Buffalo Gap NG			Bighorn NF		
Routt NF						Nebraska NF			Ft. Pierre NG			Black Hills NF		
Grand Mesa, Uncompahgre, Gunnison NF	K					Ogalala NG						Medicine Bow NF		
San Juan NF												Thunder Basin NG		
Rio Grande NF														
Pike-San Isabel NF														
Comanche NG														
Pawnee NG														

Note: A Forest Service sensitive species, *Phacelia scopulina* var. *submutica* is also managed as a sensitive [S] species by the Bureau of Land Management on lands adjoining or in close proximity to Forest lands, including occurrences on Glenwood Springs and Grand Jct. Resource Areas.

Note 2: SCoP data indicates the highest biodiversity rankings--B1 & B2--for recommended Potential Conservation Areas (PCAs) that include Debeque Phacelia among their element occurrences.

Note 3: Please consider the revised form, while more complicated than originally intended for the purposes of the review panel, as a presentation of the case for current research on PHSCS3 in response to the unsubstantiated, premature critiques of this evaluation, which is at best a precursor to rather than a substitute for a full species assessment. Information on the USFWS database, though retrieved in 2002, does not include several years of relevant research, misidentifying both numbers, populations, survivability conjectures and trends because it is incomplete. Therefore, I relied on more current sources, including the 2001 Garfield County studies by the Colorado Natural Heritage Program, element occurrence data, and the 1995 status report by Burt & Spackman.

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[1] Likely is defined as more likely to occur than not occur on the National Forest or Grassland. This generally can be thought of as having a 50% chance or greater of appearing on NFS lands.

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