

**WRITTEN FINDINGS OF THE
WASHINGTON STATE NOXIOUS WEED CONTROL BOARD
2018 Noxious Weed Proposal**

Scientific Name: *Bromus tectorum* L.

Synonyms: include *Anisantha tectorum* (L.) Nevski, *Bromus tectorum* L. var. *glabratus* Spenner, *Bromus tectorum* L. var. *hirsutus* Regel, *Bromus tectorum* L. var. *nudus* Klett & Richt.

Common Name: cheatgrass, downy brome, bronco grass, downy chess, drooping brome, June grass, wall brome, military grass, slender chess, six-weeks grass

Family: Poaceae

Legal Status: Proposed as a Class C noxious weed for 2018



Images: left, illustration of *Bromus tectorum*, image by USDA PLANTS Database, USDA NRCS PLANTS Database, Bugwood.org; right, maturing inflorescence of *B. tectorum*, image by Leslie J. Mehrhoff, University of Connecticut, Bugwood.org.

Due to the detailed scientific literature review available on *Bromus tectorum*, the information from the following document will serve as the primary source of information for the written findings:

Downy Brome (*Bromus tectorum*) and Japanese Brome (*Bromus japonicus*) Biology, Ecology, and Management Literature Review

http://mining.state.co.us/Programs/Coal/Documents/Downy_brome_and_Japanese_brome_literature_review_Colorado_DRMS_Dec_09.pdf

A brief plant description along with distribution information and additional links to information on *Bromus tectorum* are included in this document.

Description and Variation:

Bromus tectorum, cheatgrass is a tufted annual grass that is often tinged red when it is mature and has sharp florets with straight awns (DiTomaso and Healy 2007).

Overall habit:

Plants usually have hairy stems and leaves, though they can be almost glabrous. The hairs are soft, short to medium length, and mostly straight (Hitchcock et al. 1969). Plants turn a light tan color once they die.

Roots:

Bromus tectorum has a fibrous root system that typically concentrates in the upper 6 inches (15 cm) of soil (DiTomaso and Healy 2007). Seedlings have a few roots that reach about 11.8 inches (30 cm) deep while mature plants may have roots that grow to 3.3 feet (1 meter) or deeper in some locations (DiTomaso and Healy 2007).



Image: left, fibrous roots of *Bromus tectorum*, image by Leslie J. Mehrhoff, University of Connecticut, Bugwood.org; right, hairy stems and leaf bases of *Bromus tectorum*, image by K. George Beck and James Sebastian, Colorado State University, Bugwood.org.

Stems:

Stems grow 3.9 to 27.6 inches tall (10 to 70 cm) tall (Hitchcock et al. 1969).

Leaves:

Leaf sheaths are closed more than half their length and typically hairy, though sometimes nearly glabrous (DiTomaso and Healy 2007). Leaves do not have auricles. The ligules are lacerate, 1.2 to 3 (5) mm long (Hitchcock et al. 1969). The leaf blades are 1 to 6 mm wide and flat (Hitchcock et al. 1969, DiTomaso and Healy 2007).



Images: left, leaf blade detail showing leaf hairs, image by Bruce Ackley, The Ohio State University, Bugwood.org; center, lacerate leaf ligule, image by Tom Heutte, USDA Forest Service, Bugwood.org; right, lacerate leaf ligule of *Bromus tectorum*, image by Bruce Ackley, The Ohio State University, Bugwood.org.

Flowers:

The inflorescence structure is a slender-branched panicle, (3-) 6 to 22 cm long, often drooping to one side (Hitchcock et al. 1969, DiTomaso and Healy 2007). Spikelets are up to 2 cm long, contain 3 to 6 flowers (florets), and are slender with the widest point in the middle of the spikelet (Hitchcock et al. 1969). The spikelets are typically hairy, but some can be glabrous (smooth, without hairs) (Hitchcock et al. 1969).

The pair of glumes at the base of the spikelet are narrow and glabrous to villous (Hitchcock et al. 1969). The second glume is typically almost 1 cm long and 3 nerved, while the first glume is 1/2 to 2/3 as long and 1 nerved. Florets disarticulate (detach) above the glumes (DiTomaso and Healy 2007).

The floret's lemma is somewhat keeled, glabrous to villous, a bit longer than the second glume, teeth acuminate, 1-3 mm long. Attached between the two teeth is a straight to slightly bent awn, 10 to 18 mm long (Hitchcock et al. 1969, DiTomaso and Healy 2007). Florets have 3 stamens with anthers 0.5 to 0.7 mm long, typically included in the flower. Florets are mainly cleistogamous, self-fertilizing flowers that do not open (Hitchcock et al. 1969).



Images: left, awns of *Bromus tectorum* from between the two teeth at the tip of the lemmas, image by Steve Hurst, USDA NRCS PLANTS Database, Bugwood.org; right, labeled parts of old floret, image by D. Walters and C. Southwick, Table Grape Weed Disseminule ID, USDA APHIS ITP, Bugwood.org.



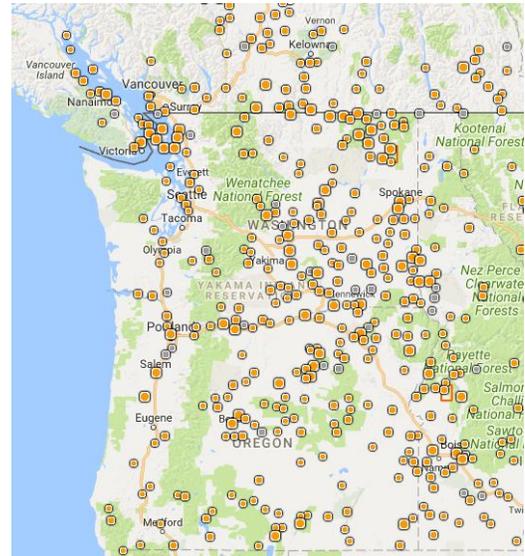
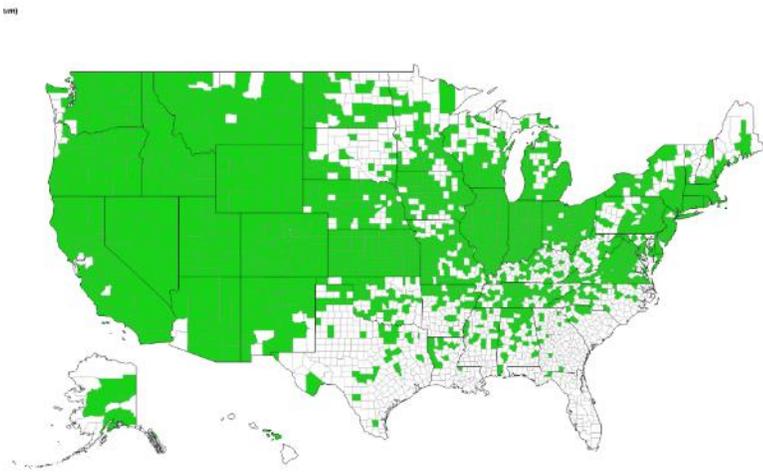
Image: left, inflorescences of *Bromus tectorum*, image by Leslie J. Mehrhoff, University of Connecticut, Bugwood.org; right, inflorescences with mature seed ready to disperse, image by K. George Beck and James Sebastian, Colorado State University, Bugwood.org.

Geographic Distribution:

According to the USDA GRIN database, (USDA ARS 2017), *Bromus tectorum* is native to parts of northern Africa, Asia and Europe. Specifically the database lists:

- Northern Africa: Algeria, Morocco, Egypt, and Tunisia; Canary Islands
- Asia: Kuwait, Saudi Arabia, Armenia, Azerbaijan, Georgia, Dagestan (Russian Federation), Ciscaucasia (Russian Federation), China, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan, Western Siberia, Afghanistan, Cyprus, Egypt, Iran, Iraq, Israel, Jordan, Lebanon, Syria, Turkey, India, and Pakistan
- Europe: Belarus, Moldova, Ukraine, Austria, Belgium, Czech Republic, Germany, Hungary, Netherlands, Poland, Slovakia, Switzerland, Denmark, Norway, Sweden, Albania, Bulgaria, Croatia, Greece, Italy, Romania, Serbia, Slovenia, France, Portugal, Spain

USDA GRIN database (USDA ARS 2017) and USDA PLANTS database (USDA ARS 2017) lists *Bromus tectorum* naturalized or adventive in South Africa, Australia, New Zealand, Argentina, Chile, Greenland, Canada, and the United States. EDDMapS (2017) lists *Bromus tectorum* naturalized in at least one county in every state in the United States, including Alaska and Hawaii.



Maps: left, county level presence/absence distribution information of *Bromus tectorum* in the United States by EDDMapS 2017; right, map of herbarium records of *B. tectorum* in Washington, Oregon, and southern British Columbia (orange dots), Consortium of Pacific Northwest Herbaria 2017.

Listings:

Bromus tectorum is listed as a Wyoming regulated weed, tolerance of 1,200 seeds per pound; on the Connecticut prohibited plant list; a Montana priority 3 regulated weed; a Colorado List C noxious weed (Colorado Department of Agriculture n.d., National Plant Board 2017).

Washington:

List of counties in Washington with the first herbarium collection (if it exists), followed by informal survey comments of county noxious weed control boards in 2017 (if any were provided).

- Adams: 1946 1.5 miles northeast of Macall on moist soil near water (WS: 162774); survey comments, *B. tectorum* is spread across the county. It is very dense on the east side of Adams County compared to the west side of the county. This is due to the east side being sage land / grazing land and the west side largely crop / produce fields.
- Asotin: 1922 sandy bar opposite Zindel on Grande Ronde (WS: 48961); survey comment, *B. tectorum* is throughout the county; a very rough and conservative total estimate of 248,000 acres or roughly 61% of the county's acres though its physical distribution is countywide.
- Benton: 1902 Prosser to Rattlesnake Hills, dry gravelly soil near railroad (WS: 2108); survey comments, *B. tectorum* likely covers 50% of all lands in Benton County. In Weed District #1, *B. tectorum* can be found on every acre. Most populations are limited to waste ground, along roadsides and canal banks. Very small amounts in cropped areas.
- Chelan: 1916 Wenatchee National Forest, along Skinny Creek, creek bank on a flat slope (USFS: 416462)
- Clallam: 1941 PLU: 6516; survey comments, *B. tectorum* found at several locations within Olympic National Park as well as the Dungeness Spit, not yet widespread.
- Clark: 1974 soil: sandy, dry; exposure: open (HPSU: 2033); survey comments, *B. tectorum* is sporadic along highways.
- Columbia: 1913, Blue Mountains (WS: 49388)
- Cowlitz 1978 4 mi. up Mt. Solo. (SRP: 15173)
- Douglas: 2008 Douglas Canyon, south-facing basalt rimrock slope, Douglas Creek riparian zone at base of slope (WTU 380944)
- Ferry: 1921 weed in alfalfa (WS: 36407)

- Franklin: 1899 (WS: 45579); survey comments, *B. tectorum* is very common throughout the county. It is distributed very evenly east to west north to south. In some parts of the county it is viewed as a desirable forage, especially in dryer years.
- Garfield: 1951 west of Pomeroy, in draw and on slopes, abundant (WS: 225451)
- Grant: 1937 upper Sonoran, in dry soil at Grand Coulee, Soap Lake (WTU: 290925)
- Grays Harbor: 1919 railroad grade (NY: 00664736)
- Island: 2004 Whidbey Island, Ebey's Landing State Park; along beach sandy-gravelly soil, in gravel (WTU 355867); survey comments, *B. tectorum* is widespread. Many agricultural fields in Island County have dense patches. Large infestations present in central Whidbey Island area. Ebey's prairie, Smith prairie vicinities.
- Jefferson: 2009 Northeast shore of Gibbs Lake, Quimper Peninsula, On floating logs near cabins (WTU 379318)
- King: 1933 (WTU: 22786)
- Kitsap: 1947 Winslow, Bainbridge Island, Sandy backbeach (WTU 294026)
- Kittitas: 1936, Ginkgo Petrified Forest Park, Dry east slope; sagebrush (WTU 220389); survey comments, *B. tectorum* is literally everywhere.
- Klickitat: 1912 Rattlesnake creek, on road near Miles' Farm (WS: 14838); survey comments, thousands of acres of *B. tectorum*.
- Lewis: 1925 herbarium collection on gravelly prairie (WS: 40785)
- Lincoln: 1933 (OSC: OSC37452); *B. tectorum* is county wide. Will fill open niches if no over-seeding occurs. Grazed in early spring prior to seed formation.
- Mason: 1933 gravelly prairie (WTU: 39639)
- Okanogan: 1934 rocky sagebrush land, Brewster (WTU: 29588); survey comments, *B. tectorum* is throughout the county, extensive infestations.
- Pacific: no herbarium records; *B. tectorum* has been increasing rapidly in Pacific County over the last few years. It has become quite common everywhere from overgrown front yards to public parks and roadsides.
- Pend Oreille: 1963 clay bank; exposure, W.; slope, 60°; soil, loam-clay mixture (EWU: 2199)
- Pierce: 1932 Longmire, Mount Rainier National Park, gravelly soil (WTU: 26109)
- San Juan: 1923 roadside near Station (WS: 64416)
- Skagit: 1930 meadow, recently established (WS: 64209)
- Skamania: 1925 Wind River, Deos' range, Columbia forest, common on older cuttings (OSC: ORE6049); *B. tectorum* widespread in southern part of county, unknown how much is on the forest.
- Snohomish: 1928 fields (RM: 115854)
- Spokane: 1896 (WS: 2692); there are thousands of acres of *B. tectorum* in the county.
- Stevens: 1949 sandy soil, open ponderosa pine forest (WS: 189020); survey comments, *B. tectorum* is very widespread in the county.
- Thurston: 1930 cultivated field near Tenino (WS: 64213)
- Wahkiakum
- Walla Walla: 1903 canyon below Walluwa (RM: 114686); survey comments, there are nearly as many acres of *B. tectorum* in the county as there are of wheat. In many areas of the county, cattle producers rely on cheat in the spring as a cattle forage.
- Whatcom: 1925 salt marsh (WS: 39379)
- Whitman: 1898 by Pullman, noted as a bad weed (WS: 45580); survey comments, probably have thousands of acres of *B. tectorum*, as the scab grounds definitely have it, but it is quickly being replaced with medusahead, so that number will probably be going down.
- Yakima: 1932, soil sandy, sagebrush, overgrazed (WS: 56358); survey comment: thousands of acres of *B. tectorum*

(Consortium of Pacific Northwest Herbaria 2017, WS Herbarium 2017)



Images: *Bromus tectorum* with drooping inflorescences, image by Leslie J. Mehrhoff, University of Connecticut, Bugwood.org; right, infestation of primarily dried *B. tectorum* plants, image by Bonnie Million, Bureau of Land Management, Bugwood.org.

Other Resources

Proceedings—Ecology and Management of Annual Rangelands:
https://www.fs.fed.us/rm/pubs_int/int_gtr313.pdf

USDA NRCS Plant Guide: Cheatgrass, *Bromus tectorum*:
https://plants.usda.gov/plantguide/pdf/pg_brte.pdf

A systematic review of cheatgrass (*Bromus tectorum*) control research
https://gallery.mailchimp.com/dba251c910508477ee857b17c/files/479be5b6-1cae-457d-9f84-b6e77e0f2083/May_Weed_Post_systematic_review_of_cheatgrass_control_literature.pdf?mc_cid=7c28ebdfc9&mc_eid=3d9c6cb0fb

Article referenced in previous link:

Monaco, T. A., J. M. Mangold, B. A. Meador, R. D. Meador, and C. S. Brown. 2017. Downy Brome Control and Impacts on Perennial Grass Abundance: A Systematic Review Spanning 64 Years. *Rangeland Ecology and Management*. 70 (3): 396-404.

<http://www.sciencedirect.com/science/article/pii/S1550742416300896>

References:

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<https://www.colorado.gov/pacific/agconservation/noxious-weed-species>

Consortium of Pacific Northwest Herbaria. Accessed August 2017 at <http://www.pnwherbaria.org/index.php>

DiTomaso J. M. and E. A. Healy. 2007. *Weeds of California and Other Western States*. Oakland, CA. University of California Division of Agriculture and Natural Resources.

EDDMapS. 2017. Early Detection & Distribution Mapping System. The University of Georgia - Center for Invasive Species and Ecosystem Health. Available online at <http://www.eddmaps.org/> accessed July 2017.

Hitchcock, C. L., A. Cronquist, and M. Ownbey. 1969. Vascular plants of the Pacific Northwest. Part 1: vascular cryptogams, gymnosperms, and monocotyledons. University of Washington Press, Seattle.

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WS Herbarium. 2017 Washington State University, Marion Ownbey Herbarium available at: <http://www.wsu.edu/~wsherb/> Accessed August, 2017.