



Meadow Knapweed

(*Centaurea x pratensis* Thuill.)

It is ironic, although not unique, that meadow knapweed was originally introduced as a potential forage species and is now considered a weed because of its low palatability to grazing animals. Its presence reduces usable forage production in pastures and grass hayfields. In Oregon, meadow knapweed is most abundant near Roseburg (Douglas County), where it was cultivated for winter forage prior to 1959.¹

Although it is leafier than other knapweeds and grazed more readily, both its palatability and nutritional value decline as plants mature. Despite its ability to regrow and produce seeds on defoliated plants, meadow knapweed does not tolerate continuous, excessive grazing. In addition to effects on forage

production, meadow knapweed is undesirable because of its persistence when it invades native plant communities.

Meadow knapweed is a fully fertile hybrid between black knapweed (*Centaurea nigra* L.) and brown knapweed (*C. jacea* L.), both of which are native to Europe and have been grown as ornamental garden plants. Brown knapweed was grown as a hay or forage crop (known in Quebec in the 1850s as bull clover) and also as a pollen source for honeybees. By the second half of the 19th Century, black knapweed was becoming a tenacious weed, spreading rapidly by seed.² Black knapweed was found in Pullman, Washington, in 1895, and near Portland from 1902 to 1916. The earliest records of meadow knap-

weed in the Pacific Northwest are from Multnomah and Lane counties, Oregon, between 1910 and 1920.

Today, the largest known populations grow in western Washington in Clark, Whatcom, Pierce, and Thurston counties, and on the east slope of the Cascade Mountains in Kittitas, Klickitat, and Skamania counties. The largest populations in Oregon grow in the western counties of Douglas, Josephine, and Jackson, extending north into the Willamette Valley.

Meadow knapweed appears to be another “weed on the move,” both geographically and genetically. West of the Cascade Mountains, populations have expanded exponentially in the past sev-

¹J. T. Howell. 1959. Distributional data on weedy thistles in western North America, Leaflets of Western Botany, 9:17-32.

²H. Groh. 1943. Canadian Weed Survey.



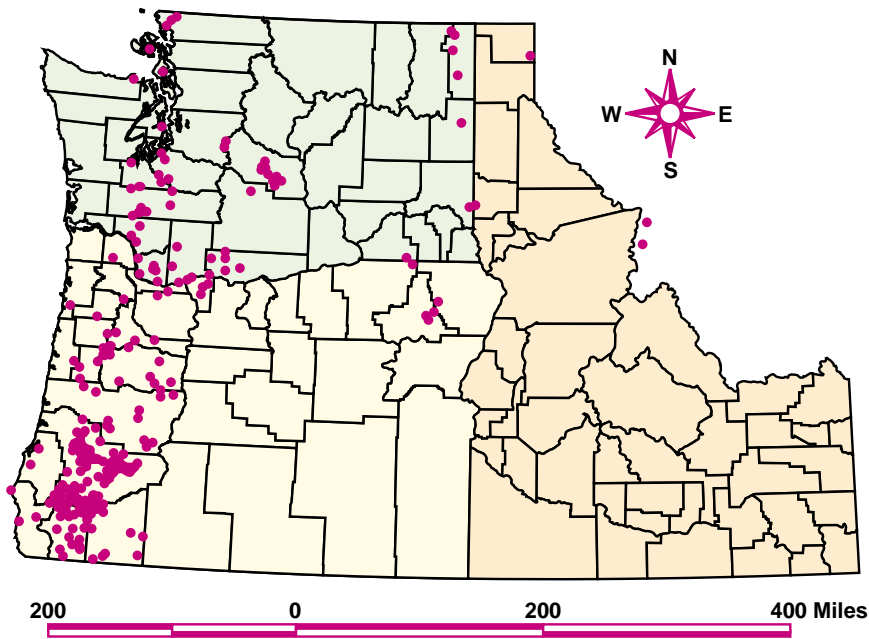
Bracts surrounding flower heads of brown knapweed have rounded papery tips.



Meadow knapweed bracts are intermediate between black-fringed and brown-papery.



Black comblike fringes characterize black knapweed bracts.



Map showing Pacific Northwest meadow knapweed distribution.

eral decades. New infestations have appeared in mesic sites in eastern Washington and Oregon, and in northern Idaho. A hybrid itself, meadow knapweed has hybridized with yellow starthistle and diffuse knapweed in Oregon, according to unpublished reports.

Identification

Hybrids readily occur with either brown or black knapweed as the female parent since both parents and the hybrid offspring are tetraploid, possessing 44

chromosomes. Because chromosome numbers are compatible, the hybrids backcross with either parent to form highly variable populations. Individuals may closely resemble brown or black knapweed, or may combine the characteristics randomly.

Meadow knapweed is a perennial that grows from a woody crown. The upright stems, mostly 20 to 40 inches tall, branch from near the middle. Unlike spotted and diffuse knapweed, meadow knapweed leaves are not finely divided. Leaves may grow to 6

inches long and 1 1/4 inch wide, having entire margins or small lobes or teeth. Leaves on the stems are progressively smaller; uppermost ones are linear, almost bractlike. The rose-purple (occasionally white) flowers are borne in heads about the size of a nickel, which are almost round rather than urn shaped (the common shape for many knapweeds and starthistles). Flowering peaks in July and August, but can continue into November and December west of the Cascade Mountains, particularly on damaged plants. The light to dark brown bracts surrounding the flower head bear a papery fringed margin. At the time of flowering, these bracts reflect a metallic golden sheen. Seeds are about 1/8 inch long, ivory-white to light brown, sometimes bearing a row of short hairs (*pappus*) opposite the point of attachment (*hilum*). Seedlings are taprooted; mature plants develop a cluster of somewhat fleshy roots below the woody crown.

Biology and Ecology

Meadow knapweed invades moist sites, including irrigated pastures and moist meadows, river banks, streams, irrigation ditches, and openings in forested areas—sites where oxeye daisy may be common. It primarily reproduces by seed, but root and crown fragments resprout when disturbed by heavy equipment or cultivation. Meadow knapweed seeds are carried in rivers, streams, or irrigation water, in hay or by vehicles



From left to right, heads of brown, meadow, and black knapweed, with details of bract shape.



Meadow knapweed forms dense populations near Hood River, Oregon.

along roadsides. It is an attractive plant, which some people plant as a garden ornamental. Both brown and black knapweed are available in flower seed catalogs. As is common among knapweeds, meadow knapweed produces both pollen and nectar, making it a desirable plant to beekeepers.

Control

Land managers can achieve long-term control of meadow knapweed in pastures by employing proper management, which may include combinations of the following: irrigation, prescribed grazing, cultivation, cover crops, mowing, fertilization, and herbicides.

Prevention

Prevent meadow knapweed from becoming established. Learn to identify it, and avoid driving through infested areas. Check purchased hay and fields or pastures from which equipment or livestock move onto your property. Use weed screens on irrigation water intake and work with irrigation districts to prevent meadow knapweed seeds from entering the water. Seed all disturbed sites to a perennial vegetative cover immediately after any soil disturbance.

Cultural

Dig out initial infestations of only a few plants. Periodically mowed plants continue to flower and produce seed on shorter plants, prolonging the season of growth and flowering. This regrowth may be an advantage in grazing or herbicide programs. The meadow knapweed green leaves may be more palatable to livestock and more susceptible to herbicides than associated plants which have dried down and become dormant.

In some situations it may be feasible to cultivate infested pastures and rotate through an annual hay crop, green manure or some other cleanup crop before reseeding to the desired permanent forage species. If plans include using herbicides along with the cleanup crop, annual grasses allow more options than legumes. Meadow knapweed does not tolerate repeated cultivation but may resprout following the initial breakup of the crown and fleshy roots. Consider the seed reserve in the soil and devise methods to either deplete it (using herbicides or repeat cultivation) or to prevent its germination (by deep burial or shading of the soil surface). Irrigation may

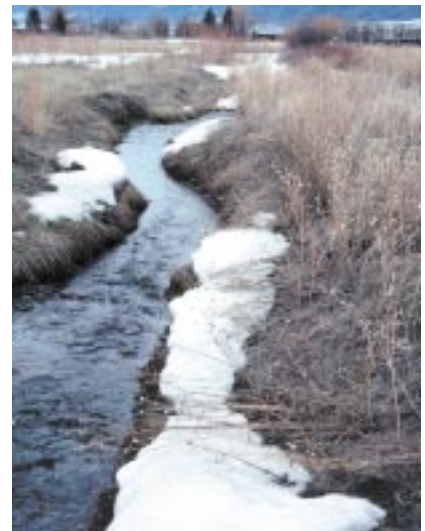
be needed for initial establishment of the new forage crop.

Where residual forage grasses are adequate, meadow knapweed may be controlled using herbicides and fertilizer. Specific fertilizer recommendations depend on deficiencies of the soil for the desired crop. Nitrogen is commonly the limiting element for pasture grasses on forest soils, but base the decision on soil testing and consideration of whether the management goal includes grasses, legumes, or a mixture of the two. Organic farmers may use cover crops or animal waste.

Following establishment of the desired forage species, manage the livestock, rotating stock as necessary to prevent overgrazing. The primary consideration is fostering growth of the forage species while limiting weed growth. Mowing tall coarse plants not only improves their palatability to grazing animals, but reduces their competition with grazed forage plants.

Chemical

For specific recommendations, refer to the *Pacific Northwest Weed Manage-*



Meadow knapweed grows along rivers and streams where its seeds are carried by flowing water.

ment Handbook, an annually revised Extension publication from the Extension Services of Oregon State University, Washington State University and the University of Idaho. <http://weeds.ippc.orst.edu/pnw/weeds>

Biological

To date, some biological controls introduced for other knapweeds attack meadow knapweed, but do not control

it. Three seed-feeding insects, a moth (*Metzneria paucipunctella*), a weevil (*Larinus minutus*), and a fly (*Urophora quadrifasciata*) are established on meadow knapweed. The most promising agent is *Larinus minutus*, which may reduce weed populations if its numbers increase as they do on spotted and diffuse knapweed. *Larinus minutus* has been found attacking meadow knapweed in both Oregon

and Washington, showing the most potential for damaging young plants and seedlings. The Oregon Department of Agriculture has made experimental releases with other knapweed biological control agents: *Sphenoptera jugoslavica*, *Agapeta zoegana*, *Bangasternus fausti*, *Cyphocleonus achates*, *Larinus obtusus* and *Terellia virens* (Eric Coombs, pers. comm.).



At the peak of flowering, meadow knapweed heads reflect a golden sheen.



Meadow knapweed invades moist open habitats in forested regions.

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Eric Coombs, Oregon Department of Agriculture, and Gary Piper, WSU entomologist, provided the information on biological control agents. Douglas Johnson prepared the distribution map, with new survey data contributed by Robert Budesá, Barbara Mumblo, Dan Sharratt, Jeanne Standley, Scott Sundberg, and collectors of specimens in the OSU herbarium. Illustrations and photos by Cindy Roché.

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