

# COLUMBIA SIDEBAND (*MONADENIA FIDELIS COLUMBIANA*) SURVEYS IN NORTHWEST OREGON

FINAL REPORT FROM THE XERCES SOCIETY TO THE INTERAGENCY SPECIAL STATUS SENSITIVE SPECIES PROGRAM (ISSSP)

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THE XERCES SOCIETY FOR INVERTEBRATE CONSERVATION

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## SUMMARY

Candace Fallon and Sarina Jepsen (Xerces Society) conducted surveys for the Columbia sideband (*Monadenia fidelis columbiana*) in May of 2014 in the Columbia River Gorge National Scenic Area (CRGNSA), Mt. Hood National Forest (Zig Zag Ranger District), and Salem BLM District (Tillamook Resource Area) in Multnomah, Clackamas, Hood River, and Yamhill Counties, Oregon. The primary purpose of these surveys was to determine whether this snail occurred on Forest Service or Bureau of Land Management land. Surveyors prioritized visiting sites with suitable habitat at or near historic localities. Surveyors visited 22 locations and collected 29 specimens of *M. fidelis* at 10 different sites. All *M. fidelis* specimens were determined by Barry Roth to be the target subspecies, *M. f. columbiana*. Collections of this subspecies from the Salem BLM in Yamhill County represent a range extension for this subspecies in Oregon. Surveyors also collected a variety of other snails encountered during surveys to gather presence/absence data on regional snail species, totaling 115 specimens from 12 different species (see table below). The Oregon Forest Service strategic species *Vespericola depressa* was found at one site in the CRGNSA. No other sensitive or strategic species were encountered during these surveys. Of note, however, is the collection of several *Allogona townsendiana frustrationis* from one of the Mt. Hood NF sites (East Welches Rd 1). This marks a range extension for this subspecies as well, which was previously only documented in southwest Washington (Burke 2013, Burke 2014, pers. comm.).

Table 1: Summary of all species collected

Species name	# specimens	# sites	Unit(s)
<i>Allogona townsendia frustrationis</i>	8	1	MTH
<i>Ancotrema hybridum</i>	4	2	MTH
<i>Ancotrema sportella</i>	37	9	MTH, CRGNSA, SAL
<i>Cryptomastix germana</i>	2	1	SAL
<i>Haplotrema vancouverense</i>	20	10	MTH, CRGNSA, SAL
<i>Monadenia fidelis columbiana</i>	29	10	CRGNSA, SAL
<i>Nesovitrea binneyanna</i>	1	1	SAL
<i>Punctum randolphi</i>	2	1	CRGNSA
<i>Striatura pugetensis</i>	1	1	CRGNSA
<i>Vespericola columbianus latilabrum</i>	12	9	MTH, CRGNSA, SAL
<i>Vespericola columbianus latilabrum?</i>	2	1	CRGNSA
<i>Vespericola columbianus ssp. (pilosa)</i>	20	4	CRGNSA
<i>Vespericola depressa</i>	1	1	CRGNSA
<i>Vespericola sp.</i>	4	1	CRGNSA
<i>Vespericola sp.?</i>	1	1	SAL

## INTRODUCTION

The Pacific sideband, *Monadenia fidelis*, is a large terrestrial snail occurring from southern Alaska to northern California. It is found primarily on the west side of the Cascade Mountain range, although several populations have also been found on its eastern slopes in Oregon and Washington (Burke 2013). It is the largest and most conspicuous native land snail in the Pacific Northwest, associated with moist forests of mixed hardwoods, conifers, and/or shrubs. The Pacific sideband is most commonly encountered in the spring, when snails leave their overwintering areas (usually located under moss or duff at the bases of bigleaf maples) and become active on the surface. There are five described subspecies of this snail in the Pacific Northwest, including the Columbia sideband, *Monadenia fidelis columbiana*. This subspecies is most common in the Columbia Gorge in Skamania County, WA, and around Mt. Hood in Oregon, where its range overlaps with that of the more prevalent and widespread *M. f. fidelis* (Burke 2013).

The conservation status of *M. f. columbiana* is as follows: Global Status G4G5T1 (last reviewed 12 May 2003), Rounded Global Status T1 – critically imperiled, National Status N1 (last reviewed 12 May 2003), State Status Oregon S1 – critically imperiled (NatureServe 2014). This species has not yet been assessed for the IUCN Red List.

In May of 2014 Candace Fallon and Sarina Jepsen (Xerces Society) spent four days surveying for *M. f. columbiana* near historic localities and at sites from which recent, tentatively identified specimens have been collected (Yamhill Co). Vouchers were collected for both *M. fidelis* and for a number of other snail species encountered during surveys. All snails were identified by Barry Roth (*Monadenia fidelis*) and Tom Burke (all other species). *Monadenia fidelis columbiana* was collected from ten sites in the Columbia River Gorge National Scenic Area and the Salem BLM, Tillamook Resource Area.

## SURVEY PROTOCOL

### SITE SELECTION

Survey sites were selected by reviewing known habitat associations and collection localities for *M. fidelis columbiana* and the parent species. Prior to these surveys, this subspecies was known from four general areas: Carson, Swift Creek, and Curly Creek in Washington, and Benson State Park and the Salmon River in Oregon. In addition, four unconfirmed collections (labeled *Monadenia fidelis* cf. *columbiana*) are known from the Salem BLM and the lava beds on the Mt. Hood National Forest near Laurance Lake. Surveys for this subspecies have been recommended in the northern Oregon Cascades and throughout the Columbia River Gorge (Johannes 2009, cited in Foltz 2009). We focused our surveys on appropriate habitat in three regions in Oregon: (1) the Columbia River Gorge National Scenic Area between Benson State Park and the Oregon side of the Gorge across from Carson, WA; (2) areas near the Salmon River and Still Creek on the Mt. Hood National Forest; and (3) Salem BLM land in the Tillamook Resource Area.

The parent species is found in mesic forest habitats or near springs and other water sources in forested areas, generally with rock substrates or large woody debris and logs for refugia. The habitat for this subspecies is described as relatively low elevations in comparatively uncut, partly shaded, somewhat rocky Douglas-fir forest (Frest and Johannes [n.d.], cited in Foltz 2009). The taxon appears to favor shaded basalt outcrops and talus in seasonally moist areas (Frest and Johannes [n.d.], cited in Foltz 2009). This habitat type is relatively abundant in the Columbia River Gorge and Zig Zag Ranger District, presenting a wide variety of potential survey locations. Final

survey locations were selected in consultation with biologists familiar with the area, including Brett Carré (CRGNSA) and Jeff Goldberg (Mt. Hood NF).

Until recently, this subspecies was not known from any Oregon localities west of Latourell Falls and Benson State Park in the Columbia River Gorge National Scenic Area (Foltz 2009). However, surveys in 2012 and 2013 in the Tillamook Resource Area of the Salem BLM District turned up two specimens (a live juvenile and an empty shell), both of which were tentatively identified by Barry Roth as *M. f. cf. columbiana*. In addition, two specimens from the lava beds near Laurance Lake on the northeast flank of Mt. Hood were also tentatively identified as *M. f. cf. columbiana*. If confirmed, these localities would represent a range extension for the subspecies in Oregon, and additional surveys to collect adult specimens from these two areas are warranted. In 2014 we were able to revisit the Salem locality but surveys to the lava beds on Mt. Hood were canceled due to inappropriate weather conditions (too dry in the spring, and then an early freeze in the fall). Jessie Mahannah Huck (Salem BLM District) provided detailed survey data for the Salem BLM records and assisted us in the field with revisiting these survey plots.

## SURVEY PERIOD

At the species level, this taxon appears to be active mostly in spring (Evergreen State College 2008, cited in Foltz 2009). Records for the subspecies span late spring through early summer (May – July) with an additional record from November (see Appendix II). The majority of records with known collection dates (5 out of 8) are from May, thus we targeted this month for our own surveys. The Laurance Lake surveys were postponed until fall due to unseasonably warm and dry spring weather; however, the fall surveys were ultimately canceled due to a hard freeze, which likely spurred winter hibernation for individuals in that area.

## SAMPLING METHODOLOGY

We followed the general Gastropoda and species specific survey protocols for *M. f. columbiana* developed by Foltz (2009) and Duncan et al (2003). Many terrestrial snail species, including *Monadenia* spp., are thought to be crepuscular (active at dawn and dusk) but to maximize our survey effort we conducted full-day surveys between the hours of 8:30 AM and 4:00 PM. Whenever possible, we opted for cool, overcast, or rainy days, or days that directly followed good rains, to ensure mollusk activity. At each site or site complex, we spent a minimum of 10 minutes carefully examining the substrate for mollusks. If no mollusks were encountered in that time span, we moved on to a new site. Specimens were hand collected and placed in collection jars in a cooler. All *Monadenia* species collected were kept alive and shipped overnight to Barry Roth for identification, who then preserved juveniles and tail snips in 95% EtOH. Specimens to be dissected were drowned and then transferred by graduated series into 80% ethanol. All other mollusk species collected were drowned in water overnight and then preserved in 95% ethanol (empty shells were wrapped in paper) and sent to Tom Burke for identification.

## SITES SURVEYED AND SURVEY RESULTS

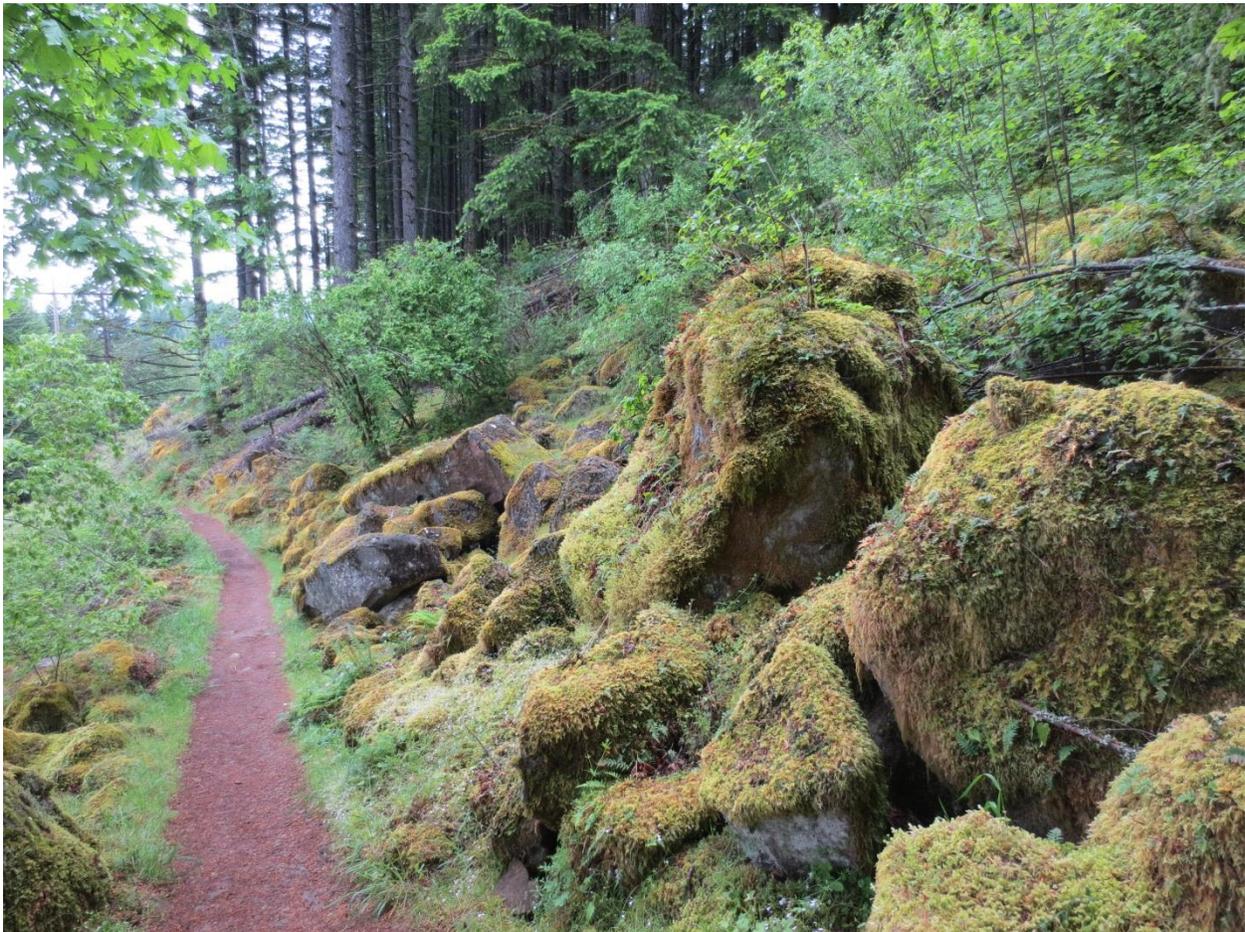
All sites visited in 2014 were surveyed by Candace Fallon and Sarina Jepsen (Xerces Society) with additional agency biologists assisting two out of the four survey days. Surveyors spent two days in the Columbia River Gorge National Scenic Area, one day in the Mt. Hood National Forest, and one day in the Salem BLM District, Tillamook Resource Area. A summary of sites visited and all species collected is available in Appendix I. A table of all previously known records of this subspecies in Oregon and Washington is provided in Appendix II. Appendix III includes a map of all previously known site localities (including the suspected localities in Yamhill and Hood River Counties) and the

locations of all 2014 surveys. Appendix IV contains aerial maps of each general survey area. Below we provide a brief habitat description and species summary for each site visited in 2014.

#### MAY 19, 2014: COLUMBIA RIVER GORGE NATIONAL SCENIC AREA, HOOD RIVER COUNTY

On May 19, 2014, Candace Fallon and Sarina Jepsen surveyed potential *Monadenia* habitat in the Columbia River Gorge National Scenic Area just east of Cascade Locks, Oregon. Sites were along three main hiking trails: Herman Creek Trail, Herman Bridge Trail, and the Pacific Crest Trail. All of these sites are within approximately 16 miles of the historic locality at Benson State Park and roughly 4 miles of historic localities in WA (although these are located across the Columbia River). *M. f. columbiana* was found at only one site (Pacific Crest Trail 1).

#### HERMAN CREEK 1 (SITE COMPLEX)



SURVEY TIME: 9:38 AM – 11:32 AM (114 minutes)

**Target species found:** No

**Habitat description:** This site complex is composed of several small talus slopes along the Herman Bridge Trail (to the north of Herman Creek). The first site (above) is a small talus slope with large mossy boulders near the junction of Herman Creek Trail and Herman Bridge Trail, in a forest clearing adjacent to open power lines. The overstory is

composed of bigleaf maple (*Acer macrophyllum*) and Douglas-fir (*Pseudotsuga menziesii*) with a midstory of cascara (*Rhamnus purshiana*), dogwood (*Cornus*), and oceanspray (*Holodiscus discolor*). Rocks are covered in thick mosses and some lichens, with small deer and maidenhair ferns (*Blechnum spicant* and *Adiantum pedatum*) persisting in moist cracks. Grasses are scattered throughout. The other three sites in this site complex were characterized by the same plant communities and varying sizes of talus slopes. Poison oak (*Toxicodendron diversilobum*), hazelnut (*Corylus cornuta*), and Oregon grape (*Mahonia* sp.) were found at the fourth site.

**Species observations and collections:** Multiple slugs and a number of snail species were observed at this site. We collected vouchers for *Vespericola columbianus* ssp. (*pilosus*), *Haplotrema vancouverense*, and *Ancotrema sportella*. We observed an Oregon slender salamander (*Batrachoseps wrighti*) nestled in grass and moss on one of the boulders. An American pika (*Ochotona princeps*) was also observed sitting and calling out from the base of the talus slope, near the trail, and again higher up the slope.





SURVEY TIME: 12:24 PM – 1:02 PM (38 minutes)

**Target species found:** No

**Habitat description:** This site is located to the south of Herman Creek, along the Herman Bridge Trail. It is composed of a rocky talus slope covered with thick moss. Overstory is dominated by Douglas-fir and bigleaf maple with some dogwood. The understory is composed primarily of mosses and some ferns.

**Species observations/collections:** Two shells of *Vespericola columbianus* ssp. (*pilosus*) and *Haplotrema vancouverense* were collected from talus boulders covered in moss.



SURVEY TIME: 1:23 PM – 1:51 PM (28 minutes)

**Target species found:** No

**Habitat description:** This site is located upslope of the Pacific Crest Trail with a dense overstory of Douglas-fir, bigleaf maple, vine maple (*Acer circinatum*), and oceanspray. The understory is composed of sword fern, false Solomon's seal (*Smilacina racemosa*), vanilla leaf (*Achlys triphylla*), poison oak, and Oregon grape. A very dense duff layer is present at this site, and it is moister than the two Herman Creek sites surveyed on this same date. This site is located on the forested back side of a large exposed basalt outcropping and is considerably more shaded than the previous sites with no open talus.

**Species observations/collections:** Two live *Haplotrema vancouverense* were collected from shaded moss substrate on the hillside.



SURVEY TIME: 2:33 PM – 4:03 PM (90 minutes)

**Target species found:** Yes

**Habitat description:** Shaded talus site with small to medium sized talus/cobble (adjacent to large cobble field). Rocks are mostly covered with thick moss. The plant community is composed of sword fern, oceanspray, fringecup (*Tellima grandiflora*), snowberry (*Symphoricarpos albus*), and poison oak. The overstory is mostly bigleaf maple with some Douglas-fir. The understory is relatively open but shaded. The Pacific Crest Trail runs along the downslope portion of this site. Downed wood is present throughout.

**Species observations/collections:** Four empty *Monadenia fidelis columbiana* shells were found in shaded, small to medium rocks in a talus slope just below a large basalt outcrop. Moss is abundant over rock surfaces. Many other mollusk species were observed and collected from this talus slope, including *Vespericola columbianus* ssp. (*pilosus*), *Ancotrema sportella*, *Punctum randolphi*, *Striatura pugetensis*, and two unknown *Vespericola* sp. In addition, several salamander species were found while looking through the substrate (see photos below).



## MAY 20, 2014: COLUMBIA RIVER GORGE NATIONAL SCENIC AREA, MULTNOMAH COUNTY

On May 20, 2014, Candace Fallon, Sarina Jepsen, Cathy Flick (CRGNSA), and Darci Rivers-Pankratz (USFS) surveyed several sites along the Columbia River Highway and Interstate 84 in the Columbia River Gorge. All of these sites were within approximately 7 miles of the historic Benson State Park collection. The Wahkeena Falls and Creek area (particularly Wahkeena Creek 1) had the highest abundance of *Monadenia* individuals seen out of any survey sites in 2014; these sites were the closest survey areas to the Benson State Park locality (less than a tenth of a mile away). *M. f. columbiana* was found at all of these sites except Ainsworth State Park.

### WAHKEENA CREEK 1



SURVEY TIME: 8:32 AM – 9:09 AM (37 minutes)

**Target species found:** Yes

**Habitat description:** The substrate at this site is composed of moss, leaf litter, small branches, downed wood, and rocks. The overstory is primarily bigleaf maple but also Douglas-fir and alder (*Alnus*). The understory is composed of waterleaf (*Hydrophyllum*), thimbleberry (*Rubus parviflorus*), false Solomon's seal, hazelnut, bleeding heart (*Dicentra formosa*), miner's lettuce (*Claytonia*), herb-robert (*Geranium robertianum*), bedstraw (*Galium*), inside-out flower (*Vancouveria hexandra*), and sword fern.

**Species observations/collections:** *Monadenia fidelis columbiana* specimens were collected about 5 feet north of Old Columbia Highway, and about 15 ft. southwest of Wahkeena Creek. Seven specimens (live and empty shells) were collected, mostly from a very small area (approximately 35 ft. by 15 ft.). The *Monadenia* population here appears quite abundant. Specimens were collected from moss, duff, and downed wood on the ground as well as from the trunks of bigleaf maple trees (see photo on first page of this report). Other mollusks collected include *Vespericola depressa* (an Oregon strategic species) and *V. columbianus latilabrum*.

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## WAHKEENA CREEK 2



**SURVEY TIME:** 9:15 AM – 9:30 AM (15 minutes)

**Target species found:** Yes

**Habitat description:** This seep is adjacent to the Wahkeena Falls parking area, on the southeast side. There is a cement rectangular block at the edge of the seep. Within the seep, where one adult *M. f. columbiana* was found, the plants included blackberry (*Rubus discolor*), maidenhair fern, fringecup, waterleaf, herb-robert, snowberry, vine maple, bigleaf maple, elderberry (*Sambucus*), sword fern, and nettles (*Urtica*). The ground is very damp, with rocks and Douglas-fir needles making up the substrate. Douglas-firs are found on the east side of the site.

**Species observations/collections:** One live snail and one empty shell (both *Monadenia fidelis columbiana*) were collected from maple leaf litter on the ground.

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WAHKEENA CREEK 3-6 (SITE COMPLEX)



SURVEY TIME: 10:24 AM – 11:56 AM (92 minutes)

**Target species found:** Yes

**Habitat description:** Several areas were sampled along the lower trail from Wahkeena Falls, on both the east and west sides of the falls themselves. Plant community composed of bigleaf maple, Douglas-fir, snowberry, oceanspray, maiden fern, thimbleberry, rose (*Rosa*), bedstraw, saxifrage (*Saxifraga*), mosses (including *Rhizomnium* and *Lycopodium*), and herb-robert. Rock/talus under moss covered with columbine (*Aquilegia formosa*), deer fern, sword fern, and vine maple. Basalt outcrops found near falls, characterized by dry soils and talus. Sea blush (*Plectritis congesta*), stonecrop (*Sedum*), and larkspur (*Delphinium*) found here in addition to other plants listed above.

**Species observations/collections:** *Monadenia fidelis columbiana* was found at several of these sites. In addition, we collected several specimens of *Vespericola columbianus latilabrum*.



SURVEY TIME: 1:06 PM – 1:26 PM (20 minutes)

**Target species found:** No

**NOTE:** Cathy Flick (CRGNSA) suggested we survey CRGNSA land on the southern boundary of Ainsworth State Park, which we attempted to do. However, we were unsuccessful in actually reaching this boundary, and instead surveyed land managed by Oregon State Department of Parks and Recreation.

**Habitat Description:** Dense Douglas-fir forest with vine maple, bigleaf maple, sword fern, wood sorrel (*Oxalis*), Oregon grape, and hazelnut. Ground is very rocky with big boulders covered in moss and vegetation. This is a moist, fully shaded site.

**Species observations/collections:** Four *Ancotrema* sp. were observed, one of which was collected and identified as *A. sportella*. A *Vespericola columbianus latilabrum* shell was also collected. Both were found on mossy rocks in dense shade. A tail dropper (*Prophyaon* sp.) was also observed on some leaf litter.



SURVEY TIME: 2:01 PM – 2:56 PM (55 minutes)

**Target species found:** Yes

**NOTE:** This site is located on land managed by Oregon State Department of Parks and Recreation (part of the John B. Yeon State Scenic Corridor). We mistakenly believed we were surveying land managed by the Columbia River Gorge National Scenic Area.

**Habitat Description:** Steep, mossy talus slope off bike path parallel to Interstate 84. Open full sun areas with shaded forest edges composed of bigleaf maple, Douglas-fir, sword fern, saxifrage, oceanspray, miner's lettuce, bleeding heart, and various grasses. This site is just west of Moffett Creek. Soil temperature in this area is very cool, at 3° C (37° F), and drafts of air can be felt coming up through the talus.

**Species observations/collections:** Four *Monadenia fidelis columbiana* were collected from cool mossy rocks in this area. In addition, 1 live *Vespericola columbianus latilabrum*, and one live *Ancotrema sportella* were collected. One *Ancotrema sportella* shell was also collected.

MAY 23, 2014: MT. HOOD NATIONAL FOREST, CLACKAMAS COUNTY

On May 23, 2014, Candace Fallon and Sarina Jepsen surveyed sites in the Mt. Hood National Forest near the Salmon River and Still Creek. The holotype and paratypes for *M. f. columbiana* were collected in this region prior to 1939, “near the Salmon River, 12 miles from Mt. Hood at Tawney’s hotel” (Pilsbry 1939). This hotel no longer exists, and its exact location is unknown, but discussions with Darci Rivers-Pankratz and neighbors in the area lead us to believe we found the site of the historic hotel (see photo below). This photo was taken on East Welches Road, just east of the junction with Bridge Street and northeast of the Salmon River. All sites surveyed in this area in 2014 are within 7.5 miles of this suspected location for Tawney’s Hotel; however, no *Monadenia* species were found at any of these sites.



Suspected location of the historic Tawney’s hotel near the Salmon River, OR.



SURVEY TIME: 10:04 AM – 10:33 AM (29 minutes)

**Target species found:** No

**Habitat description:** East side of East Welches Road on embankment composed of thick miner's lettuce, fringed cup, sword fern, waterleaf, blackberry, and herb-robert. Overstory of bigleaf maple, western red cedar (*Thuja plicata*). Parsnip present. Surveyed wet rocky seeps with downed logs, moss, and maple leaf litter. This locality is very close to the intersection of Welches Rd. and Salmon River Rd, which is adjacent to the suspected location of the historic collection from Tawney's hotel.

**Species observations/collections:** Seven *Allogona townsendiana frustrationis* as well as four live *Ancotrema sportella* and four shells of *Haplotrema vancouverense* were collected from this site. The *A. t. frustrationis* collections mark a range extension for this subspecies, which was previously only documented in southwest Washington. Burke (2014, pers. comm.) notes that these are also the largest specimens he has ever seen of this subspecies.



SURVEY TIME: 11:10 AM – 11:40 AM (30 minutes)

**Target species found:** No

**Habitat Description:** Open talus slope with large basalt outcrops by the Salmon River West trailhead (just before the bridge). Margins are shaded by alder and fir. Sparse undergrowth in talus area – grasses, stonecrops, saxifrage, oceanspray. Surveyed moist rocky areas near forested edges. Very little mollusk activity in this area; likely too exposed to the sun and not enough moisture.

**Species observations/collections:** Four live snails were collected from the base of the basalt outcrop above the talus slope: *Haplotrema vancouverense*, *Ancotrema sportella*, and *Vespericola columbianus* ssp. (*pilosa*). One empty shell of *A. sportella* was also found in moss on a shaded rock just within the tree line.



SURVEY TIME: 11:54 AM – 12:05 PM (11 minutes)

**Target species found:** No

**Habitat Description:** Seepy rock outcrop on east side of E. Welches Road. Bigleaf maple, sword fern, Douglas-fir, vine maple, saxifrage, and borage (*Mertensia*). Overstory of cedar and hemlock (*Tsuga*).

**Species observations/collections:** One live *Ancotrema hybridum* was collected below the wet seep on rock and moss substrate.

## STILL CREEK 1



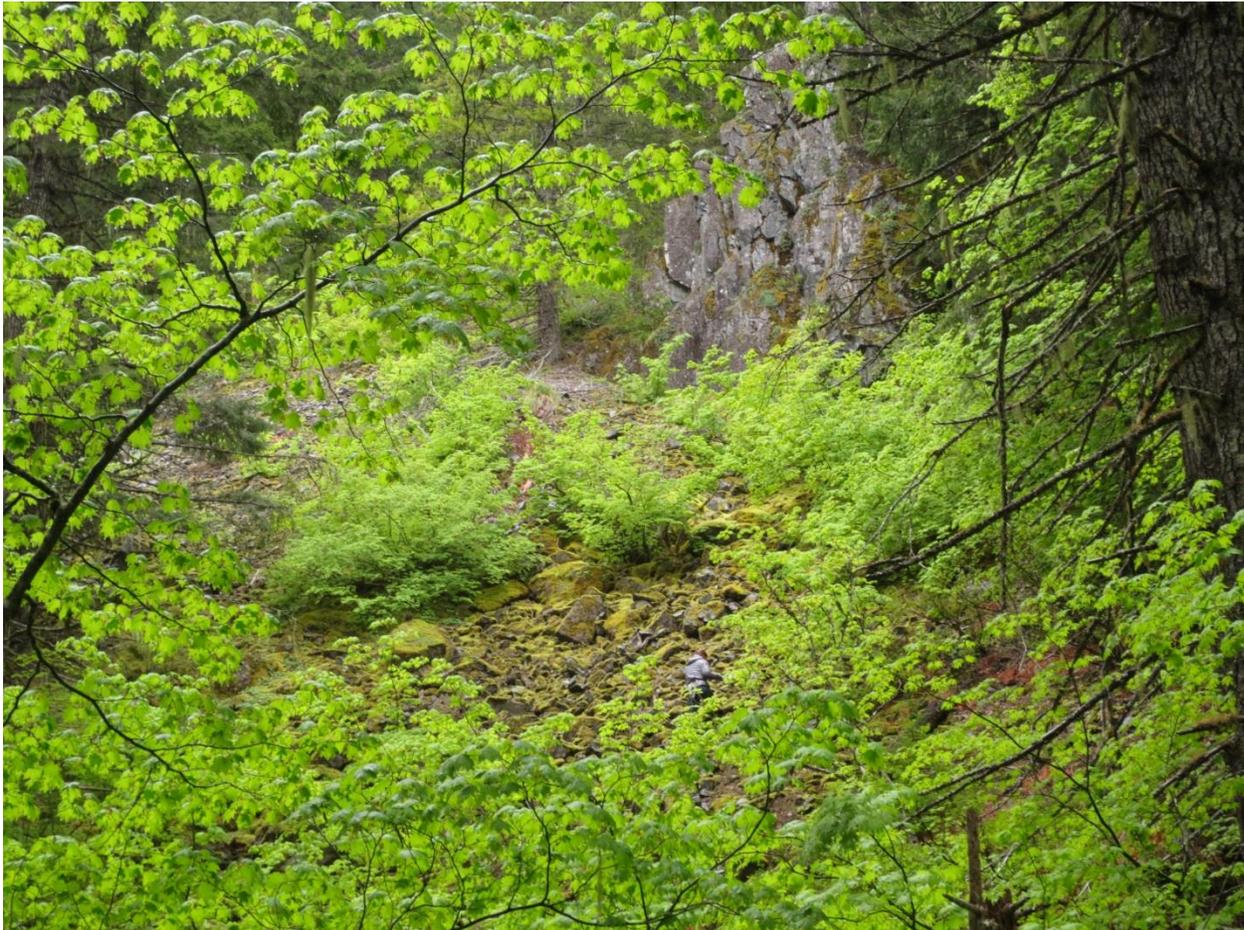
SURVEY TIME: 1:15 PM – 2:01 PM (46 minutes)

**Target species found:** No

**Habitat Description:** Open talus slope on west side of Still Creek Road, approximately 6.3 miles from beginning of Still Creek Rd. Alder, cedar, hemlock, salmonberry (*Rubus spectabilis*), lady fern (*Athyrium filix-femina*), sword fern, rhododendron (*Rhododendron*), vine maple, Douglas-fir, devil's club (*Oplopanax horridus*), and gooseberry (*Ribes lacustre*). While the soil and substrate surface was moist, it was very dry just below. This site may have provided better mollusk habitat earlier in the season, before the hot and dry weather

**Species observations/collections:** Three *Ancotrema hybridum* and one *Haplotrema vancouverense* were collected from under the moss-covered talus. Surveyors also observed a rough-skinned newt (*Taricha granulosa*) and an unidentified yellow-backed small salamander in the talus (see photos below).





SURVEY TIME: 2:13 PM – 2:30 PM (17 minutes)

**Target species found:** No

**Habitat Description:** Open talus slope covered in moss and lichen with large basalt outcrops above. Base of the slope is filled with huckleberry (*Vaccinium*), moss, dwarf dogwood (*Cornus canadensis*), vine maple, kinnikinnick (*Arctostaphylos uva-ursi*). Overstory of Douglas-fir and some cedar. Surface of the rocks at this site is wet but underneath is quite dry – this site may provide good mollusk habitat earlier in the season or during years with a less hot and dry spring season.

**Species observations/collections:** No mollusks of any species were observed or collected at this site. Several pikas were heard calling out from the talus slope.

MAY 28, 2014: SALEM BLM DISTRICT, YAMHILL COUNTY

On May 28, 2014, Candace Fallon and Jessie Mahannah Huck (Salem BLM) revisited several terrestrial mollusk survey plots on the Salem BLM district. Two *Monadenia fidelis* specimens collected from these sites in 2013 were tentatively identified by Barry Roth as subspecies *columbiana*. All sites surveyed in 2014 are within 0.75 miles of the tentatively identified specimen localities. Tillamook 1-1 and 1-2 are off of NW Moores Valley Rd. Tillamook 2-1

and 2-2 are just off NW Von Rd, just south of the Carlton Reservoir. Tillamook 3-1 is just north of NW Meadowlake Road. *M. f. columbiana* was found at three of the five survey sites in 2014 (Till 2-1, Till 2-2, and Till 3-1).

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#### TILLAMOOK 1-1



SURVEY TIME: 8:29 AM – 8:49 AM (20 minutes)

**Target species found:** No

**Habitat Description:** Moist Douglas-fir forest with large amounts of downed wood. There is a thick ground cover here composed of snowberry, salal (*Gaultheria shallon*), Oregon grape, and sword fern. An intermediate second story of oceanspray and bigleaf maple persists at this site but otherwise the understory is relatively open. Thick moss is found underneath the vegetation layer.

**Species observations/collections:** *Haplotrema vancouverense* was collected from the inside of a moist rotting log. Another tiny snail, *Nesovitrea binneyana*, was collected from under the duff.



SURVEY TIME: 8:58 AM – 9:35 AM (37 minutes)

**Target species found:** No

**Habitat Description:** Moist “bowl” in the forest with cedar, Douglas-fir, bigleaf maple, hazelnut, and Indian plum (*Oemleria cerasiformis*). Sword fern is very large and abundant at this site (see photo). Fungi very common, lots of downed wood. Ground cover of inside-out flower and native blackberry (*Rubus ursinus*).

**Species observations/collections:** A lot of mollusk activity at this site (snails, slugs) and abundant slime trails. Nine mollusk specimens were collected from throughout the site on mossy duff, leaf litter, small forbs, and the bases of trees, including *Ancotrema sportella*, *Cryptomastix germana*, *Haplotrema vancouverense*, *Vespericola columbianus latilabrum*, and an unidentified *Vespericola* sp.



SURVEY TIME: 10:43 AM – 11:22 AM (39 minutes)

**Target species found:** Yes

**Habitat Description:** Small clearing in the forest downhill from NW Von Road. The overstory at this site is primarily alder and bigleaf maple. The understory is composed of large sword ferns, wood sorrel, miner's lettuce, some Oregon grape, and grasses. Mossy downed logs are scattered throughout the site.

**Species observations/collections:** One *Monadenia fidelis columbiana* was collected from a decaying branch in leaf litter at this site. Several other snails were collected from mossy logs, twigs, sword fern fronds, and leaf litter, including *Vespericola columbianus latilabrum*, *Ancotrema sportella*, and *Haplotrema vancouverense*.



SURVEY TIME: 11:28 AM – 11:56 AM (28 minutes)

**Target species found:** Yes

**Habitat Description:** This site is located upslope from NW Von Road. There are many recently fallen trees, making movement through the site difficult. The understory is thick with duff and vegetation, including salal, sword fern, snowberry, and moss. Overstory trees included bigleaf maple, Douglas-fir, and some hazelnut. Soil is slightly moist on the surface but dry below the duff layer.

**Species observations/collections:** One *M. f. columbiana* was collected on moss substrate. Two additional species, *Vespericola columbianus latilabrum* and *Haplotrema vancouverense*, were found on moss in leaf litter.



SURVEY TIME: 1:00 PM – 1:34 PM (34 minutes)

**Target species found:** Yes

**Habitat Description:** This is a young Douglas-fir forest with some bigleaf maple. The midstory is composed of oceanspray, dogwood, and alder. Ground cover is dense with vanilla leaf, sword fern, Oregon grape, salal, twinflower (*Linnaea borealis*), and rose, with a few open patches of mossy ground. Substrate is moss and duff with downed logs.

**Species observations/collections:** Two *M. f. columbiana* (a broken shell and a live juvenile) were collected from open mossy ground at this site. No other mollusk activity was observed. This site is fairly dry compared to the other Tillamook sites surveyed.

## RECOMMENDATIONS FOR FUTURE SURVEYS

Significant gaps exist in our knowledge of this subspecies' current and former distribution, ecology, and taxonomy. It is surprising that all *Monadenia fidelis* specimens collected for this project were identified as the target subspecies, *M. f. columbiana*, even though *Monadenia fidelis fidelis* is thought to be more prevalent and widespread in the Columbia River Gorge area (Burke 2013). The 29 new collections of *M. f. columbiana* from not only the Columbia River Gorge National Scenic Area but also the geographically disjunct Tillamook Resource Area of the Salem BLM raises questions about this subspecies' distribution and taxonomic status. To date, most work differentiating subspecies has resulted from inspection of morphological characteristics. Our understanding of the taxonomic placement of *Monadenia fidelis* in general would likely benefit from a study combining both genetic and morphological analyses to officially describe and separate the various subspecies.

Future surveys beyond the Columbia River Gorge NSA may be helpful in determining the full range of this subspecies and the habitats in which it can survive. Within the known range of *M. f. columbiana* in the Columbia River Gorge and Mt. Hood National Forest, we targeted areas with rocky, talus substrates in mixed coniferous/hardwood forests. However, the sites in which we found this subspecies in the Salem BLM District were on the whole less rocky and more dominated by sword fern and dense shrubs such as Oregon grape and salal. It is possible that this subspecies occupies a wider range of habitat types than currently known.

A priority for further surveys should be surveying the lava beds near Laurance Lake on the Mt. Hood National Forest in Hood River County, OR, which is the locality for two suspected *M. fidelis columbiana* vouchers (collected in November 2012 and May 2013). Confirmation of this subspecies in this area would be an eastern range extension and may indicate a range overlap with the Dalles sideband, *M. f. minor*, which is typically associated with dry, exposed basalt talus (more typical of the Laurance Lake localities).

## ACKNOWLEDGEMENTS

The authors gratefully acknowledge Barry Roth for identifying all of the *Monadenia* specimens collected during this project and Tom Burke for identifying all of the other mollusk species collected. Brett Carré (Columbia River Gorge National Scenic Area), Jeff Goldberg (Mt. Hood National Forest), Jessie Mahannah Huck (Salem District BLM), Kelli Van Norman (USFS) and Darci Rivers-Pankratz (USFS) all kindly provided maps, previous survey records, and advice on site selection, survey methods, and specimen preparation. In addition, we greatly appreciate assistance in the field from Cathy Flick (Columbia River Gorge National Scenic Area), Darci Rivers-Pankratz (USFS), and Jessie Mahannah Huck (Salem BLM). Kelli Van Norman (BLM) provided helpful feedback on the report.

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APPENDIX I: TABLE OF SITES VISITED AND SPECIES COLLECTED DURING 2014 SURVEYS

\*Target species and other species of interest are in **bold**.

Site Name	Land Mgr	County	Date surveyed	Species collected	# specimens
Herman Creek 1	CRGNSA	Hood River	19-May-14	<i>Vespericola columbianus</i> ssp. ( <i>pilosa</i> )	1
Herman Creek 1.1	CRGNSA	Hood River	19-May-14	<i>Haplotrema vancouverense</i>	1
Herman Creek 1.2	CRGNSA	Hood River	19-May-14	<i>Ancotrema sportella</i>	1
Herman Creek 1.3	CRGNSA	Hood River	19-May-14	<i>Ancotrema sportella</i>	2
				<i>Vespericola columbianus</i> ssp. ( <i>pilosa</i> )	5
Herman Creek 2	CRGNSA	Hood River	19-May-14	<i>Haplotrema vancouverense</i>	1
				<i>Vespericola columbianus</i> ssp. ( <i>pilosa</i> )	1
Pacific Crest Trail 1	CRGNSA	Hood River	19-May-14	<i>Haplotrema vancouverense</i>	2
Pacific Crest Trail 2	CRGNSA	Hood River	19-May-14	<i>Ancotrema sportella</i>	21
				<b><i>Monadenia fidelis columbiana</i></b>	<b>4</b>
				<i>Punctum randolphi</i>	2
				<i>Striatura pugetensis</i>	1
				<i>Vespericola columbianus</i> ssp. ( <i>pilosa</i> )	13
<i>Vespericola</i> sp.	4				
Wahkeena Creek 1	CRGNSA	Multnomah	20-May-14	<b><i>Monadenia fidelis columbiana</i></b>	<b>6</b>
				<i>Vespericola columbianus latilabrum</i>	1
				<i>Vespericola columbianus latilabrum?</i>	2
				<b><i>Vespericola depressa</i></b>	1
Wahkeena Creek 2	CRGNSA	Multnomah	20-May-14	<b><i>Monadenia fidelis columbiana</i></b>	<b>2</b>
Wahkeena Creek 3	CRGNSA	Multnomah	20-May-14	<b><i>Monadenia fidelis columbiana</i></b>	<b>1</b>

Site Name	Land Mgr	County	Date surveyed	Species collected	# specimens
Wahkeena Creek 4	CRGNSA	Multnomah	20-May-14	<i>Vespericola columbianus latilabrum</i>	2
Wahkeena Creek 5	CRGNSA	Multnomah	20-May-14	<b><i>Monadenia fidelis columbiana</i></b> <i>Vespericola columbianus latilabrum</i>	7 3
Wahkeena Creek 6	CRGNSA	Multnomah	20-May-14	<b><i>Monadenia fidelis columbiana</i></b>	1
Ainsworth	CRGNSA	Multnomah	20-May-14	<i>Ancotrema sportella</i> <i>Vespericola columbianus latilabrum</i>	1 1
West Moffett	CRGNSA	Multnomah	20-May-14	<i>Ancotrema sportella</i> <b><i>Monadenia fidelis columbiana</i></b> <i>Vespericola columbianus latilabrum</i>	2 4 1
East Welches Rd 1	MTH	Clackamas	23-May-14	<b><i>Allogona townsendia frustrationis</i></b> <i>Ancotrema sportella</i> <i>Haplotrema vancouverense</i>	8 4 4
East Welches Rd 2	MTH	Clackamas	23-May-14	<i>Ancotrema sportella</i> <i>Haplotrema vancouverense</i> <i>Vespericola columbianus latilabrum</i>	3 1 1
East Welches Rd 3	MTH	Clackamas	23-May-14	<i>Ancotrema hybridum</i>	1
Still Creek 1	MTH	Clackamas	23-May-14	<i>Ancotrema hybridum</i> <i>Haplotrema vancouverense</i>	3 1
Still Creek 2	MTH	Clackamas	23-May-14	None	0
Tillamook 1-1	Salem BLM	Yamhill	28-May-14	<i>Haplotrema vancouverense</i> <i>Nesovitrea binneyanna</i>	1 1

Site Name	Land Mgr	County	Date surveyed	Species collected	# specimens
Tillamook 1-2	Salem BLM	Yamhill	28-May-14	<i>Ancotrema sportella</i>	2
				<i>Cryptomastix germana</i>	2
				<i>Haplotrema vancouverense</i>	4
				<i>Vespericola columbianus latilabrum</i>	1
				<i>Vespericola</i> sp.?	1
Tillamook 2-1	Salem BLM	Yamhill	28-May-14	<i>Ancotrema sportella</i>	1
				<i>Haplotrema vancouverense</i>	4
				<b><i>Monadenia fidelis columbiana</i></b>	<b>1</b>
				<i>Vespericola columbianus latilabrum</i>	1
Tillamook 2-2	Salem BLM	Yamhill	28-May-14	<i>Haplotrema vancouverense</i>	1
				<b><i>Monadenia fidelis columbiana</i></b>	<b>1</b>
				<i>Vespericola columbianus latilabrum</i>	1
Tillamook 3-1	Salem BLM	Yamhill	28-May-14	<b><i>Monadenia fidelis columbiana</i></b>	<b>2</b>
Total specimens collected					<b>144</b>

APPENDIX II: TABLE OF ALL PREVIOUSLY KNOWN *MONADENIA FIDELIS COLUMBIANA* LOCATIONS IN OR AND WA

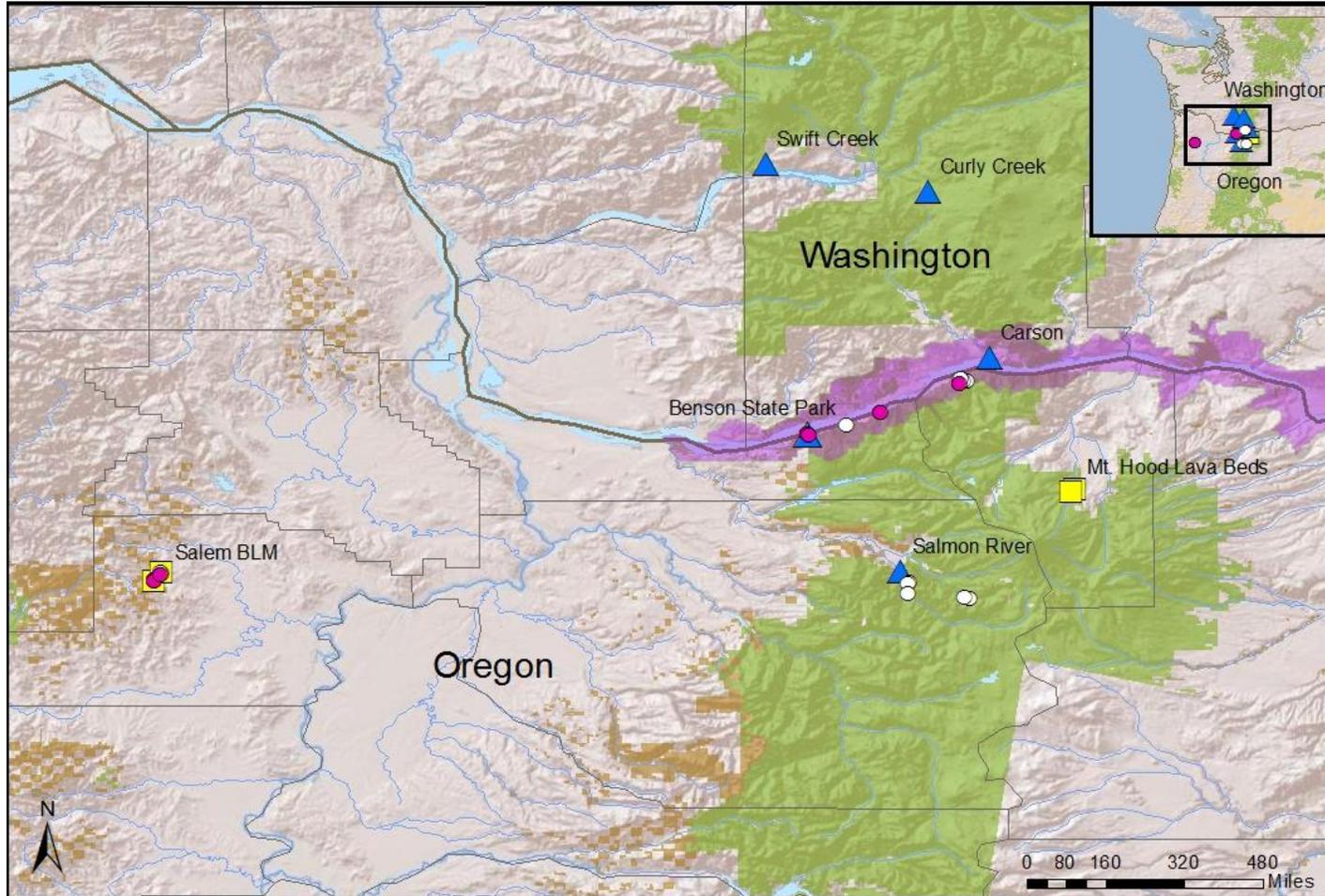
Species	datum	UTM_N	UTM_E	Zone	Loc Acc	Land Owner	Adj BLM_NF	State	County	Date	Notes
<i>Monadenia fidelis columbiana</i>	NAD83	5019101.0	582020.4	10	MAN6		MTH	OR	Clackamas	pre-1939	7 specimens (holotype and paratypes) deposited at ANSP.
<i>Monadenia fidelis cf. columbiana</i>	NAD83	5036379.0	607256.0	10	MAN6	MTH		OR	Hood River	May 2, 2013	
<i>Monadenia fidelis cf. columbiana</i>	NAD83	5035869.0	606763.0	10	GPS3	MTH		OR	Hood River	Nov 3, 2012	1 shell
<i>Monadenia fidelis columbiana</i>	NAD27	5047260.7	568143.3	10	MAN2	State	CRGNSA	OR	Multnomah	Jun 29, 1998	
<i>Monadenia fidelis cf. columbiana</i>	NAD83	5018313.0	473611.0	10	GPS3	SAL		OR	Yamhill	May 13, 2013	One shell of either a MOFI minor or a young MOFI in small plastic vial
<i>Monadenia fidelis cf. columbiana</i>	NAD83	5016472.0	472496.0	10	MAN6	SAL		OR	Yamhill	May 15, 2013	Live juvenile, County, WA.

Species	datum	UTM_N	UTM_E	Zone	Loc Acc	Land Owner	Adj BLM_NF	State	County	Date	Notes
<i>Monadenia fidelis columbiana</i>	NAD27	5063534.1	594338.2	10	MAN6			WA	Skamania	pre-1939	A dark form, together with the Salmon River specimens forms a distinct subspecies.
<i>Monadenia fidelis columbiana</i>	NAD83	5063108.2	594427.2	10	MAN6			WA	Skamania	Jul 6, 1946	2 specimens deposited at ANSP, #306991, listed as "type?" but probably not due to date
<i>Monadenia fidelis columbiana</i>	NAD83	5097855.5	584880.9	10	MAN6	GIP		WA	Skamania	May 31, 1996	
<i>Monadenia fidelis columbiana</i>	NAD83	5103298.5	561318.5	10	MAN2	GIP		WA	Skamania	May 28, 1996	Prophysaon (2 spp.), 2 <i>Monadenia</i> , 1 <i>Vespericola</i> , 1 <i>Allogona sportella</i> , 1 <i>Haplotrema vancouverens</i> e. Hand collected.
<i>Monadenia fidelis columbiana</i>	WGS84	5267777.3	662161.6	10	VAGUE			WA	UNK	no date	2 specimens deposited at MCZ, #137528

APPENDIX III: MAP OF KNOWN *M. FIDELIS COLUMBIANA* RECORDS IN OR & WA

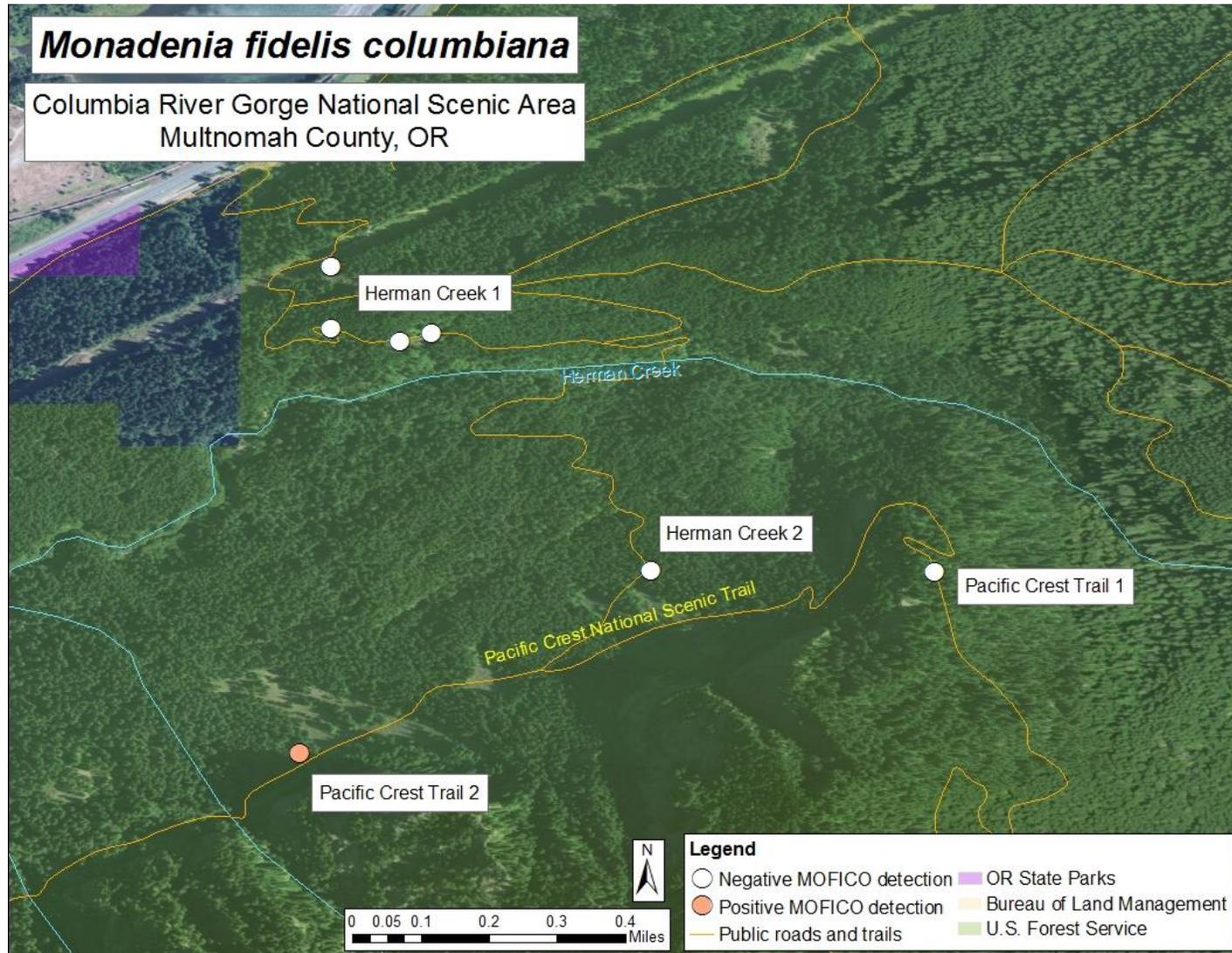
***Monadenia fidelis columbiana***  
Pacific Sideband Snail

- ▲ Known records
- Unconfirmed records
- Positive 2014 detection
- Negative 2014 detection
- US Counties
- CRGNSA
- U.S. Forest Service
- Bureau of Land Management

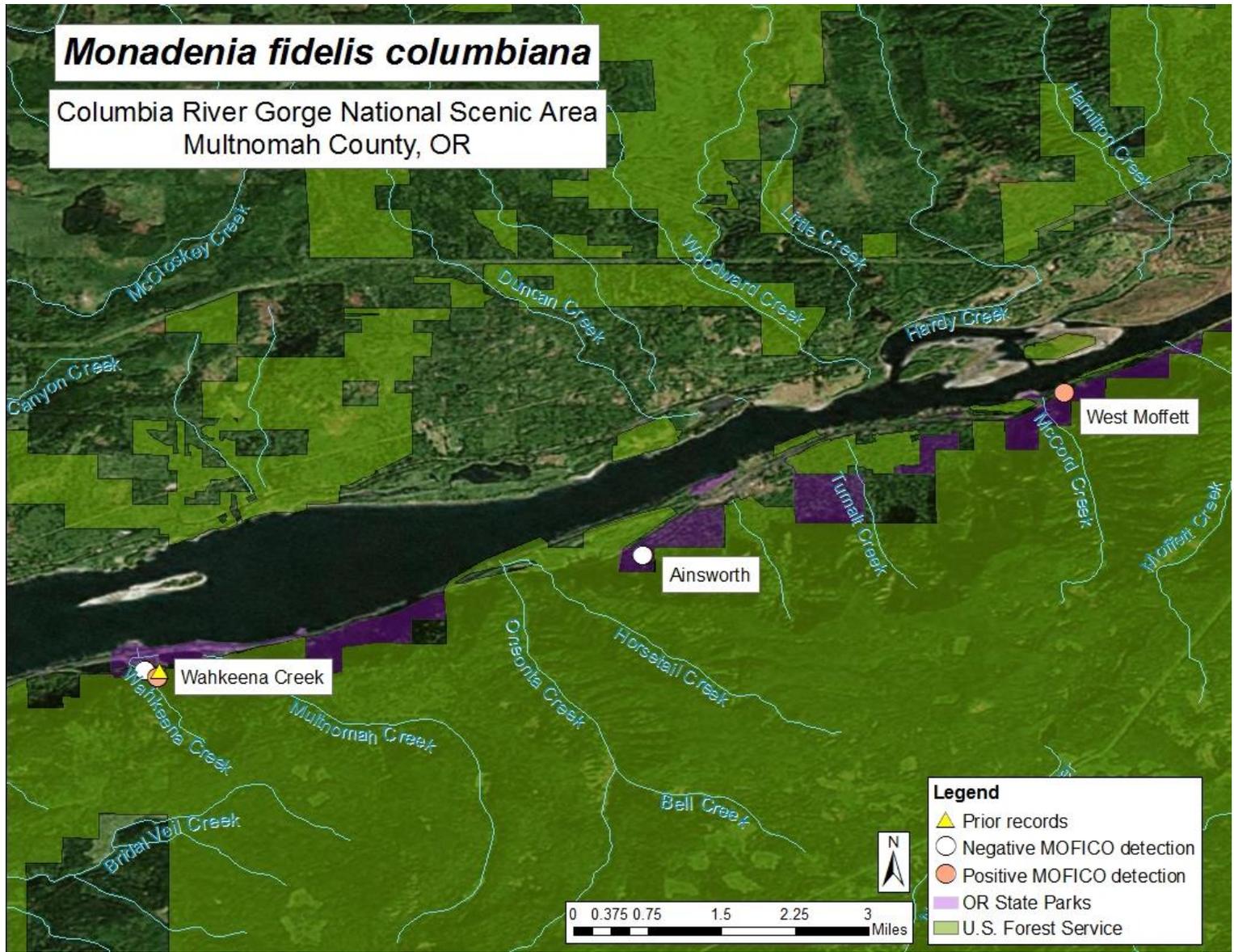


Map 1: All areas surveyed for *Monadenia fidelis columbiana* relative to known and unconfirmed records. Site names indicate previously known collection sites.

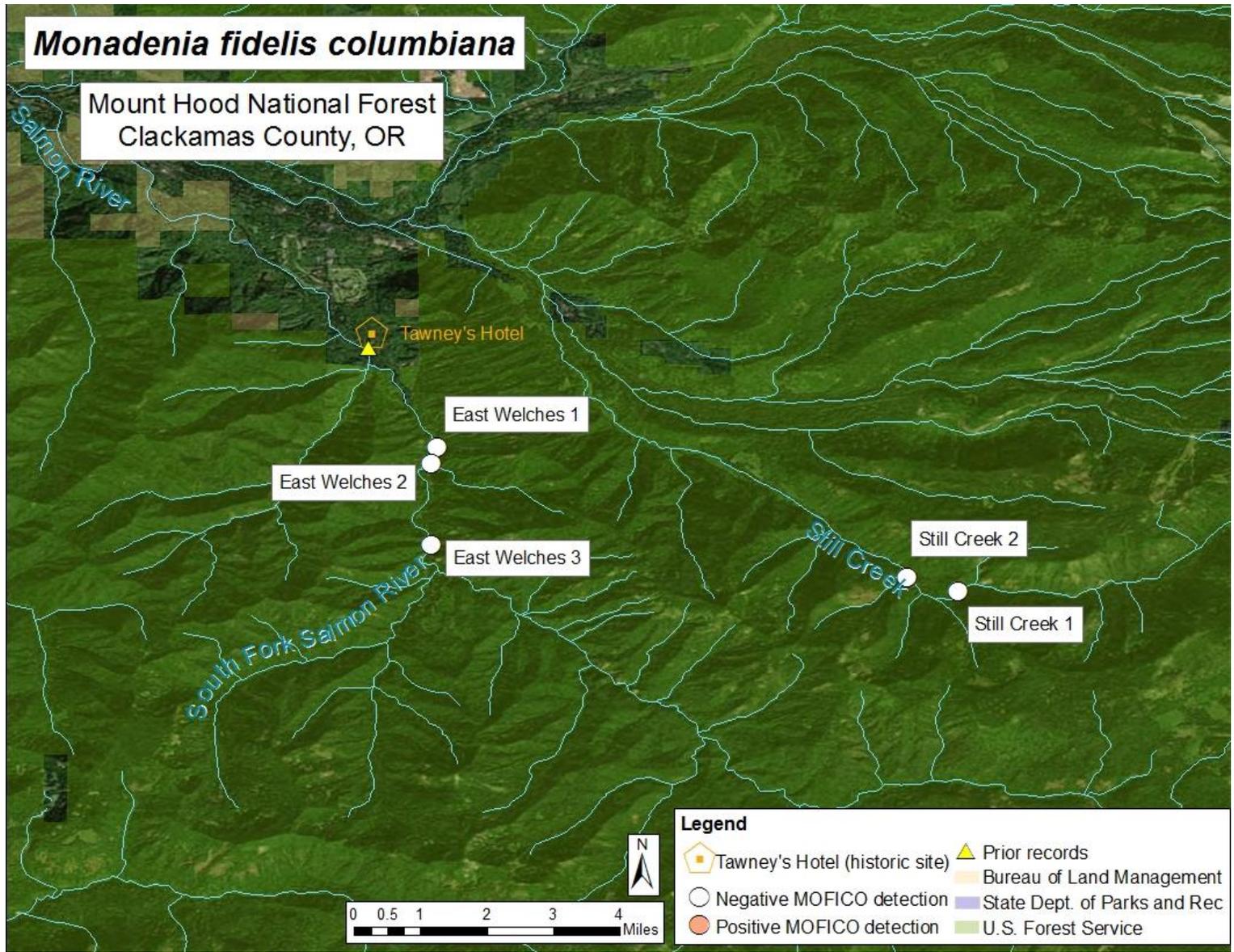
APPENDIX IV: 2014 SURVEY SITE MAPS



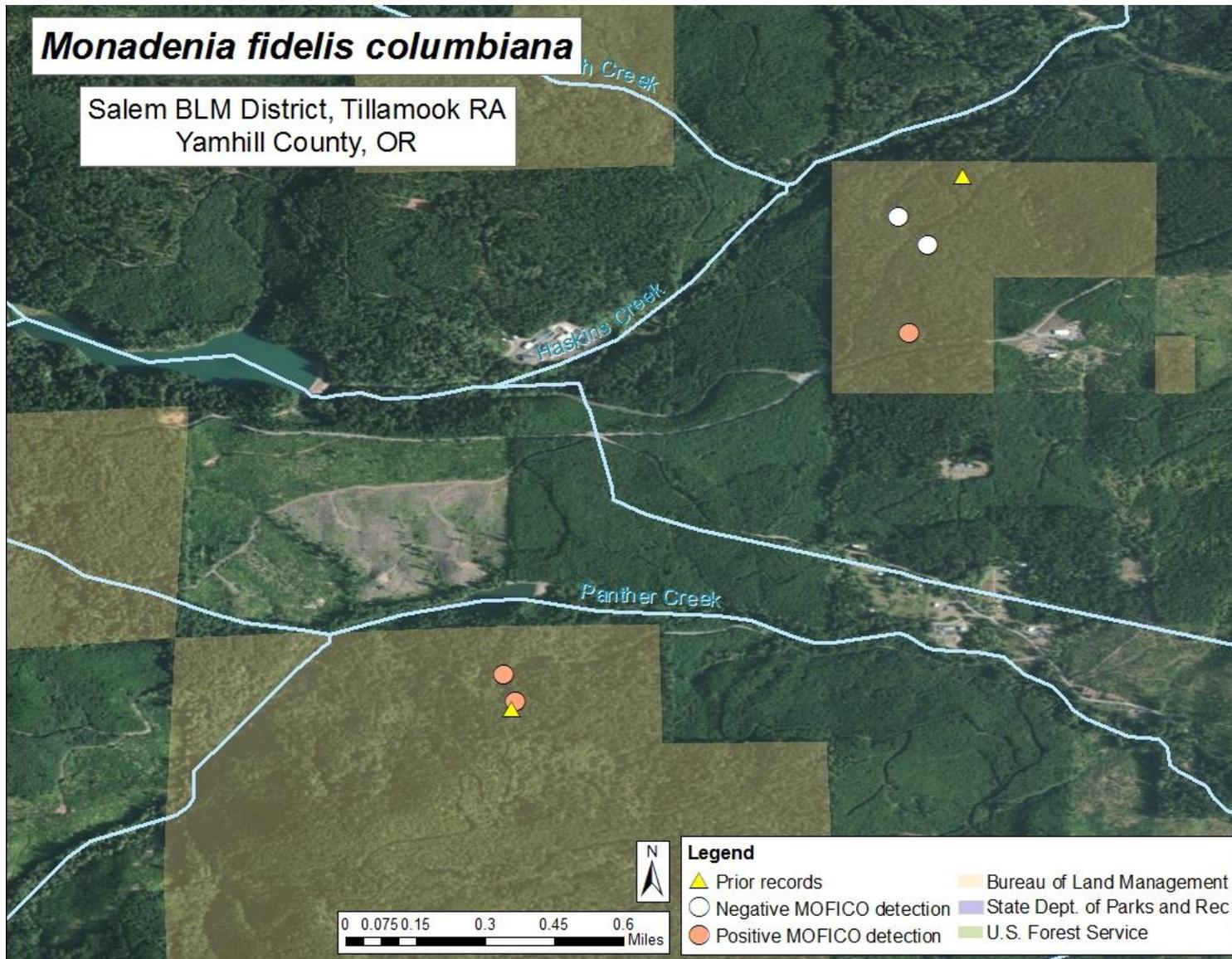
Map 2: CRGNSA survey sites, May 19, 2014



Map 3: CRGNSA survey sites, May 20, 2014



Map 4: Mt. Hood NF survey sites, May 23, 2014



Map 5: Salem BLM District survey sites, May 28, 2014