

Water Quality Enhancement Activity – WQL01 – Biological suppression and other non-chemical techniques to manage brush, herbaceous weeds and invasive species



Enhancement Description

This enhancement is for the reduction of woody brush, herbaceous weeds and invasive plants using non-chemical methods. Physical methods include pulling, hoeing, mowing, mulching or other similar techniques. Biological methods include use of natural enemies either introduced or augmented. Use of chemicals is prohibited with this enhancement.

Land Use Applicability

Pastureland, Rangeland, Forestland

Benefits

Environmental benefits will be site specific. Benefits may include but are not limited to improved water quality achieved through eliminating the use of synthetic pesticides resulting in no chemicals in surface runoff or leaching into the soil profile. Air quality will see similar impacts by eliminating chemical drift and volatilization. Controlling invasive species, brush and weeds will allow native plant communities to return and improve wildlife habitat.

Conditions Where Enhancement Applies

This enhancement applies to all pasture, range or forest land use acres.

Criteria

1. Develop a plan for managing invasive plants, brush and/or weeds that includes:
 - a. Assessment of existing conditions,
 - b. Identify strategies for control,
 - c. Control methods selected,
 - d. Monitoring and evaluation process, and
 - e. Operation and maintenance follow up activities.
2. Implementation of this enhancement requires the use of biological and/or physical pest suppression techniques instead of pesticides. These techniques, used individually or in combination, can include activities such as:
 - a. Grazing animals (primarily through the use of goats) to target undesirable vegetation.
 - b. Introduction of beneficial insects to attack undesirable vegetation.
 - c. Introduction of beneficial micro-organisms to attack undesirable vegetation.
 - d. Prescribed burning
 - e. Hand removal or cultivation



- f. Mowing or cutting
- g. Use of heavy equipment in areas with well established, dense brush cover
- 3. Biological suppression techniques should be based on techniques recommended by the local Land Grant University.
- 4. Biological suppression must be preceded by an analysis to ensure the proposed biological agent is compatible with the agronomic, ecological and social objectives of the operation.
- 5. Operation and maintenance activities must be followed to ensure regrowth or resprouting is controlled. Additional treatment of individual plants or areas needing retreatment should be completed as required to effectively controlling the targeted species.

Adoption Requirements

This enhancement is considered adopted when invasives are being managed via biological or physical methods described above and no pesticides were used.

Documentation Requirements

Written documentation for each treatment area and year of this enhancement including:

- 1. A full description of all biological and/or physical suppression techniques utilized include:
 - a. Method (s) of control used
 - b. Area (s) on farm control methods were applied
 - c. Number of animals or insect colonies distributed and the planned time frame of the treatment.
 - d. Photograph (s) of treatment applied
- 2. A map showing where the activities were applied including treatment acreage

References

- Bellows, T.S., and T.W. Fisher. 1999. Handbook of Biological Control. Academic Press.
- Bond, W. and A.C. Grundy. 2001. Non-chemical Weed Management in Organic Farming Systems. Weed Research 41: 383-405.
- DiTomaso, J.M., M.L. Brooks, E.B. Allen, R. Minnich, P.M. Rice, and G.B. Kyser. 2006. Control of Invasive Weeds with Prescribed Burning. Weed Technology 20(2):535-548.
- Peischel, A. and D.D. Henry, Jr. 2006. Targeted Grazing: a Natural Approach to Vegetation Management and Landscape Enhancement. American Sheep Industry.
- Popay, I., and R. Field, 1996. Grazing Animals as Weed Control Agents. Weed Technology 10(1):217-231.
- Upadhyaya, M.K., and R.E. Blackshaw. 2007. Non-Chemical Weed Management : Principals, Concepts and Technology. Cabi.
- USDA-NRCS. 2010. Conservation Practice Standards: Herbaceous Weed Control-Code 315, Integrated Pest Management-Code 595, and Prescribed Burning-Code338.
- USDA-NRCS. 2009. Conservation Practice Standard: Brush Management-Code 314.
- Valentine, J.R., 1989. Range Developments and Improvements, 3rd ed. Academic Press, MA.

WATER QUALITY ENHANCEMENT ACTIVITY

**WQL01– OR Biological Suppression and Other Non-chemical
Techniques to Manage Brush, Herbaceous Weeds and
Invasive Species**

Oregon Criteria

The criteria and references listed here are to be used in Oregon and are in addition to those listed on the national activity sheet.

Criteria

- 1) Biological suppression techniques for brush management are limited to grazing management using appropriate livestock species, timing, intensity, and duration.
- 2) Other non-chemical techniques for brush management include prescribed fire, and mechanical removal/felling.
- 3) Biological suppression agents for suppression of herbaceous weeds are listed in the table at the end of this document.
- 4) Biological suppression must be preceded by an analysis to ensure the proposed biological agent is compatible with the agronomic, ecological and social objectives of the operation.
- 5) Use of any biological control agent will be coordinated with Oregon Department of Agriculture Plant Division, Noxious Weed Control and any local weed board. All requirements stated in permits will be followed.
- 6) Extra care must be taken in mesic temperature regimes to avoid establishment and/or increase of annual grasses in the treated area.

References

Targeted Grazing: A natural approach to vegetation management and landscape enhancement. 2006. Edited by Karen Launchbaugh, Rangeland Ecology and Management Department, University of Idaho.

<http://www.cnr.uidaho.edu/rx-grazing/Handbook.htm>

Pacific Northwest Weed Management Handbook 2011

<http://pnwhandbooks.org/weed/weed-management-options-quick-guide/current-status-biological-weed-control-agents-oregon-washington->

accessed 12/14/2011

Biology, Ecology, and Management of Western Juniper. 2005. Oregon State University Agricultural Experiment Station Technical Bulletin 152.

Current Status of Biological Weed Control Agents in Oregon

Weed	Agent	Distribution ¹	Attack Rate ²	Control ³	Availability ⁴
Bindweed, field (<i>Convolvulus arvensis</i>)	<i>Aceria malherbae</i>	L	H	G	L
	<i>Tyta luctuosa</i>	L	L	P	L
Broom, Scotch (<i>Cytisus scoparius</i>)	<i>Bruchidius villosus</i>	W	H	G	M
	<i>Exapion fuscirostre</i>	W	H	G	M
	<i>Leucoptera spartifoliella</i>	W	M	F	M
Cordgrass, smooth (<i>Spartina alterniflora</i>)	<i>Prokelisia marginata</i>	—	—	—	—
Gorse (<i>Ulex europaeus</i>)	<i>Exapion ulicis</i>	W	H	G	M
	<i>Tetranychus lintearius</i>	W	L	P	L
Knapweed, diffuse (<i>Centaurea diffusa</i>)	<i>Bangasternus fausti</i>	W	H	G	M
	<i>Cyphocleonus achates</i>	L	L	F	L
	<i>Larinus minutus</i>	W	H	E	M
	<i>Pterolonche inspersa</i>	L	L	L	L
	<i>Sphenoptera jugoslavica</i>	W	H	G	M
	<i>Urophora affinis</i>	W	H	G	M
	<i>Urophora quadrifasciata</i>	W	H	G	M
Knapweed, meadow (<i>Centaurea debeauxii</i> ; = <i>C. jacea</i> x <i>nigra</i> ; = <i>C. moncktonii</i> ; = <i>C. pratensis</i>)	<i>Larinus minutus</i>	L	M	F	L
	<i>Larinus obtusus</i>	W	H	G	M
	<i>Urophora quadrifasciata</i>	L	L	F	L
Knapweed, Russian (<i>Acroptilon repens</i>)	<i>Jaapiella ivannikovi</i>	U	U	U	U

Weed	Agent	Distribution ¹	Attack Rate ²	Control ³	Availability ⁴
	<i>Subanguina picridis</i>	L	S	F	L
Knapweed, spotted	<i>Agapeta zoegana</i>	L	H	G	M
(<i>Centaurea stoebe</i> ; = <i>C.</i>	<i>Bangasternus fausti</i>	L	L	G	L
<i>stoebe</i> ssp. <i>micranthos</i>)	<i>Chaetorellia acrolophi</i>	L	L	F	L
	<i>Cyphocleonus achates</i>	L	H	F	M
	<i>Larinus minutus</i>	W	H	E	M
	<i>Larinus obtusus</i>	W	H	E	M
	<i>Metzneria paucipunctella</i>	W	H	G	M
	<i>Sphenoptera jugoslavica</i>	W	H	G	M
	<i>Terellia virens</i>	L	M	G	L
	<i>Urophora affinis</i>	W	M	G	M
	<i>Urophora quadrifasciata</i>	W	H	G	M
Loosestrife, purple	<i>Galerucella californiensis</i>	W	H	E	M
(<i>Lythrum salicaria</i>)	<i>Galerucella pusilla</i>	W	H	E	M
	<i>Hylobius transversovittatus</i>	W	H	G	L
	<i>Nanophyes marmoratus</i>	W	M	F	M
Puncturevine (<i>Tribulus terrestris</i>)	<i>Microlarinus lareynii</i>	L	L	P	L
	<i>Microlarinus lypriformis</i>	U	U	U	U
Ragwort, tansy	<i>Botanophila seneciella</i>	W	H	F	M
(<i>Senecio jacobaea</i> ; =	<i>Longitarsus jacobaeae</i>	W	H	E	M
<i>Jacobaea vulgaris</i>)	<i>Tyria jacobaeae</i>	W	H	E	M
Sage, Mediterranean (<i>Salvia aethiopis</i>)	<i>Phrydiuchus tau</i>	W	H	G	M
St. Johnswort	<i>Agrilus hyperici</i>	L	H	E	M

Weed	Agent	Distribution ¹	Attack Rate ²	Control ³	Availability ⁴
(Hypericum perforatum)	Aplocera plagiata	W	M	F	M
	Chrysolina hyperici	W	H	E	M
	Chrysolina quadrigemina	W	H	E	M
Saltcedar (Tamarix ramosissima)	Diorhabda carinulata (formerly D. elongata)	L	H	F	M
Skeletonweed, rush	Bradyrrhoa gilveolella	L	S	U	U
(Chondrilla juncea)	Cystiphora schmidti	W	H	G	M
	Eriophyes chondrillae	W	H	E	M
	Puccinia chondrillina	W	H	G	M
Spurge, leafy	Aphthona cyparissiae	L	H	E	M
(Euphorbia esula)	Aphthona czwalinae	L	H	E	M
	Aphthona flava	L	H	F	L
	Aphthona lacertosa	W	H	E	M
	Aphthona nigricutis	W	H	E	M
	Hyles euphorbiae	—	—	—	—
	Oberea erythrocephala	W	H	G	M
Starthistle, yellow	Bangasternus orientalis	W	L	P	L
(Centaurea solstitialis)	Chaetorellia australis	W	H	E	M
	Eustenopus villosus	W	H	E	M
	Larinus curtus	W	H	E	M
	Puccinia jacea var. solstitialis	F	—	—	—
Thistle, bull (Cirsium vulgare)	Urophora stylata	W	H	G	M
Thistle, Canada (Cirsium arvensis)	Hadroplontus litura (formerly Ceutorhynchus litura)	L	H	G	M
	Rhinocyllus conicus	W	H	F	N
	Urophora cardui	W	H	F	M
Thistle, Italian	Rhinocyllus conicus	W	H	G	N

Weed	Agent	Distribution ¹	Attack Rate ²	Control ³	Availability ⁴
(<i>Carduus pycnocephalus</i>)	<i>Trichosirocalus horridus</i>	W	H	U	N
Thistle, milk (<i>Silybum marianum</i>)	<i>Rhinocyllus conicus</i>	W	H	G	N
Thistle, musk	<i>Rhinocyllus conicus</i>	W	H	G	N
(<i>Carduus nutans</i>)	<i>Trichosirocalus horridus</i>	L	M	G	N
Thistle, plumeless	<i>Rhinocyllus conicus</i>	L	H	G	N
(<i>Carduus acanthoides</i>)	<i>Trichosirocalus horridus</i>	—	—	—	—
Thistle, slenderflower	<i>Cheilosia corydon</i>	W	M	F	M
(<i>Carduus tenuiflorus</i>)	<i>Rhinocyllus conicus</i>	W	H	G	N
	<i>Trichosirocalus horridus</i>	W	H	U	N
Toadflax, Dalmatian	<i>Brachypterolus pulicarius</i>	W	M	P	M
(<i>Linaria dalmatica</i>)	<i>Calophasia lunula</i>	L	L	F	L
	<i>Mecinus janthinus</i>	W	H	E	M
Toadflax, yellow	<i>Brachypterolus pulicarius</i>	L	M	F	L
(<i>Linaria vulgaris</i>)	<i>Calophasia lunula</i>	—	—	—	—
	<i>Gymnetron antirrhini</i>	W	M	U	L
	<i>Mecinus janthinus</i>	U	U	U	U
Watermilfoil, Eurasian (<i>Myriophyllum spicatum</i>)	<i>Euhrychiopsis lecontei</i>	L	U	U	U

¹ Distribution within host range: W = widespread; L = limited sites; F = failed to establish; U = unknown status; — = not released

² Attack rate host: H = heavy (> 70%); M = medium (> 30%); L = light (> 10%); S = slight (< 1%); U = unknown status

³ Control ability on seeds and/or plant density: E = excellent; G = good; F = fair; P = poor; U = undetermined

⁴ Availability for redistribution: M = mass collections; L = limited (Limited availability indicates agent populations are slow in building or are recently introduced. Work on these species should be coordinated through biological control specialists at the state department of agriculture or state university); U = unavailable; N = not recommended. (These agents may attack native species and interstate shipments are no longer permitted. Contact your local biocontrol specialist to determine if releases are appropriate in your area).