FIRE EFFECTS ON NOXIOUS WEEDS WITHIN THE'COLUMBIA RIVER BASIN

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Fire Effects on Noxious Weeds within the Columbia River Basin - Based on a list provided by Mike Karl, Range Ecologist, Science Integration Team, Interior Columbia Basin Ecosystem Management Project

Yellow Star-thistle - (*Centaurea solstitialis*); Purple Starthistle (*Centaurea calcitrapa*) Seed on soil surface killed by intense heat, however favored habitat (dry, overgrazed range or pasture for C. *solstitialis* and heavily disturbed *soils* for *C calcitrapa*) generally has lower biomass for available fuel and hence either infrequently bums or is unable to generate sufficient heat to kill much of the seed. Seed spreads rapidly from adjacent areas and as an annual is able to rapidly colonize. The ability to colonize a site is especially noticeable in burned areas populated by Eurasian grasses or cool season native grasses which have a greater chance of being harmed by a fire, resulting in a reduced ability to compete with outside invaders. Generally a neutral response.

Orange Hawkweed *(Hieracium aurantiacum)* and Yellow Hawkweed *(Hieracium pratense)* Able to readily resprout from below ground rhizomes and stolons. Dissemination is by wind blown seed and are able to colonize recently burned areas. Other than seed on soil within burned areas being sterilized or consumed by the heat, fire has little impact on these species when it already occupies a site. Generally a neutral response.

Sulfur Cinquefoil (*Potentilla recta*) This tap-rooted long-lived perennial is little effected by the passing of a fire other than top'removal. The mature plants readily resprout from the woody rootstock. The temporary removal of herbaceous biomass and litter following a fire can provided new, and more favorable locations for the establishment of seedlings by providing a substrate with more available light and nutrients. Generally a neutral response.

Purple Loosestrife *(Lythrum salicaria)* Locations with this plant present are only likely to bum when the perennial is dormant and the above ground vegetation in the occupied habitat is cured. This usually only happens during a strong drought. If the vegetation is not in a cured state the fire is of such low intensity from burning litter that only the above ground portion of the plant will be killed. The top will topple over but seldom be completely consumed. The plant resprouts from its well established root system following either type of fire. Stems that resprout and come in contact with moist soil can also develop new root systems at the point of contact and further spread the plant. If a fire enters the plants habitat during a drought and the substrate has a high enough organic content the fire can consume both the organic *soils* and *the* root systems of *the Lythrum* down to the fires moisture of extinction. *Any Lythrum* seed within this consumed layer would be destroyed. However the plants ability to produce up to 120,000 seeds per year generally preclude eradication of Lythrum by this method. Generally after a fire of this *type* the dominance of *Lythrum* is reduced and a greater diversity of riparian vegetation is present. Given time *Lythrum* again becomes dominant, or co-dominant with *Typha*. A + to a neutral response.

Dyer's Woad (*Isatis tinctoris*) This plant is a perennial, biennial or winter annual forb that reproduces from seed and from roots The seeds maintain viability for numerous years (length undetermined) and unless destroyed by the heat generated by a fires passage will have the chance to germinate. The plant is tap rooted and is able to resprout after being top killed. Only 'new plants still in the rosette stage can be successfully killed by a fire. Generally a neutral to a slightly + response.

Diffuse Knapweed *(Centaurea diffusa)* This plant is a tapiooted annual or biennial which spreads by seed. The only phases of its life cycle that are sensitive to fire are the seed on the soil surface which can be killed by extreme heat, the germinated plant and the rosette stage before sufficient carbohydrate storage has occurred to support resprouting. Seed not killed by a passing fire can maintain viability for several years. Once established the root system of the plant exudes an allelopath hindering germination of other plants. This process not only allows the expansion of parent plant and its progeny, but also reduces the flammability of the site through biomass reduction. Generally a'neutral to a slightly + response.

Russian Knapweed *(Centaurea repens)* This plant is a perennial forb which spreads by creeping rootstock and seed. Fire effects for this species is similar to that reported for C. diffusa other than long-term seed viability is not known in C. repens. Also no mention is made of allleopathic effects. Rhizomes for this plant have been reported to extend to depths of 8 feet the first year and down to 23 feet the second providing a very effect system for resprouting tier being top killed by a passing fire. Generally a neutral to a slightly + response.

**** Spotted Knapweed not on vour list, covers over 800,000 ac of Missoula County, MT alone within the Columbia River Basin. Estimated that 46.5 million acres in Montana can potentially be infected. Also affects Alberta, British Columbia, northern Idaho and eastern Washington. * * * *

Spotted Knapweed *(Centaurea maculosa* Lam.)A short-lived perennial forb that reproduces by seed. Seed germinates throughout the growing'season, whenever growing conditions are favorable. Plants usually remain in the rosette stage during the first year. They will over winter in this stage and resume growth in June. The plant will usually bloom from early July through August with an average plant in Montana producing about 1000 seed. Seed transport is usually a short distance and can be by wind, water, or animals. Man also is a major form of transport with vehicles carrying seed long distances. Seed are know to have long-term viability, forming a seed bank in the soil for up to 12 years. The mature plant develops a taproot. Established root systems exude an allelopath that hinders germination of other nearby vegetation. This species is adapted to a wide range of growing conditions and has been observed from 1900 to 10000 ft in elevation, and in precipitation zones from 8 to more than 80 inches annually. Although capable of dominating most of the more productive habitats it does not thrive in sub-irrigated or wet meadows. The potential threat is greatest in range dominated by bluebunch wheatgrass, needle-and-thread, Idaho fescue, or in woodlands dominated by ponderosa pine or

Douglas fir. It is soil disturbance, not soil properties that determines the potential for establishment. Fire effects are the same as reported above for C. *diffusa*. Generally a neutral to a slightly + response.

Squarrose knapweed ***(Centaurea virgata)*** No fire effects information known by me, but from what you have written here it doesn't seem to be negatively effected, possibly the opposite.

Dalmatian toadflax ***(Linaria dalmatica)*** Agreed as written.

Yellow toadflax ***(Linaria vulgaris)*** Agreed as written.

Bull thistle ***(Cirsium vulgare)*** **and Musk thistle** ***(Carduus nutans)*** Both species are tap-rooted biennial forbs that reproduce by seed. Musk thistle prefers moist, alluvial soils, but can be found on upland sites as well. Bull thistle is a widespread weed of heavily grazed pastures. Seeds are wind blown and germinate readily on sites which have been severely burned and other herbaceous competition has been eliminated. Typical sites where these thistles can be found after fire are; hay stacks, former home sites, log decks, and pile bums for slash removal. These thistles can remain on these sites until the strong fertilizing effect is diluted and competing vegetation moves in and eliminates thistle germination sites. Mature thistles from these species can be top killed by a passing fire if sufficient heat is generated. But because of the general lack of fuel on the sites which they grow they are usually protected from fire. Generally a neutral to a slightly + response, strong + on severely burned sites and areas disturbed by suppression tactics.

Scotch thistle ***(Onopordum acanthium)*** Fire effects unknown.

**** Canadian thistle not on your list, Moderate to heavy infestation affects Alberta, British Columbia, northern Idaho, Washington, western Oregon, and Montana. Most other areas of the Columbia River Basin report only light to moderate infestation. In Montana, Idaho, and Washington, Canada thistle is reported to cause heavier losses than any other perennial weed because it seriously reduces crop yields wherever infestation occurs.****

Canadian thistle ***(Cirsium arvense)*** This species is a perennial forb that reproduces by horizontal and vertical roots, and by seed. It is found growing in cultivated fields, meadows, pastures and waste places. Plants usually produce large quantities of seed each year which is disseminated by the wind and by animals. Single plants have been known to spread 10 - 12 feet by root growth in one direction in a single season. New shoots arise from the extensive root system in the spring and develop into mature reproducing plants within 7 - 8 weeks. Cut or broken root are capable of development of mature plants. Canada thistle is best adapted to areas with moderate summer temperatures. Moisture zones in which this species occurs is generally between 15 and 30 inches, or where there is irrigation. A high water table limits root development. The plant grows well in a wide variety of soils. Infestations are commonly found in cultivated fields, pastures, rangeland,

forests, roadsides, rights-of-way, ditch banks and lawns and gardens. Overgrazing or ranges, pastures and forests exposes these vegetation types to invasion by Canadian thistle. The use of fire, or other management techniques, in controlling this species will work if the management promotes the vigorous growth and competition of other perennials and forage species. However, complete control frequently involves the use of herbicide application as well as improving overall competition. Canada thistle will resprout following fire from its below ground root system. Wind blown seed can also become established on a burned area if competition by other herbaceous growth has been removed. Severely burned locations devoid of other plant growth and with high nutrient contents are favored locations for the germination of Canada thistle. Generally a neutral to a slightly + response, strong + on severely burned sites and areas disturbed by suppression tactics.

Common crupina ***(Crupina vlgaris)*** No fire effects information known. I would expect that any fire that deteriorates rangeland condition, in terms of biomass and competition, would enhance the potential for invasion by this species. Most of the life cycle of this species is complete by the time the normal wildfire season is starting and the only fire effect would be in destroying seed. Spring prescribed burning may be an option at top killing areas infested by this species.

Leafy spurge ***(Euphorbia esula)*** Fire is not known to have any. negative effect on this species, it readily resprouts following a fire from its deep rhizomes. These roots have been found as deep as 15 feet and have numerous vegetative buds. This root system has been found to have preformed buds as deep as 10 feet. The roots can contain sufficient nutrient reserve to sustain the plants below ground for several years. Generally a neutral effect.

Mediterrane sage ***(Salvia aethiopis)*** No fire effects information known and I don't even have much autecological information either.

Medusahead ***(Taeniatherum caput-medusae)*** Agreed as written.

Oxeye daisy ***(Chrysanthemum leucanthemum)*** Fire has little observed effect on this species. Rhizomatous root system capable of resprouting. Mostly in mesic to dry-mesic habitats where fire will run across a soil surface but have little subterranean effect. Generally a neutral effect.

Field sowthistle ***(Sonchus arvensis)*** Fire has little observed effect on this species. Rhizomatous root system capable of resprouting. Mostly in mesic to dry-mesic habitats where fire will run across a soil surface but have little subterranean effect. Generally a neutral effect.

Rush skeletonweed ***(Chondrilla juncea)*** Seed matures on plants from mid-July through frost and can be destroyed by fire during this period. Reduced chance of killing seed when

the seed falls to the ground. Otherwise fire appears'to have little impact on the species. Neutral to a - effect.

**** Goatweed or St. Johnswort *(Hypericum perforatum)* not on your list. Common from Tacoma, Washington to central California, also in portions of western Montana where it appears to be rapidly spreading in native range. Fire does not appear to have any impact on the species. * * * *

**** Yellowsweet clover *(Melilotus officinalis)* is not listed as a weedy species but in my opinion, and that of various range professors it should be. Of course the SCS and the Extension Service are always resistant to listing a species as a weed when they are still actively promoting its use as a cover plant following disturbance, for nitrogen fixation, nutritious forage and hay, and as a honey crop. Certainly it has more favorable qualities than many other "weeds". But wamings are being issued about its use as forage or hay because of the chemical dicoumarin which when eaten in large quantities or in moldy hay prevents blood clotting and may result in livestock death. The plant is rapidly spreading from its introduced sites. Following a wet year increased germination occurs during the spring. The second growing season produces mass blooming and lots of seed which is spread by water, gravity and rodents. The course dead litter remaining after a prominent growth year is highly flammable. The seed also has increased germination following a heat (fire) treatment and has long-term viability within the soil. ****

**** Common tansey *(Tanacetum vulgare)* is another weedy species that is a problem in western Montana but I'm not sure about elsewhere. Other species that might deserve consideration *are* white top *(Cardaria draba)*, poison hemlock *(Conium maculatum)*, and field bindweed *(Convolvulus* arvensis). Spotted knapweed, goatweed and field bindweed are listed as "noxious" in Montana. ****

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