ELEMENT STEWARDSHIP ABSTRACT
for

*Taeniatherum caput-medusae*

Medusahead

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The Nature Conservancy
Element Stewardship Abstract
For *Taeniatherum caput-medusae*
(*Elymus caput-medusae,(T. asperum*)

## I. IDENTIFIERS

Common Name: Medusahead

General Description:
The following description is from Furbish (1953), Hitchcock (1971), Munz and Keck (1973), and Cronquist et al. (1977).

Taeniatherum caput-medusae is a slender annual grass. The culms are ascending from a branching base, decumbent to erect, and (1.5) 2.5-5 (6) dm tall. The sheaths are slightly inflated and glabrous, and the ligules are very short, 0.2-0.5 mm long. The blades are more or less involute, narrow, 1-2.5 mm broad, short, 3-6 cm long, glabrous to puberulent, with the margins sometimes ciliate, and the auricles very short and inconspicuous.

The spikes are very bristly, small, 1.5-4 cm long (excluding the long, spreading awns), and dense. Spikelets are in twos; the first a perfect floret, the second much reduced, sometimes obsolete. The glumes are 15-35 mm long, usually much shorter than the awns of the lemma, stiff, subulate, and awnlike throughout, connate at the base, usually glabrous and shiny below and scabrous apically. Lemmas are narrow-lanceolate, (5) 6-8 mm long, very scabrous throughout, prolonged into a long, flattened and divergent awn (2) 3-7 cm long. The lodicules are about 0.8 mm long, oblanceolate, and ciliate. The anthers are 0.6-1 mm long.

The awns are straight and compressed when green, becoming twisted and erratically spread upon drying, thus giving rise to the common name from its resemblance to the mythical Medusa's head. Plants green up later than associated annuals and bleach later to a very light color, facilitating its recognition.

## II. STEWARDSHIP SUMMARY

## III. NATURAL HISTORY

Habitat:
A winter annual native to the Mediterranean region of Eurasia, medusahead was introduced into the United States in the late 1880s and spread rapidly in the 1930s. The first known herbarium specimen was collected near Roseburg, Oregon, in 1887. Furbish (1953) describes the spread of medusahead in California.

Medusahead grows where extended periods of great cold are lacking. Soils with high clay content, well-developed profiles, and those receiving run-off from infested areas are most

susceptible to invasion (Dahl and Tisdale 1975). The species matures later than other annual grasses and may require clay soils for their high water-holding capacity (Young and Evans 1970). Well-drained soils and coarse-textured sands with poorly developed profiles are less likely to be utilized by T. caput-medusae. The species overlaps in range and local habitat with Bromus mollis and B. tectorum in California and Oregon (McKell et al. 1962a). Harris (1977) reports that T. caput-medusae is displacing cheat grass on more mesic sites.

Reproduction:
Medusahead germinates in the fall. Roots begin to grow immediately and continue to grow all winter. Seed dormancy is due to inhibitory substances in the awns of fresh seed which have been removed by early fall (Nelson and Wilson 1969). Laboratory experiments (Harris 1977) showed that germination may be delayed by dryness and cold temperatures but still occurs sooner than cheat grass and bluebunch wheatgrass. Germination rates increased with increases in temperature and water potential. Harris (1977) also found that speed of germination, percent germination, and winter root growth exceeded that of Bromus tectorum (cheat grass) and AGROPYRON SPICATUM (bluebunch wheatgrass), supplementing earlier studies by Hironaka (1961). In Idaho, it was found that seed viability increased from 12% to 78% from late June to early July and reached a maximum viability by the middle of July (Sharp et al. 1957). Germination rates of 98% have been reported (Murphy and Turner 1959). Germination may be observed within 8-10 hours of moistening, and primary root growth occurs rapidly to 18-20 cm before branching (Harris 1977).

Harris and Wilson (1970) found that medusahead effectively removed available soil water at depths where A. SPICATUM roots were growing. These characteristics confer an advantage in fall establishment and allows medusahead to compete successfully for soil moisture with B. tectorum and, especially, with A. SPICATUM, which is late germinating and slow growing (Harris 1977).

Seedling emergence and growth were favored in field treatments which included burial in pits and surface burial combined with subsequent soil movement (Evans and Young 1972). Also documented in Evans and Young's study were specific effects of these field microsites on micro-environmental variables important to germination/establishment and comparisons with controlled laboratory treatments.

Plant density after establishment may range from 500 plants per square foot on scablands to 2000 plants per square foot on valley bottom soils (Sharp et al. 1957). Established populations form stem mats 5-12.5 cm thick which decompose slowly. The dense litter cover enhances medusahead germination, may exclude cheat grass (Harris 1965, Evans and Young 1970), ties up soil nutrients, and contributes to fire danger in the summer (Hilken and Miller 1980).

T. caput-medusae has root development and anatomy suitable for later reproductive phenology and matures later than other annual species (Harris 1977). Sharp et al. (1957) found that medusahead reaches maturity two to three weeks later than cheat grass. Medusahead requires a cold treatment and possibly a light stimulus after seed germination for seed formation to occur. Medusahead sends up culms with seed heads in May (Lusk et al. 1961) and reaches full

flowering by mid-June, about the time that the root system has reached full development (Hironaka 1961). Young et al. (1970) found seasonal, seed source location, garden location, and yearly differences of as much as two to three weeks in the phenology of medusahead. The number of seeds per head ranges from 5.6 in drier areas to 8.7 in wetter ones (Sharp et al. 1957).

Long distance dispersal is primarily by travel in coats of livestock, especially sheep. Local dispersal from established patches is by wind and water (Furbish 1953).

Although a few reports indicate that medusahead is palatable in early spring before maturity (Lusk et al. 1961), most grazing animals rarely eat it unless under forced or fertilized grazing conditions. Livestock are often injured by its awns and seeds, and the seeds are least preferred by wild birds (Goebel and Berry 1976).

Medusahead threatens rangelands with sparse native plant communities, as well as more complex communities degraded by overgrazing, fire, or cultivation, particularly ARTEMISIA/AGROPYRON/POA-dominated communities (Dahl and Tisdale 1975). Its primary range includes areas with 25-50 cm of annual precipitation, although it has been noted in areas with up to 1 m of precipitation. In Oregon, 2.5 million acres are included within the boundary of known infestations; 750,000 acres in Idaho (Hironaka 1961); at least 120,000 acres in eastern Washington; 100,000 acres in northern California; as well as portions of northeastern California, northern Nevada, and western Utah.

This weed is a major problem on Nature Conservancy preserves in the interior valleys of Oregon (Lower Table Rock, Agate Desert, Round Table Butte, and Poverty Flat) and California where it crowds out native species by producing a thick thatch of highly siliceous plant matter.

Medusahead is a major problem on preserves in the interior valleys of Oregon and California.

## IV. CONDITION

## V. MANAGEMENT/MONITORING

Management Requirements:
Taeniatherum caput-medusae is an annual grass native to Eurasia. It is a threat to native grasses in rangelands with sparse native plant vegetation as well as in more complex communities degraded by disturbances (such as overgrazing) in Oregon, Idaho, California, northern Nevada, and western Utah. Controlled burning in early June eliminated this weed for several years. Heavy spring grazing by sheep during the green stage of medusahead has been reported to assist in its control. Maintaining good stands of perennial vegetation helps to prevent medusahead invasion, but restoration of most native vegetation without first removing this weed have not been successful. Atrazine can help to control medusahead, but this herbicide also eradicates some native grasses.

## VI. RESEARCH

Management Research Programs:
Nested plot frequency or percent cover could be used to monitor changes in medusahead as well as changes in the community in which it occurs. Population studies for detailed analysis of the effects of management activities can be done by mapping individuals.

The effects of burning are being monitored on several preserves in Oregon. Early results show a reduction in thatch but to date has not reduced frequency (Macdonald personal communication 1988). Recovery of areas taken out of grazing is being monitored at Lower Table Rock, Oregon.

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Research on the effects of controlled burning is being conducted in Oregon.

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In California, burns are being done on some of the preserves on which medusahead is a problem, but the effects on that species are not being monitored.

### PRESCRIBED BURNING

Furbish (1953) indicates that controlled burning in early June successfully controlled medusahead infestations in northern California. A satisfactory burn was obtained with average air temperatures of 60-70 F and relative humidities of 40-50%. Burning in late May and early June was chosen because medusahead seeds were immature while associated annuals had cured, thus promoting a light but intense fire to arrest seed development. These single burns resulted in nearly complete elimination of medusahead for the next several years observed, except in sheltered areas such as gullies.

Laboratory experiments exposing seeds of varying moisture content to three temperatures for varying durations were done to establish threshold values for seed damage (McKell et al. 1962a). Germination was reduced from 92% to 64% when seeds with 9.2% moisture content were exposed to 392 F for 90 seconds. When seed moisture content was increased to 15.4%

percent, germination was reduced to zero with this treatment. Field estimates of moisture content indicated that seed heads retain a higher moisture content than litter. Moisture content of seeds remained above 30% for approximately one month after stems, leaves, and associated vegetation had dried. The most effective burns were done in late afternoon when fires burned slowly and the seeds were in the 'soft-dough' stage.

## FLASH GRAZING

Heavy grazing of infested areas during the spring green stage can be done to assist in control of medusahead, but animals must be removed after the seed head forms to limit seed dispersal (Furbish 1953). Lusk et al. (1961) reported that spring grazing by sheep could reduce medusahead cover, especially in areas where medusahead litter had been burned, clipped, or previously grazed.

## PLANT COMPETITION/RESTORATION OF NATIVES

Maintaining good stands of perennial vegetation helps prevent medusahead invasion into native plant communities. Conversely, attempts to establish perennials without previously removing competition by annual grasses have been unsuccessful in the Intermountain Region (Torell et al. 1961, Turner et al. 1963, Harris 1965). One exception has been establishment of the native perennial bunchgrass, SITANION HYSTRIX, from broadcast seedings over undisturbed existing annual vegetation dominated by medusahead (Hironaka and Sindelar 1973). It should be noted that the original vegetation at the seeded sites included ARTEMISIA TRIDENTATA var. VASEYANA, AGROPYRON SPICATUM, and POA SANDBERGII. However, establishment of SITANION might allow for eventual restoration of other native perennials if it reduces the populations of competing annuals such as medusahead. Natural establishment of SITANION HYSTRIX in cheat grass and medusahead communities has been reported in Idaho by Hironaka and Tisdale (1963). Greenhouse competition studies between medusahead and SITANION performed by Hironaka and Sindelar (1975) suggest that the success of SITANION may be due to a higher rate of development in this species which allows it to store sufficient root reserves to withstand the summer drought period and to resume growth again when conditions become more favorable.

## CHEMICAL CONTROL

Fall applications of 1.12 kg/ha of the herbicide Atrazine have been used to control medusahead in ponderosa pine woodlands (Christensen et al. 1974). However, AGROPYRON SPICATUM and STIPA COLUMBIANA also decreased in abundance, while Bromus tectorum increased.

### Management Research Needs:

More research on the effects of burning, particularly timing, intensity, etc., is needed. More research on controlling medusahead by encouraging competition of native bunchgrasses should be done.

VII. ADDITIONAL TOPICS

VIII. INFORMATION SOURCES

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## IX. DOCUMENT PREPARATION & MAINTENANCE

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