

STATUS REPORT ON
Haplopappus macronema var. linearis
IN BRIDGER-TETON NATIONAL FOREST

Prepared for Bridger-Teton National Forest

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I. INTRODUCTION

Haplopappus macronema var. linearis (narrowleaf goldenweed) is listed as a Sensitive species by US Forest Service Region 4 (Joslin 1994). Although the full species has a wide range in western North America, variety linearis is restricted to western Wyoming and southwestern Montana (Fertig et al. 1994). Prior to 1990, this taxon was known from only 2-3 historical records on Bridger-Teton National Forest (BTNF) and eight other sites in Wyoming (WYNDD records).

In 1994, BTNF contracted on a cost-share basis with The Nature Conservancy's Wyoming Natural Diversity Database (WYNDD) to conduct field surveys for Haplopappus macronema var. linearis on Forest lands. The objectives of this project were to collect information on the biology, distribution, habitat use, population size, and potential threats to this species to be used in guiding management decisions.

II. METHODS

Information on the habitat and distribution of Haplopappus macronema var. linearis was obtained from secondary sources, including WYNDD files and computer databases, Rocky Mountain Herbarium (RM) collections, the literature, and knowledgeable individuals. USGS topographic maps, geologic maps (Love and Christiansen 1985), and US Forest Service maps were used to identify areas of potential habitat for ground survey.

Field surveys were conducted by the author in mid August 1995 (survey routes and collection sites are indicated in Appendix B).

Data on biology, habitat, population size, and management needs were collected using WYNDD plant survey forms (Appendix C). Locations of occurrences were mapped on 7.5 minute USGS topographic maps. If populations were sufficiently large, voucher specimens were collected for deposit at the RM and the BTNF herbarium. Color slides were taken of H. macronema var. linearis plants and their habitat at each site. Information gathered in the field was entered into the computerized Element Occurrence database of WYNDD.

III. SPECIES INFORMATION

A. CLASSIFICATION

1. SCIENTIFIC NAME: Haplopappus macronema Gray var. linearis (Rydb.) Dorn (Dorn 1988, p. 295).

2. SYNONYMS:

Haplopappus macronema Gray
ssp. linearis H. M. Hall

Haplopappus macronema Gray
var. canescens (A. Nels.) Cronq.
Ericameria discoidea (Nutt.) Nesom
var. linearis (Rydb.) Nesom
Macronema lineare Rydb.
Macronema lineare Rydb.
var. canescens A. Nels. in Coult. & Nels.

3. COMMON NAME: Narrowleaf goldenweed.

4. FAMILY: Asteraceae or Compositae (sunflower family).

5. SIZE OF GENUS: As traditionally defined, the genus Haplopappus contains about 150 species divided equally between western North America and western South America (Cronquist 1994). Recently, a number of systematists have proposed dividing this heterogenous assemblage into as many as 11 different genera. Alternative treatments have placed H. macronema var. linearis in the genus Macronema (9 species) or Ericameria (27-39 species, depending on the author) (Nesom 1990; Anderson 1995). Dorn (1988) maintains this taxon in the genus Haplopappus with 18 other Wyoming species, acknowledging that the group will probably be split "but necessary studies have not been completed."

6. PHYLOGENETIC RELATIONSHIPS: Hall (1928) considered Haplopappus macronema to be most closely related to H. suffruticosus (Ericameria suffruticosa). Although it is also morphologically similar to Chrysothamnus parryi, Hall discounted a close relationship between these two taxa. Two varieties of H. macronema are currently recognized, differing primarily in growth form and leaf proportions (Cronquist 1994).

7. TAXONOMIC CONSIDERATIONS: Two distinctive growth forms of Haplopappus macronema var. linearis can be recognized in the field, and have been described as separate taxa in the past. Plants with green, glandular leaves are typical of the Gros Ventre River drainage and were originally described as Macronema lineare by Rydberg (1900). A second growth form with white-woolly leaves and few to no glands was named by Aven Nelson as variety canescens (Coulter and Nelson 1909). This "woolly morph" is the predominant phase in the Absaroka

Range (RM and WYNDD records). Plants combining woolly and glandular pubescence characters can be found at Yellowstone Lake and one site along South Fork Fish Creek on BTNF. Hall (1928) emphasized the presence of morphologically intermediate individuals in lumping both taxa under the name Haplopappus macronema ssp. linearis. Later authors used the name H. macronema var. canescens for both morphs (Cronquist 1955). Dorn (1988) revived the epithet linearis (as a variety) based on its nomenclatural priority over var. canescens.

The collection of additional material of the "green, glandular morph" on BTNF raises the question of whether these populations should be recognized as taxonomically distinct. To do so would require treating variety linearis as a subspecies and naming the two morphs as new varieties or treating both morphs as separate varieties equal in rank to var. macronema. Additional biosystematic research is needed, however, before taxonomic changes can be recommended.

B. PRESENT LEGAL OR OTHER FORMAL STATUS

1. NATIONAL:

a. LEGAL STATUS: Haplopappus macronema var. linearis is listed as Sensitive in US Forest Service Region 4 (Joslin 1994). Variety macronema is listed as Sensitive by US Forest Service Region 1 in Montana, but var. linearis does not currently have protective status (Lesica and Shelly 1991).

b. HERITAGE RANK: Ranked G4T2 in The Nature Conservancy's Natural Heritage Network system. As a species, Haplopappus macronema is considered "apparently secure", although it may be quite rare at the edge of its range. Variety linearis is considered "imperiled because of rarity or because of factors making it vulnerable to extinction rangewide" (Fertig 1996 a).

2. STATE:

a. LEGAL STATUS: None.

b. HERITAGE RANK: Variety linearis is ranked S2

in Wyoming where it is considered to be "imperiled because of rarity" (Fertig 1996 a). It is also ranked S2 in Montana, but is no longer tracked as a high priority species of concern (Heidel 1995).

C. DESCRIPTION

1. GENERAL NON-TECHNICAL DESCRIPTION: Haplopappus macronema var. linearis is a low shrub with mostly creeping, white-woolly or glandular-hairy, leafy stems 15-40 cm long (Figures 1-2). Leaves are entire, linear, 1-3 cm long, 1-2.5 mm wide, and white-woolly or greenish-glandular. Flower heads number one to a few per branch. Involucres are 8-15 mm high with glandular bracts arranged in a single row. Disk flowers are yellow and 8-11 mm long. Ray flowers are absent (Cronquist 1955, 1994; Fertig 1992; Fertig et al. 1994; Hartman et al. 1991; Mills and Fertig 1996).

2. TECHNICAL DESCRIPTION: Low, rounded, fragrant subshrub with numerous usually procumbent stems 15-40 cm long radiating from near the base. Twigs tough, leafy, densely white-tomentose, becoming glandular-puberulent under the heads. Leaves linear, 1-2.5 mm wide, 1-3 cm long, tomentose, loosely cottony-tomentose, or stipitate-glandular. Heads solitary or a few on each branch, turbinate or campanulate, strictly discoid, the flowers all tubular and perfect. Involucre 8-15 mm high, glandular-puberulent, the bracts not much imbricate, or the outer larger and more herbaceous. Flowers mostly 10-25, the corolla 8-11 mm long. Style appendages slender and elongate, 2-3 mm long. Achenes slender, evidently pubescent, 6-8.5 mm long. Pappus of whitish or sordid, somewhat unequal bristles (Hall 1928; Cronquist 1955, 1994; Hartman et al. 1991).

3. LOCAL FIELD CHARACTERS: This taxon can be recognized by its sprawling growth form, felt-like stem pubescence, slender green glandular or white-woolly leaves, and relatively large, rayless flower heads with a single row of involucre bracts. Glandular plants often have the aroma of freshly cut Christmas trees.

Two distinct growth forms can be recognized in the field in Wyoming. Specimens with non-woolly, green glandular herbage predominate in the Gros Ventre

River drainage in the northern Wind River Range.
Plants of the Absaroka Range and the Overthrust
Belt of southwest Wyoming have white-

Figure 1. Line drawing of Haplopappus macronema var. linearis.
Illustration by W. Fertig (Mills and Fertig 1996).

woolly leaves with sparse glands. Intermediate forms with glandular leaves and stems and less densely white-woolly pubescence are present in Yellowstone National Park and along South Fork Fish Creek. These intermediate plants are typically found in mixed populations with woolly or green, glandular individuals.

4. SIMILAR SPECIES: Chrysothamnus parryi and C. nauseosus have erect stems, smaller and more numerous flower heads, and involucre bracts in 5 vertical rows. Haplopappus suffruticosus has yellow ray flowers and glandular, non-woolly twigs (Dorn 1992; Fertig et al. 1994).

D. GEOGRAPHICAL DISTRIBUTION

1. RANGE: Haplopappus macronema var. linearis is a regional endemic of western Wyoming and southwestern Montana. In Wyoming, it is known from the southern Absaroka Mountains, Gros Ventre River drainage (northern Wind River Range), Yellowstone Plateau, and Overthrust Belt in Fremont, Lincoln, Park, and Teton counties (Figure 3). Montana populations are found in the Beaverhead, Big Hole, and upper Missouri river drainages of Beaverhead, Deer Lodge, Madison, Meagher, Powell, and Silver Bow counties (Lesica and Shelly 1991; Montana Natural Heritage Program records).

2. EXTANT SITES: This taxon is currently known from 14 extant occurrences in Wyoming, all of which have been discovered or relocated since 1981. Five populations were discovered on BTNF during general floristic surveys in 1990 (Hartman et al. 1991; Fertig et al. 1991; Fertig 1992). Each of these populations was relocated in 1995 and two additional populations were discovered. Based on 1995 surveys, five discrete occurrences are now recognized on BTNF (two of the previously known populations were found to be confluent with neighboring populations and are now being treated as a single occurrence).

Figure 2 (page 7). Photograph of Haplopappus macronema var. linearis on floodplain terrace approximately 0.15 miles north of Cottonwood Creek, Teton County, Wyoming (EO # 017). Plants exhibit traits of the "Green, glandular" morph and have large heads of yellow disk flowers (rays are not present). WYNDD photograph by W. Fertig, 13 August 1995.

Figure 3. Distribution of Haplopappus macronema var. linearis in Wyoming.

Eight Wyoming populations of Haplopappus macronema var. linearis are found in the southern Absaroka Range and the north side of Yellowstone Lake. An additional disjunct population was discovered in the badlands along the Bear River Divide by Charmaine Refsdal during a general floristic survey of southwest Wyoming in 1995. This discovery extends the known range of the taxon by approximately 135 miles to the south.

Exact locations of extant populations in Wyoming are listed in Table 1. More detailed information is provided in the Element Occurrence Records and maps in Appendix A.

3. HISTORICAL SITES: Several historical records reported in the literature (Rydberg 1900; Hall 1928) have not been relocated in recent years. Reports from the "Gros Ventre River" (Tweedy 557, NY), and "Teton Forest" (Brandege s.n., UC) are probably from BTNF lands, but are too vague to be accurately relocated. A more specific report from Pinyon Peak on BTNF has not been observed since 1928 (EO # 013). Other historical records include "Kingman's Pass (Williams, s.n., NY) and "Elephant Back" (Tweedy 722, NY) from Yellowstone National Park and "La Barge, Uinta County [now Lincoln Co.]" (Stevenson 191, US) from southwest Wyoming.

4. SITES WHERE PRESENT STATUS NOT KNOWN: Most of the occurrences from the southern Absaroka Range have not been resurveyed since the early to mid 1980s and their present status is poorly known. The Yellowstone Lake population has been revisited by Jennifer Whipple (Yellowstone NP botanist) and is still extant.

5. UNVERIFIED/UNDOCUMENTED REPORTS: None known.

6. AREAS SURVEYED BUT SPECIES NOT LOCATED: Surveys in 1995 focused on streamside terrace and badlands habitats in the Gros Ventre River, Fish Creek, Blackrock Creek, and Spread Creek drainages on BTNF. Some potential habitat was also investigated along the Green River in conjunction with a status survey for another BTNF Sensitive plant (Fertig 1996 b). No populations were located along the main stem of the Gros Ventre and Green rivers nor along Spread and Black Rock creeks.

Table 1. Location Information for Extant Populations of
Haplopappus macronema var. linearis in Wyoming.

1. Northern Wind River Range/Gros Ventre River Drainage

Occurrence # 005.

County: Teton.

Legal Description: T42N R111W S7 (W4 of SE4).

Latitude: 43° 36' 54" North.

Longitude: 110° 13' 05" West.

Elevation: 7950 ft (2425 m).

USGS 7.5' Quad: Burnt Mountain.

Location: Adjacent to Cottonwood Creek trail on west bank of Cottonwood Creek, ca 0.3 miles north of confluence with Sohare Creek.

Occurrence # 006.

County: Teton.

Legal Description: T42N R111W S21 (SE4 of SE4 of SE4), 24, 26 (N2 of NE4), 27 (S2 of NW4), 28 (NE4 of NE4 of NE4).

Latitude: 43° 34' 47" North (centrum).

Longitude: 110° 08' 00" West (centrum).

Elevation: 7800-8100 ft (2375-2470 m).

USGS 7.5' Quad: Burnt Mountain and Sheridan Pass.

Location: South bank of North Fish Creek, ca 0.75 miles northeast of confluence with Deer Creek.

Also on north bank of South Fork Fish Creek ca 0.8 miles east of confluence with North Fork and on north side of Purdy Creek, ca 0.75 miles north of confluence with South Fork Fish Creek.

Occurrence # 007.

County: Teton.

Legal Description: T41N R110W S8 (SE4 of SE4 of NW4, W4 of NE4 of NW4, and center).

Latitude: 43° 31' 54" North (centrum).

Longitude: 110° 04' 55" West (centrum).

Elevation: 8000 ft (2440 m).

USGS 7.5' Quad: Sheridan Pass.

Location: South Fork Fish Creek along north bank approximately midway between Devils Basin and Buck

creeks, ca 2 miles northeast of Burnt Ridge. Also near mouth of Buck Creek.

Occurrence # 016.

County: Fremont.

Legal Description: T41N R110W S23 (SE4 of SW4).

Latitude: 43° 29' 45" North.

Longitude: 110° 01' 23" West.

Elevation: 8320 ft. (2535 m).

USGS 7.5' Quad: Mosquito Lake.

Location: South Fork Fish Creek drainage, adjacent to jeep trail ca 3 road miles north-northwest of junction with Union Pass Road and adjacent to small pond on west side of South Fork Fish Creek just south of confluence with Lost Creek and Pelton Creek.

Occurrence # 017.

County: Teton.

Legal Description: T42N R112W S36 (SE4 of NE4).

Latitude: 43° 33' 50" North.

Longitude: 110° 14' 10" West.

Elevation: 7560 ft. (2300 m).

USGS 7.5' Quad: Burnt Mountain.

Location: Terrace ca 0.5 miles north of Cottonwood Creek, adjacent to Cottonwood Creek Road (FS

Road 30410) just after junction with Fish Creek Road (FS Road 30411), ca 3.5 air miles southeast of Upper Slide Lake.

Table 1 (continued).

2. Southern Absaroka Range

Occurrence # 001.
County: Fremont.
Legal Description: T44N R106W S3.
Latitude: 43° 48' 25" North.
Longitude: 109° 33' 15" West.
Elevation: 8000 ft (2440 m).
USGS 7.5' Quad: Snow Lake.
Location: Confluence of Frontier Creek and Wiggins Fork (in vicinity of Double Cabin).

Occurrence # 002.
County: Fremont.
Legal Description: T44N R105W S26-27, 34.
Latitude: 43° 44' 25" North.
Longitude: 109° 26' 10" West.
Elevation: 8400-8600 ft (2560-2620 m).
USGS 7.5' Quad: Castle Rock.
Location: Bear Creek, 2 miles east to southeast of Kent Mountain, in vicinity of Bear Basin, ca 18 air miles northeast of Dubois.

Occurrence # 003.
County: Fremont.
Legal Description: T44N R104W S26-27.
Latitude: 43° 44' 42" North.
Longitude: 109° 18' 30" West.
Elevation: 10,200 ft (3110 m).
USGS 7.5' Quad: East Fork Basin.
Location: Ca 6 air miles north-northeast of the East Fork Guard Station on ridge to east of the East Fork Wind River (on ridge north of Needle Creek).

Occurrence # 004.
County: Fremont.
Legal Description: T43N R104W S9-10.
Latitude: 43° 42' 25" North.
Longitude: 109° 19' 50" West.
Elevation: 9000-10,000 ft (2745-3050 m).
USGS 7.5' Quad: East Fork Basin.
Location: 2-3 air miles northeast of the East Fork Guard Station (probably on ridge between Sheep and Lake creeks).

Occurrence # 010.
County: Park.
Legal Description: T48N R106W S15, 21.

Latitude: 44° 07' 05" North.
Longitude: 109° 35' 07" West.
Elevation: 9900-10,300 ft (3015-3140 m).
USGS 7.5' Quad: Needle Mountain.
Location: Top of Boulder Ridge (ridge between the South Fork of the Shoshone River and Boulder Creek).

Occurrence # 012.
County: Fremont.
Legal Description: T007N R004W S3 (NE4).
Latitude: 43° 36' 57" North.
Longitude: 109° 13' 00" West.
Elevation: 10,000 ft. (3050 m).
USGS 7.5' Quad: Johnson Draw.
Location: Trail Ridge (ca 1 mile east of Crow Creek Basin and 5 miles north of Black Mountain).

Table 1 (continued).

Occurrence # 014.
County: Fremont.
Legal Description: T43N R109W S28.
Latitude: 43° 39' 45" North.
Longitude: 109° 56' 07" West.
Elevation: 8200 ft. (2500 m).
USGS 7.5' Quad: Kisinger Lakes.
Location: Ca 21 air miles northwest of Dubois in vicinity of Forest Service Road 513 (east of US Highway 26 between the Wind River and the West Fork of Long Creek, 1-1.5 miles north-northwest of the Tie Hack Historical Monument).

3. Yellowstone Plateau

Occurrence # 011.
County: Park (Yellowstone NP).
Legal Description: T53N R112W S21 (S2).
Latitude: 44° 33' 30" North.
Longitude: 110° 21' 47" West.
Elevation: 7750-7780 ft. (2360-2370 m).
USGS 7.5' Quad: Lake Butte.
Location: Mouth of Pelican Creek and north shore of Yellowstone Lake.

4. Overthrust Belt

Occurrence # 015.
County: Lincoln.
Legal Description: T20N R118W S23 (E2).
Latitude: 41° 41' 55" North.
Longitude: 110° 43' 13" West.
Elevation: 7280-7300 ft. (2220-2225 m).
USGS 7.5' Quad: Warfield Creek.
Location: Bear River Divide, ca 8.2 air miles southwest of Kemmerer (near head of South Fork Twin Creek).

E. HABITAT

1. ASSOCIATED VEGETATION: On BTNF, Haplopappus macronema var. linearis is found primarily on dry, clay-rich or cobblestone terraces above large streams (Figures 4-5). These sites may be dominated by communities of silver sagebrush (Artemisia cana), mountain big sagebrush-green rabbitbrush (Artemisia tridentata var. vaseyana-Chrysothamnus viscidiflorus) or mountain big sagebrush-Canby bluegrass (A. tridentata var. vaseyana-Poa secunda var. elongata). Small colonies of H. macronema var. linearis may also be found along the ecotone between terrace sagebrush stands and adjacent lodgepole pine (Pinus contorta var. latifolia) communities. Most of these colonies have low vegetative cover and are restricted to small clearings among the shrubs.

One small colony on BTNF (EO # 006) is found in a cushion plant-bunchgrass community on steep, south-facing whitish-clay slopes below a large sandstone outcrop. Several populations in the southern Absaroka Range have also been reported from barren slopes and ridges, including one site near timberline (EO # 003).

At least three occurrences in the southern Absaroka Range and along Yellowstone Lake are reported from sandy-gravel bars and shores. H. macronema var. linearis is conspicuously absent from similar sites in the Gros Ventre River drainage on BTNF. The species is also absent from riparian communities with high cover of willows or graminoids.

Montana populations are found primarily on lower mountain slopes, alluvial terraces, and glacial valleys (Montana Natural Heritage Program records).

2. FREQUENTLY ASSOCIATED SPECIES:

Antennaria umbrinella (Umbrella pussytoes)
Arenaria congesta (Ballhead sandwort)
Artemisia cana var. viscidula (Silver sagebrush)
Artemisia tridentata var. vaseyana (Mountain big sagebrush)
Aster ascendens (Long-leaved aster)
Astragalus alpinus (Alpine milkvetch)
Astragalus miser (Weedy milkvetch)
Bromus carinatus (California brome)

Campanula rotundifolia (Harebell)
Castilleja flava (Yellow paintbrush)
Chrysothamnus nauseosus (Rubber rabbitbrush)
Chrysothamnus viscidiflorus (Green rabbitbrush)
Collomia linearis (Narrowleaf collomia)
Cordylanthus ramosus (Bushy birdsbeak)
Cymopterus terebinthinus (Turpentine cymopterus)
Elymus elymoides [Sitanion hystrix] (Bottlebrush
squirreltail)
Elymus lanceolatus [Agropyron dasystachyum]
(Thickspike wheatgrass)
Epilobium suffruticosum (Shrubby willow-herb)
Eriogonum umbellatum (Sulfur buckwheat)
Festuca saximontana (Sheep fescue)
Galium boreale (Northern bedstraw)
Ipomopsis crebrifolia (Compact gilia)
Juncus balticus var. montanus (Baltic rush)
Koeleria macrantha (Prairie junegrass)
Linum lewisii (Wild blue flax)
Lupinus argenteus (Silvery lupine)
Machaeranthera canescens (Hoary aster)
Oryzopsis hymenoides (Indian ricegrass)
Oxytropis borealis [O. viscida] (Sticky crazyweed)
Perideridia montana (Gairdner's yampah)
Phlox hoodii (Hood's phlox)
Pinus contorta var. latifolia (Lodgepole pine)
Poa secunda var. elongata (Canby bluegrass)
Polygonum douglasii (Douglas' knotweed)
Potentilla gracilis (Slender cinquefoil)
Rosa sayi (Prickly rose)
Sedum lanceolatum (Lanceleaved stonecrop)
Stipa nelsonii (Nelson's needlegrass)

3. TOPOGRAPHY: Most Wyoming populations of Haplopappus macronema var. linearis are found on level streamside terraces or low slopes and ridges on all aspects (Figure 6). Terrace sites on BTNF are usually well above the current stream channel and are unlikely to be flooded.

Elevations of Wyoming occurrences range from 7280-10,300 feet (2220-3140 m).

Figure 4 (page 15). Habitat of Haplopappus macronema var. linearis on barren clay flats on terrace above South Fork Fish Creek, Teton County, Wyoming (EO # 016). Locally common on semi-barren flats in foreground, but absent from adjacent roadbed. WYNDD photograph by W. Fertig, 11 August 1995.

4. SOIL RELATIONSHIPS: Populations of Haplopappus macronema var. linearis on BTNF are found primarily on light-colored sandy clay or gray shale-clay barrens and floodplain terraces. These sites often have a high cover of gray-green foliose lichens. Soils in lodgepole pine-sagebrush ecotone sites may also have a high cover of needle duff. Roadside sites on BTNF may have a high proportion of river cobbles and gravel. Occasionally, populations are found on whitish clay slopes beneath outcrops of sandstone.

5. REGIONAL CLIMATE: In Wyoming, the average annual precipitation within the range of Haplopappus macronema var. linearis varies from 10 inches (254 mm) in the Overthrust Belt to 20 to 40 inches (508-1016 mm) in the Gros Ventre drainage, Yellowstone Plateau, and southern Absaroka Range (Martner 1986). Over most of this area peak precipitation occurs in January and May-June. Only about 20% of annual precipitation occurs during the flowering period of H. macronema var. linearis (Martner 1986). Mean annual temperature ranges from 32 to 36° F (0 to 2.2° C) in the Gros Ventre River Drainage and southern Absaroka Range to 38° F (3.3° C) in the Overthrust Belt. Mean maximum and minimum temperatures in January in the plant's range are 24 to 28° F (-4.4 to -2.2° C) and -4 to 2° F (-20 to -16.6° C). In July, mean maximum and minimum temperatures are 74 to 82° F (23.3 to 27.7° C) and 38 to 44° F (3.3 to 6.6° C) (Martner 1986).

6. LOCAL MICROCLIMATE: Many of the habitats occupied by Haplopappus macronema var. linearis are on sparsely vegetated soils that may be warmer and drier than adjacent sites.

F. POPULATION BIOLOGY AND DEMOGRAPHY

1. PHENOLOGY: In Wyoming, flowering occurs from mid July to mid September. Mature fruits have been observed from late July to late September (Fertig

Figure 5 (page 17). Habitat of Haplopappus macronema var. linearis on sandy-clay terrace on west side of South Fork Fish Creek, Teton County, WY (EO # 007). Plants locally common in bare patches among scattered clumps of mountain big sagebrush. WYNDD photograph by W. Fertig, 11 August 1995.

Figure 6. Topographic position of Haplopappus macronema var. linearis on the landscape. Top figure: plants restricted to level terraces upslope of the existing stream channel on north-facing slopes at the mountain big sagebrush-lodgepole pine ecotone (EO # 006, North Fork Fish Creek). Bottom figure: plants found on west-facing sandy-clay terrace above gravel bar and current stream channel in openings of mountain big sagebrush-shrubby cinquefoil vegetation (EO # 007, South Fork Fish Creek). Illustration by W. Fertig.

et al. 1994). Flowering appears to be staggered over the course of the growing season so that no more than 50% of all plants in a colony may be flowering at any one time. Observations in 1995 also suggest that the onset of flowering may be delayed in colonies found in shadier microsites.

2. POPULATION SIZE AND CONDITION: There are currently 5 extant populations of Haplopappus macronema var. linearis known on BTNF and a total of 14 extant occurrences in Wyoming. Populations on BTNF may consist of 1-4 discrete subpopulations restricted to small areas of suitable habitat. The total area occupied by this taxon on the Forest is estimated to be less than 25 acres. Demographic data from extant BTNF occurrences are summarized in Table 2.

Individual subpopulations on BTNF may contain 12-2000 plants. Colonies usually consist of a wide range of size classes, suggesting that a mix of different aged individuals is present. Plants are usually distributed in non-random clusters, although occasionally plants may be widely scattered and sparse. H. macronema var. linearis contributes very little to overall vegetative cover and is almost never dominant, even in its localized microhabitat.

The total population of this taxon on BTNF is estimated to be 3000-5100 individuals. Census data are lacking for all other known populations in Wyoming, so no accurate state-wide population estimate is available.

In Montana, this species is known from approximately 18 records, most of which have been discovered or relocated since 1992. Census data from 12 of these occurrences indicate a minimum population of 3750-4500 individuals (Montana Natural Heritage Program records). As in Wyoming, most of these populations are small in size and area (Lesica and Shelly 1991).

Three of the BTNF occurrences of H. macronema var. linearis have been known since 1990 and are believed to be stable (at least at present). Long-term trend data are not available for any of the other Wyoming occurrences with the exception of the Yellowstone Lake population (EO # 011), which has been known since 1885.

Table 2. Demographic Information for Surveyed Populations of Haplopappus macronema var. linearis on BTNF.

Occurrence # 005.

Area: 0.5 acres.

Number and Age of Plants: 18 flowering and vegetative individuals observed in area of ca 20 square feet along trail in 1995.

Density: Plants clustered in limited area.

Evidence of Reproduction: Plants observed in flower and bud.

Population Trend: Reported from the vicinity by Hartman et al. (1991), but no population data

available. Site appears to have been burned in the last decade, but it is unknown whether this population recolonized the area or was able to persist.

Occurrence # 006.

Area: 5-10 acres.

Number and Age of Plants: 132 flowering and vegetative plants observed or estimated in 4 small colonies along a two mile stretch of patchy habitat in 1995.

Density: Plants often clustered in small patches, but absent in adjacent areas of seemingly good

habitat. One colony, however, consisted of widely scattered individuals.

Evidence of Reproduction: Mixture of size classes observed, suggesting different ages and periods of seedling establishment.

Population Trend: One colony reported in vicinity by Hartman et al. (1991), but no population data

available. Long-term trend data are lacking.

Occurrence # 007.

Area: 6-10 acres.

Number and Age of Plants: Total population estimated at 2250-3400 flowering and vegetative individuals in 3 main colonies in 1995.

Density: Plants are arranged non-randomly in dense clusters. Individual clusters may have nearly continuous cover of this taxon.

Evidence of Reproduction: Plants observed in flower and bud.

Population Trend: Two additional subpopulations reported by Hartman et al. (1991) could not be

relocated in 1995. Long-term trend data are lacking, but short-term data suggest that this occurrence is stable.

Occurrence # 016.

Area: 3 acres.

Number and Age of Plants: 621 flowering and vegetative plants observed in one colony in 1995

census. Total population estimated at 1500.

Density: Plants tend to form broad mats and are usually clustered.
Evidence of Reproduction: A wide range of size classes observed, suggesting a variety of different age classes.
Population Trend: This occurrence was first discovered in 1995 and thus no trend data are available.

Occurrence # 017.

Area: 2 acres.

Number and Age of Plants: 26 flowering plants observed in a single, small roadside colony in 1995.

Density: Plants mostly clustered in a limited area.

Evidence of Reproduction: Plants observed in flower and fruit.

Population Trend: This occurrence was first discovered in 1995 and thus no trend data are available.

3. REPRODUCTIVE BIOLOGY:

- a. TYPE OF REPRODUCTION: This taxon reproduces primarily by seed. Individual clumps may also spread vegetatively, occasionally forming nearly continuous mats over a small area.
- b. POLLINATION BIOLOGY: Large yellow jackets and medium sized brown moths were observed pollinating flowers in one roadside population on BTNF.
- c. SEED DISPERSAL AND BIOLOGY: The fruits of Haplopappus macronema var. linearis have a feathery pappus of slender bristles that facilitates dispersal by the wind.

G. POPULATION ECOLOGY

1. GENERAL SUMMARY: Haplopappus macronema var. linearis occurs primarily in semi-barren openings on clay-rich or gravelly streamside terraces in communities dominated primarily by mountain big sagebrush, silver sagebrush, and bunchgrasses. Plants are typically found in dense clusters restricted to suitable microhabitats. Most colonies are extremely small in number and area. The affinity of this taxon for semi-barren floodplain terrace habitats suggests that it is an early to mid-seral species which may be replaced in habitats that become too crowded by shrubs over the course of succession.
2. COMPETITION: Most populations of Haplopappus macronema var. linearis occur in microhabitats with low vegetative cover. The taxon is usually absent from adjacent sites with high shrub or tree cover, suggesting that it is unable to become established or persist in sites with high competition for light and space. Occasionally, however, small colonies can be found in semi-shaded ecotonal areas between sagebrush and lodgepole pine communities. Long-term monitoring studies are needed to determine if these communities are merely remnants or are expanding.
3. HERBIVORY: Little evidence of foliar herbivory was observed in BTNF populations in 1995. The species is thought to be of low forage value (Hall 1928), although some studies in Montana suggest that it may be heavily browsed (C. Wambolt, personal communication in Lesica and Shelly 1991).

Herbivory of fruits and flowering heads by insects or rodents may have a negative impact on reproduction.

4. RESPONSE TO DISTURBANCE: This taxon may be dependent on low-level disturbances for the creation or maintenance of suitable microhabitats. Several small colonies have been observed along trails or roadsides on BTNF, suggesting that the plants are capable of withstanding some disturbance. Ironically, H. macronema var. linearis does not thrive on bare soils overturned by pocket gopher activity.

One BTNF population is also known from an area that appears to have been burned in the previous ten years. It is not known whether this small colony was able to survive the burn or became established afterwards.

5. HYBRIDIZATION: There is no evidence of hybridization between Haplopappus macronema var. linearis and other taxa in Wyoming.

H. LAND OWNERSHIP

1. US FOREST SERVICE: Five extant and at least one historical occurrence of Haplopappus macronema var. linearis are known from BTNF (Table 3). Six other Wyoming populations are found on lands managed by Shoshone National Forest (Mills and Fertig 1996). Five occurrences on USFS lands in Wyoming are within designated Wilderness Areas (Washakie and Teton Wilderness). This taxon also occurs on Beaverhead and Deer Lodge National Forests in Montana (Lesica and Shelly 1991; Montana Natural Heritage Program records).

2. BUREAU OF LAND MANAGEMENT: One Wyoming occurrence is found on lands in the BLM Rock Springs District (Kemmerer Resource Area). At least nine Montana populations are from lands managed by the BLM Butte District (Montana Natural Heritage Program records).

3. NATIONAL PARK SERVICE: A single extant Wyoming occurrence is found within Yellowstone National Park. At least two other historical records are known from the Park (Rydberg 1900; Hall 1928).

Table 3. Land Management Status of Known Occurrences of Haplopappus macronema var. linearis in Wyoming.

1. Bridger-Teton National Forest
 - A. Buffalo Ranger District
EO # 013 Pinyon Peak [Teton Wilderness].
 - B. Jackson Ranger District
EO # 005 Cottonwood Creek trail.
EO # 006 North Fork Fish Creek and Purdy Creek.
EO # 007 (in part) South Fork Fish Creek between Devils Basin and Buck creeks.
EO # 017 Cottonwood Creek road.
 - C. Pinedale Ranger District
EO # 007 (in part) South Fork Fish Creek between Devils Basin and Buck creeks.
EO # 016 South Fork Fish Creek near Lost Creek.
2. Shoshone National Forest
 - A. Wapiti Ranger District
EO # 010 Boulder Ridge [Washakie Wilderness].
 - B. Wind River Ranger District
EO # 001 Frontier Creek and Wiggins Fork.
EO # 002 Bear Creek [Washakie Wilderness].
EO # 003 Ridge north of Needle Creek [Washakie Wilderness].
EO # 004 Ridge between Sheep and Lake creeks [Washakie Wilderness].
EO # 014 West Fork Long Creek.
3. BLM Rock Springs District
 - A. Kemmerer Resource Area
EO # 015 Bear River Divide.
4. Yellowstone National Park
EO # 011 Mouth of Pelican Creek on Yellowstone Lake.
5. Wind River Indian Reservation
EO # 012 Trail Ridge.

4. OTHER: One Wyoming occurrence in the southern Absaroka Range is found within the Wind River Indian Reservation. Several Montana populations are found wholly or partially on private lands (Montana Natural Heritage Program records).

IV. ASSESSMENT AND MANAGEMENT RECOMMENDATIONS

A. POTENTIAL THREATS TO CURRENTLY KNOWN POPULATIONS: The restricted range of Haplopappus macronema var. linearis makes this species vulnerable to habitat degradation and loss. The following potential threats have been reported in the literature or were identified in 1995 surveys:

1. GRAZING: Several studies have suggested that grazing may have a negative impact on this taxon due to herbivory or trampling (Hartman et al. 1991; Lesica and Shelly 1991; Fertig 1992). Surveys in 1995, however, found little evidence of herbivory by cattle or wildlife on BTNF populations. Overall use of H. macronema var. linearis habitat by livestock appears to be low in most areas surveyed on BTNF (at least in late summer). Grazing intensity is higher in most Montana occurrences, but the impacts on survival and reproduction have not been fully documented (Montana Natural Heritage Program records).

2. RECREATION: Several BTNF populations are found along roadbeds or horse trails used primarily for recreational access to fishing and hunting areas. Some of these sites probably receive little use during the growing and flowering season, being used primarily for fall hunting access. Plants appear to be persisting at these sites because or despite of periodic disturbances. Evidence suggests that H. macronema var. linearis may be dependent on low level disturbances to maintain its semi-barren or sparsely vegetated habitat. The construction of new roads and trails, however, should be discouraged in occupied habitat to prevent inadvertent loss of habitat.

3. OTHER: Water development projects involving inundation of streamside terrace habitat is a potential threat in the Gros Ventre River drainage.

B. MANAGEMENT PRACTICES AND RESPONSE: No experimental data exist on the response of this taxon to most management actions. The plant may be able to recolonize or

persist in burned areas, although additional observations or experiments are needed for confirmation.

C. CONSERVATION RECOMMENDATIONS

1. RECOMMENDATIONS REGARDING PRESENT OR ANTICIPATED

ACTIVITIES: Haplopappus macronema var. linearis appears to be less threatened by human-induced activities than previously suspected. Current levels of grazing and recreational use in its habitat appear to be compatible and in some instances may help maintain habitat. Accelerated development or major changes in grazing use, however, may have unforeseen consequences and should be discouraged until experimental information on the response of this taxon can be gathered.

2. NOTIFICATION OF USFS PERSONNEL OF LOCATIONS ON BTNF LANDS: To prevent inadvertent impacts to known populations, all appropriate USFS personnel involved in planning and on-the-ground land management activities should be provided with location data for Haplopappus macronema var. linearis.

3. AREAS RECOMMENDED FOR PROTECTION: Colonies between the confluence of the North and South forks of Fish Creek and the confluence of Devils Basin Creek and South Fork Fish Creek (EOs 006 and 007) occur in undeveloped, relatively pristine riparian habitats of high value for wildlife habitat, watershed management, and recreation. This area should be considered for special management designation as a Special Botanical Area.

D. STATUS RECOMMENDATIONS: Haplopappus macronema var. linearis is currently designated as Sensitive in USFS Region 4 (Joslin 1994). Surveys in 1995 found that this taxon is apparently restricted to a relatively small area of BTNF and is not abundant. Nevertheless, threats to these populations were found to be minimal. Rangelwide, var. linearis is now known to be more widespread than once thought, and threats to its survival are low. Much additional unsurveyed habitat exists in northern and western Wyoming, suggesting that the taxon may be more widespread than currently suspected.

In the absence of significant threats or a downward population trend, it is unlikely that Haplopappus macronema var. linearis will trend towards endangerment

and subsequent listing as Threatened or Endangered under the Endangered Species Act. As long as current management continues, this taxon can be removed from the regional Sensitive list without jeopardizing its long-term survival. Ideally, however, examples of representative habitat should be formally recognized in special management areas and suitable management plans should be developed before it is delisted.

In light of recent discoveries in Wyoming and Montana, the Heritage Rank of var. linearis should be dropped from T2 to T3.

E. SUMMARY: Haplopappus macronema var. linearis is a regional endemic of northwestern Wyoming and southwestern Montana. Rangewide, the taxon is known from approximately 30-35 extant occurrences, most of which appear to be small and localized. In Wyoming, this plant is found in the northern Wind River Range (Gros Ventre River drainage), southern Absaroka Range, Yellowstone Plateau, and Overthrust Belt in Fremont, Lincoln, Park, and Teton counties. H. macronema var. linearis is found primarily in sparsely vegetated or semi-barren openings on clay or cobblestone terraces above large streams dominated by sagebrush-bunchgrass communities. Surveys on BTNF in 1995 found that most populations consist of one to several discrete subpopulations of 12-2000 often densely clustered individuals. These populations do not appear to be adversely impacted by current land uses on BTNF, including low level grazing and recreational activity. Due to the low degree of threat, Haplopappus macronema var. linearis is not in need of Sensitive species status as long as current management of its habitat continues.

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Appendix A.
Element Occurrence Records
and
Population Maps
for Haplopappus macronema var. linearis

Appendix B.
1995 Survey Routes

Appendix C.

WYNDD Special Plant Survey Form

Appendix D.

Slides