U.S. FISH AND WILDLIFE SERVICE
SPECIES ASSESSMENT AND LISTING PRIORITY ASSIGNMENT FORM

SCIENTIFIC NAME: *Centrocercus urophasianus*

COMMON NAME: Greater sage-grouse, Columbia Basin Distinct Population Segment

LEAD REGION: Region 1

INFORMATION CURRENT AS OF: June 2007

STATUS/ACTION

___ Species assessment - determined we do not have sufficient information on file to support a proposal to list the species and, therefore, it was not elevated to Candidate status
___ New candidate
___ Continuing candidate
___ Non-petitioned
_X_ Petitioned - Date petition received: June 21, 1999
X 90-day positive - FR date: August 24, 2000
X 12-month warranted but precluded - FR date: May 7, 2001
_ Did the petition request a reclassification of a listed species?

FOR PETITIONED CANDIDATE SPECIES:
a. Is listing warranted (if yes, see summary of threats below)? Yes
b. To date, has publication of a proposal to list been precluded by other higher priority listing actions? Yes
c. If the answer to a. and b. is "yes", provide an explanation of why the action is precluded.

We find that the immediate issuance of a proposed rule and timely promulgation of a final rule for this species has been, since publication of the last CNOR, and continues to be, precluded by higher priority listing actions (including candidate species with lower LPNs) because most of our national listing budget has been consumed by work on various listing actions to comply with court orders and court-approved settlement agreements, meeting statutory deadlines for petition findings or listing determinations, emergency listing evaluations and determinations, and essential litigation-related, administrative, and program management tasks. We will continue to monitor the status of this species as new information becomes available. This review will determine if a change in status is warranted, including the need to make prompt use of emergency listing procedures. For information on listing actions taken, see the discussion of "Progress on Revising the Lists" in the current CNOR, which can be viewed on our Internet website (http://endangered.fws.gov/).

___ Listing priority change

Former LP: ___
New LP: ___

Date when the species first became a Candidate (as currently defined): May 7, 2001

___ Candidate removal: Former LPN: ___
- ___ A – Taxon is more abundant or widespread than previously believed or not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status.
- ___U – Taxon not subject to the degree of threats sufficient to warrant issuance of a proposed listing or continuance of candidate status due, in part or totally, to conservation efforts that remove or reduce the threats to the species.
- ___ F – Range is no longer a U.S. territory.
- ___ I – Insufficient information exists on biological vulnerability and threats to support listing.
- ___ M – Taxon mistakenly included in past notice of review.
- _ _ N – Taxon does not meet the Act's definition of "species."
- ___ X – Taxon believed to be extinct.

ANIMAL/PLANT GROUP AND FAMILY: Birds; Phasianidae (Pheasant Family)

HISTORICAL STATES/TERRITORIES/COUNTRIES OF OCCURRENCE: Oregon and Washington; British Columbia, Canada

CURRENT STATES/COUNTIES/TERRITORIES/COUNTRIES OF OCCURRENCE: Washington; Douglas, Grant, Kittitas, Yakima, and Benton Counties

LAND OWNERSHIP: The northern subpopulation of greater sage-grouse within the Columbia Basin occurs primarily on private and State-owned lands in Douglas County; the southern subpopulation occurs almost entirely on Federal lands of the Yakima Training Center, administered by the Army, in Kittitas and Yakima Counties. Greater sage-grouse within the Columbia Basin historically encompassed roughly 7 percent of the entire range of the taxon, or about 181,000 square miles.

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BIOLOGICAL INFORMATION

Species Description

The greater sage-grouse is the largest grouse species in North America. Adult males range in length from 66 to 76 centimeters (cm) (26 to 30 inches (in)) and weigh between 2 and 3

kilograms (kg) (4 and 7 pounds (lb)). Adult females range in length from 48 to 58 cm (19 to 23 in) and weigh between 1 and 2 kg (2 and 4 lb). Males and females have dark grayish-brown body plumage with many small gray and white speckles, fleshy yellow combs over the eyes, long pointed tails, and dark green toes. Males also have blackish chin and throat feathers, conspicuous phylloplumes (specialized erectile feathers) at the back of the head and neck, and white feathers forming a ruff around the neck and upper belly. During breeding displays, males exhibit olive-green apteria (fleshy bare patches of skin) on their breasts (Schroeder *et al.* 1999).

Taxonomy

In response to recent judicial direction (*Institute for Wildlife Protection* v. *Norton* (9th Cir. 2005, Unpublished opinion)), we are in the process of revisiting our interpretation of the taxonomic status of the greater sage-grouse subspecies. We will publish an updated finding addressing the Columbia Basin DPS in the **Federal Register** following our reassessment of the validity of the species' current taxonomy. At that time the following taxonomy discussion will be updated.

In July, 2000, the American Ornithologists' Union (AOU) recognized sage grouse (*Centrocercus urophasianus*) by the common name of greater sage-grouse. In addition, the AOU recognized sage grouse inhabiting southwestern Colorado and extreme southeastern Utah as a congeneric species (*C. minimus*), referred to as Gunnison sage grouse (AOU 2000). The U.S. Fish and Wildlife Service (Service or we) follow this nomenclature for the species' common names for the purposes of this assessment. Currently, the AOU also recognizes two subspecies of greater sage-grouse (AOU 1957). The western subspecies (*C.u. phaios*) was first described in 1946 (Aldrich 1946). Compared to the eastern subspecies (*C.u. urophasianus*), the western subspecies has reduced white markings and darker grayish-brown feathering, resulting in a more dusky overall appearance.

Based on communications with recognized experts, disagreement as to the validity of the subspecies designations for greater sage-grouse exists (Braun 1992 and Aldrich 1992, both in Drut 1994; Banks 1992, 2000, 2002). With regard to current taxonomic standards and information generated over the last few decades, these designations may be inappropriate (Johnsgard 1983; Schroeder et al. 1999a; Benedict et al. 2001). Banks (1992) indicates that, while differences between the eastern and western subspecies specimens are discernible, individual morphological variation in greater sage-grouse, such as plumage coloration, is extensive. Further, given current taxonomic concepts he doubts that most taxonomists today would identify a subspecies based on minor color variations from a limited number of specimens, as were available to Aldrich during the mid-1900s (Aldrich 1946 and 1963). However, he also indicates that no additional studies specifically addressing the extent of morphological variation within the species have been conducted and that a sufficient number of specimens for conducting a thorough update of the taxon have yet to be made available. In addition, even given the compelling genetic information (below), Benedict et al. (2001) conclude that "...additional morphological, behavioral, and genetic studies are warranted to further investigate this potential taxonomic error."

When informed taxonomic opinion is not unanimous, we must evaluate the available information and come to our own adequately documented conclusions for species listing actions undertaken pursuant to section 4 of the Act. The available information indicates that the subspecies designations for greater sage-grouse are likely inappropriate given current taxonomic standards. In addition, additional assessments that could further clarify taxonomic relationships below the species level in greater sage-grouse have not yet been conducted. Until pertinent additional

information may become available, we are required to base our listing decisions on the best available information. Therefore, we conclude that there is little justification to consider the western subspecies as it relates to our section 4 listing responsibilities. However, we also recognize that early taxonomists appear to have documented a phenotypic gradient within the northwest extent of the species historic distribution, which indicates that morphological differentiation of populations within the taxon may occur.

In May of 1999, we received a petition requesting that the Washington population of the western subspecies of greater sage-grouse be listed as threatened or endangered under the Endangered Species Act of 1973, as amended (Act). The petitioners made this request based upon threats to the population and its isolation from the remainder of the taxon, and they provided biological and ecological support for the petitioned action. We considered this request appropriate because, while we do not base listing decisions on political subdivisions other than international boundaries, we must consider for listing under the Act any population of vertebrate taxa (species or subspecies) if it may be recognized as a distinct population segment (DPS) (61 FR 4722). The criteria under which we recognize DPS are based upon the population's physical, physiological, ecological, behavioral, morphological, or genetic separation from the remainder of the taxon (discreteness), and its importance to the taxon to which it belongs (significance). Therefore, the following assessment addresses the population segment of greater sage-grouse that occurs in Washington as it relates to the remainder of the taxon.

Habitat/Life History

Greater sage-grouse depend on a variety of shrub-steppe habitats throughout their life cycle to provide essential food and cover requirements, and are considered obligate users of several species and subspecies of sagebrush (*Artemisia* spp.) (Braun *et al.* 1976; Schroeder *et al.* 1999; Connelly *et al.* 2000; Connelly *et al.* 2004). Thus, greater sage-grouse distribution is strongly correlated with the distribution of sagebrush habitats (Schroeder *et al.* 2004). While greater sage-grouse are dependent on large, interconnected expanses of shrub-steppe (Patterson 1952; Connelly *et al.* 2004), information is not available regarding minimum habitat patch sizes required to support populations of greater sage-grouse. Greater sage-grouse exhibit strong site fidelity (loyalty to a particular site) for breeding and nesting areas (Connelly *et al.* 2004).

Greater sage-grouse display preferential use of different taxa of sagebrush as winter food (Remington and Braun 1985; Welch *et al.* 1991) and, in some areas, low sagebrush (*A. arbuscula*) may be preferred over big sagebrush (*A. tridentata* subspp.) (Schroeder *et al.* 1999). In addition, greater sage-grouse display preference for different subspecies of big sagebrush as food, showing the highest preference for mountain big sagebrush (*A.t. vaseyana*), followed by Wyoming big sagebrush (*A.t. wyomingensis*), then basin big sagebrush (*A.t. tridentata*) (Welch *et al.* 1991). The different growth forms of sagebrush taxa (Winward 1980; Winward 1981; Meyer 1992) also provide different cover conditions for greater sage-grouse, and their winter movements are associated with locating appropriate sites (WDFW 1995; Schroeder *et al.* 1999).

During the spring breeding season, male greater sage-grouse gather together to perform courtship displays on areas called leks. Leks are typically located in relatively open sites, including areas of bare soil, short-grass steppe, windswept ridges, and exposed knolls (Patterson 1952; Connelly *et al.* 2004). Leks are often surrounded by patches of more dense shrub-steppe, which are

primarily used as escape, thermal, and feeding cover. Leks can be formed opportunistically at any appropriate site within or adjacent to nesting habitat (Connelly *et al.* 2000) and, therefore, lek habitat availability is not considered to be a limiting factor for greater sage-grouse (Schroeder 1997). Leks range in size from less than 0.04 hectare (ha) (0.1 acre (ac)) to over 36 ha (90 ac) (Connelly *et al.* 2004) and can contain from several to hundreds of males (Johnsgard 2002). Males defend individual territories within leks and perform elaborate displays with their specialized plumage and vocalizations to attract females for mating. Relatively few dominant males account for the majority of breeding at each lek (Schroeder *et al.* 1999).

Female greater sage-grouse have been documented traveling more than 20 kilometers (km) (12.5 miles (mi)) to their nest sites after mating (Connelly *et al.* 2000), but distances between a nest site and the lek on which breeding occurred is variable (Connelly *et al.* 2004). While earlier studies indicated that most hens nest within 3.2 km (2 mi) of a lek, more recent research indicates that hens actually move much further from leks to nest based on quality of available nesting habitat (Connelly *et al.* 2004). Research by Bradbury *et al.* (1989) and Wakkinen *et al.* (1992) demonstrated that nest sites are largely selected independent of lek locations.

Female greater sage-grouse typically select nest sites under sagebrush cover, although other shrub or bunchgrass species are sometimes used (Klebenow 1969; Connelly *et al.* 2000; Connelly *et al.* 2004). The understory of productive nesting areas typically contains native grasses and forbs that provide sufficient horizontal and vertical structural diversity to support an insect prey base, herbaceous forage for pre-laying and nesting hens, and cover for the hen while she is incubating (Gregg 1991; Schroeder *et al.* 1999; Connelly *et al.* 2000; Connelly *et al.* 2004). Shrub canopy and grass cover provide concealment for greater sage-grouse nests and young, and are critical for reproductive success (Barnett and Crawford 1994; Gregg *et al.* 1994; DeLong *et al.*1995; Connelly *et al.* 2004).

Greater sage-grouse clutch sizes range from 6 to 13 eggs (Schroeder *et al.* 2000). Nest success (one or more eggs hatching from a nest) ranges from 15 to 86 percent of initiated nests (Schroeder *et al.* 1999), which is typically lower than other prairie grouse species (Connelly *et al.* 2000) and indicative of a lower intrinsic (potential) population growth rate compared to most game bird species (Schroeder *et al.* 1999). Renesting rates following nest loss range from 5 to 41 percent (Schroeder 1997).

Hens rear their broods in the vicinity of the nest site for the first 2 to 3 weeks following hatching (Connelly *et al.* 2004). Forbs and insects are essential nutritional components for chicks (Klebenow and Gray 1968; Johnson and Boyce 1991; Connelly *et al.* 2004). Therefore, good early brood-rearing habitat provides adequate cover adjacent to areas rich in forbs and insects, which improves chick survival during this period (Connelly *et al.* 2004).

Greater sage-grouse typically move from sagebrush uplands to more mesic (moist) areas during the late brood-rearing period (roughly 3 weeks post-hatch) in response to summer desiccation of herbaceous vegetation (Connelly *et al.* 2000). Summer use areas can include sagebrush habitats as well as riparian areas, wet meadows, and alfalfa fields (Schroeder *et al.* 1999). These areas provide an abundance of forbs and insects for both hens and chicks (Schroeder *et al.* 1999;

Connelly *et al.* 2000). Greater sage-grouse will use free water, although they do not require it since they can obtain their water needs from food matter they consume. However, natural water bodies and reservoirs can provide mesic areas with an abundance of succulent forbs and high insect production, thereby attracting hens with broods (Connelly *et al.* 2004). Cocks and broodless hens will also use more mesic areas in close proximity to sagebrush cover during late summer (Connelly *et al.* 2004).

As vegetation continues to desiccate through late summer and fall, greater sage-grouse shift their diets to include greater amounts of sagebrush (Schroeder *et al.* 1999). Greater sage-grouse depend entirely on sagebrush throughout the winter for both food and cover, at which time sagebrush stand selection is influenced by snow depth (Patterson 1952; Connelly *et al.* 2000) and, in some areas, topography (Beck 1977; Crawford *et al.* 2004).

Many populations of greater sage-grouse migrate between seasonal ranges in response to habitat distribution (Connelly *et al.* 2004). Migration can occur between winter, breeding, and summer areas, or not at all. Migration distances of up to 161 km (100 mi) have been recorded (Patterson 1952), however, average movements are generally less than 34 km (21 mi) (Schroeder *et al.* 1999). Migration distances for female greater sage-grouse are generally less than for males (Connelly *et al.* 2004). Little information is available regarding the distribution and characteristics of migration corridors for greater sage-grouse (Connelly *et al.* 2004). Greater sage-grouse dispersal behaviors (permanent moves to other areas) are poorly understood (Connelly *et al.* 2004) and dispersal events appear to be sporadic (Dunn and Braun 1986).

Greater sage-grouse typically live between 1 and 4 years, but individuals up to 10 years of age have been recorded in the wild (Schroeder *et al.* 1999). Juvenile survival (from hatch to first breeding season) is affected by food availability, habitat quality, weather, and hunting. Documented juvenile survival rates range between 7 and 60 percent (Crawford *et al.* 2004). The documented annual survival rates for male greater sage-grouse (all ages combined) range from 38 to 60 percent (Schroeder *et al.* 1999), and for females from 55 to 75 percent (Schroeder 1997; Schroeder *et al.* 1999). Survival rates are high compared with other prairie grouse species (Schroeder *et al.* 1999). Higher female survival rates account for a female-biased sex ratio in adult birds (Schroeder 1997; Johnsgard 2002). Although seasonal patterns of mortality have not been thoroughly examined, over-winter mortality is low (Connelly *et al.* 2004).

Historical Range/Distribution

Prior to extensive European settlement of interior western North America (*circa* 1800), greater sage-grouse likely occurred within the current borders of 13 states and 3 Canadian provinces (Schroeder *et al.* 1999, Young *et al.* 2000, Stinson *et al.* 2004). The historical distribution of greater sage-grouse, based primarily on estimates of historical sagebrush habitats that potentially supported the species, occurred over approximately 1,200,483 km^2 (463,509 mi^2) (Schroeder *et al.* 2004).

Current Range/Distribution

Range-wide, the distribution of greater sage-grouse has declined in a number of areas (Figure 1). Currently, greater sage-grouse occur in 11 states and 2 Canadian provinces, having been extirpated from Arizona and Nebraska and British Columbia, Canada. The current distribution of greater sage-grouse is estimated to occur over approximately 668,412 km^2 (258,075 mi^2), or roughly 56 percent of the species' potential historical distribution (Schroeder *et al.* 2004; Connelly *et al.* 2004).

Population Estimates/Status

Declines in the abundance of greater sage-grouse have also been reported from throughout the species' historical range (Hornaday 1916; Crawford and Lutz 1985; Drut 1994; WDFW 1995;

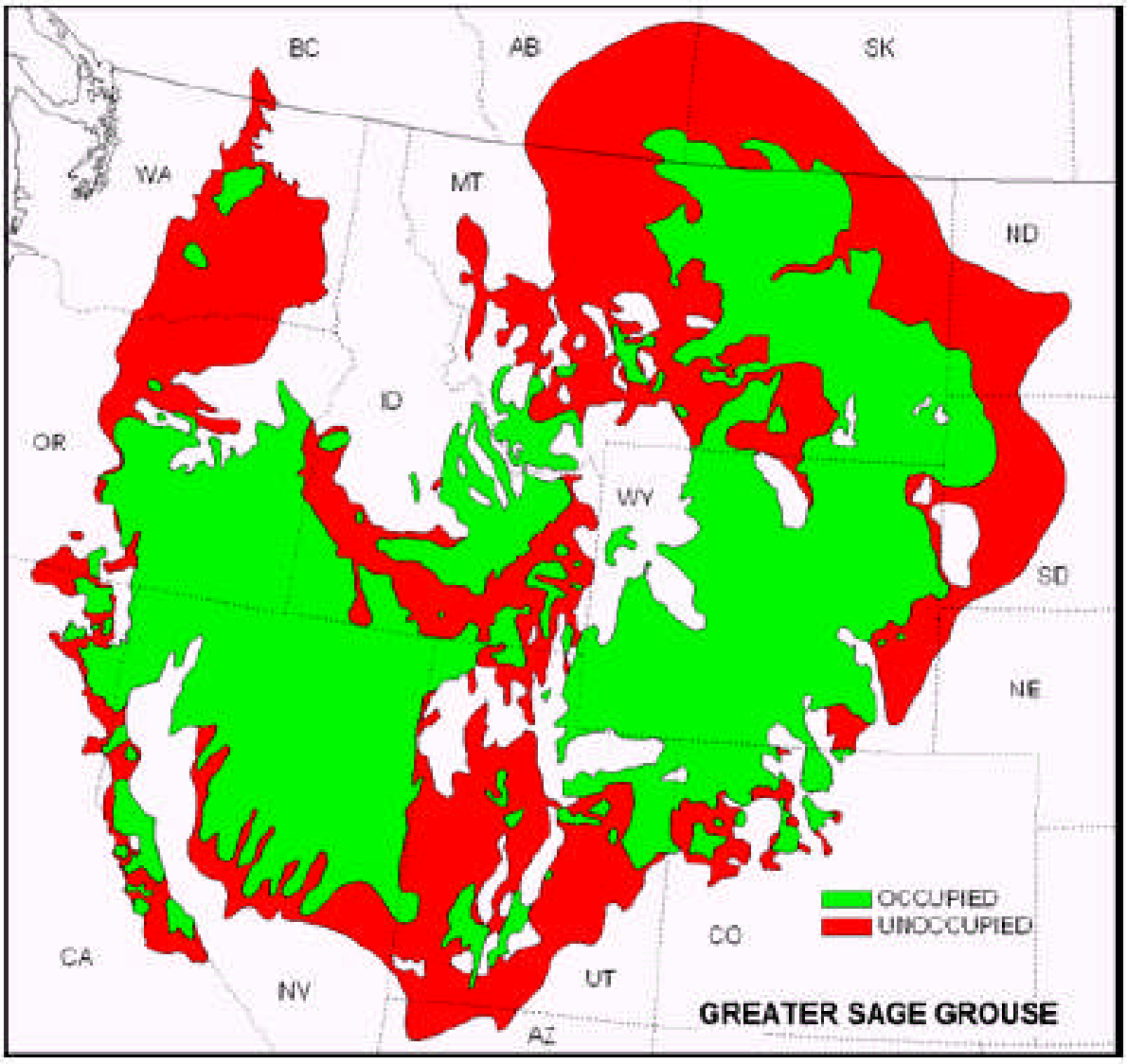

Figure 1. Historical (unoccupied) and current (occupied) distribution of greater sage-grouse (after Stinson *et al.* 2004).

Coggins and Crawford 1996; Braun 1998; Schroeder *et al.* 1999, Connelly *et al.* 2004). However, there is little substantiated information available addressing the historical abundance of greater sage-grouse range wide, and the actual rate or extent of decline from historical levels cannot be precisely estimated. Rough estimates, based on the presumed historical distribution of greater sage-grouse (Stinson *et al.* 2004), contemporary density projections (Johnsgard 1973; Drut *et al.* 1994; WDFW 1995; M. Schroeder, WDFW, pers. comm., 1999), and recent estimates of greater sage-grouse abundance (see following), indicate that the range wide population of reater sage-grouse has likely declined by at least 67 percent from historical levels.

Population census methods used across the range of greater sage-grouse are inconsistent, and a precise estimate of the species' current range wide abundance is not possible (Connelly *et al.* 2004). The Service estimated that the range wide abundance of greater sage-grouse in 2000 was likely between 100,000 and 500,000 birds. These lower and upper estimates were derived from those of Braun (1998), Willis *et al.* (1993) for Oregon, and the additional assumption that contemporary harvest data for Idaho, Montana, and Wyoming represented roughly 10 percent of the total spring breeding population (65 FR 51578).

In a detailed analysis of lek counts, Connelly *et al.* (2004) estimated that there was a two percent average annual range wide population decline in greater sage-grouse between 1965 and 2003. The decline was more pronounced from 1965 through 1985, averaging 3.5 percent annually. The estimated rate of population decline from 1986 through 2003 was approximately 0.4 percent annually, and some regional populations likely increased during this period. Based on their analyses, Connelly *et al.* (2004) estimated that greater sage-grouse abundance in the late 1960s and early 1970s was likely two to three times greater than their current abundance.

DISTINCT POPULATION SEGMENT (DPS)

Under the Act, we must consider for listing any species, subspecies, or, for vertebrates, any distinct population segment (DPS) of these taxa if there is sufficient information to indicate that such action may be warranted. To implement the measures prescribed by the Act and its Congressional guidance, we (along with the National Marine Fisheries Service) developed policy that addresses the recognition of DPSs for potential listing actions (61 FR 4722). The policy allows for more refined application of the Act that better reflects the biological needs of the taxon being considered and avoids the inclusion of entities that do not require its protective measures.

Under our DPS policy, we use two elements to assess whether a population segment under consideration for listing may be recognized as a DPS. The elements are: (1) the population segment's discreteness from the remainder of the taxon; and (2) the population segment's significance to the taxon to which it belongs. If we determine that a population segment being considered for listing represents a DPS, then the level of threat to the population segment is evaluated based on the five listing factors established by the Act to determine if listing it as either threatened or endangered is warranted.

Below, we assess the population segment of greater sage-grouse that remains within the Columbia Basin under our DPS policy.

Discreteness

A population segment of a vertebrate species may be considered discrete if it satisfies either one of the following two conditions: (1) it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors - quantitative measures of genetic or morphological discontinuity may also provide evidence of this separation; and (2) it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant with regard to conservation of the taxon. We did not address the international boundary criterion in this assessment because greater sage-grouse within the Columbia Basin have been extirpated from British Columbia.

The two subpopulations of greater sage-grouse that remain in central Washington are separated by approximately 55 km (34 mi). While this distance is well within the species' maximum estimated dispersal distance, a number of recent telemetry studies have never documented their intermixing (M. Schroeder, pers. comm., 1999; M. Pounds, YTC, pers. comm., 1999). However, until recently the two subpopulations were considered relatively continuous and may now represent isolated components of a single metapopulation (WDFW 1995; Schroeder et al. 2000). In addition, recent assessments undertaken by the Washington Sage Grouse Working Group (WSGWG) indicate that neither of these two subpopulations is likely large enough to ensure the species' long-term viability within the Columbia Basin (Stinson et al. 2004), and reestablishing connectivity between them may be a key recovery action. Finally, sporadic sightings outside current concentrations indicate there may be some minimal interaction and, possibly, genetic interchange between them (WDFW 1995).

The next closest population of greater sage-grouse is located over 185 km (115 mi) to the south, in central Oregon. Historically, there was a greater level of continuity and interaction between the population segments of greater sage-grouse occupying these two regions (Drut 1994). However, bottlenecks in the distribution of greater sage-grouse may have existed historically across central Oregon. In this area, greater sage-grouse range is confined to relatively narrow corridors of lower elevation, shrub steppe habitats that transect higher elevation, forested habitats. In addition, the shrub steppe habitats and land forms found in central Oregon may further restrict greater sage-grouse distribution within this region (see Significance, below).

It is currently unclear to what extent the restrictions of shrub steppe habitats in central Oregon may have acted to isolate the Columbia Basin population segment of greater sage-grouse historically. Nevertheless, with regard to greater sage-grouse seasonal movements, dispersal behavior, and recent census information (M. Schroeder, pers. comm., 1999; M. Pounds, pers. comm., 1999; B. Ferry, Oregon Department of Fish and Wildlife, pers. comm., 2001), the population segment remaining in Washington is now considered physically discrete from the population segment in central and southern Oregon (WDFW 1995, WSGWG 1998, Schroeder et

al. 2000). It is likely that the population segments within these two regions have been physically discrete since at least the early-1900s (Gabrielson and Jewett 1940; Crawford and Lutz 1985; Drut 1994).

Based on the above information, we found that the population segment of greater sage-grouse that occurs within the Columbia Basin of central Washington is discrete from the remainder of the taxon.

Significance

Our DPS policy provides several examples of the types of information that may demonstrate the significance of a population segment to the remainder of its taxon, including, but not limited to: (1) persistence of the population segment in an ecological setting unusual or unique for the taxon; (2) evidence that the population segment differs markedly from other population segments in its genetic characteristics; (3) evidence that loss of the population segment would result in a significant gap in the range of the taxon; and (4) evidence that the discrete population segment represents the only surviving natural occurrence of the taxon that may be more abundant elsewhere as an introduced population outside its historic range. We assessed the following significance factors as they relate to the discrete population segment of greater sage-grouse that remains within the Columbia Basin.

Persistence in an unusual or unique ecological setting: The broad shrub steppe biome historically occupied by greater sage-grouse across their range consists of a number of variable habitat types that grade from one to the next, and which may be considerably different between the regions occupied by the species (Miller and Eddleman 2000). The different habitats historically and currently occupied by greater sage-grouse are a reflection of the different geologic, climatic, and edaphic (soil) conditions and disturbance regimes influencing the various regions within the shrub steppe biome (Miller and Eddleman 2000). Necessarily, greater sage-grouse have adapted to the mosaic of shrub steppe habitat types found throughout their historic distribution (Schroeder et al. 1999).

With regard to the historic range of greater sage-grouse in Washington and Oregon, several studies have defined and mapped landscape-level ecosystem components of the northwestern United States (Franklin and Dyrness 1988; Quigley et al. 1997), while others have focused on the management and conservation of natural resources within these regional ecosystems (Wisdom et al. 1998; Miller and Eddleman 2000). Although there are a number of differences between these studies and their stated objectives, the ecosystem mapping units that result are surprisingly consistent (Quigley et al. 1997). Use of this biogeographic information is important for determining if the population segment of greater sage-grouse that remains within the Columbia Basin occupies an unusual or unique ecological setting. In addition, it is important for delineating the bounds of any potential DPS in the region, as required by our DPS policy.

Five of the ecosystems in Washington and Oregon that have been identified by the above studies provide essential habitat requirements for greater sage-grouse. For the purposes of this assessment, we refer to the ecosystems historically occupied by greater sage-grouse in these two

states as the Columbia Basin, High Lava Plains, Northern Great Basin, Owyhee Uplands, and Modoc Plateau (after Quigley et al. 1997). The Columbia Basin occurs in Washington and northern Oregon, while the other four ecosystems occur in central and southern Oregon (Figure 2). These ecosystems are interspersed to varying degrees with forested habitats of the Southern and Eastern Cascades ecosystems to the west, Okanogan Highlands to the north, and the Bitterroot and Blue Mountains to the east; and steppe (grassland) habitats of the Palouse Prairie to the east.

The population segment of greater sage-grouse that remains in Washington occurs entirely within the Columbia Basin and is the only representation of the taxon within this ecosystem. The population segment of greater sage-grouse in central and southern Oregon shows nearly

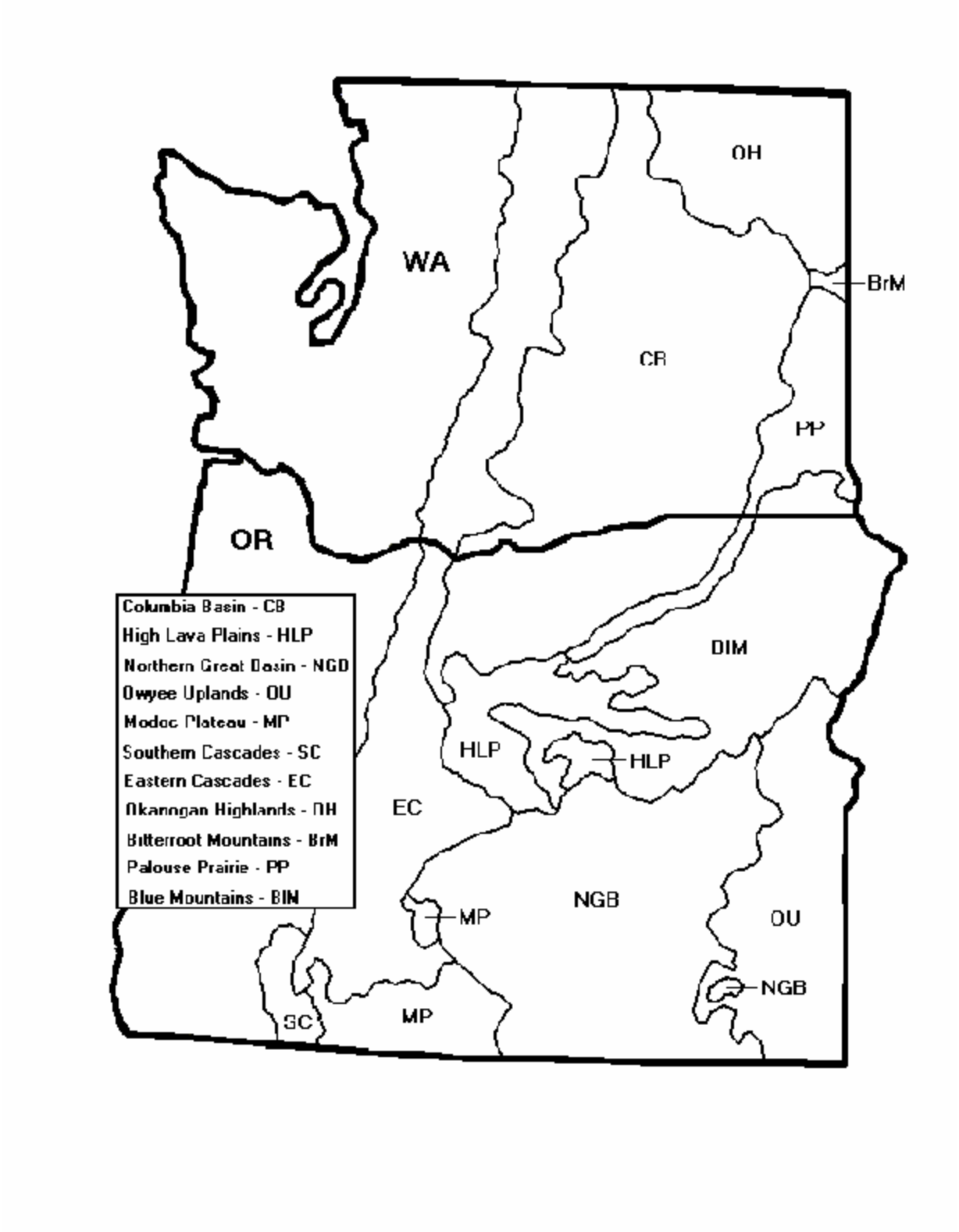

Figure 2. The ecosystems of eastern Washington and Oregon (as modified from Franklin and Dyrness 1988, Daubenmire 1988, Keane et al. 1996, and Quigley et al. 1997).

continuous occupation across the High Lava Plains, Northern Great Basin, and Owyhee Uplands. There is also a disjunct subpopulation in the vicinity of Gerber Reservoir in extreme south-central Oregon (Modoc Plateau). These birds likely have a closer affinity to the greater sage-grouse population in northern California (WDFW 2000), and they are not considered further for the purposes of this assessment. Currently, there is insufficient information available to assess the other ecosystems throughout the remainder of the species' historic range in North America.

A number of significant differences are found between the Columbia Basin and the balance of historic greater sage-grouse range in central and southern Oregon (Table 1). In general, the Columbia Basin is lower in elevation, contains deeper soils of varying origin, and has been influenced by different geological processes. These structural differences, combined with regional climatic conditions, significantly influence the broad plant associations found within each ecosystem (Daubenmire 1988; Franklin and Dyrness 1988). Historically, transitional steppe habitats were much more prevalent within the Columbia Basin than within the ecosystems of central and southern Oregon. In contrast, juniper (*Juniperus* spp.) woodlands and salt-desert shrub habitats were much more common in central and southern Oregon. Finally, there are significant differences in the type and distribution of sagebrush taxa among the ecosystems historically occupied by greater sage-grouse in the northwestern extent of their historic range.

There are a number of broad habitat associations in common between the Columbia Basin and the ecosystems of central and southern Oregon (Daubenmire 1988; Franklin and Dyrness 1988). However, even within these common habitat associations, notable differences exist. In general, the composition of forb species differs considerably between the Columbia Basin and the ecosystems in central and southern Oregon (Daubenmire 1988; Franklin and Dyrness 1988). Even when the same forb species may be present, the two regions typically support different subspecies and/or varieties of these taxa (Hitchcock and Cronquist 1973).

The differences noted above between the Columbia Basin and the ecosystems of central and southern Oregon affect the essential habitat requirements of greater sage-grouse within these different regions, as described below.

Greater sage-grouse are sagebrush "obligates" and depend on sagebrush to a great degree to provide essential food and cover requirements, especially during winter (Drut 1994; Barnett and Crawford 1994; WDFW 1995; Schroeder et al. 1999). Greater sage-grouse display preferential use of different taxa of sagebrush as winter food (Remington and Braun 1985; Welch et al. 1991) and, in some areas, low sagebrush may be preferred over big sagebrush (Schroeder et al. 1999). In addition, greater sage-grouse display preference for the different subspecies of big sagebrush as food, showing the highest preference for mountain big sagebrush, followed by Wyoming big sagebrush, then basin big sagebrush (Welch et al. 1991). The different growth forms of sagebrush taxa (Winward 1980, 1981; Meyer 1992) also provide different cover conditions for greater sage-grouse, and their winter movements are associated with locating appropriate sites (WDFW 1995; Schroeder et al. 1999). The sagebrush taxa that are available as winter food and cover for greater sage-grouse differ between the Columbia Basin and the ecosystems of central and southern Oregon (Table 1).

Table 1. Differences in ecosystem elements between regions occupied by the extant population segments of greater sage-grouse in Washington and Oregon (after Winward 1980; Daubenmire 1988; Franklin and Dyrness 1988; McNab and Avers 1994; Dobler et al. 1996; Quigley et al. 1997; Miller and Eddleman 2000).

Ecosystem Elements--Geologic, Edaphic, and Transitional Habitats

Population Segment	Elevations	Soils	Channeled Scablands	Internally-drained Playas	Steppe	Juniper Woodland	Salt-desert Shrub
Columbia Basin	< 3,000' ft	Deep/Loamy Glacial/ Eolian	Prominent (north)	Rare/Absent	Abundant (east)	Rare/Absent	Rare/Absent
Central / Southern Oregon	> 3,500 ft	Thin/Rocky Volcanic/ Alluvial	Rare/Absent	Prominent (NGB, OU)[1]	Rare/Absent	Abundant (HLP) Present (NGB, OU)	Abundant (NGB, OU)

Ecosystem Elements--Sagebrush (*Artemesia*) Taxa[2]

Population Segment	Basin ssp	Wyoming Ssp	Mountain Ssp	Low	Three-Tip	Stiff	Early	Silver	Black
Columbia Basin	Dominant	Rare/ Absent	Rare/ Absent	Rare/ Absent	Abundant (north)	Abundant	Rare/ Absent	Rare/ Absent	Rare/ Absent
Central / Southern Oregon	Rare/ Absent	Dominant	Abundant	Abundant	Present (OU)	Present	Present (HLP)	Present (NGB, OU)	Present (NGB, OU)

1 Element primarily applies to the ecosystems noted: HLP - High Lava Plains; NGB - Northern Great Basin; OU - Owyhee Uplands.
2 Big Sagebrush (*A. tridentata*) Subspecies (ssp): Basin - *A.t. tridentata*, Wyoming - *A.t. wyomingensis*, Mountain - *A.t. vaseyana*; Low - *A. arbuscula*; Three-tip - *A. tripartita*; Stiff - *A. rigida*; Early - *A. longiloba*; Silver - *A. cana*; Black - *A. nova*.

During the breeding season, adult greater sage-grouse undergo a nutritional deficit and lose weight (WDFW 1995; Schroeder et al. 1999). During this period and continuing into summer, forbs and insects become increasingly important as food items for greater sage-grouse. Greater sage-grouse hens require sufficient forb abundance for their pre-laying and nesting periods, and an assortment of forb and insect species form important nutritional components for chicks during the early stages of their development (Gregg et al. 1993; Barnett and Crawford 1994; Drut et al. 1994b; Hanf et al. 1994). Preferential use of food resources by greater sage-grouse is believed to be associated with the foods' nutritive values, the dietary needs of the birds, and, ultimately, the birds' reproductive fitness and survival (Remington and Braun 1985; Johnson and Boyce 1990; Barnett and Crawford 1994; Drut et al. 1994a,1994b; Hanf et al. 1994; WDFW 1995; Schroeder et al. 1999). Many of the native forb species and varieties that differ between the Columbia Basin and the ecosystems of central and southern Oregon (Hitchcock and Cronquist 1973; Franklin and Dyrness 1988) form important food items for greater sage-grouse from spring through summer, including those within the genera *Agoseris*, *Astragalus*, *Crepis*, *Aster*, *Erigeron*, *Eriogonum*, and *Lomatium* (Sveum 1995; Miller and Eddleman 2000).

From spring through fall, sagebrush canopies provide vertical cover for greater sage-grouse, while grasses and forbs provide horizontal cover. This variety of cover is very important for concealing nesting hens and their broods from potential avian and ground predators, as well as providing protection from inclement weather. Greater sage-grouse in central and southern Oregon use different sagebrush habitat associations (e.g., mountain big sagebrush, low sagebrush) throughout the spring and summer periods (Gregg et al. 1993; Barnett and Crawford 1994; Drut et al. 1994a; Hanf et al. 1994). The sagebrush habitat associations preferentially selected by greater sage-grouse in central and southern Oregon are not available to the population segment within the Columbia Basin (Table 1).

Juniper woodlands and salt-desert shrub communities are notable primarily for their potential to exclude greater sage-grouse and the management implications that result. As juniper becomes more abundant and areas become increasingly closed woodlands, use by greater sage-grouse is precluded. The exclusion of fire from juniper woodlands allow these communities to expand. Active invasion of sagebrush habitat associations by juniper woodlands has occurred over the last 130 years (Miller and Eddleman 2000). Likewise, salt-desert shrub habitats are not typically used by greater sage-grouse. Intense grazing pressure and other local activities that can affect the hydrology of an area (e.g., irrigation, mining, impoundments) may alter the composition and distribution of salt-desert shrub communities. The historic, present, and predicted future occurrence of juniper woodlands and salt-desert shrub communities differ between the Columbia Basin and the ecosystems of central and southern Oregon (Table 1; Keane et al. 1996).

Based on the above information, we concluded that the Columbia Basin represents a unique ecological setting due to its geologic, climatic, edaphic, and plant community components. In addition, the unique elements of the Columbia Basin ecosystem affect the essential habitat requirements of greater sage-grouse. Necessarily, the population segment of greater sage-grouse occupying the Columbia Basin must differentially exploit the resources that are available, as compared to the population segment within the ecosystems of central and southern Oregon. The different habitat use patterns of greater sage-grouse within the Columbia Basin have bearing on

their food and cover preferences, distribution, movements, reproductive fitness, and, ultimately, their survival. The unique elements of the Columbia Basin also hold different management implications for greater sage-grouse within this ecosystem (see THREATS below).

Markedly different genetic characteristics: To date, most genetic research on greater sage-grouse has concentrated on clarifying issues surrounding the taxonomic separation of Gunnison sage grouse in Colorado. Results of this research show that Gunnison sage grouse have a dissimilar genetic profile and less genetic diversity than greater sage-grouse populations in Colorado (Quinn et al. 1997; Oyler-McCance et al. 1999). This information, along with behavioral and morphological information, supports the new species designation for these birds (AOU 2000). The genetic and other information concerning Gunnison sage grouse demonstrates that the genus may differentiate significantly within a relatively small geographic region. In addition, this information is important for helping to determine the extent of genetic differentiation between population segments of greater sage-grouse, and whether such differentiation may be significant to the remainder of the taxon.

Additional studies to investigate the range-wide genetic profiles of greater sage-grouse are ongoing (Quinn et al. 1997; Benedict and Quinn 1998; Benedict et al. 2001). Range-wide investigations include samples from Colorado, Utah, Nevada, California, Oregon, and Washington. Sample sizes are minimal for portions of the range, and the results are preliminary and have been used primarily to guide further investigation (S. Oyler-McCance, University of Denver, pers. comm., 1999; T. Quinn, University of Denver, pers. comm., 1999; Benedict et al 2001; Oyler-McCance et al 2001).

The range-wide investigations into the genetic profiles of greater sage-grouse have identified a number of rare and unique haplotypes (from mitochondrial DNA). In addition, haplotype frequencies and the level of genetic diversity vary among the local populations sampled (Quinn et al. 1997; Benedict and Quinn 1998; Benedict et al. 2001). So far, there are several notable results from this range wide work (Benedict et al. 2001). First, the population sampled from the Mono Basin area in California and Nevada stands out for having an unusually high proportion of novel haplotypes, sharing only a single haplotype (represented by just one individual) with the rest of the range. This population represents the extreme southwestern extent of historic greater sage-grouse range. Second, there is no genetic differentiation apparent between the delineated eastern and western subspecies. Third, the population segment that remains within the Columbia Basin stands out for having very low genetic diversity, with just three haplotypes represented among the two subpopulations. Thirteen individuals sampled from the northern subpopulation ($n = 18$) and all of the individuals sampled from the southern subpopulation ($n = 18$) represent a single, widespread haplotype that is shared with most of the other sampled locales. The remaining five individuals from the northern subpopulation are represented by a novel ($n = 3$) or rare ($n = 2$) haplotype (Benedict et al. 2001).

The comparatively low genetic diversity of the population segment of greater sage-grouse that remains within the Columbia Basin is consistent with a recent and severe bottleneck in its effective population size (i.e., the number of individuals contributing to reproduction), reduced or no gene flow to this population segment from other regions, or both (Benedict et al. 2001; Oyler-

McCance et al. in litt. 2001). The results from the range-wide work on the regional genetic profiles of greater sage-grouse are suggestive and demonstrate a marked difference between the population segment of greater sage-grouse within the Columbia Basin and the population segment in central and southern Oregon. However, these results do not necessarily indicate that genetic differentiation of this population segment is significant to the remainder of the taxon. To what extent the forces of isolation, adaptive change, genetic drift, and/or inbreeding may have influenced the regional genetic profiles of greater sage-grouse, including those that remain within the Columbia Basin, merits further investigation (Benedict et al. 2001; Oyler-McCance et al. in litt. 2001).

Significant gap in the range of the taxon: Greater sage-grouse within the Columbia Basin represent the extreme northwestern extent of the species' historic range. The Columbia Basin historically encompassed roughly 7 percent of the entire range of the taxon. Currently, greater sage-grouse occupy approximately 5 percent of their historic distribution within this ecosystem.

A number of studies address the characteristics of peripheral and/or isolated populations and their potential influences on, and importance to, the remainder of the taxon. Peripheral and isolated populations may experience increased directional selection due to marginal or varied habitats or species compositions at range peripheries, exhibit adaptations specific to these differing selective pressures, demonstrate genetic consequences of reduced gene flow dependent on varying levels of isolation, and/or have different responses to anthropogenic influences (Levin 1970; MacArthur 1972; Morain 1984; Lacy 1987; Hengeveld 1990; Saunders et al. 1991; Hoffmann and Blows 1994; Furlow and Armijo-Prewitt 1995; Garcia-Ramos and Kirkpatrick 1997).

Recent discussions have addressed the attributes of isolated and peripheral populations and their potential importance to conservation efforts. Some investigations would emphasize genetic distinctiveness (Lesica and Allendorf 1995; Waples 1998), while others suggest a spectrum of influences may demonstrate the value of discrete populations (Pennock and Dimmick 1997; Ruggiero et al. 1999). The purposes of the Act are to conserve species "...of esthetic, ecological, educational, historical, recreational, and scientific value...." As addressed above, the DPS policy reflects this broader objective and does not limit the concept of significance strictly to genetic distinctiveness.

The available information regarding the historic distribution and potential isolation of greater sage-grouse within the Columbia Basin demonstrates that this population segment is likely experiencing increased directional selection due to marginal and varied habitats at the taxon's range periphery, exhibiting genetic consequences of reduced gene flow from other population segments, and is responding (and will continue to respond) to the different anthropogenic influences in the region.

Based on the above information, we conclude that loss of the population segment of greater sage-grouse that remains within the Columbia Basin would represent a significant gap in the historic range of the taxon (i.e., the loss of a conspicuous peripheral and potentially isolated extension of historic range, and representation of the taxon within a unique ecological setting).

Conclusion

To summarize, we found that the discrete population segment of greater sage-grouse that remains in Washington is significant to the remainder of the taxon, and thus represents a distinct population segment. The significance of this population segment is primarily due to its persistence in the unique ecological setting of the Columbia Basin. In addition, the available genetic and morphological information on greater sage-grouse, while inconclusive, indicates that this population segment may be differentiating from the remainder of the taxon, and its extirpation could preclude further scientific inquiry into these characteristics. Finally, information concerning the historic and current distribution of greater sage-grouse indicates that the loss of the Columbia Basin population segment would represent a significant gap in the historic range of the taxon.

THREATS:

A. The present or threatened destruction, modification, or curtailment of its habitat or range. A number of influences have been implicated in the decline of greater sage-grouse distribution and abundance throughout the species' range (Crawford and Lutz 1985; Blus et al. 1989; Braun et al. 1994; Drut 1994; WDFW 1995; Fischer et al. 1996; Connelly and Braun 1997; Schroeder et al. 1999). Of primary concern are impacts to native shrub steppe habitats, which include conversion for agriculture, urban and mineral resources developments, construction of utility and transportation corridors, and habitat degradation through overgrazing, brush control, altered fire frequencies, and exotic species invasions. Other potential influences that may be associated with greater sage-grouse population declines include predation, excessive hunting, disease and parasitism, chemical applications for pest control, weather cycles, and recreational activities. As a result of these combined influences, greater sage-grouse distribution and abundance have continued to decline over the past decade, and a number of populations may now be at risk of extinction throughout the species' range (WSCSGW 1996 and 1998). Currently, greater sage-grouse populations may be considered secure in five States, including Montana, Wyoming, Idaho, Nevada, and Oregon (Connelly and Braun 1997).

Native Americans began grazing horses in the Columbia Basin in the mid-1700s and, by the mid-1800s, European settlers had established extensive cattle and horse grazing operations throughout the shrub steppe habitats used by greater sage-grouse (Daubenmire 1988; WDFW 1995; Livingston 1998). By the late 1800s, sheep production became increasingly important and large flocks were grazed along with other previously established livestock herds. Concurrent with significant declines in native shrub steppe habitats (see below), contemporary grazing levels are much reduced from historic levels. However, large livestock operations continue within the shrub steppe habitats of the Columbia Basin to the present. From 1986 to 1993, roughly 500,000 cattle were being supported in nine central Washington counties that historically harbored greater sage-grouse (WDFW 1995).

There is some evidence that the shrub steppe habitats of the Columbia Basin evolved in the absence of substantial grazing pressure from large native herbivores since the latest period of

glaciation, roughly 12,000 years before present (Mack and Thompson 1982; Daubenmire 1988). Excessive grazing pressure can have significant impacts on the shrub steppe ecosystems found throughout the historic range of greater sage-grouse (Fleischner 1994), and these impacts may be exacerbated in the Columbia Basin. In this region, excessive grazing removes current herbaceous growth and residual cover of native grasses and forbs, and can increase the canopy cover and density of sagebrush and invasive species (Daubenmire 1988; WDFW 1995; Livingston 1998). These impacts may be especially critical to greater sage-grouse populations during the spring nesting and brood rearing periods, and may negatively affect their reproductive potential (Crawford 1997; Connelly and Braun 1997; Schroeder et al. 1999).

The latest available estimate (1993) of the number of cattle supported in Douglas County, which also supports the northern subpopulation of the Columbia Basin DPS, is roughly 20,000 (WDFW 1995). It is currently unclear if this level of livestock use in the county may have negative affects on greater sage-grouse or their habitats. Prior to 1992, livestock grazing pressure was intense throughout the area of Kittitas and Yakima Counties that now comprises the YTC, which supports the southern subpopulation of the Columbia Basin DPS. In 1992, grazing intensity was reduced at the YTC within the greater sage-grouse protection areas identified by the Army. In 1995, cattle grazing was eliminated throughout the installation (Livingston 1998). Twice annually during spring and fall, flocks of sheep are trailed-through the YTC over a period of several weeks (M. Pounds, pers. comm., 1999). It is unknown to what degree current livestock use levels may be impacting greater sage-grouse or their habitat at the YTC. However, impacts from past livestock grazing are still evident throughout the installation (Livingston 1998).

During the first half of the 1900s, large portions of the shrub steppe habitats on deeper soils within the Columbia Basin were converted for dryland crop production (Daubenmire 1988; Franklin and Dyrness 1988; WDFW 1995). During the mid-1900s, a number of hydro-electric dams were developed on the Columbia and Snake Rivers in Washington and Oregon. The reservoirs formed by these projects impacted native shrub steppe habitats adjacent to the rivers and led to further conversion of large expanses of upland shrub steppe habitats in the Columbia Basin for irrigated agriculture (WDFW 1995; Franklin and Dyrness 1988). It has been estimated that approximately 60 percent of the original shrub steppe habitat in Washington has been converted, primarily for agricultural uses (Dobler 1994). While at much reduced levels, shrub steppe habitats within the Columbia Basin continue to be converted for both dryland and irrigated crop production. In addition, the U.S. Bureau of Reclamation retains options for further development of the Columbia Basin Irrigation Project in central Washington (USDI 1998). Major portions of Washington's shrub steppe ecosystem are considered among the least protected areas in the state (Cassidy 1997).

Large areas of privately owned lands in Douglas County are currently withdrawn from crop production and planted to native and non-native cover under the federal Conservation Reserve Program (CRP), established in 1985 (USDA 1998). Lands under the CRP are very important to the northern subpopulation of the Columbia Basin DPS (M. Schroeder, pers. comm., 1999). These areas, some of which have been set aside since the late 1980s, can provide the essential grass and shrub cover requirements of greater sage-grouse on lands previously used for agriculture. The juxtaposition of CRP lands with the remaining areas of native shrub steppe

habitats and crop lands may further increase the value of these habitat patches for greater sage-grouse (M. Schroeder, pers. comm., 1999). A number of CRP contracts in Washington have expired since 2002. New contracts completed in 1998 for Douglas County increased the acreage of CRP lands potentially available for use by greater sage-grouse. However, contracts extend for just 10 years and new standards for CRP lands will be implemented that may require replanting of significant acreage under existing contracts (USDA 1998; M. Schroeder, pers. comm., 1999). Presently, it is unclear what effects these changes have had, or will have, on the northern subpopulation of the Columbia Basin DPS.

In 1991, the Army expanded the YTC along its northern boundary by approximately 24,000 ha (60,000 ac) to form its present configuration and size of approximately 130,000 ha (325,000 ac). One of the primary justifications for expansion of the installation was to reduce impacts to heavily used areas by allowing rotational training exercises and rehabilitation of impacted sites (U.S. Department of Defense (DOD) 1989). In 1994, the Army restationed mechanized and armored combat forces to Fort Lewis in western Washington (DOD 1994). This action was undertaken to accommodate brigade-level maneuver exercises and may result in an increase in overall training activity and associated impacts at the YTC. Large-scale training exercises at the YTC are scheduled to occur at 18 to 24 month intervals and may involve over 10,000 troops and 1,000 tracked and wheeled vehicles. Small-scale training exercises are also conducted annually at the YTC by other United States' (e.g., Washington National Guard) and allied military units (DOD 1989; Livingston 1998).

In the fall of 1995, the Army conducted its first large-scale training exercise at the YTC following the restationing action. Analysis of the impacts from this exercise indicated that over 9 percent of the sagebrush plants within the greater sage-grouse protection areas experienced major structural damage. In addition, modeling exercises indicated that sagebrush cover would decline due to similar training scenarios if conducted on a biannual basis (Cadwell et al. 1996). Analyses of the potential impacts to other shrub steppe components that may be important to greater sage-grouse at the YTC (e.g., grass, forb, and insect quality and abundance), or those associated with the smaller, ongoing training activities, are not currently available. However, it has been suggested that native vegetation on impacted sites with limited soil disturbance will recover following large-scale maneuver exercises (Cadwell et al. 1996). In addition, the YTC conducts aggressive revegetation efforts for sagebrush and native grasses within the greater sage-grouse protection areas (Livingston 1998) and has eliminated season-long grazing on the installation (DOD 1996). Evaluation of the quality or quantity of naturally recovered areas and the efficacy of revegetation efforts is currently not available.

Natural and human-caused fire is a significant threat to greater sage-grouse throughout the Columbia Basin because, at increased frequencies, it can remove sagebrush from the vegetation assemblage (USDI 1994; WDFW 1995). Sagebrush is easily killed by fire (Daubenmire 1988) and, in the absence of a sufficient seed source, may not readily reinvade sites where it has been removed. Fire may be especially damaging at the YTC where military training activities provide multiple ignition sources, vegetative cover is relatively continuous, and invasive species such as cheatgrass (*Bromus tectorum*) and knapweed (*Centauria* spp) may provide fine fuels that can carry a fire. The Army considered fire management and control in its planning efforts for the

restationing action (DOD 1996), and the YTC has since developed a detailed fire management plan (DOD 1998). However, the potential for relatively large range fires to occur at the YTC remains. In 1996, over 25,000 ha (60,000 ac) of shrub steppe habitat, much of it currently and potentially used by greater sage-grouse, was burned as a result of training activities. A fire of this magnitude within the identified greater sage-grouse protection areas would jeopardize the species' persistence at the installation (Livingston 1998).

B. Over-utilization for commercial, recreational, scientific, or educational purposes. Recent scientific investigations in Washington have resulted in some mortality of greater sage-grouse. However, the level of mortality incurred is not likely to significantly influence the viability of the Columbia Basin DPS (M. Schroeder, pers. comm., 1999; M. Pounds, pers. comm., 1999).

The northern subpopulation of the Columbia Basin DPS occurs primarily on private lands and is not subject to extensive viewing by the general public or other recreational activities (M. Schroeder, pers. comm., 1999). The YTC closely manages recreation and sage grouse viewing by the general public using the installation, and these activities are not believed to be significant to the well-being of the southern subpopulation of the Columbia Basin DPS (M. Pounds, pers. comm., 1999).

The Columbia Basin DPS has not been subject to hunting since 1987 (WDFW 1995).

C. Disease or predation. There are apparently no documented severe episodes of disease or predation that have played a significant role in the broad-scale population declines and range reduction of greater sage-grouse. However, local populations of greater sage-grouse are subject to a number of mortality factors related to disease and predation (WDFW 1995). In addition, in 2003 the death of greater sage-grouse due to the recently introduced West Nile Virus was confirmed in Wyoming, Montana, and Alberta, Canada (Stinson et al. 2004). Episodes of existing or newly introduced diseases or altered predation patterns may play an important role in the dynamics of small and isolated populations, and increase the risk of their extirpation (see threat factor 'E', below).

D. Inadequacy of existing regulatory mechanisms. Revegetation standards under the CRP may promote the improvement of habitat conditions for the northern subpopulation of the Columbia Basin DPS, and the CRP restricts livestock grazing on contract lands except under extraordinary circumstances. However, these measures are not specifically promulgated for the protection of greater sage-grouse, and there are few other mechanisms that regulate grazing practices or the conversion of native habitats on privately owned lands.

We are currently assisting with development of a voluntary, county-wide Habitat Conservation Plan (HCP) for private agricultural interests in central Washington (Foster Creek Conservation District, Douglas County). When completed, the HCP will include measures to protect the northern subpopulation of the Columbia Basin DPS. However, the Act does not provide regulatory protections for unlisted species during development of HCPs (USDI 1996).

Some illegal or accidental shooting of greater sage-grouse may occur in Washington in

association with hunting seasons for other upland game species. However, the state hunting moratorium and hunting regulations implemented by the Army at the YTC appear to be sufficient to control this form of mortality, and it is not likely to significantly influence the viability of the Columbia Basin DPS (M. Schroeder, pers. comm., 1999; M. Pounds, pers. comm., 1999).

The Army implements a number of regulations at the YTC to promote environmental protection of the installation's natural resources. However, various impacts to the habitats important to greater sage-grouse occur, and are primarily the result of training-related fire and direct damage to vegetation communities from training maneuvers (see threat factor 'A', above).

E. Other natural or human-caused factors affecting continued existence. The fragmented, isolated nature of the Columbia Basin DPS is a concern for conservation of the taxon within the Columbia Basin ecosystem. A preliminary viability analysis conducted by the WSGWG (1998) indicates that neither subpopulation is likely viable over the long term (approximately 100 years). In addition to the relatively large-scale impacts on native shrub steppe habitats (above), other naturally occurring impacts and human influences of lesser magnitude may pose threats to the Columbia Basin's isolated subpopulations. Potential risks include direct impacts to individuals from inclement weather conditions, altered predator demographics or behavior, agricultural practices (e.g., cultivation, harvest, etc.), vehicle collisions, pest control measures, scientific investigations, and military training (e.g., smoke obscurant and live-fire exercises, etc.). Impacts may also result from indirect disturbance of the subpopulations caused by agricultural and grazing activities, transportation corridors, recreation, and military training events (over-flights, troop movements, etc.). Small, isolated populations may also be at greater risk to the effects of inbreeding (Benedict et al. 2001; Oyler-McCance et al. in litt. 2001). Although it is unlikely that any one of these factors have played a significant role in the population declines and range reductions of greater sage-grouse, these combined influences may now play an important role in the dynamics of the relatively small and isolated subpopulations that make up the Columbia Basin DPS.

CONSERVATION MEASURES PLANNED OR IMPLEMENTED

In 1992, the Service entered into a voluntary Candidate Conservation Agreement with the Army and WDFW for greater sage-grouse occurring at the YTC. The agreement expired on April 30, 2000. Pursuant to Army regulations, the YTC has developed and is currently implementing a species conservation plan for greater sage-grouse that occur at the installation (USDD 2002). An informal Washington Sage Grouse Working Group (WSGWG) has met several times since 1999. Current participants in the WSGWG include various federal and state resource agencies (including Service representation), Native American tribes, non-governmental organizations, and individual stakeholders. The group plans to develop a more formal Memorandum of Agreement among its members, and to prioritize and pursue appropriate near-term (~5 years) and longer term conservation measures that could be undertaken for greater sage-grouse in the state. The WSGWG may also consider development of an updated Candidate Conservation Agreement with the Service for the Columbia Basin DPS of greater sage-grouse as other conservation planning efforts progress and workload commitments allow.

The WDFW recently completed a state recovery plan for greater sage-grouse (Stinson et al. 2004). The recovery plan outlines various strategies to increase the number and distribution of greater sage-grouse throughout the species' historic range in Washington. As part of the WDFW's broader recovery efforts, 25 greater sage-grouse from populations in Nevada were trapped and translocated to the YTC in March, 2004. This initial augmentation effort is being closely monitored by YTC and WDFW biologists, and adaptive management measures will be implemented based on any new information that is gathered from this work (C. Leingang, YTC, pers. comm., 2004)

The Yakama Nation, in cooperation with the YTC, recently completed a resource inventory of tribal lands as part of a broader study to investigate the feasibility of re-establishing a population of greater sage-grouse at the reservation. The tribe is also actively participating with other WSGWG members in the ongoing reintroduction and augmentation planning efforts in the state.

We are currently assisting with development of a county-wide Habitat Conservation Plan (HCP) for private agricultural lands in central Washington (Foster Creek Conservation District, Douglas County). When completed, this HCP will likely include measures to protect the northern subpopulation of the Columbia Basin DPS.

The Western Association of Fish and Wildlife Agencies (WAFWA) recently completed a report entitled Conservation Assessment of Greater Sage-Grouse and Sagebrush Habitats (Connelly et al. 2004). WAFWA's conservation assessment is a range-wide examination of the current status and trends of greater sage-grouse populations and sagebrush-steppe habitat. The information contained in the report, as well as all other available information on the greater sage-grouse and its habitats, will be reviewed by the Service to determine whether a proposal to list this species throughout its historic range is warranted under the Act. The decision to conduct a range wide status review was the result of a positive 90-day petition finding made by the Service, which was announced in April 2004. WAFWA's range-wide conservation assessment for the species has not yet been reviewed with regard to this assessment addressing the Columbia Basin DPS of greater sage-grouse.

As a result of the WAFWA conservation assessment, states, the Bureau of Land Management, and others entities are continuing to develop conservation strategies for the sage grouse in Washington.

SUMMARY OF THREATS

The Columbia Basin discrete population segment continues to be threatened by declining habitats, training exercises and management at YTC, grazing of shrub steppe habitats, fire, and ongoing fragmentation and isolation of populations.

For species that are being removed from candidate status:

___Is the removal based in whole or in part on one or more individual conservation efforts that you determined met the standards in the Policy for Evaluation of Conservation Efforts When Making Listing Decisions (PECE)?

RECOMMENDED CONSERVATION MEASURES

Continue to work with Department of Defense, tribes, state agencies, Bureau of Land Management, and Landowners to maintain and develop shrub steppe habitats.

Continue reintroduction efforts as needed to support isolated populations.

LISTING PRIORITY

THREAT			
Magnitude	Immediacy	Taxonomy	Priority
High	Imminent	Monotypic genus	1
		Species	2
		Subspecies/population	3
	Non-imminent	Monotypic genus	4
		Species	5
		Subspecies/population	***6**
Moderate to Low	Imminent	Monotypic genus	7
		Species	8
		Subspecies/population	9
	Non-imminent	Monotypic genus	10
		Species	11
		Subspecies/population	12

Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed? Yes.

Rationale for listing priority number:

Magnitude: The abundance of greater sage-grouse within the Columbia Basin DPS declined by approximately 30 percent between 2000 and 2001 (WDFW 2001). Of even greater concern was the estimated reduction in size of the larger subpopulation in Douglas and Grant Counties, Washington, which accounted for the majority of the decline (dropping from 684 in 2000 to 395 in 2001, or approximately 42 percent). The overall population estimate in 2001 of 730 individuals was the lowest ever recorded for the Columbia Basin DPS. While the total population rebounded slightly in 2002, totaling 1,059 individuals, it again declined by approximately 10% in 2003 and an additional 24% in 2004, with a current population estimate of 765 individuals in the spring breeding population. Since 1970, the estimated population lows for

the Columbia Basin DPS have occurred periodically over a 3- to 4-year period roughly at mid-decade (e.g., ‘75-‘78, ‘85-‘87, and ‘93-‘96) (cf WDFW 2001). Should this pattern in population abundance hold, we may expect additional declines in the Columbia Basin DPS over the next several years. Due to their small sizes, the greater sage-grouse subpopulations in Washington are currently not considered viable over the long-term, primarily due to genetic and demographic considerations (WDFW 2004). As such, we conclude that the magnitude of threat to the Columbia Basin DPS of greater sage-grouse remains high.

Imminence: Military training constitutes the primary threat to the southern subpopulation, while habitat conversion (primarily loss of CRP acreage) is the primary threat impacting the northern subpopulation. However, we conclude that threats related to military training are not imminent, based on the implementation of the Army’s conservation measures and considerably less-than-planned Army training activities occurring in Yakima and Kittitas Counties in recent years. We likewise conclude that the threat to the northern subpopulation from habitat conversion is not imminent, because much of the CRP acreage that could have expired was re-signed and total CRP acreage increased in 1998 in Douglas County. As such, we conclude that threats to the Columbia Basin DPS of greater sage-grouse remain non-imminent.

Rationale for Change in Listing Priority Number (insert if appropriate)

Yes Have you promptly reviewed all of the information received regarding the species for the purpose of determining whether emergency listing is needed?

Is Emergency Listing Warranted? No Emergency listing is not currently warranted because, while the magnitude of threat to the Columbia Basin DPS remains high, the primary threats are not imminent and, if the population should decline further, the decline would likely occur gradually and over several years. n/a

DESCRIPTION OF MONITORING

The WDFW and YTC conduct annual surveys (lek counts and lek searches) to monitor the size, distribution, and status of the greater sage grouse subpopulations in Washington. Planning efforts for these surveys, the survey results, and proposed management activities are coordinated informally among WSGWG members. In addition, the WDFW and YTC develop project completion reports summarizing their annual survey and management efforts, which are made available to interested parties. The WSGWG also meets roughly on an annual basis to share information concerning other ongoing efforts conducted by the group’s members. Finally, the WSGWG members regularly share information concerning relevant literature and data sources that they become aware of from throughout the species’ historic range.

COORDINATION WITH STATES
Indicate which State(s) (within the range of the species) provided information or comments on the species or latest species assessment: Washington and Oregon

The greater sage-grouse is also a species of greatest concern under Washington's Comprehensive Wildlife Conservation Strategy (WDFW 2005). The strategy is a non-regulatory statewide approach to conservation and fulfills a requirement for access to two new Federal grant programs. The draft strategy describes basic biology and distribution, general and specific problems facing the species, and general conservation strategies for the species. It also identifies specific conservation actions for the species. Development of the strategy has proceeded on a parallel track with completion of ecoregional assessments for nine ecoregions in Washington. For each ecoregion, WDFW will complete Wildlife Action Plans that will include species-specific proposed conservation actions. The Wildlife Actions Plans are anticipated to be completed in 2008. However, it is unknown what actions will be proposed, or when such actions would be implemented.

Indicate which State(s) did not provide any information or comments: n/a

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Reference Categories

[1]Peer-reviewed original research based on data.
[2]Peer-reviewed secondary research derived.
[3]Gray research based on data.
[4]Gray literature based on literature analysis.
[5]Other.

APPROVAL/CONCURRENCE: Lead Regions must obtain written concurrence from all other Regions within the range of the species before recommending changes, including elevations or removals from candidate status and listing priority changes; the Regional Director must approve all such recommendations. The Director must concur on all resubmitted 12-month petition findings, additions or removal of species from candidate status, and listing priority changes.

Approve: _____
Regional Director, Fish and Wildlife Service Date

Concur: Kenneth Stansell November 27, 2007
Acting Director, U.S. Fish and Wildlife Service Date

Do not concur: _____
Director, Fish and Wildlife Service Date

Director's Remarks:

Date of annual review:
Conducted by: