

FIELD INVESTIGATION OF CALAMAGROSTIS TWEEDYI,
A REGION 4 SENSITIVE SPECIES,
ON THE PAYETTE NATIONAL FOREST.

by

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ABSTRACT

A field investigation of *Calamagrostis tweedyi* (Cascade reedgrass) was carried out on the Payette National Forest (NF) and adjacent lands by the Idaho Department of Fish and Game's Natural Heritage Program in August 1988. Cascade reedgrass is a Region 4 Sensitive Species and a Category 2 Candidate for federal listing. Prior to 1988, Cascade reedgrass was known from two sites in Idaho: Warren Summit on the Payette NF and on BLM land along Elkhorn Creek in the Salmon River Canyon. The Elkhorn Creek site was determined to be a misidentification. Searches on the Payette NF revealed that Cascade reedgrass was distributed more-or-less continuously from 0.5 miles southwest of Warren Summit, north for about 6 miles to at least the Raines Creek Trailhead, with an isolated population on Smith Knob. It is restricted to the subalpine fir/beargrass habitat type. It is more abundant, in both fertile and vegetative stages, in early seral stands of this habitat type, such as the recently burned area north of Buck Saddle, where flowering stems occurred consistently throughout the stands. In midseral stands of lodgepole pine, Cascade reedgrass persists in a vegetative state, with flowering individuals only present in the vicinity of the few, localized, human-caused disturbances. No climax stands of this habitat type were observed. Suppression of stand-replacing wildfires appears to be the only management action that threatens the long-term viability of Cascade reedgrass in Idaho.

Studies in Washington have found Cascade reedgrass to be more common than previously thought and that it reacts positively to most human-caused disturbance in its habitat. The Washington Natural Heritage Program will soon recommend that the U.S. Fish and Wildlife Service no longer consider it as a candidate for federal listing as threatened or endangered. Due to its rarity in Idaho, it is recommended that Cascade reedgrass remain a Region 4 Sensitive Species for the Payette NF and that the Forest establish a long-term monitoring program to determine the effects of forest succession on population trends.

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INTRODUCTION

The National Forest Management Act and Forest Service policy require that Forest Service land be managed to maintain populations of all existing native animal and plant species at or above the minimum viable population level. A minimum viable population consists of the number of individuals, adequately distributed throughout their range, necessary to perpetuate the existence of the species in natural, genetically stable, self-sustaining populations.

The Forest Service, along with other Federal and State agencies, has recognized the need for special planning considerations in order to protect the flora and fauna on the lands in public ownership. Species recognized by the Forest Service as needing such considerations are those that (1) are designated under the Endangered Species Act as endangered or threatened, (2) are under consideration for such designation, or (3) appear on a regional Forest Service sensitive species list.

Calamagrostis tweedyi (Cascade reedgrass) is currently on the U.S. Fish and Wildlife Service notice of review list as a candidate for listing (Category C2) under the Endangered Species Act (U.S. Fish and Wildlife Service 1985). It is also on the USFS Region 1 Sensitive Species List (Lolo NF), USFS Region 4 Sensitive Species List (Payette NF), USFS Region 6 Sensitive Species List (Wenatchee NF), and Idaho BLM Sensitive Species List (Coeur d'Alene District).

A field investigation of Cascade reedgrass was conducted in August 1988, on the Payette NF by the Idaho Department of Fish and Game's Natural Heritage Program through the Cooperative Challenge Cost Share Program.

The primary objectives of this investigation were as follows:

- 1) Survey the two known Idaho populations of Calamagrostis tweedyi and search potential habitats on the Payette NF for new populations.
- 2) Characterize habitat conditions for known populations.
- 3) Assess population trends and threats to existing populations and make management recommendations to the forest based on these assessments.

Calamagrostis tweedyi (Scribner) Scribner

CURRENT STATUS USFWS Category 2 Candidate Species
USFS Region 1 Sensitive Species (Lolo NF)
USFS Region 4 Sensitive Species (Payette NF)
USFS Region 6 Sensitive Species (Wenatchee NF)

TAXONOMY

Family: Poaceae (Grass)

Common Name(s): Cascade reedgrass, Tweedy's reedgrass

Citation: Calamagrostis tweedyi (Scribner) Scribner in Vasey, Contr. U.S. Nat. Herb. 3:83. 1892.

Synonymy: Deyeuxia tweedyi Scribner Bull. Torrey Bot. Club 10:64. 1883.

The taxon was originally described by Lamson F. Scribner in 1883 and published as Deyeuxia tweedyi. Later (1892) Scribner realized Deyeuxia to be a synonym of Calamagrostis and the name of the taxon was changed to C. tweedyi.

Technical Description: Plants with short, stout rhizomes, (4) 6-15 dm tall, glabrous except the leaf blades mostly scabrous on the dorsal surface; ligules 6-15 mm long, irregularly erose-jagged, and often lacerate; blades of the culm leaves flat, (5) 7-13 mm broad, rarely over 12 cm long, those of the innovations (young shoots on rhizome) scarcely half as broad and up to 20 cm long; panicle 8-16 cm long, compact, but about 2 cm broad when pressed, continuous or interrupted below; glumes (4.5) 5.5-7 (9) mm long; lemma slightly shorter than the glumes, scaberulose, awned from near midlength; callus very lightly bearded with hairs less than 1 mm long; awn twisted, geniculate, exceeding the glumes by about 5 mm; rachilla prolonged 2-4 mm; strongly bearded; palea subequal to the lemma; anthers purplish, about (3) 4 mm long; lodicules 1-1.5 mm long (Hitchcock 1969).

Nontechnical Description: Cascade reedgrass is a rhizomatous perennial that stands from 4-15 dm tall. The few leaves of the stem are flat, from 5-13 mm broad and up to 12 cm long. The inflorescence is a compact panicle 8-16 cm long and 2 cm broad. The awn of each floret is sharply bent and exerted beyond the glume about 5 mm (Kennison and Taylor 1979). See Appendix 1 for a detailed line drawing of Cascade reedgrass.

Distinguishing Features and Similar Species: According to Hitchcock (1969) the genus Calamagrostis is distinctive from other genera in our area yet the species are often difficult to distinguish. This is due in large part to a high frequency of apomixis (selfing), which perpetuates aberrant plants of hybrid origin. Cascade reedgrass, however, is rather easy to distinguish from other members of the genus in Idaho by having broad, flat leaves and relatively long, geniculate awns and a sparsely and shortly bearded callus. In a vegetative state, stems are widely spaced

along the rhizome.

Pinegrass (*Calamagrostis rubescens*) is an associate of Cascade reedgrass on the Payette NF. It is easily distinguished by its numerous, narrow, densely arranged leaves and awns which exceed the glumes by no more than 1 mm. Callus bearding is short.

Bluejoint (*Calamagrostis canadensis*) is commonly found in communities adjacent to Cascade reedgrass, such as moist meadows, swales and as a riparian understory species in moist subalpine fir habitat types. It was not observed in the same stands as Cascade reedgrass. *C. canadensis* is easily distinguished by habitat and its long, densely bearded callus, short awn and densely rhizomatous habit.

DISTRIBUTION

Range: Three widely separated centers of distribution are known for Cascade reedgrass. The largest is in the Wenatchee Mountain region of Chelan and Kittitas Counties, Washington (Kennison and Taylor 1979). Most populations are on the Wenatchee NF, where it is locally abundant, and on private land owned by Plum Creek Timber Company in Kittitas County (Caruso 1988; John Gamon, Washington Natural Heritage Program, personal communication, 1988).

Another center is located in Montana, approximately seven miles west of St. Regis, on the Lolo NF. As in Washington, Cascade reedgrass is abundant there within a small geographical area (Stickney 1980; Steve Shelly, Montana Natural Heritage Program, personal communication, 1988). This site is within three miles of the Montana-Idaho border, but it is not yet known to occur in adjacent Idaho.

Prior to 1988, there were two known populations of Cascade reedgrass in Idaho. A population from Warren Summit was discovered on July 5, 1940, by Ray J. Davis of Idaho State University. It apparently was not seen again until 1987, when Duane Atwood of the U.S. Forest Service, relocated the Davis collection site around the undeveloped camps in Warren Summit. A second site on Elkhorn Creek in the Salmon River Canyon was reported by Heidel (1979) during a BLM rare plant survey. As discussed in the Conservation History section (below), I found this report to be a misidentification.

As a result of this Challenge Cost Share project, I found Cascade reedgrass to be distributed in a more-or-less continuous manor from 0.5 mile southwest of Warren Summit, north along the South Fork Salmon River-Warren Creek divide to at least the Raines Creek Trailhead, with an isolated population on Smith Knob (see Appendix 2 for maps of the known distribution of Cascade reedgrass in Idaho). I found no other populations in suitable-appearing habitat to the west of this divide (see Appendix 3 for maps of areas unsuccessfully searched for Cascade reedgrass).

Habitat and Associated Species: I found Cascade reedgrass to occur only in the subalpine fir/beargrass (*Abies lasiocarpa*/*Xerophyllum tenax*) habitat type (Steele et al. 1983). This habitat type is widespread along the broad ridge that parallels the South Fork Salmon River between Warren Summit and Raines Creek Trailhead. Elevations range from approximately 7000' at Warren Summit and Smith Knob to over 8000' near the Raines Creek Trailhead. Cascade reedgrass did not occur in adjacent stands of the subalpine fir/menziesia (*Menziesia ferruginea*) and subalpine fir/smooth woodrush (*Luzula hitchcockii*) habitat types and a steep, east-facing bald community dominated by squaw currant (*Ribes cereum*) and elk sedge (*Carex geyeri*).

Within the range of Cascade reedgrass, various seral stages of the subalpine fir/beargrass habitat type are present. The earliest successional stage occurs from Buck Saddle north to Raines Creek Trailhead, where a wildfire probably in the 1930's (Larry Swan, Fire Management Staff, Payette NF, 1988, personal communication) left the area devoid of large trees. Small lodgepole pine (*Pinus contorta*) trees occur in a few small pockets established naturally and through plantings. Much of the area is covered with a diverse assortment of herbaceous species, especially beargrass and elk sedge, and, to a lesser extent, shrubs. Cascade reedgrass occurs on the northerly aspects in this area and is absent from the driest slopes. It occurs in low, but consistent coverage throughout these nonforested stands in both a vegetative state and as scattered clones of flowering stems.

The rest of the range of Cascade reedgrass in Idaho is dominated by midseral stands of even-aged lodgepole pine. In the most advanced stages, subalpine fir is beginning to replace lodgepole pine as the dominant species. These stands probably resulted from the "Old Idaho Fire" in 1919, a 135,204 acre wildfire that burned almost all of the old Warren Ranger District (Larry Swan, Fire Management Staff, Payette NF, 1988, personal communication). Cascade reedgrass occurs in these stands only in a vegetative state as individual stems, widely scattered along the rhizome. Two to four leaves occur on these stems, which are 10 to 25 cm tall. It is easily identifiable in these stands as the graminoid with the widest leaves. Closure of the tree canopy appeared to reduce the abundance of Cascade reedgrass in forested stands. Since no climax stands of the subalpine fir/beargrass habitat type were seen, it is not known if it completely drops out of late seral and climax stands or persists in a vegetative state.

Various kinds of localized human-caused disturbance occurs within these forested areas, including the undeveloped camps in Warren Summit that have been bladed flat, an old jeep trail (Forest Trail 287) that is used by hikers, horseback riders, motorcycles, and ORVs, and a dirt road (Forest Road 355) from Warren Summit through Buck Saddle. In every case Cascade reedgrass reacts to this disturbance by forming dense clones on the edge of the disturbed area with 10 to over 50 flowering stems per clone.

The reaction of Cascade reedgrass to natural and human-caused disturbance observed in Idaho, is similar to that observed in Washington and Montana, where studies have revealed that it responds favorably to clear-cutting and burning (Stickney 1980; Caruso 1988).

Species associated with Cascade reedgrass in disturbed areas in Warren Summit include *Stipa*

occidentalis, *Trisetum spicatum*, *Phleum pratense*, *Bromus vulgaris*, *Danthonia intermedia*, *Dactylus glomerata*, *Elymus glaucus* var. *glaucus*. Other species occurring throughout its range in Idaho include *Phlox diffusa*, *Calamagrostis rubescens*, *Carex rossii*, *Carex concinnoides*, *Carex geyeri*, *Calamagrostis canadensis*, *Pinus contorta*, *Abies lasiocarpa*, *Picea engelmannii*, *Epilobium angustifolium*, *Potentilla glandulosa*, *Fragaria virginiana*, *Valeriana sitchensis*, *Symphoricarpos oreophilus*, *Vaccinium scoparium*, *Vaccinium globulare*, *Cladonia gracilis*, and *Arnica cordifolia*.

CONSERVATION STATUS

Conservation History: The rarity of Cascade reedgrass was recognized soon after the Endangered Species Act was enacted in 1973. It was initially recommended as a threatened species by the Smithsonian Institution (FR 40(127):27856). It was placed on the review list as a category 1 candidate by the U.S. Fish and Wildlife Service (FR 45(242):82493) in 1980, and on the review list as a category 2 candidate by the U.S. Fish and Wildlife Service in 1983 (FR 48(229):53646), and 1985 (FR 50(188):39526).

Steele (1977; 1981) evaluated the species in Idaho, based on the 1940 Davis and 1979 Heidel collections. From these he recommended a federal status of threatened.

Heidel (1979) conducted a rare plant survey of the Coeur d'Alene District BLM and reported a population of Cascade reedgrass along Elkhorn Creek, 1.5 miles south of the Salmon River. Due to this report, it was placed on the Idaho BLM Sensitive Species List. I visited the Elkhorn Creek site in 1988 and found this report to be a misidentification. I found an as yet unidentified grass "after first bend in Partridge Creek trail", but did not find Cascade reedgrass. This 2800 foot site occurs in the Douglas-fir/ninebark (*Physocarpus malvaceus*) habitat type, atypical of all other known Cascade reedgrass habitats.

Cascade reedgrass occurs on the Region 4 Sensitive Species List for the Payette National Forest. Duane Atwood, Regional Botanist for Region 4, relocated the 1940 Davis collection at Warren Summit in 1987. This Challenge Cost Share Project between the Payette Forest and Department of Fish and Game is the first concerted effort to determine the status of Cascade reedgrass in Idaho.

Ownership: All known Idaho populations of Cascade reedgrass occur on the McCall Ranger District, Payette NF.

Threats: At this time, the only human-caused threat to Cascade reedgrass in Idaho appears to be the suppression stand-replacing wildfires. As the subalpine fir/beargrass habitat type progresses toward a late seral stage, Cascade reedgrass becomes less common in the stands. No climax stands were observed, so it is not known if it completely drops out of stands at this stage.

Management Implications: Wildfire suppression by the Payette NF appears to be the only management action that conflicts with the long-term viability of Cascade reedgrass in Idaho. As

described above, it declines in abundance in late seral forested stands of the subalpine fir/beargrass habitat type. A disturbance regime that replaces the forested stands with nonforest communities, such as stand-replacing fires or clear-cutting, is necessary to perpetuate Cascade reedgrass populations. In the short-term, no management actions appear to threaten Cascade reedgrass.

ASSESSMENT AND RECOMMENDATIONS

Summary: In Idaho, Cascade reedgrass is known only from approximately six miles of the Warren Creek - South Fork Salmon River divide between Warren Summit and the Raines Creek Trailhead and an isolated population on Smith Knob. It occurs in a more-or-less continuous manner along this divide in the subalpine fir/beargrass habitat type. It is more abundant in early seral stands of this habitat type, such as the recently burned area north of Buck Saddle, where flowering stems occurred consistently throughout the stands. In midseral stands of lodgepole pine, Cascade reedgrass persists in a vegetative state, with flowering individuals only present in the vicinity of the few, localized, human-caused disturbances. No climax stands were observed. Wildfire suppression appears to be the only management action that threatens the long-term viability of Cascade reedgrass in Idaho.

Recommendations to U.S. Fish and Wildlife Service: Recent studies in the Wenatchee Mountains of Washington have revealed that Cascade reedgrass is more abundant than previously thought and responds positively to most disturbances, such as clear-cutting (Caruso 1988; John Gamon, Washington Natural Heritage Program, personal communication, 1988). Evidence from Montana (Stickney 1980) and Idaho (this report) support this conclusion. The Washington Natural Heritage Program will recommend to the Fish and Wildlife Service that Cascade reedgrass no longer be considered a candidate for federal listing and be downlisted to category 3c (John Gamon, Washington Natural Heritage Program, personal communication, 1988)

Recommendations to Payette National Forest: Although Cascade reedgrass is no longer considered a possible candidate for federal listing, I recommend that it remain on the Region 4 Sensitive Species list for the Payette NF due to its rarity in Idaho. It does not appear that management actions of the Payette NF will jeopardize Cascade reedgrass populations in Idaho in the short-term. Any actions that allow a closed canopy forest to develop, such as suppression of stand-replacing wildfires, appear to be the greatest threat to the long-term viability of the species in the state.

To gain a better understanding of the role of forest succession on the population trends of Cascade reedgrass in Idaho, long-term monitoring plots should be established along the Warren Creek-South Fork Salmon River divide. Research on successional relationships within the subalpine fir/beargrass habitat type was recently initiated by the Intermountain Research Station, with research being conducted by Mike Simpson, a graduate student from the University of Idaho. Mike indicated to me that he would be willing to place study plots in the area in 1989. The Payette NF should follow-up on this offer.

I searched a considerable area of the northern Payette NF (see Appendix III) for Cascade reedgrass during the course of this project, but was largely unsuccessful. Due to time limitations, I was unable to search the following areas in the vicinity of known populations that appear to be suitable habitat: (1) broad ridges of the Pony Meadows - Bear Creek Point area south of Warren Summit; (2) the major ridge systems between the lower South Fork Salmon River and Chamberlain Basin (Mosquito Ridge, Sheepeater Ridge, and Horse Heaven Ridge); and (3) the ridge between the Raines Creek Trailhead and Nelson Point. Further searches should be concentrated in these areas. Newly located populations should be documented and location information should be submitted to the Idaho Natural Heritage Program for entry into their permanent data base on sensitive species.

Recommendation to Idaho Panhandle National Forests: Populations of Cascade reedgrass are known to occur on the ridge systems around Newman Peak, within 3 miles of the Idaho-Montana border west of St. Regis, Montana. Suitable habitat may occur on adjacent areas of the St. Joe NF in the vicinity of Flattop Mountain. A search should be conducted along the crest of the Bitterroot Mountains in this area to determine whether Cascade reedgrass is present.

Recommendation to Bureau of Land Management: The 1979 Heidel collection of Cascade reedgrass along Elkhorn Creek on Coeur d'Alene District BLM land was a misidentification. I was unable, however, to positively identify the grass species there. It is now being looked at by experts. I also searched BLM land in the Marshall Mountain area (see Appendix 3) and found no populations. I recommend that it be taken off the BLM Sensitive Species List for Idaho.

REFERENCES

- Caruso, L.B. 1988. Biological evaluation for Calamagrostis tweedyi in the Dry Meadows Planning Area and the Jungle Ridge Timber Sale on the Naches Ranger District of the Wenatchee National Forest. Unpublished report on file at U.S. Fish and Wildlife Service, Boise Field Office, Boise, ID. 9 p.
- Heidel, B. 1979. Endangered and threatened plants in the northern Idaho BLM District. Unpublished report on file at the Bureau of Land Management, Coeur d'Alene District Office, Coeur d'Alene, ID. 100 p.
- Hitchcock, C.L. 1969. Calamagrostis tweedyi. Page 535 In: C.L. Hitchcock, A. Cronquist, M. Ownbey, and J.W. Thompson, Vascular Plants of the Pacific Northwest, Part 1. University of Washington Press, Seattle, WA.
- Kennison, J.A., and R.J. Taylor. 1979. Status report for Calamagrostis tweedyi. Unpublished report on file at U.S. Fish and Wildlife Service, Boise Field Office, Boise, ID. 9 p.
- Scribner, L.F. 1883. A list of grasses from Washington Territory. Bull. Torrey Bot. Club. 10:63-66.
- Scribner, L.F. 1892. Calamagrostis. Pages 1-89 In: G. Vasey, Monograph of the grasses of the United States and British America. Contr. U.S. Nat. Herb. Vol. 3.
- Steele, R. 1977. Calamagrostis tweedyi. Page 54 In: Rare and Endangered Plants Technical Committee, Endangered and threatened plants of Idaho. Bull No. 21. University of Idaho, Forest, Wildlife and Range Experiment Station, Moscow, ID.
- Steele, R. 1981. Calamagrostis tweedyi. Page 12 In: Rare and Endangered Plants Technical Committee, Vascular plant species of concern in Idaho. Bull No. 34. University of Idaho, Forest, Wildlife and Range Experiment Station, Moscow, ID.
- Steele, R., R.D. Pfister, R.A. Ryker, and J.A. Kittams. 1981. Forest habitat types of central Idaho. General Technical Report INT-114. USDA, Forest Service, Intermountain Research Station, Ogden, UT. 138 p.
- Stickney, P.F. 1980. Data base for post-fire succession, first 6 to 9 years, in Montana larch-fir forests. General Technical Report INT-62. USDA, Forest Service, Intermountain Research Station, Ogden, UT. 133 p.
- U.S. Fish and Wildlife Service. 1985. Endangered and threatened wildlife and plants; review of plant taxa for listing as endangered or threatened species; notice of review. Federal Register 50(188):39526-39585 (September 27, 1985).

APPENDIX 1

Line drawing of Calamagrostis tweedyi
(taken from Hitchcock 1969).

APPENDIX 2

Distribution of Calamagrostis tweedyi in Idaho.

- Map 1. Portion of the 1984 Payette National Forest map.
- Map 2. Portion of 1969 Pony Meadows 7.5' Quadrangle.
- Map 3. Portion of 1969 Pilot Peak 7.5' Quadrangle.
- Map 4. Portion of 1956 Warren 15' Quadrangle.

APPENDIX 3

Maps of areas unsuccessfully searched for
Calamagrostis tweedyi on the Payette
National Forest in 1988.

- Map 1. Portion of 1984 Payette National Forest map.
- Map 2. Portion of 1984 Payette National Forest map.

APPENDIX 4

Slides of Calamagrostis tweedyi and habitat.

1. Calamagrostis tweedyi culms and inflorescences.
2. Close-up of Calamagrostis tweedyi inflorescences.
3. Close-up of Calamagrostis tweedyi rhizomes.
4. Two Calamagrostis tweedyi stems approximately 1 m in length.
5. Calamagrostis tweedyi clone on edge of forest in Warren Summit.
6. Warren Summit - Calamagrostis tweedyi occurs in graminoid-dominated ecotone between forest and cleared camp.
7. Flowering Calamagrostis tweedyi clone on edge of Forest Trail 287, southwest of Warren Summit.
8. Flowering clone in middle of Forest Trail 287. Note recent ORV track through middle of clone.
9. Close-up of vegetative Calamagrostis tweedyi in midseral stand of Pinus contorta near Warren Summit.
10. Overview of understory of midseral Abies lasiocarpa / Xerophyllum tenax habitat type near Warren Summit. Note vegetative Calamagrostis tweedyi stems among Vaccinium scoparium.
11. Calamagrostis tweedyi clone with several flowering culms in burned area north of Buck Saddle. Associated with Carex geyeri and Xerophyllum tenax.