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Sawflies (Hymenoptera, Symphyta) newly recorded from Washington State

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Abstract

Examination of museum specimens, unpublished collection data, and field surveys conducted between 2010 and 2014 resulted in records for 22 species of sawflies new to Washington State, seven of which are likely to be pest problems in ornamental landscapes. These data highlight the continued range expansion of exotic species across North America. These new records also indicate that our collective knowledge of Pacific Northwest arthropod biodiversity and biogeography is underdeveloped, even for a relatively well known and species-poor group of insects. Notable gaps in the knowledge of Washington State's Symphyta remain for the Olympic Peninsula, the Cascade Mountain Range, and the arid interior of the state. Washington's shrub-steppe appears to be particularly poorly surveyed for sawflies.

Keywords

Exotic species, range expansion, state record, museum data

Introduction

Sawflies (Hymenoptera, Symphyta) comprise 14 families worldwide, with 12 of these and about 1,000 described species known from North America (Smith 1979a, Taeger et al. 2010). Eleven families and approximately 180 named species are currently recorded from Washington State (Smith 1979a, Gibson 1980, Goulet 1986, Smith 1989, Goulet 1996, Looney et al. 2012, Schiff et al. 2012). Most sawfly species are herbivores, including leaf- and stem-mining species, chewing defoliators, wood-borers, and leaf-tying defoliators. Species in the family Orussidae are external parasitoids of wood-boring insects (Powell and Turner 1975, Deyrup 1984), and adult *Tenthredo* (Tenthredinidae) are commonly observed feeding upon other arthropods (Pasteels and Gregoire 1984). Some sawflies are important forestry, horticultural and agricultural pests.

The 2009 discovery of the introduced alder-feeding sawfly *Monsoma pulveratum* (Retzius, 1783) in the Pacific Northwest (Looney et al. 2012) provided impetus to conduct a broad sawfly survey in Washington State from 2010 through 2012. Specimens collected during that survey revealed that the Pacific Northwest range of many sawfly species is incompletely delineated, and that relatively few contributions have been made towards understanding Pacific Northwest Symphyta during recent decades. Subsequent to the two year survey, we collected data from other researchers, museum specimens, and further serendipitous discoveries. Here we report 22 species not previously known from Washington or documented only in gray literature, expanding known ranges in some cases and filling gaps in others.

Methods

New sawfly records were compiled from many sources, including regional entomological collections and recent field surveys. More than 3,500 identified and unidentified sawflies in entomology collections at the Evergreen State College, the College of Idaho, Oregon State University, the University of Idaho, Washington State University, and Western Washington University were examined for species of interest.

Field surveys from 2010 through 2012 employed sticky traps and Malaise traps (Fig. 1), with subsequent targeted and opportunistic hand collections made through 2015. Double-sided yellow, green, or white sticky traps with hot-applied adhesive were placed in various woody host plants across Washington in 2010–2012. Host material surveyed included alder, poplar, hawthorn, mountain ash, cherry, pear, apple, elderberry, and various conifers, with approximately 105 sites surveyed in Washington. Nine Malaise traps were installed in Washington west of the Cascade mountain range. Three traps were installed near ports of entry, two along the Columbia River, two in mixed-use forest stands, and two in residential areas. One Malaise trap was installed in a prairie remnant surrounded by agricultural fields in eastern Washington. Traps were installed in April, 2012, and maintained through September 2012. Opportunistic

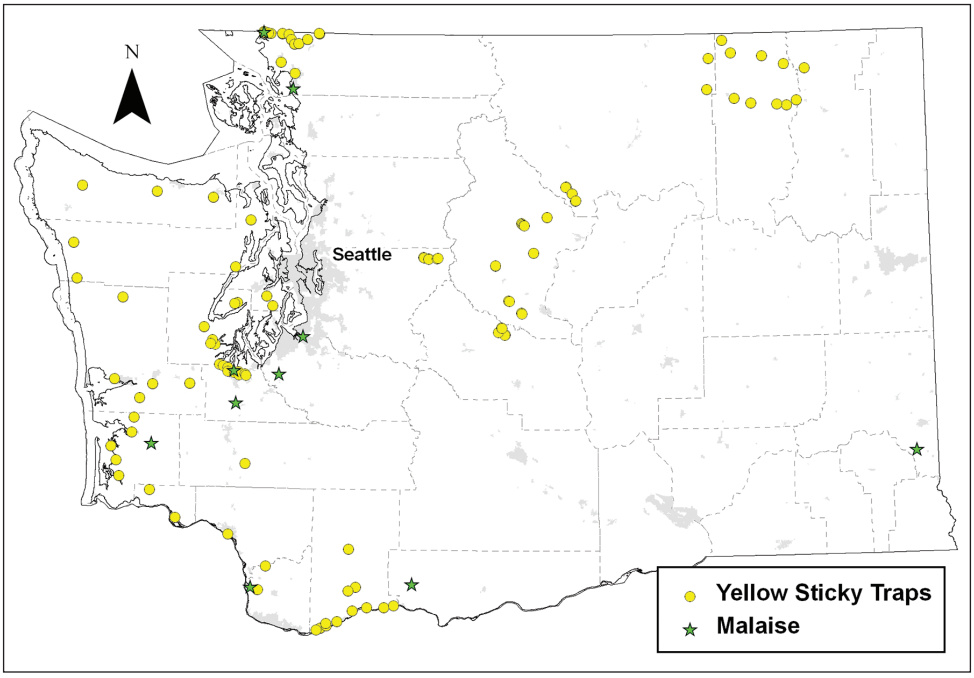

Figure 1. Locations of yellow sticky traps and Malaise traps deployed in Washington State in 2011.

hand collections of larvae and adults were made throughout 2010–2015 as part of this study. We also present novel data for leaf-mining sawflies in Washington collected during a survey conducted in 2006 (see also Digweed et al. 2009). Lastly, some of the species recorded here were first detected by citizens reporting new pest problems (e.g., *Neodiprion sertifer*).

Collection data were compiled for each species, and narratives were composed that briefly describe each species' natural history and other details. Species names follow Taeger et al. (2010). We have chosen to not alter two combinations in the Nematinae suggested by new work by Prous et al. (2014). Taxonomic changes for the North American fauna resulting from their research have not yet been made, and are best approached via a thorough examination of North American Nematinae rather than piecemeal in papers such as this. Probable combinations are noted in the narrative accompanying each species. There are numerous common names ascribed to many of the species reported on here, since so many of these species are pestiferous and conspicuous. We do not provide those names, but North American common names can be found at the websites for the Entomological Society of Canada (esc-sec.ca) and the Entomological Society of America (entsoc.org). Voucher specimens are deposited at the Northern Forestry Centre Arthropod Collection in Edmonton, Alberta (NFRC), the Washington State Department of Agriculture Collection (WSDAC), Western Washington University (WWUC), the Evergreen State College (TESC), and the National Museum of Natural History, Smithsonian Institution, Washington, DC (USNM).

Results

Twenty-two species not previously documented in Washington State in peer-reviewed literature were detected in these field and museum surveys, primarily in western Washington (Table 1). One species was collected as by-catch in a survey for other pests, and seven species were first detected due to citizen complaints. Five species were first detected by examining unidentified material in museum collections, and the remainder were collected in sawfly surveys or general collecting. A map of collection localities for more than 1,200 sawfly specimens indicates that most collecting has been near developed towns and cities, or along major highways (Fig. 2). Remote and rugged areas are undersampled, and very few collections have been made in the arid interior shrub-steppe.

Xiphydriidae

Xiphydria prolongata (Geoffroy, 1785)

Xiphydria prolongata is a European species that is a wood-borer in small limbs of deciduous tree genera, including *Salix* L., *Quercus* L., and numerous Betulaceae (Smith 1983). Larvae generally bore in decaying wood, and are not pestiferous. This western European species was first documented in North America in Michigan and New Jersey in the early 1980s, bringing the known *Xiphydria* species in North America to nine (Smith 1983). Mudge et al. (2001) recorded the first west coast specimen from Multnomah County, Oregon, in 1989. The single specimen from Washington was found in a trap for Japanese beetle, near Boeing Field in King County (Fig. 3). The specimen is housed at WSDAC.

Diprionidae

Neodiprion sertifer (Geoffroy, 1785)

A member of Ross's (1955) *sertifer* species group, this species is the only *Neodiprion* native to Europe, where it is a forestry and nursery pest (Day and Leather 1997). Its primary hosts are *Pinus resinosa* Aiton and *P. sylvestris* L., although it will feed on most *Pinus* species and can be a significant source of damage in pine plantations during outbreak years (Alford 2012). Introduced to New Jersey, USA, in 1925 (Schaffner 1939), its more visible impacts have included feeding damage on Christmas trees, making them less valuable or unmarketable, and defoliation of older needles on ornamental and landscape plants (Wilson 1971). Economic damage in North America has been recorded on *P. strobus* L., *P. sylvestris*, and *P. mugo* Turra, well as several native North American *Pinus* spp. (Schaffner 1943, Craighead 1950, Benjamin et al. 1955, Griffiths 1959, Baker 1972). Since its introduction, the species has spread westward at least to North Dakota (Van Driesche et al. 2012) and Saskatchewan, Canada (Langor, unpublished data).

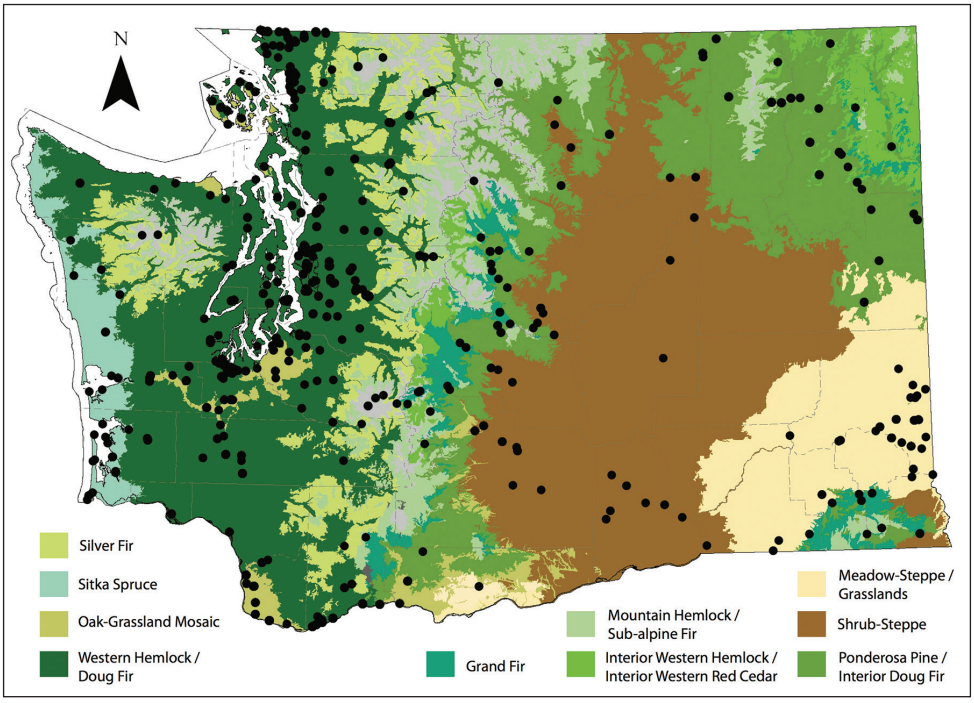

Figure 2. Map of specimen localities (black circles) for over 1,200 specimens collected in Washington State, including museum data and field data generated during this project. Vegetation zones are simplified from Washington's GAP Analysis project (Cassidy et al. 1997).

Neodiprion sertifer was detected in Washington State in 2008, when citizens in Bellingham, Washington, alerted pest control professionals to several defoliating outbreaks on ornamental pines. Larvae were observed again in 2012 on *P. sylvestris* and *P. mugo* in Bellingham, and adult males of *Neodiprion* sp. were collected in pheromone traps in the city that year. Although the latter were likely *N. sertifer*, male *Neodiprion* are not readily identifiable to species using external or genitalic morphology, or by mitochondrial DNA sequences (Linnen and Farrel 2012). Despite extensive surveys in 2010–2013, *N. sertifer* populations have to date only been found in Washington State within the Bellingham city limits (Fig. 3). The records from Washington State could represent a newer and separate introduction event in the Pacific Northwest, although transport on nursery stock seems to be the most likely introduction pathway. Specimens are housed at WSDAC.

***Diprion similis* (Hartig, 1836)**

Taeger et al. (2010) list 13 world species of *Diprion*. Most are Asian, but *D. similis* is one of two *Diprion* species native to Europe. Large populations of this solitary feeder

Table 1. Collection information for 22 sawfly species newly reported from Washington State.

County	Lat N	Long W	Date	Specimens	Collection Method	Collector
Xiphydria prolongata						
King	47.5374	122.3040	7 Aug 2012	1♀	Japanese beetle trap	D. Kitchen
Neodiprion sertifer						
Whatcom	48.7659	122.4518	30 May 2008, em. ~ 20 Sep 2008	6♀, 1♂	Rrd. ex *Pinus mugo*	L. Haines
Whatcom	48.7632	122.4505	May 2012	Mul. larvae	Obs. on *Pinus sylvestris*	C. Looney
Whatcom	48.7612	122.4482	May 2012, em. Aug 2012	2♂, 1♀	Rrd. ex *Pinus mugo*	C. Looney
Whatcom	48.7412	122.4745	25 Jul-4 Oct 2012	Multiple ♂	Wing trap w/ *Neodiprion* lure	C. Looney
Diprion similis						
Mason	47.1978	123.0995	26 Jul 2012, em. ~2 Aug 2012	3♂, 2♀	Rrd. ex *Pinus sylestris*	C. Looney
Thurston	47.0802	123.0203	4 Sep 2012	1 larva	Obs. on *Pinus contorta*	C. Looney C. Fate
Thurston	47.0799	123.0203	4 Sep 2012	3 larvae	Obs. on *Pinus monticola*	C. Looney C. Fate
Thurston	47.1056	123.0009	4 Sep 2012	2 larvae	Obs. on *Pinus monticola*	C. Looney C. Fate
Thurston	47.0902	123.0471	4 Sep 2012	1♂, 5 larvae	Wing trap w/ *D. pini* lure, Hand coll. on *Pinus monticola*	C. Looney C. Fate
Thurston	47.0540	122.9254	10 Sep 2012	1♀, 1 larva	Obs. on *Pinus monticola*	C. Looney A. Pelegrin
Whatcom	48.7412	122.4748	Aug 2012, em. 4 Jun 2013	1♂	Rrd. ex *Pinus monticola*	C. Looney M. Peterson
Gilpinia hercyniae						
Whatcom	48.7412	122.4745	31 Jul-6 Aug 2008; 9 Jul 2011, em Aug 2011; 8 Aug 2012	1♀; 1♀; 1♀	Hand coll.; Rrd. ex. *Picea abies*; White sticky trap, *Picea abies*	M. Peterson
Cladius grandis						
Thurston	47.0734	122.9767	9-16 May 1997	1♀	Malaise trap	J. Longino

County	Lat N	Long W	Date	Specimens	Collection Method	Collector
Cladius gregarious						
Okanogan	48.4204	119.7115	16 Sep 2010, em. spring 2011	1♀, 1♂	Rrd. ex *Populus tremuloides*	G. Kohler
Pristiphora geniculata						
King	47.7295	122.3045	25 Jul 2009	Mul. larvae	Obs. on *Sorbus aucuparia*	S. Collman
King	47.7295	122.3045	10 Aug 2010	Mul. adults	Obs. on *Sorbus aucuparia*	S. Collman
King	47.6808	122.1106	12 Jul 2011	Mul. larvae	Obs. on *Sorbus aucuparia*	A. Clarke
King	47.4857	121.7674	7 Jul 2011, em. 11-22 Aug 2011	15♀	Rrd. ex *Sorbus aucuparia*	K. Ripley
King	47.7724	122.3270	7 Aug 2012	Mul. larvae	Obs. on *Sorbus aucuparia*	S. Collman
King	47.4503	122.4908	6 June 2015	Mul. larvae	Obs. on *Sorbus aucuparia*	K. Ripley
King	47.4483	122.4836	6 June 2015	Mul. larvae	Obs. on *Crataegus douglasii*	K. Ripley
Snohomish	47.8626	121.8165	8 Aug 2009	Mul. larvae	Obs. on *Sorbus aucuparia*	S. Collman
Snohomish	47.9571	122.2318	1 Jul 2011	Mul. larvae	Obs. on *Sorbus aucuparia*	A. Jordan
Snohomish	47.8788	122.2240	9 Aug 2011	Mul. larvae	Obs. on *Sorbus aucuparia*	S. Collman
Snohomish	47.8788	122.2240	18 Jun 2012	Mul. larvae	Obs. on *Sorbus aucuparia*	S. Collman
Whatcom	48.7084	122.4433	11 Jul 2011	Mul. larvae	Obs. on *Sorbus aucuparia*	D. Wallesz
Whatcom	48.7427	122.4350	7 Jul 2013, em. 19-23 Aug 2013	7♀, 3♂	Rrd. ex *Crataegus douglasii*	T. Cahill
Pristiphora rufipes						
King	47.7295	122.3045	17 Sep 2010; 5 May 2012	Mul. larvae; Mul. larvae	Hand coll. on *Aquilegia* sp.	S. Collman
Snohomish	47.8656	121.9876	3 Sep 2013	Mul. larvae	Hand coll. on *Aquilegia* sp.	S. Collman
Snohomish	47.8788	122.2240	7 Sep 2013; 6 Nov 2014	Mul. larvae; Mul. larvae	Hand coll. on *Aquilegia* sp.	S. Collman
Thurston	47.0562	122.9250	24 Mar 2014	2♀, 6♂	Hand coll. on *Aquilegia* sp.	C. Looney
Craesus alniastri						
Island	47.9590	122.3607	7-26 Jul 2011	1♀	Yellow sticky trap, *Alnus rubra*	K. Ripley
King	47.3809	122.2348	22 Sep 1976	1♀	Rrd. ex *Alnus rubra*	D. Rhoades
Kitsap	47.4400	122.9365	22 Jun-1 Jul 2011	1♀	Yellow sticky trap, *Alnus rubra*	K. Ripley

County	Lat N	Long W	Date	Specimens	Collection Method	Collector
Pierce	47.2500	122.3502	17 Jun-16 Aug 2010	1♀	Green sticky trap, *Alnus rubra*	D. Kitchen
Skagit	48.4204	122.4142	13 Sep 2010	1♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Skamania	45.5763	122.1917	20 May-23 Jun 2011	1♀	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Skamania	45.6260	122.0241	15 Jun 2011	1♀	Yellow sticky trap, *Alnus rubra*	T. Murray
Skamania	45.5870	122.1595	2-23 Jun 2011	2♀	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Skamania	45.7105	121.7801	30 Jun 2011	5♀	Yellow sticky trap, *Alnus rubra*	T. Murray
Skamania	45.5763	122.1917	30 Aug-6 Oct 2011	1♀	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Snohomish	48.1987	122.1251	16 Aug-29 Aug 2011	2♀	Japanese beetle trap	R. Taylor
Whatcom	48.9970	122.2635	14-26 Jun 2012	2♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9940	122.6876	26 Jul-20 Aug 2012	1♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	49.0019	122.7547	26 Jul 2012	1♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	49.0013	122.7493	26 Jul 2012	1♀	Malaise trap	C. Looney
Whatcom	48.9988	122.2684	26 Jul-20 Aug 2012	4♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.7479	122.4343	1-21 Aug 2012	1♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9131	122.5741	8-20 Aug 2012	10♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9915	122.5294	8-20 Aug 2012	6♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9388	122.4443	8-20 Aug 2012	7♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9636	122.3675	8-20 Aug 2012	4♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9965	122.2632	8-20 Aug 2012	2♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9970	122.2635	8-20 Aug 2012	6♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9940	122.6878	20-30 Aug 2012	4♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9933	122.5874	20-30 Aug 2012	4♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9131	122.5741	20-30 Aug 2012	3♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9915	122.5294	20-30 Aug 2012	4♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9619	122.5091	20-30 Aug 2012	1♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9357	122.4817	20-30 Aug 2012	1♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9388	122.4443	20-29 Aug 2012	5♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9637	122.3675	20-30 Aug 2012	5♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9988	122.2684	20-30 Aug 2012	4♀	Yellow sticky trap, *Alnus rubra*	D. Maclean

County	Lat N	Long W	Date	Specimens	Collection Method	Collector
Nematus lipovskyi						
King	47.7295	122.3046	12 Jun 2008	Mul. larvae	Hand coll. on *Rhododendron mollis*	S. Collman
King	47.7632	122.3147	9 Jun 2008	Mul. larvae	Hand coll. on *Rhododendron occidentalis*	S. Collman
King	47.6367	122.2966	12 Jun 2011	Mul. larvae	Hand coll. on *Rhododendron occidentalis*	S. Collman
King	47.6569	122.2899	Jun 2013	Mul. larvae	Hand coll. on *Rhododendron* sp.	S. Collman
King	47.7632	122.3147	30 May 2014	Mul. larvae	Hand coll. on *Rhododendron occidentalis*	C. Looney A. Pelegrin
Thurston	47.0393	122.7985	26 Apr 1996	1♀	Hand coll.	B. Dightman
Thurston	47.0329	122.8992	28 May 2014	Mul. larvae	Obs. on *Rhododendron* sp.	C. Looney
Thurston	47.0384	122.8984	2 Jun 2014; 14 Apr 2015	Mul. larvae; 10♀	Hand coll. on *Rhododendron* sp.	C. Looney
Heterarthrus nemoratus						
Whatcom	48.8053	121.8936	22 Jul 1967	1♀	unknown	unknown
King	47.5085	122.3095	1 May 2007	1 sex unk.	Photograph, bugguide	C. Moorehead
Heterarthrus vagans						
Whatcom	48.9353	122.4817	2 Sep 2011	1 pupa	Hand coll. on *Alnus rubra*	W. Hellman
Whatcom	48.9939	122.6830	2 Sep 2011	1 pupa	Hand coll. on *Alnus rubra*	W. Hellman
Whatcom	48.9623	122.5085	2 Sep 2011	1 pupa	Hand coll. on *Alnus rubra*	W. Hellman
Whatcom	48.9636	122.3675	14-26 Jun 2012	3♂, 1♀	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9381	122.4428	26 Jun-12 Jul 2012	4♂	Yellow sticky trap, *Alnus rubra*	D. Maclean
Whatcom	48.9636	122.3675	8-20 Aug 2012	1♂	Yellow sticky trap, *Alnus rubra*	D. Maclean
Metallus lanceolatus						
Thurston	47.0734	122.9767	15-22 Aug 1997	1♀	Malaise trap	J. Longino
Thurston	47.0802	122.9749	Jun-Aug 2012	Mul. larvae	Mines in *Geum macrophyllum*	C. Looney
King	47.6538	122.1098	Jul 2014	Mul. larvae	Mines in *Geum macrophyllum*	C. Looney
King	47.5583	122.2503	22 Aug 2015	Mul. larvae	Mines in *Geum macrophyllum*	C. Looney
Fenusella nana						
Grays Harbor	47.0565	123.2739	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Grays Harbor	46.9826	123.6043	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor

County	Lat N	Long W	Date	Specimens	Collection Method	Collector
Grays Harbor	46.9755	123.8670	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
King	47.9820	122.1947	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
King	47.7449	122.3424	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
King	47.5067	122.2900	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
King	47.5285	121.8760	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
King	47.6579	122.1105	5 May 2013	2♀	Hand coll. on *Betula* sp.	C. Looney
King	47.4886	121.7946	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Pierce	47.2505	122.2896	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Skagit	48.4046	122.3315	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Skagit	48.4838	121.5991	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Skagit	48.5270	121.4420	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Snohomish	47.8562	121.6960	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Whatcom	48.9640	122.4625	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Whatcom	48.7949	122.4833	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Snohomish	48.2003	122.1266	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Snohomish	48.2462	121.6066	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Profenusa thomsoni						
King	47.5285	122.8760	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
King	47.4886	121.7946	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Skagit	48.4046	122.3315	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Skagit	48.5270	121.4420	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Snohomish	47.8562	121.6960	2006	Mul. larvae	Hand coll. on *Betula* sp.	D. Langor
Whatcom	48.8053	121.8936	15 Jul 1967	1♀	Unknown	Unknown
Profenusa inspirata						
Yakima	46.7157	120.8633	7 Jun 2015	Mul. larvae	Hand coll./obs. on *Quercus garryana*	C. Looney
Yakima	46.7441	120.7884	8 Jun 2015	Mul. larvae	Hand coll./obs. on *Quercus garryana*	C. Looney
Skamania	45.7182	121.4746	24 Sep 2015	Mul. larvae	Hand coll./obs. on *Quercus garryana*	C. Looney T. Murray
Lewis	46.6451	123.0198	2 Oct 2015	Mul. larvae	Hand coll./obs. on *Quercus garryana*	C. Looney M. Freeman

County	Lat N	Long W	Date	Specimens	Collection Method	Collector
Fenusa ulmi						
County	Lat N	Long W	Date	Specimens	Collection Method	Collector
King	47.6379	122.2961	20 Apr-9 May	Mul. ♀	Hand coll. near *Ulmus carpinifolia*	C. Scannell
Lewis	46.5523	122.8126	20 Jul-11 Aug 2011	3♀	Yellow sticky trap, *Alnus rubra*	D. Kitchen
San Juan	48.7017	122.9136	12 Jun 2015	Mul. larvae	Obs. on *Ulmus* sp.	C. Looney
Thurston	47.0415	122.8617	Jun 2012	Mul. larvae	Obs. on *Ulmus* sp.	C. Looney
Thurston	47.0379	122.8991	11 Jun 2014	Mul. larvae	Hand coll. on *Ulmus* sp.	E. Spurrier
Thurston	46.8716	122.9116	5-13 May 2010	1♀	Yellow sticky trap, *Alnus rubra*	E. LaGasa
Halidamia affinis						
Whatcom	48.9061	122.4991	6 Jun 1989	2♀	Hand coll.	E. LaGasa
Ferry	48.6091	118.138	6-27 Jun 2011	1♀	Yellow sticky trap, *Alnus rubra*	M. Johnson
San Juan	48.5514	123.0781	1 Apr 2010	1♀	Yellow sticky trap, *Alnus rubra*	T. Hanson
Clallam	48.0851	124.2636	29 Jun-19 Jul 2011	1♀	Yellow sticky trap, *Alnus rubra*	G. Kohler
Jefferson	47.9227	122.8156	18 May-7 Jun 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	G. Kohler
King	47.4558	122.4529	5 May 2015	2 sex unk.	Hand coll	C. Looney
King	47.4473	122.4599	3-13 May 2010	1♀	Yellow sticky trap, Alnus rubra	K. Ripley
Kitsap	47.44	122.9365	26 May-4 Jun 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	K. Ripley
Kitsap	47.4325	122.6126	26 May-4 Jun 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	K. Ripley
King	47.3766	122.2418	12 Apr 2010	1♀	Sweep net	J. Cena
Pierce	47.2607	122.3513	2-16 May 2012; 16 May-7 Jun 2012	3 sex unk.; 1 sex unk.	Malaise trap	C. Looney
Thurston	47.0783	122.9732	18 May 2011	1♀	Sweep net	C. Looney
Thurston	47.0734	122.9767	9-16 May 1997	3 sex unk.	Malaise trap	J. Longino
Thurston	47.0231	122.9089	8 Jun-1 Aug 2011	1 sex unk.	Emerald Ash Borer trap	D. Kitchen
Thurston	47.0026	123.0002	24 May 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	C. Looney
Grays Harbor	46.9738	123.2945	5-27 May 2010	2♀	Yellow sticky trap, *Alnus rubra*	G. Kohler
Thurston	46.8716	122.9116	10-27 May 2011; 2-14 Jun 2011	2 sex unk.; 3 sex unk.	Green sticky trap, *Alnus rubra*	E. LaGasa
Thurston	46.8207	123.1162	27 May-14 Jun 2010	8 sex unk.	Yellow sticky trap, *Alnus rubra*	K. Ripley
Pacific	46.5204	123.887	4-18 May 2011	2 sex unk.	Yellow sticky trap, *Alnus rubra*	D. Kitchen

County	Lat N	Long W	Date	Specimens	Collection Method	Collector
Lewis	46.4497	122.7989	18 May-1 Jun 2011	5 sex unk.	Yellow sticky trap, Alnus rubra	G. Kohler
Cowlitz	46.1103	122.8945	24 May-1 Aug 2011	1 sex unk.	Emerald Ash Borer trap	D. Kitchen
Clark	45.8623	122.7467	18 May-1 Jun 2011; 1-15 Jun 2011	8 sex unk.; 7 sex unk.	Yellow sticky trap, *Alnus rubra*	G. Kohler
Skamania	45.8473	121.4122	29 Jun 2012	1♀	Malaise trap	J. Markgraf
Skamania	45.8042	121.9348	19 May-23 Jun 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Clark	45.8004	122.6811	4 May-8 Jun 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Clark	45.7997	122.6818	31 Mar-4 May 2011; 4 May-8 Jun 2011	1 sex unk.; 6 sex unk.	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Skamania	45.7106	121.6395	16 Jun 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	T. Murray
Skamania	45.7105	121.7801	16-30 Jun 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	T. Murray
Skamania	45.6257	122.0241	31 May 2011	3 sex unk.	Yellow sticky trap, *Alnus rubra*	T. Murray
Skamania	45.6142	122.115	19 May-23 Jun 2011	1 sex unk.	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Clark	45.6053	122.5459	23 Mar 2010	1♀	Hand collected	A. Karankou
Skamania	45.587	122.1595	2-23 Jun 2011	2♀	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Skamania	45.5763	122.1917	19 Apr-19 May 2011	2 sex unk.	Yellow sticky trap, *Alnus rubra*	K. Sheehan
Monophadnus pallescens						
Chelan	47.3120	120.2811	15 May 1999	1♀	Unknown	D. Knutson
Chelan	47.2802	120.1865	4 May 2003	1♀	Unknown	R. MacLean
Grays Harbor	46.9954	123.5951	28 Apr 2010	1♀	Hand coll.	C. Looney
King	47.3637	122.1202	20 Apr 1985	1♀	Unknown	P.E. Kalina
San Juan	48.4924	122.8944	10 May 1987	1♀	Unknown	D. Overdorff
Thurston	46.8716	122.9116	2-13 May 2012	2♀	Malaise trap	E. LaGasa
Thurston	47.0734	122.9767	18-25 Apr 1997; 25 Apr-2 May 1997; 2-9 May 1997; 9-16 May 1997	1♀; 1♀; 3♀; 1♀	Malaise trap	J. Longino
Whatcom	48.4534	122.2918	15 May 1986	1♀	Unknown	W. R. Buce
Whatcom	48.9465	122.4521	2 Jun 1967	2♀	Unknown	Unknown

County	Lat N	Long W	Date	Specimens	Collection Method	Collector
Whatcom	48.7502	122.4750	28 May 1975	1♀	Unknown	F. Robertson
Whatcom	48.9974	122.7278	18 Apr-11 May 2012	1♀	Yellow sticky trap, *Alnus rubra*	W. Hellman
Eupareophora parca						
King	47.6538	122.1098	5 May 2015	Mul. larvae	Hand coll. on *Fraxinus* sp.	C. Looney
Monostegia abdominalis						
King	47.5732	121.8856	26 Jun 2013	Mul. larvae	Obs. on *Lysimachia vulgaris*	K. Wal
King	47.6284	121.9334	Jun 2013	Mul. larvae	Obs. on *Lysimachia vulgaris*	K. Wal
King	47.5565	122.0735	11 Jun 2014, em. 13 Jul 2014	6♀	Reared ex. *Lysimachia vulgaris*	K. Wal
King	47.5701	122.0948	11 Jun 2014	Mul. larvae	Obs. on *Lysimachia vulgaris*	K. Wal
King	47.6532	122.1070	30 May 2014, em. 6 Jul 2014	3♀	Reared ex. *Lysimachia vulgaris*	C. Looney A. Pelegrin
Macrophya puntumalbum						
Whatcom	48.7596	122.4882	20 May 1977	1♀	Hand coll.	D. Manley

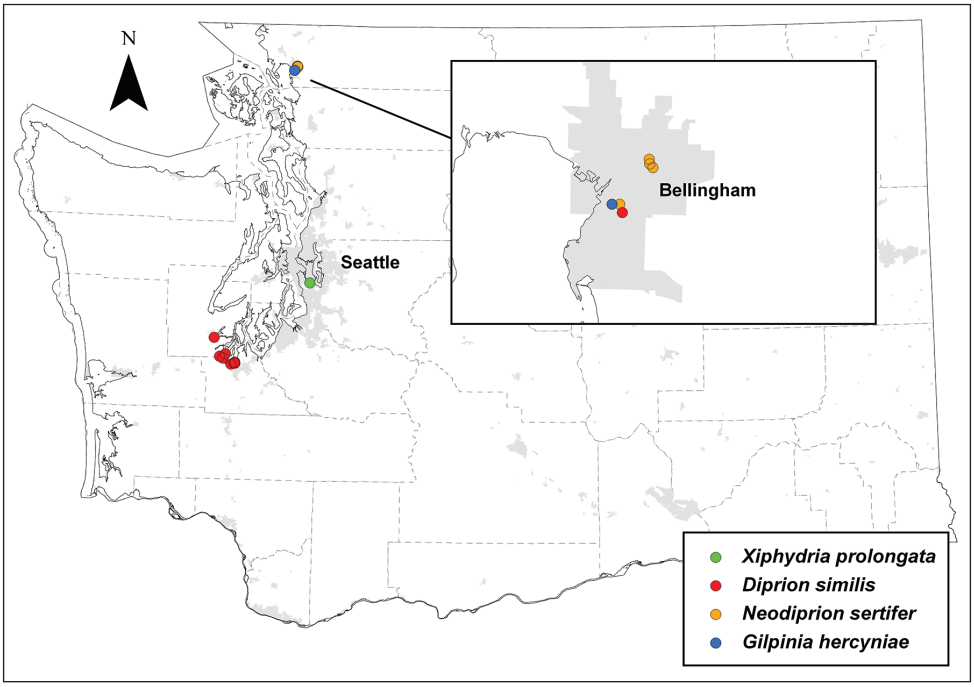

Figure 3. Localities of Xiphydriidae and Diprionidae newly detected in Washington State.

occasionally occur in production forestry, often in association with *D. pini* L., but it is typically not a serious pest (Taeger et al. 1998). The only *Diprion* recorded from North America (Taeger et al. 2010), *D. similis* was discovered in New Haven, Connecticut, in 1914, presumably introduced on imported European nursery stock or associated packing materials (Britton 1915). *Diprion similis* feeds upon multiple pine species, with marked oviposition preference for *P. strobus* observed in North America (Tsao and Hodson 1956). The species can potentially defoliate entire trees when populations are high; however, this appears to be rare in North America, perhaps due to control by weather events and introduced parasitoids (Wilson 1966, Van Driesche et al. 1996). It is known to occur from the northeastern states westward to the Great Lakes region, and south to North Carolina.

Specimens of *D. similis* were collected in 2012 when adult females emerged from *P. sylvestris* boughs collected in Shelton, Washington. Following this detection, yellow card traps were deployed in the south Puget Sound area and Whatcom County. Subsequent visual surveys for larvae were conducted in western Washington. The distinctive larvae are readily recognized, and were found at eight sites in three western Washington counties (Fig. 3). Larvae were most commonly found feeding on *P. monticola* Douglas ex D. Don, but also on *P. sylvestris* and *P. contorta* Douglas ex Loudon. A single male specimen was captured in a *Dipion pini* pheromone-baited trap, probably by chance

since the lure is not known to be attractive across species (O. Anderbrant, in litt.). Voucher specimens are deposited at WSDAC and WWUC.

Gilpinia hercyniae **(Hartig, 1837)**

Gilpinia comprises 37 described species native to Europe and Asia. *Gilpinia hercyniae* is a solitary spruce feeder, first detected in Ottawa, Ontario, Canada in 1922 and in New Hampshire in 1929 (Baker 1972). It quickly became a forest pest in the eastern United States and Canada (Balch 1939, Reeks and Barter 1951). Ambitious biological control programs during the 1930s imported and released several parasitoid species throughout the region. Concurrent with this, a nuclear polyhedrosis virus was inadvertently released which resulted in consistent region-wide control (Balch and Bird 1944). The species has not been an active management concern in North America for many decades (Nielon and Morris 1964, Kelleher and Hulme 1984). There are no published records of its occurrence west of Manitoba.

A specimen of *G. hercyniae* was collected in Bellingham in 2008 (although not identified until 2011) from *Picea abies* (L.) Karst. in a residential neighborhood. Wide-ranging visual and sticky-trap surveys in northwestern Washington failed to detect it beyond the original site, where more specimens were collected in 2011 and 2012 (Fig. 3). Specimens are housed at WWUC and WSDAC.

Tenthredinidae, Nematinae

Cladius grandis **(Serville, 1823)**

The earliest North American collections for this Palaearctic species are from Albany, New York, in 1887 (Smith 1974a). The species was presumably introduced separately to the west coast, with records from British Columbia in 1914 (Blackmore 1917). The specimens from British Columbia were first described as a new species, *Platycampus victoria* MacGillivray, 1920, reared from *Populus nigra* L. (MacGillivray 1920). In most previous literature, the species is known as *Trichiocampus viminalis* (Fallén, 1808). The most common host plants are *Populus* spp., although *Salix* (Benson 1958, Raizenne 1957) and *Alnus* P. Mill. (Smith 1974a) are also recorded. It has been reported as a minor pest of *Populus* L. in eastern North America and British Columbia (Béique 1961, Downes 1925). In Quebec, the species is bivoltine, with adults active in late May and early June, and again in late July through September (Béique 1961). There appears to be only one generation per year in British Columbia (Downes 1925). A single specimen from Washington was collected in a Malaise trap on the Evergreen State College campus in 1997 (Fig. 4), and detected while examining unidentified material in the college's natural history museum. The specimen is housed at WSDAC.

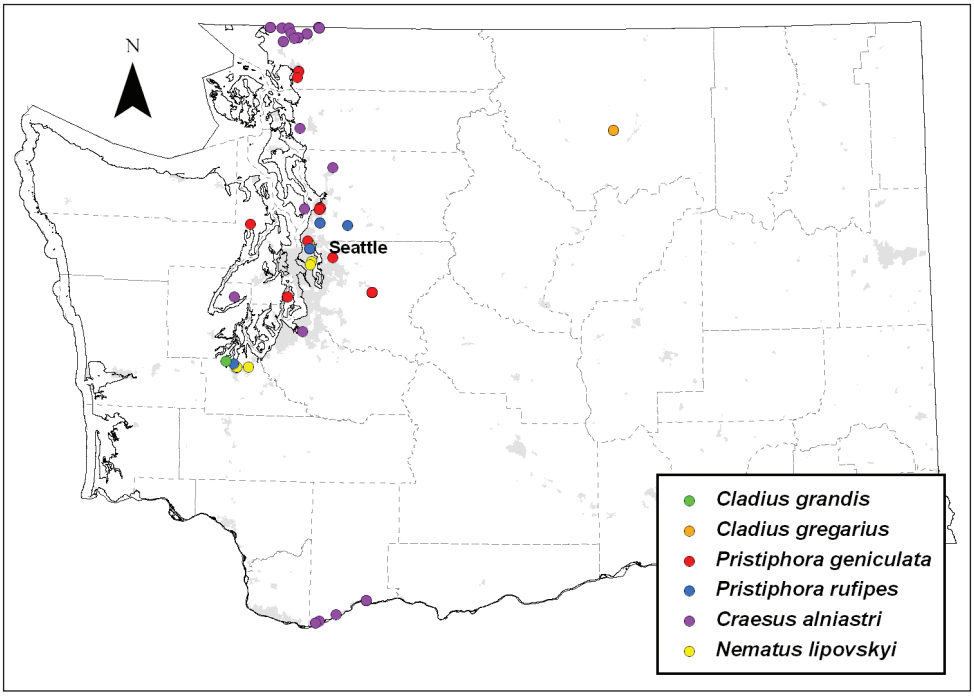

Figure 4. Localities of Nematinae (Tenthredinidae) newly detected in Washington State.

Cladius gregarius Dyar, 1895

This poplar-feeding species is native to North America, and is known from the northeastern United States and adjacent Canada, west to Michigan and Ontario (Smith 1974a, 1979a). Larvae feed on species of *Populus* in the spring, and adults can be found in late summer and fall. Two adult specimens were reared from larvae collected on *Populus tremuloides* Michx. in Okanogan County, Washington, 2010 (Figs 4–5). A visit to the same site in late summer 2013 failed to find more larvae, although similar feeding damage was seen on trees throughout the area. Specimens are housed at WSDAC.

Pristiphora geniculata (Hartig, 1840)

Pristiphora is a large, primarily Holarctic genus, although there are several described Neotropical and southern Asian species (Taeger et al. 2010). The genus is most diverse in Europe, with ca. 115 known species. Five European *Pristiphora* spp. introduced to North America are pestiferous, including *P. geniculata*. This species was first detected in the United States in Haines Falls, New York, and in Massachusetts in 1926, and now occurs throughout the northeastern states and provinces, and west to Minnesota and Ontario (Schaffner 1936, Smith 1979a). *Pristiphora geniculata*

Figure 5. *Cladius gregarius* larvae on poplar, Okanogan County WA.

feeds on *Sorbus aucuparia* L., *S. americana* Marshall, *S. decora* (Sarg.) C.K. Schneid., and the hybrid cultivar *Sorbaronia hybrida* (Moench) C.K. Schneid. (Forbes and Daviault 1964). Kunneman and Albers (1991) list *P. geniculata* as a pest of *Tilia* L., but this seems to be a misreporting of the "elm sawfly", *Cimbex americana* Leach, 1817 (Cimbicidae; Dirr 1983, Sinclair et al. 1987). Larvae are voracious feeders and can almost completely defoliate healthy trees; however, mortality of even repeatedly defoliated trees is infrequent (Forbes and Daviult 1964). Release and establishment of the ichneumonid *Olesicampe geniculatae* Quednau and Lim in the eastern states and provinces has resulted in diminished outbreaks of *P. geniculata* since the 1980s (Kelleher and Hulme 1984, Quednau 1990).

The species was first detected in Washington State in 2009, and is now common throughout the Puget Sound region (Fig. 4). Most specimens have been found via visual survey of defoliated trees, where larvae were readily apparent and subsequently reared. Several adults were reared from *Crataegus douglasii* Lindl. (a native hawthorn species) in 2011 and 2012, a new host record for the species (Fig. 6). The record in Washington probably represents a separate introduction event, either from its native range or a translocation from eastern North America. Specimens are housed at WSDAC.

Figure 6. *Pristiphora geniculata* larvae on *Crataegus douglasii*, Whatcom County, WA.

Pristiphora rufipes Serville, 1823

Pristiphora rufipes is native to central Europe, and spread to the United Kingdom in the mid-20th century (Benson 1947). It was first recorded in North America from Ottawa, Canada, in 1963 (MacNay 1964). The species is a significant pest of *Aquilegia* L. (Alford 2012). The species was previously known from the eastern states and provinces to the midwest. Most North American literature refers to the species by the synonym *Pristiphora aquilegiae* Snellen van Vollenhoven, 1866. It has been present in Washington since at least 1996, when Seattle-area gardeners began complaining of a new and voracious pest on columbine (Seattle Times 1996). Populations in Washington are currently known from Snohomish, King, and Thurston Counties (Fig. 4). The species has at least three generations per year in western Washington, with larvae present as late as November (Table 1). Specimens are housed at WSDAC.

Craesus alniastri (Scharfenberg, 1805)

Craesus alniastri is an alder-feeding nematine sawfly native to Europe, where it has been well-studied for its distinctive larval feeding aggregations (e.g., Boevé 1991). Buckle (1930) collected a single specimen of *C. alniastri* on parsnip flowers near Mt. Royal

(Montreal), Quebec, Canada, in 1926, and Kirby (1882) lists a single male specimen housed in the Natural History Museum, London, that was collected in Nova Scotia. Smith (1972) does not report any further specimens, and there appears to be no further literature discussing the species in North America. Prous et al. (2014) reassign species in this genus to *Nematus*.

Numerous specimens of *C. alniastri* were collected in western Washington while conducting surveys for alder-feeding sawflies throughout the Pacific Northwest in 2009–2011 (Fig. 4). Adult specimens were collected from May through August. Specimens were collected very near the British Columbia and Oregon borders, indicating that the species is likely widespread in the region. An additional female specimen collected near Seattle in 1976 is in the USNM; other voucher specimens are deposited at WSDAC.

Nematus lipovskyi Smith, 1974

This species was described from the eastern United States (Smith 1974b) and is known from Maine to Alabama, and west to Wisconsin. It is recently established in the Czech Republic (Macek and Šípek 2014). Larvae feed on deciduous azaleas in the *Pentanthera* subgenus and section of *Rhododendron* (e.g., *R. viscosum* (L.) Torr., *R. molle* (Blume) G. Don, *R. luteum* Sweet, and *R. calendulaceum* (Michx.) Torr.). Macek and Šípek (2014) also noted feeding damage on *R. obtusum* (Lindl.) Planch. inflorescences, but proposed that this was opportunistic feeding due to the proximity of more suitable host plants. This species is reassigned to *Euura* in Prous et al. (2014).

A 1996 specimen from Lacey, Washington, is the earliest record from the western USA. Larvae have been observed in several locations in King, Thurston, and Clark counties (Fig. 4). Adults were collected in Olympia, Washington, in April 2015, and are stored at WSDAC.

Tenthredinidae, Heterarthrinae

Heterarthrus nemoratus (Fallén, 1808)

Heterarthrus is a relatively small genus of leaf-mining sawflies native to Europe and Asia, which generally mine leaves of trees in Aceraceae, Betulaceae, and Salicaceae (Taeger et al. 2010). Two species have been introduced to North America, *H. nemoratus* and *H. vagans* (Fallén, 1808), which mine species of *Betula* L. and *Alnus*, respectively (Smith 1971, Taeger et al. 1998, Humble 2010). *Heterarthrus nemoratus* was first collected in North America in Pictou, Nova Scotia, in 1905 (Dowden 1941), and now has a transcontinental distribution in Canada (Digweed et al. 2009). Digweed et al. (2009) review the biology and provide detailed keys to mines, larvae, and adults of this and other birch-feeding Heterarthrinae in North America. The earliest known Wash-

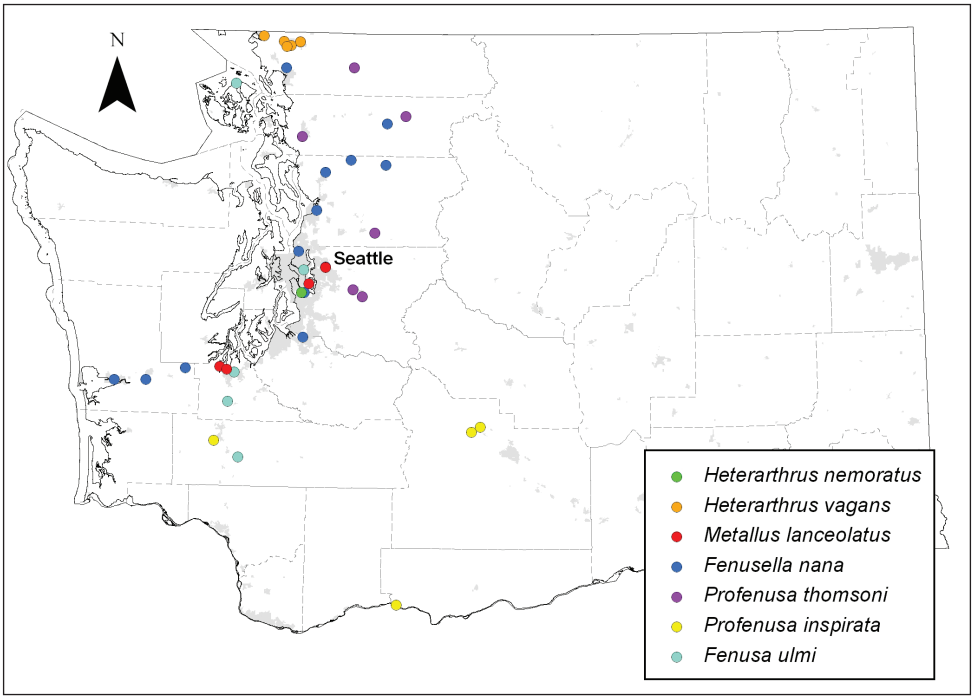

Figure 7. Localities of Heterarthrinae (Tenthredinidae) newly detected in Washington State.

ington specimen is a female collected in Whatcom County (the northern-most county in western Washington) in 1967, housed at WWUC. Specimens are also known from the Seattle area (Fig. 7), and the species is likely widespread in western Washington.

Heterarthrus vagans (Fallén, 1808)

Heterarthrus vagans was recently detected in North America, discovered in British Columbia in 2009 in numerous locations west of the Cascade Range and very close to the Washington State border (Humble 2010). Visual and sticky trap surveys in 2011 and 2012 detected the species at six sites in Whatcom County (Fig. 7). We have not yet found the species south of Whatcom County, but the widespread distribution of alder makes it likely that this species will continue to spread through Washington and into Oregon. This species' mines are identifiable by the round cocoon formed in the leaves of its host plants; other *Heterarthrus* spp. pupate outside of leaves (Humble 2010). Specimens are housed at WSDAC.

Metallus lanceolatus (Thomson, 1870)

Metallus lanceolatus (referenced as *M. gei* (Brishcke, 1883) in much of the European literature) is a leaf-miner of *Geum* L. The earliest North American specimens of this Palaearctic species were collected in British Columbia in 1933, and multiple specimens were collected

in the northeastern USA and Canada in the 1960s (Smith 1971). Smith (1971) described *M. bensoni* as a new species from the New York and British Columbia specimens; Koch (1989) subsequently recognized *M. bensoni* and *M. gei* as junior synonyms of the Palaearctic *M. lanceolatus*. *Metallus lanceolatus* forms coalescing blotch-mines in ornamental and wild *Geum*, and can be a pest of garden plants (Buhr 1941, Hoebeke and Wheeler 2005). It has apparently spread through southern Puget Sound (Fig. 7), where it was found attacking *Geum macrophyllum* Willd. in cultivated and wild conditions. Specimens have been hand-collected and captured in Malaise traps. The earliest mines in a large patch of *G. macrophyllum* near Olympia, Washington, were visible by early July in 2012 and 2013, and could be found on nearly every plant by mid-July of both years. Specimens are housed at WSDAC.

Fenusella nana **(Klug, 1816)**

This Palaearctic species is commonly recorded in the literature as *Messa nana* (see Taeger and Blank 1998 for nomenclatural discussion). *Fenusella nana* larvae form coalescing blotch mines in many birch species (e.g., Buhr 1941, Taeger et al. 1998, Digweed et al. 2009). The first North American records for this leafminer are from Maine in 1966 (Smith 1967). It has since spread across Canada and into Washington State (Digweed et al. 2009). Digweed et al. (2009) review its biology and provide detailed keys to mines, larvae, and adults of this and other birch-feeding Heterarthrinae in North America. This species has been collected as far southwest as Hoquiam, Grays Harbor County (Fig. 7). Voucher specimens are housed at the NRFC.

Profenusa thomsoni **(Konow, 1886)**

The first North American records for this birch leafminer are from Hamden, Connecticut in 1926. It was known from Maine, Ontario, Quebec, and Vermont by the 1960s (Smith 1971), and has since spread across Canada and into Alaska, the Yukon Territory, and Northwest Territories (Digweed and Langor 2004, Digweed et al. 2009, MacQuarrie et al. 2013). It is a significant pest in urban forests (Martin 1960, Drouin and Wong 1984, Snyder et al. 2007). Digweed et al. (2009) review its biology and provide detailed keys to mines, larvae, and adults of this and other birch-feeding Heterarthrinae in North America. The earliest Washington specimen was collected in 1967, in Whatcom County, and was discovered by examining specimens housed at WWUC. Numerous specimens have also been collected south to King County (Fig. 7) and are housed at NRFC.

Profenusa inspirata **(MacGillivray, 1909)**

Profenusa inspirata, a native North American species, is the only known sawfly leafminer of oaks in western North America. It creates blotch mines in the upper surface of oak leaves (Fig. 8), that can coalesce when multiple larvae are present in a leaf. The

Figure 8. *Profenusa inspirata* mines on *Quercus garryana*, Yakima County, Washington.

species was previously known from Nevada, California, and Oregon (Smith 1971). Multiple mines were observed in Garry oak (*Quercus garryana* Douglas ex Hook.) along the Tieton River, Yakima County, and in Skamania and Lewis counties in 2015 (Fig. 7). Larvae were identified using characters described in Smith (1971). Voucher specimens are at WSDAC.

Fenusa ulmi Sundevall, 1847

This Palaearctic elm leafminer was already well established in New York by 1898 (Felt 1898), and was certainly introduced with elms from Europe. It is known to attack several elm species, especially *Ulmus glabra* Huds. and its hybrids (Slingerland 1905, Liston 1993, Scannell 2000); Scannell (2000) added *U. pumilla* L. and *U. davidiana*

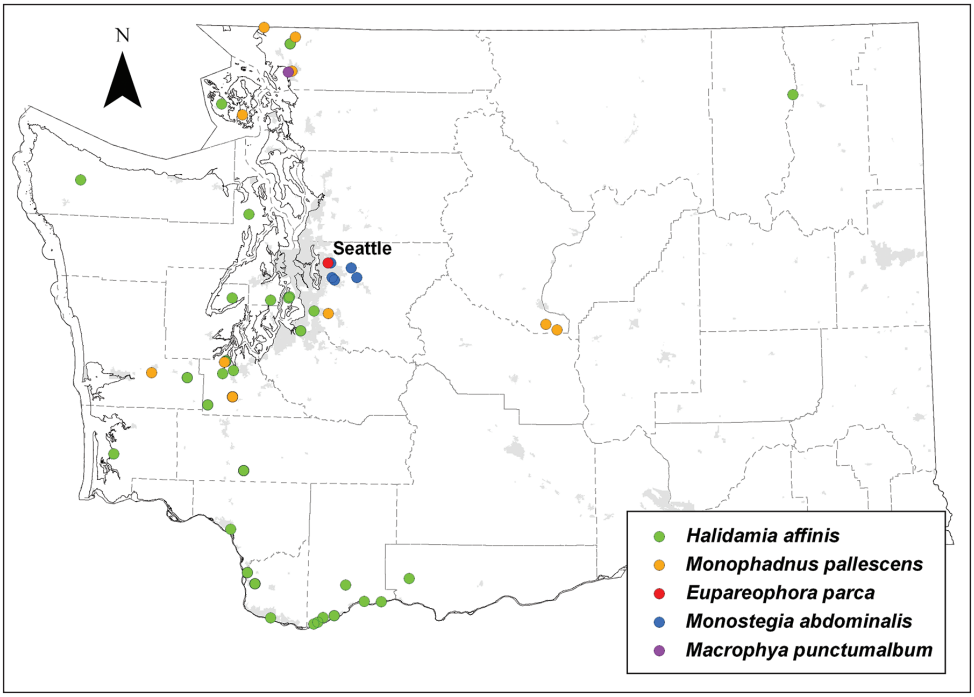

Figure 9. Localities of Blennocampinae, Allantinae, and Tenthredininae (Tenthredinidae) newly detected in Washington State.

Planch. to the known elm hosts. Early records of significant damage to *U. americana* L. seem to be unsubstantiated, with most authors reporting that larvae are unable to do more than initiate feeding (Slingerland 1905, Guries and Smalley 1994, Scannell 2000). Scannell (2000) provided detailed information on the life history and host preferences of this species in the Seattle area. The oldest known west coast specimens were collected in British Columbia in 1947, and are stored in the Canadian National Collection (H. Goulet, pers. comm.). There is anecdotal evidence that the species has been present in Washington since the early 1990s (Scannell 2000), and has since spread south through the Puget Sound area (Fig. 7). Washington State voucher specimens are at WSDAC.

Tenthredinidae, Blennocampinae

Halidamia affinis (Fallén, 1807)

This is an introduced European species that feeds on *Galium* L (Smith 1969, Taeger et al. 1998). The earliest North America records are 1931 from Cold Spring Harbor, New York, 1933 from Connecticut, and 1934 from New Jersey (Smith 1969). It has since spread to California and the Pacific Northwest. The species is common and was col-

lected as larvae from host plants and readily on yellow sticky traps and in Malaise traps in nearly every county surveyed (Fig. 9). Voucher specimens are at WSDAC.

Monophadnus pallescens (Gmelin, 1790)

A *Ranunculus*-feeding European introduction, this species has been present in the eastern United States and Canada since the late 1800s and in British Columbia since at least 1919 (Smith 1969). This species is widespread (Fig. 9), and was collected with sticky card traps, Malaise traps, and by hand. The earliest specimens discovered from Washington were collected in Whatcom County in the late 1960s, and were found in the material at WWUC. Numerous species of *Ranunculus* L. provide suitable hosts in western Washington, including the widespread invasive European weed *Ranunculus repens* L. Voucher specimens are housed at WWUC and WSDAC.

Eupareophora parca (Cresson, 1880)

The genus *Eupareophora* contains three species, with only *E. parca* native to North America. It is known from most of the northeastern and central states, and north and west to Alberta (Williams 2007). The species is not known from the Rocky Mountains, but has been collected from several northern California locations and Oregon (Smith 1969). The single historical specimen from Oregon was collected by Koebele, who collected in and around California in the 1880s. Most collection records for this western disjunct population are from California (Smith 1969), suggesting the species may have been native to eastern North America and spread west via human commerce. Williams (2007) similarly suggests that the species was not present in Alberta until the early 2000s. Several *Fraxinus* L. species are recorded hosts, as well as *Carya illinoinensis* (Wangenh.) K. Koch (Smith 1969) and *Chionanthus* L. (Dyar 1898), although Smith (1969) described the latter association as "dubious". Larvae are readily recognizable by the bristly appearance caused by numerous thick, bifurcate spines. Williams (2007) presented a very detailed account of larval and adult biology in Alberta. Heavy ash defoliation and shed skins of an unknown sawfly were noticed at a public park on the border of King and Snohomish counties in 2014, but no living animals were observed. A return visit in May 2015 found the easily identifiable larvae feeding on *Fraxinus latifolia* Benth. throughout the park (Fig. 9). Voucher specimens are at WSDAC.

Tenthredinidae, Allantinae

Monostegia abdominalis (Fabricius, 1798)

Monostegia abdominalis is a European sawfly pestiferous on *Glaux* L., *Lysimachia* L. and *Anagallis* L. (Price 1970, Taeger et al. 1998). It was first collected in North America

in Massachusetts in 1899, and described as *M. martini* MacGillivray, 1908 (Smith 1979b). In late summer of 2013, noxious weed management staff in King County noticed heavy defoliation of populations of *Lysimachia vulgaris* L., regulated as a noxious weed in Washington State, by unknown sawfly larvae. Larvae were subsequently collected and reared in the lab on a *Lysimachia* cultivar in 2014. Specimens are known from several *Lysimachia* infestations in western Washington (Fig. 9). Voucher specimens are at WSDAC.

Tenthredinidae, Tenthredininae

***Macrophya punctumalbum* (Linnaeus, 1767)**

This adventive European species was first recorded in North America from Toronto, Ontario, in 1932, from British Columbia in 1934 (Gibson 1980), and later from New York (Hoebeke and Johnson 1985). Larvae feed on *Ligustrum* L., *Syringa* L., and *Fraxinus* (Gibson 1980). A specimen collected in 1977 in Bellingham, Washington, and housed at WWUC is the only record from Washington State (Fig. 9).

Discussion

In addition to expanding regional knowledge of an ecologically interesting and economically important group of insects, these data highlight the continual intra-continental spread of introduced species. Eighteen of the 22 sawflies reported here represent range expansions for exotic sawflies introduced to North America long ago. Most of these species were first recorded from eastern states or provinces, likely introduced with nursery stock. Five species may have been first or simultaneously introduced on the west coast based on their historical detection data - *Cladius grandis*, *Heterarthrus vagans*, *Metallus lanceolatus*, *Monophadnus pallescens*, and *Macrophya punctumalbum*. It is unknown how most of the introduced species became established in the west. Certainly, commerce from eastern North America could explain the distribution of some species. For some pests of common cultivated plants, such as *Pristiphora rufipes* and *Neodiprion sertifer*, it seems probable that insects were transported inadvertently with nursery trade or by home gardeners, although natural dispersal by adults can not be discounted.

The movement of other species, such as *Halidamia affinis* and *Monostegia abdominalis*, is more mysterious – *Galium* is not commonly cultivated, and *Lysimachia vulgaris* is a noxious weed. *Halidamia affinis* has likely spread of its own accord, expanding through the immense range of its host plant, *Galium*. *Monostegia* may have moved with other cultivars of *Lysimachia* that are commercially sold, although one would expect that such voracious and notable sawfly larvae on garden plants would have been reported. The reports of previously more southern species, such as *Profenusa inspirata* and *Eupareophora parca* could indicate northward range expansion concurrent with in-

creasingly moderate winters. *Profenusa inspirata* in particular seems suggestive of such new expansion, since Garry oak conservation and ecology have long been studied in the Puget Sound region. However, it is certainly possible that *P. inspirata* has been present but undetected in Washington for decades.

The older specimens recorded here from collections made decades ago emphasize the value of institutional insect collections as repositories of valuable biodiversity information. It is noteworthy that for several of the species discussed herein, the first records for the state were found in the holdings of the insect collections at regional universities, providing evidence that many species had been transported west earlier than was previously known, or were perhaps derived from separate introduction events. Thus, despite the relatively small size of such collections compared to those at land grant universities, these collections fill a valuable role in documenting shifts in regional species composition. As a whole, the data from all museum specimens examined during this research also demonstrate gaps in our regional knowledge of sawflies. Unsurprisingly given remoteness and lack of access, the arid Columbia Basin and rugged mountain ranges in Washington are less frequently collected than other parts of the state (Fig. 2). Undoubtedly, other sawfly species occur in Washington that as yet are undetected and perhaps limited to these under-surveyed habitats. For example, the juniper-feeding genus *Susana* Rohwer & Middleton, 1932 occurs in states and provinces surrounding Washington but has not been recorded from the state.

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