

Biological Control Agents and Their Roles

Classical biological control agents introduced into the Pacific Northwest for the management of weeds
and the general role of each biocontrol species.

HIGHLIGHTED SPECIES (GREY) ARE NOT APPROVED BY USDA-APHIS FOR INTERSTATE COLLECTION AND RE-DISTRIBUTION.

Biocontrol Agent	Role	Weed Species
<i>Aceria chondrillae</i> (formerly <i>Eriophyes chondrillae</i>)	bud gall mite	Skeletonweed, rush (<i>Chondrilla juncea</i>)
<i>Aceria drabae</i> ^F	gall mite	Whitetop or hoary cress (<i>Lepidium draba</i>)
<i>Aceria malherbae</i>	bud/leaf gall mite	Bindweed, field (<i>Convolvulus arvensis</i>)
<i>Agapeta zoegana</i>	root-boring moth	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, diffuse (<i>Centaurea diffusa</i>)
<i>Agonopterix alstroemeriana</i>	defoliating moth	Hemlock, poison (<i>Conium maculatum</i>)
<i>Agrilus hyperici</i>	root-boring beetle	St. Johnswort (<i>Hypericum perforatum</i>)
<i>Aphalara itadori</i> ^F – Hokkaido strain	sap-sucking psyllid	Knotweed, giant (<i>Reynoutria sachalinensis</i> ; = <i>Polygonum sachalinense</i> ; = <i>Fallopia sachalinensis</i>)
<i>Aphalara itadori</i> ^F – Kyushu strain	sap-sucking psyllid	Knotweed, Japanese (<i>Reynoutria japonica</i> ; = <i>Polygonum cuspidatum</i> ; = <i>Fallopia japonica</i>); Bohemian (<i>Reynoutria x bohemica</i> ; = <i>Polygonum x bohemicum</i> ; = <i>Fallopia x bohemica</i>)
<i>Aphalara itadori</i> ^F – Murakami strain	sap-sucking psyllid	Knotweed, Japanese (<i>Reynoutria japonica</i> ; = <i>Polygonum cuspidatum</i> ; = <i>Fallopia japonica</i>); Bohemian (<i>Reynoutria x bohemica</i> ; = <i>Polygonum x bohemicum</i> ; = <i>Fallopia x bohemica</i>)
<i>Aphthona cyparissiae</i>	root/defoliating flea beetle	Spurge, leafy (<i>Euphorbia virgata</i> ; = <i>E. esula</i>)
<i>Aphthona czwalinai</i>	root/defoliating flea beetle	Spurge, leafy (<i>Euphorbia virgata</i> ; = <i>E. esula</i>)
<i>Aphthona flava</i>	root/defoliating flea beetle	Spurge, leafy (<i>Euphorbia virgata</i> ; = <i>E. esula</i>)
<i>Aphthona lacertosa</i>	root/defoliating flea beetle	Spurge, leafy (<i>Euphorbia virgata</i> ; = <i>E. esula</i>)
<i>Aphthona nigricutis</i>	root/defoliating flea beetle	Spurge, leafy (<i>Euphorbia virgata</i> ; = <i>E. esula</i>)
<i>Aplocera plagiata</i>	defoliating moth	St. Johnswort (<i>Hypericum perforatum</i>)
<i>Aulacidea acroptilonica</i>	gall wasp	Knapweed, Russian (<i>Rhaponticum repens</i> ; = <i>Acroptilon repens</i>)
<i>Aulacidea subterminalis</i> ^F	gall wasp	Hawkweeds (mouse-ear [<i>Pilosella officinarum</i>]; orange [<i>P. aurantiaca</i>]; whiplash [<i>P. flagellaris</i>])
<i>Bangasternus fausti</i>	seed head weevil	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, diffuse (<i>C. diffusa</i>); knapweed, squarrose (<i>Centaurea virgata</i> subsp. <i>squarrosa</i>)

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<i>Bangasternus orientalis</i>	seed head weevil	Starthistle, yellow (<i>Centaurea solstitialis</i>)
<i>Botanophila seneciella</i>	seed head fly	Ragwort, tansy (<i>Jacobaea vulgaris</i> ; = <i>Senecio jacobaea</i>)
<i>Brachypterolus pulicarius</i>	flower beetle	Toadflax, yellow (<i>Linaria vulgaris</i>); toadflax, Dalmatian (<i>L. dalmatica</i>)
<i>Bradyrrhoa gilveolella</i>	root-boring moth	Skeletonweed, rush (<i>Chondrilla juncea</i>)
<i>Bruchidius villosus</i>	seed beetle	Broom, Scotch (<i>Cytisus scoparius</i>); broom, French (<i>Genista monspessulana</i>)
<i>Calophasia lunula</i>	defoliating moth	Toadflax, Dalmatian (<i>L. dalmatica</i>); toadflax, yellow (<i>Linaria vulgaris</i>)
<i>Ceratapion basicorne</i> ^F	root crown weevil	Starthistle, yellow (<i>Centaurea solstitialis</i>)
<i>Chaetorellia acrolophi</i>	seed head fly	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>)
<i>Chaetorellia australis</i>	seed head fly	Starthistle, yellow (<i>Centaurea solstitialis</i>)
<i>Cheilosia grossa</i> (formerly <i>C. corydon</i>)	stem fly	Thistle, slenderflower (<i>Carduus tenuiflorus</i>); thistle, Italian (<i>C. pycnocephalus</i>); thistle, bull (<i>Cirsium vulgare</i>); thistle, musk (<i>Carduus nutans</i>)
<i>Cheilosia urbana</i> ^F	root-boring fly	Hawkweeds (<i>Pilosella aurantiaca</i> , <i>P. caespitosa</i> , <i>P. flagellaris</i> , <i>P. floribunda</i> , <i>P. glomerata</i> , <i>P. officinarum</i> , <i>P. piloselloides</i>)
<i>Chrysolina hyperici</i>	defoliating beetle	St. Johnswort (<i>Hypericum perforatum</i>)
<i>Chrysolina quadrigemina</i>	defoliating beetle	St. Johnswort (<i>Hypericum perforatum</i>)
<i>Cyphocleonus achates</i>	root-boring/gall weevil	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, diffuse (<i>C. diffusa</i>); knapweed, squarrose (<i>Centaurea virgata</i> subsp. <i>squarrosa</i>)
<i>Cystiphora schmidtii</i>	stem/leaf gall midge	Skeletonweed, rush (<i>Chondrilla juncea</i>)
<i>Diorhabda</i> spp. ^C	leaf beetle	Saltcedar (<i>Tamarix chinensis</i> , <i>T. parviflora</i> , <i>T. ramosissima</i>)
<i>Euhrychiopsis lecontei</i> ^E	stem weevil	Watermilfoil, Eurasian (<i>Myriophyllum spicatum</i>)
<i>Eustenopus villosus</i>	seed head weevil	Starthistle, yellow (<i>Centaurea solstitialis</i>)
<i>Exapion fuscirostre</i>	seed weevil	Broom, Scotch (<i>Cytisus scoparius</i>)
<i>Exapion ulicis</i>	seed weevil	Gorse (<i>Ulex europaeus</i>)
<i>Galerucella californiensis</i>	leaf beetle	Loosestrife, purple (<i>Lythrum salicaria</i>)
<i>Galerucella pusilla</i>	leaf beetle	Loosestrife, purple (<i>Lythrum salicaria</i>)
<i>Hadroplontus litura</i> (formerly <i>Ceutorhynchus litura</i>)	crown/stem-mining weevil	Thistle, Canada (<i>Cirsium arvense</i>)

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<i>Hyles euphorbiae</i>	defoliating moth	Spurge, leafy (<i>Euphorbia virgata</i> ; = <i>E. esula</i>)
<i>Hylobius transversovittatus</i>	root-boring weevil	Loosestrife, purple (<i>Lythrum salicaria</i>)
<i>Jaapiella ivannikovi</i>	shoot tip gall midge	Knapweed, Russian (<i>Rhaponticum repens</i> ; = <i>Acroptilon repens</i>)
<i>Larinus curtus</i> ^D	seed head weevil	Starthistle, yellow (<i>Centaurea solstitialis</i>)
<i>Larinus minutus</i>	seed head weevil	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, meadow (<i>C. debeauxii</i> subsp. <i>grandiflora</i> ; <i>C. jacea</i> nothosubsp. <i>pratensis</i>); knapweed, diffuse (<i>C. diffusa</i>); knapweed, squarrose (<i>Centaurea virgata</i> subsp. <i>squarrosa</i>)
<i>Larinus obtusus</i>	seed head weevil	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, meadow (<i>C. debeauxii</i> subsp. <i>grandiflora</i> ; <i>C. jacea</i> nothosubsp. <i>pratensis</i>)
<i>Leucoptera spartifoliella</i>	twig mining moth	Broom, Scotch (<i>Cytisus scoparius</i>)
<i>Longitarsus jacobaeae</i>	root/defoliating flea beetle	Ragwort, tansy (<i>Jacobaea vulgaris</i> ; = <i>Senecio jacobaea</i>)
<i>Mecinus janthiniformis</i> (formerly <i>M. janthinus</i>)	stem-boring weevil	Toadflax, Dalmatian (<i>Linaria dalmatica</i>)
<i>Mecinus janthinus</i>	stem-boring weevil	Toadflax, yellow (<i>Linaria vulgaris</i>)
<i>Mesoanguina picridis</i> (formerly <i>Subanguina picridis</i>)	stem/leaf gall nematode	Knapweed, Russian (<i>Rhaponticum repens</i> ; = <i>Acroptilon repens</i>)
<i>Metzneria paucipunctella</i>	seed head moth	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, diffuse (<i>C. diffusa</i>)
<i>Microlarinus lareynii</i> ^G	seed weevil	Puncturevine (<i>Tribulus terrestris</i>)
<i>Microlarinus lypriformis</i> ^G	stem weevil	Puncturevine (<i>Tribulus terrestris</i>)
<i>Nanophyes marmoratus</i>	flower bud weevil	Loosestrife, purple (<i>Lythrum salicaria</i>)
<i>Oberea erythrocephala</i>	stem-boring beetle	Spurge, leafy (<i>Euphorbia virgata</i> ; = <i>E. esula</i>)
<i>Phrydiuchus tau</i>	crown/root weevil	Sage, Mediterranean (<i>Salvia aethiopsis</i>)
<i>Pterolonche dispersa</i>	root-boring moth	Knapweed, diffuse (<i>Centaurea diffusa</i>)
<i>Puccinia chondrillina</i> ^H	rust fungus	Skeletonweed, rush (<i>Chondrilla juncea</i>)
<i>Puccinia jacea</i> var. <i>solstitialis</i> ^H	rust fungus	Starthistle, yellow (<i>Centaurea solstitialis</i>)
<i>Puccinia punctiformis</i> ^H	rust fungus	Thistle, Canada (<i>Cirsium arvense</i>)
<i>Ramularia crupinae</i> ^H	fungus	Crupina, common (<i>Crupina vulgaris</i>)
<i>Rhinocyllus conicus</i> ^A	seed head weevil	Thistle, slenderflower (<i>Carduus tenuiflorus</i>); thistle, plumeless (<i>C. acanthoides</i>); thistle, musk (<i>C. nutans</i>); thistle, milk (<i>Silybum marianum</i>); thistle, Italian (<i>C. pycnocephalus</i>); thistle, Canada (<i>Cirsium arvense</i>)

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<i>Rhinusa</i> spp.	seed head weevil	Toadflax, Dalmatian (<i>L. dalmatica</i>); toadflax, yellow (<i>Linaria vulgaris</i>)
<i>Rhinusa pilosa</i> ^F	shoot-galling weevil	Toadflax, yellow (<i>Linaria vulgaris</i>)
<i>Sericothrips staphylinus</i> ^F	leaf thrips	Gorse (<i>Ulex europaeus</i>)
<i>Sphenoptera jugoslavica</i>	root-boring/gall beetle	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, diffuse (<i>C. diffusa</i>); knapweed, squarrose (<i>Centaurea virgata</i> subsp. <i>squarrosa</i>)
<i>Terellia virens</i>	seed head fly	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>)
<i>Tetranychus lintearius</i>	spider mite	Gorse (<i>Ulex europaeus</i>)
<i>Trichosirocalus horridus</i> ^A	root/crown weevil	Thistle, slenderflower (<i>Carduus tenuiflorus</i>); thistle, plumeless (<i>C. acanthoides</i>); thistle, musk (<i>C. nutans</i>); thistle, Italian (<i>C. pycnocephalus</i>); thistle, bull (<i>Cirsium vulgare</i>)
<i>Tyria jacobaeae</i> ^B	defoliating moth	Ragwort, tansy (<i>Jacobaea vulgaris</i> ; = <i>Senecio jacobaea</i>)
<i>Tyta luctuosa</i>	defoliating moth	Bindweed, field (<i>Convolvulus arvensis</i>)
<i>Urophora affinis</i>	seed head gall fly	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, diffuse (<i>C. diffusa</i>); knapweed, squarrose (<i>Centaurea virgata</i> subsp. <i>squarrosa</i>)
<i>Urophora cardui</i>	stem gall fly	Thistle, Canada (<i>Cirsium arvense</i>)
<i>Urophora quadrifasciata</i>	seed head gall fly	Knapweed, spotted (<i>Centaurea stoebe</i> ; = <i>C. stoebe</i> ssp. <i>micranthos</i>); knapweed, meadow (<i>C. debeauxii</i> subsp. <i>grandiflora</i> ; <i>C. jacea</i> nothosubsp. <i>pratensis</i>); knapweed, diffuse (<i>C. diffusa</i>); knapweed, squarrose (<i>Centaurea virgata</i> subsp. <i>squarrosa</i>)
<i>Urophora sirunaseva</i>	seed head gall fly	Starthistle, yellow (<i>Centaurea solstitialis</i>)
<i>Urophora stylata</i>	seed head gall fly	Thistle, bull (<i>Cirsium vulgare</i>)

^A *Rhinocyllus conicus* and *Trichosirocalus horridus* are not recommended. They attack native thistles and interstate permits are suspended.

^B *Tyria jacobaeae* is not recommended east of the Cascades, particularly in Idaho. It attacks several native plant species.

^C Interstate permits are suspended for *Diorhabda* spp.

^D *Larinus curtus* may be infected with a disease that can reduce insect populations. It should not be redistributed to avoid spreading the disease to healthy *L. curtus* populations.

^E *Euhrychiopsis lecontei* is a native insect, and thus, not a classical biological control agent. The weevil is co-evolved with native milfoil, *Myriophyllum sibiricum*, but also attacks Eurasian watermilfoil, *M. spicatum*. It is naturally-occurring at many lakes in the Pacific Northwest but is not currently available for redistribution.

^F *Aceria drabae*, *Aphalara itadori*, *Aulacidea subterminalis*, *Ceratopion basicorne*, *Cheilosia urbana*, *Rhinusa pilosa*, and *Sericothrips staphylinus* are new biocontrol agents that are still undergoing testing and establishment. It is unclear when they will be available for widespread distribution or how effective they will be on their host plant.

^G Puncturevine weevils (*Microlarinus lareynii* and *M. lypriformis*) cannot survive cold winters in the Pacific Northwest and do not sustain large enough populations to provide adequate control.

^H Special research permits are currently required for all pathogen biocontrol agent distribution. It is illegal to redistribute pathogens, both inter- and intrastate, without a permit.

