SPECIES FACT SHEET

Common Name: Scott's apatanian caddisfly
Scientific Name: *Allomyia scotti* Wiggins 1973 (*Imania*)
Synonyms: *Imania scotti*
Phylum: Mandibulata
Class: Insecta
Order: Trichoptera
Family: Apataniidae
Genus: Allomyia

Conservation Status:
Global Status (2005): G1
National Status (1999): N1
State Statuses: Oregon: S1
(NatureServe 2010).

Type Locality: OREGON, Clackamas and Hood River counties, Mt. Hood, 1st to 3rd order streams originating from perennial seeps and springs supplied by permanent snowfields around Mt. Hood at elevations from 3,500 to 5,700 feet (Wiggins 1973b; Wanner and Arendt 2015). Water was clear and cold, temperature in July and August between 2 and 6°C. Rocks in the stream bear dense growths of a wiry moss (Wiggins 1973b; Wanner and Arendt 2015).

Technical Description (Wiggins 1973b):
Adult: Length of forewing male 7.7-8.1 mm, female 7.7-9.0 mm. General structure typical of the genus and for tripunctata group; dark brown in color, forewings covered uniformly with dark brown hairs. Venation similar in two sexes, essentially as illustrated for *Imania bifosa* Ross by Schmid (1955, see fig 15). Wing coupling mechanism consisting of approximately eight stout, non-clavate, bristles at base of hind wing, and line of short, stout, hooked setae along costal margin of hind wing which engage upon long hairs arising from anal margin of forewing (as illustrated for *Lepania cascadia* by Wiggins 1973a, see fig 21). Male and female genitalia described in Wiggins 1973b.

Adult Caddisfly (NC State 2005).

Larva: Generally similar to other larvae in this genus, but distinguished primarily by the prominent horns on the head. Length of larva 7.0-8.9 mm. Head with very prominent dorsal carina arising just behind eyes and extending completely around anterolateral margin; two clusters of three or four prominent horns arising from raised posterodorsal area of head; central part of head concave, with coarse granulations extending posterior to horns; head capsule in dorsal view wider than long, broadly elliptical; secondary setae absent; primary setae reduced. But what appear to be setae 14 and 15 arise close together as in *Apatania*. Mandibles with cutting edge entire, teeth lacking; gular sclerite t-shaped, lateral margins of postgula linear; maximum width of postgula less than one-half maximum width of pregula; labrum with anterolateral margins membranous as in *Apatania*. Labium with both mesal and lateral submental sclerites; sclerite of palpiger extending somewhat more than half way around base of labial palp. Maxilla with galea flattened and dome-like.

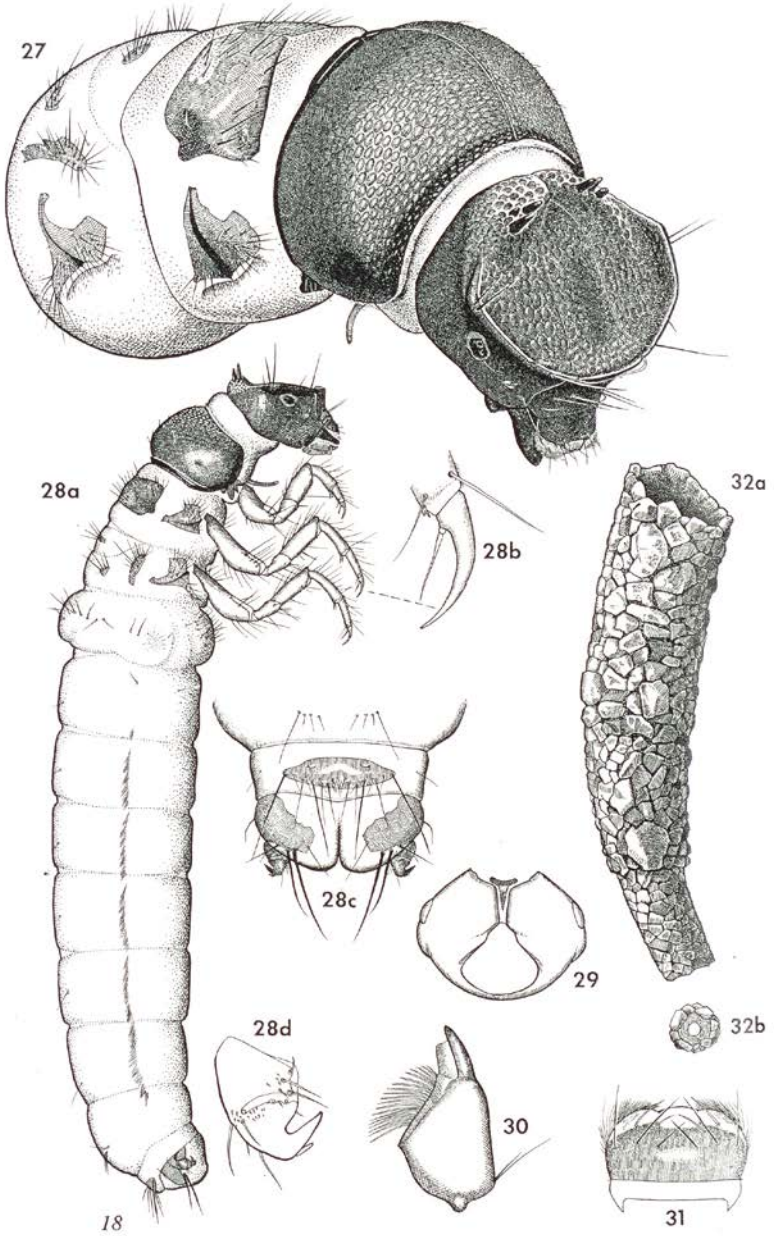
Pronotum wide, inflated and strongly convex, surface granulate, anterodorsal area with short golden pubescence; prosternal horn well developed. Mesonotum short and wide, shorter mesally than laterally. Metanotum with all three primary setal areas represented by well-developed sclerites. Legs as illustrated, tarsal claws somewhat longer and more slender than in *Apatania*, but with basal seta reaching almost to tip of claw; trochanteral brushes absent from all legs.

Abdomen lacking gills; first abdominal segment with 15-19 dark setae between dorsal hump and each lateral hump, and 68-76 dark setae on venter; venters II to VII inclusive each an ovoid scleritized ring; posterodorsal sclerite of IX with four major setae and 15-18 minor setae; claw of anal proleg with accessory tooth; basal tuft of anal proleg with three setae, lateral seta less than half as long as two mesal setae.

Larvae build a tapered, cylindrical case of small, rather coarse rock fragments. The case of *Allomyia scotti* is unique in having the basal quarter sharply constricted from the remainder. Larval case of small stones, without lateral ridges, but basal quarter sharply constricted from remainder; posterior end reduced with silk to a round, central hole; length of larval case up to 8.1-9.3 mm.

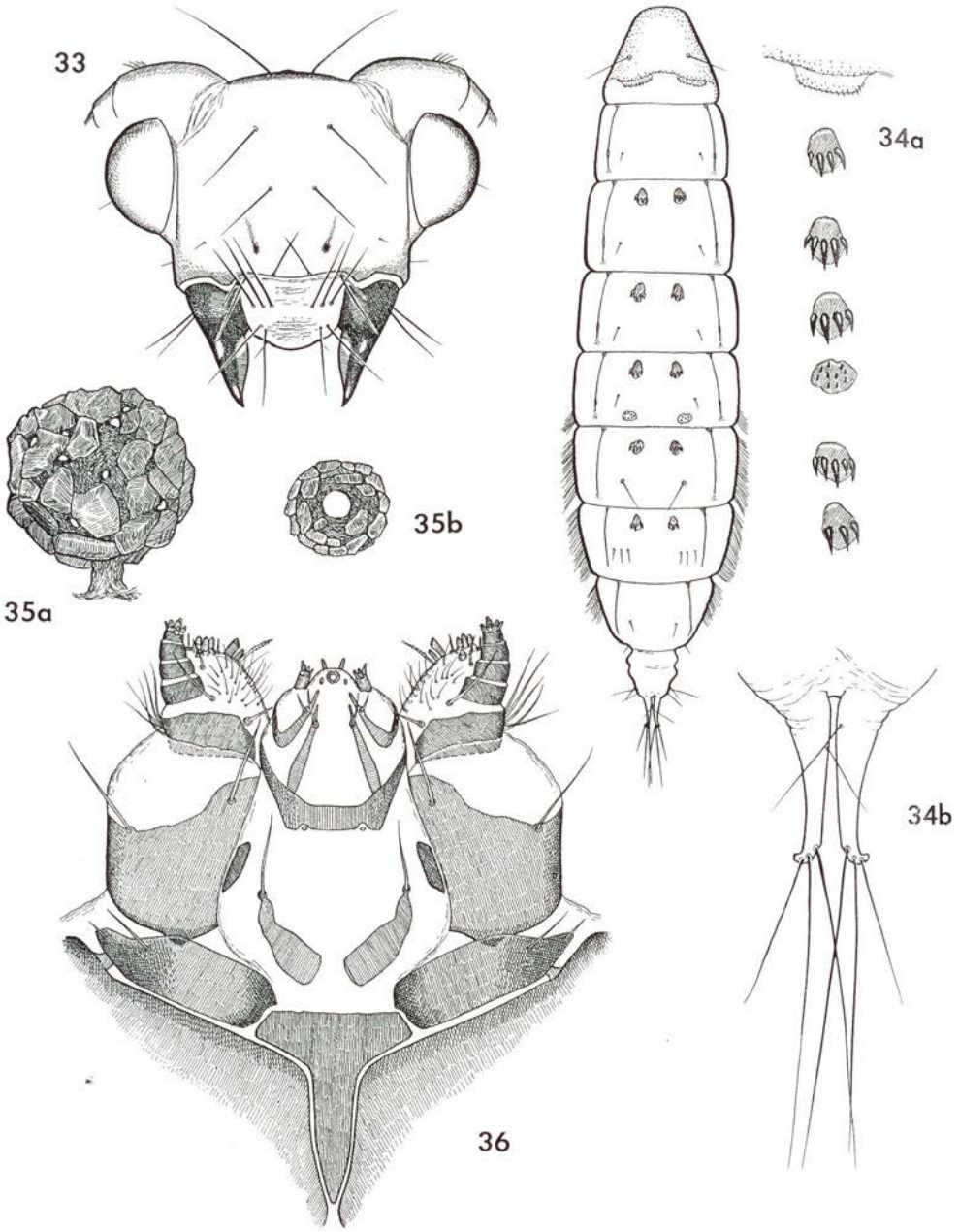
Pupa: Length of pupa 7.7-8.6 mm. Mandibles with cutting edge proximal to apex, lacking dentations; labrum with all major setae lacking apical hook of *Apatania* and *Manophlax*. Abdomen without gills; anal process heavily scleritized and stout, not slender as in many genera of family, and bearing three stout setae along posteromesal face of terminal enlargement; some variation seen in scleritized anal processes, stouter than illustrated in some pupae.

Pupal case similar to larval case in every respect, retaining characteristic constricted basal portion; silken closure membrane of anterior opening with small holes scattered over entire surface, some small stones fastened to silk; posterior opening apparently not modified from condition in larval case. Length of pupal case 10.1-12.2 mm.



Figures 27-32. *Allomyia scotti* from Wiggins 1973b.
27. Head and thorax, frontolateral view.
28. Larva: a. lateral view; b. mesotarsal claw; c. ninth abdominal segment and anal prolegs, dorsal view; d. claw of right anal proleg.

29. Head capsule, ventral view.
30. Mandible, left side, ventral view.
31. Labrum, dorsal view.
32. Larval case: a. ventrolateral view; b. posterior end, facial view.



Figures 33-36. *Allomyia scotti* from Wiggins 1973b.
33. Head of pupa, facial view.
34. Pupal abdomen: a. dorsal view with scleritized plates enlarged;, b. anal process, dorsal view.
35. Pupal case: a. anterior end, facial view; b. posterior end, facial view.
36. Maxillae and labium of larva.

Life History:
The Apataniidae family is a northern and montane group found in North America, Europe, and Asia. The family name dates to Wallengren (1886), but for most of its history it was included as a subfamily of Limnephilidae. Wiggins (1996) treated the group as a distinct family and subsequent workers have accepted this designation.

Female deposit their egg masses above the water in a gelatinous material on various objects (Usinger 1968). Corbet (1966) documented parthenogenesis (reproduction from an ovum without fertilization, a normal process in some invertebrates) in some species of Apatania. Newly hatched larvae drop or migrate into the water nearby. Two years are required to complete the life cycle. Prepupae occur as early as June and are still present in September, but have changed to pupae by the following April.

Most larvae of the Apataniidae family graze periphyton from rocks with scraper mandibles (Holzenthal et al. 2007). Based on gut content analysis of larvae in this genus, the diet is apparently consistent with the interpretation that *Allomyia* larvae scrape the upper surface of rocks and plants.

Range and Distribution:
Allomyia scotti is a glacial relict species with a patchy distribution only (endemic) recorded around Mt. Hood, Oregon. This species was first collected in 1964 in what was likely West Fork Salmon River near the Timberline Highway 173 ("…alpine stream crossing paved road between Government Camp and Timberline Lodge at a point 3.3 mi below Timberline Lodge, elevation 4200 ft…"; from Wiggins 1973b) and in South Fork Iron Creek near Highway 35 in 1966 (Wiggins 1973b). In 2010, this species was recorded at seven sites in headwater seeps, springs, and tributaries to the West Fork Salmon River (Wisseman 2010).

In 2013 and 2014, an exhaustive survey was conducted around Mt. Hood from 3,157 to 6,257 feet elevation for larval *A. scotti* (Wanner and Arendt 2015). Six new populations of *A. scotti* were recorded in Little Zigzag River, Sand Canyon Creek, Still Creek, a tributary to the Muddy Fork of the Sandy River, a tributary to McGee Creek, and in a tributary to the East Fork Hood River within the Mt. Hood Meadows Ski Area.

As a result of the 2013 and 2014 survey efforts and past records (Wiggins 1973b; Wisseman 2010), *A. scotti* populations are known to occur in approximately 4.6 linear miles of seeps, springs, and 1st through 3rd order streams around Mt. Hood (Wanner and Arendt 2015). However, because of their patchy distribution, association with cold seeps and springs, and dense mats of "wiry" moss, 4.6 miles maybe a gross over-estimate of their actual habitat. The Little Zigzag River and Sand Canyon Creek appear to be the

stronghold habitat for this species. These two streams account for 69% of their entire known range. These two streams have stable discharge mostly originating from springs. The population range in Still Creek and West Fork Salmon River are believed to only occur in the headwater springs of these streams. *A. scotti* habitat in South Fork Iron Creek and tributaries to McGee Creek, and Muddy Fork Sandy River are much less known due to the steepness of terrain and lack of sampling that has occurred in these streams; however, these streams do have the required spring fed, cold water with dense mats of moss. Much of the *A. scotti* populations are protected from anthropomorphic disturbances (with the exception fires or climate change) due to their location within the congressionally designated Mt. Hood Wilderness. The populations on Still Creek, West Fork Salmon River, and the tributary to East Fork Hood River are more susceptible to human disturbance as they are located within ski permit areas with associated roads and trails and appear to be occupying limited ranges within those areas.

It is likely that *A. scotti* is present at other sites around Mt. Hood. Further studies could investigate perennial seeps, springs, and alpine streams with stable hydrographs around Mt. Hood. Additionally, further studies for this species could explore these habitat types on nearby isolated volcanic peaks that have permanent snowfields such as Mt. Adams and Mt. Jefferson.

Habitat Associations:

Larval *A. scotti* were recorded at elevations ranging from 3,494 to 5,722 in cold seeps, springs, or streams (2.8 to 6.8 °C), in streams that had depths of 5 to 45 cm and widths of 35 to 200 cm (Wanner and Arendt 2015). Dense mats of "wiry" moss were always present where this species was collected (Wiggins 1973b; Wanner and Arendt 2015). The over-story vegetation does not appear to determine if *A. scotti* are present as this species was found with canopies of large trees (21"- 32" dbh) to shrubs (1"- 5" dbh) in the riparian area. All sample locations where Scott's apatanian caddisfly were collected had substrate either dominated by gravel or cobble and generally a mix of the two substrates with some sand (Wanner and Arendt 2015).

There were two key environmental attributes that were present at all the sites where larval *A. scotti* were collected by Wiggins (1973b), Wisseman (2010), and Wanner and Arendt (2015); each site had "wiry" moss growing in dense mats that was lightly attached to rock or wood substrate and was located in or downstream of a spring. *A. scotti* were collected in the moss *Brachythecium frigidum* in Sand Canyon Creek and in *Hygrohypnum bestii* in a tributary to the East Fork Hood River in the Meadows Ski Area (unpublished data, G. Wanner 2015). Both of these mosses are common in the Pacific Northwest. The larvae of this caddisfly was found when moss and the substrate underneath the moss was disturbed upstream of the kick net. This moss was lightly attached and

floated over the rock or wood substrate, appearing to provide a living area during the larval phase for this species. The dense mats are likely necessary as refuge and feeding at the larval stage for this species. Course sand particles and small gravels were found within and underneath the moss. Wanner and Arendt (2015) speculate that for these moss species to grow into dense mats, the moss is dependent on stable stream discharge and water temperatures associated with springs as this caddisfly was most commonly found where there was a lack of evidence of annual scour and deposition.

Elevation may be a determinate to *A. scotti* distribution based on maintaining stable flow without scour. Dispersal to other areas for this glacial relict species may be limited based on the limited amount of stable spring type streams. Habitat variables such as stream gradient, over-story canopy, substrate, depth and wetted width play a lesser role in determining *A. scotti* habitat; however, there must be enough gradient or stream discharge to not allow for silt to accumulate. Like other caddisfly species, chronic fine sediment would be a detriment to this species.

Threats:

(1) Destruction of small creeks by roads, trails, and other construction activities.
(2) Silt building up from upslope erosion that covers rocks and instream vegetation.
(3) Stream connectivity to roads that are treated with sanding during the winter.
(4) Change in hydrograph that would increase substrate scour and deposition such as increased impervious surfaces upstream.
(5) Intense fires that could severely burn mosses in the stream or increase upslope erosion post-fire.
(6) Reduction in ground water and stream flows due to disappearing glaciers and snow pack around Mt. Hood as a result of climate change.
(7) Over collection of this rare species and associated habitat disturbance of field surveys.

Conservation Considerations:

Protection of small creeks should be considered during the construction of roads or trails during forest management activities. Slope stability is important to prevent erosion that washes silt into small creeks and destroys habitat by covering small rocks and by filling interstitial spaces.

Adults are most susceptible to disturbance whenever they are present. Larval caddisflies are most susceptible to disturbance from late winter through the spring. To avoid disturbance, management activities could include precautions that prevent soil erosion near streams where caddisflies reside.

The limiting factors for caddisflies include availability of habitat, and for *A. scotti* dense mats of moss fronds in cold, spring fed alpine streams.

Survey Techniques:

Adult Trichoptera (caddisflies) can be captured in an insect sweep net by walking along a stream and sweeping the net over the top of the water, through vegetation along and overhanging streams, and beating the underside of logs or bridges over a stream. A beating net can also be used to collect adult caddisflies. This is done by placing or holding a white sheet under vegetation while the vegetation is beaten with a stick or pole. Captured adults can be placed directly into a vial containing 70 to 90% ethyl alcohol. Adults are likely active after snow melts in late spring and early summer. Adult *A. scotti* have only been collected from April through July (Wiggins 1973b). Field identification requires taxonomic expertise and is not practical for the inexperienced.

Larval or pupal caddisflies can be collected by using a kick net, a D-frame dip net, or a Surber Sampler or similar device. Kick nets are made of fiberglass screen material attached to 1 or 2 poles, and functions similarly to a fish kick seine. D-frame dip nets or Surber Samplers are commercially available from equipment suppliers. Larvae are found in the rocks and cobbles on the bottom of the stream or attached at the base of moss fronds. Larvae should be placed in vials of 70 or 90% ethyl alcohol for preservation. Larval A. scotti have been collected from mid-April through early October (Wiggins 1973b; Wanner and Arendt 2015). Field identification of larval *A. scotti* is possible using a hand lens. Identifications should be confirmed with taxonomic experts.

Other pertinent information (includes references to Survey Protocols, etc):

The species is named after Mr. Robert S. Scott (Wiggins sample collecting partner in 1964). The name of the genus is taken from the Iman River in south Ussuri region of Russia, where, along the upper reaches, the genus was first collected.

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Final edits by: Rob Huff, ISSSSP Conservation Planning Coordinator, Forest Service Region 6 and BLM Oregon/Washington, Portland, Oregon. Final edits: July 26, 2017

ATTACHMENTS:

(1) References
(2) List of pertinent or knowledgeable contacts
(3) Map of larval *A. scotti* collections
(4) Photos of typical *A. scotti* habitat
(5) Photos and description of survey techniques for caddisflies

ATTACHMENT 1: References

Holzenthal R.W., Blahnik, R.J., Prather, A.L., and Kjer K.M. 2007. Order Trichoptera Kirby 1813 (Insecta), Caddisflies. In: Zhang, Z.-Q., and Shear, W.A. (Eds). 2007 Linneaus Tercentenary: Progress in Invertebrate Taxonomy. Zootaxa. Zootaxa 1668:639–698.

NC State. 2005. North Carolina State University College of Agriculture and Life Sciences website. Trichoptera page. http://www.cals.ncsu.edu/course/ent425/compendium/caddis~1.html

Schmid, F. 1955. Contribution à l'étude des Limnephilidae (Trichoptera). Mitt. Schweiz Ent. Ges Vol. 28. 245 pp.

Usinger, R.L. 1963. Aquatic Insects of California. University of California Press, Berkeley. 508 pp.

Wallengren, H.D.J. 1886. Skandinaviens arter af Trichoptera-familjen Apataniidae. *Entomologisk tidskrift*, 73–80.

Wanner, G. A., and K. Arendt. 2015. Caddisfly survey around Mt. Hood: search for Scott's apatanian and other sensitive caddisfly species. Final Report prepared for USDA Forest Service – Region 6 and DOI Bureau of Land Management Interagency Special Status/Sensitive Species (ISSSSP) Coordinator. USDA Forest Service, Mt. Hood National Forest – Zigzag Ranger District, Zigzag, Oregon.

Wiggins, G.B. 1973a. New systematic data for the North American caddisfly genera *Lepania, Goeracea,* and *Goerita* (Trichoptera: Limnephilidae). Life Sciences Contributions Royal Ontario Museum No. 91. 33 pp.

Wiggins, G.B. 1973b. Contributions to the Systematics of the Caddisfly Family Limnephilidae (Trichoptera). I. Life Sciences Contributions Royal Ontario Museum No. 94. 32 pp.

Wiggins, G.B. 1996. Larvae of the North American Caddisfly Genera (Trichoptera). University of Toronto Press, Toronto, 457 pp.

Wisseman, R. 2010. Survey for Sensitive Aquatic Invertebrate Species in Tributaries of Still Creek and the West Fork Salmon River in the Vicinity of Proposed Mountain Bike Trails for the Timberline Lodge Winter Sports Area, Mount Hood, Mount Hood National Forest, Oregon, August 9-10, 2010. Prepared for Zigzag Ranger District, Mount Hood National Forest, Zigzag, OR. Aquatic Biology Associates, Inc., Corvallis, OR.

ATTACHMENT 2: List of pertinent or knowledgeable contacts

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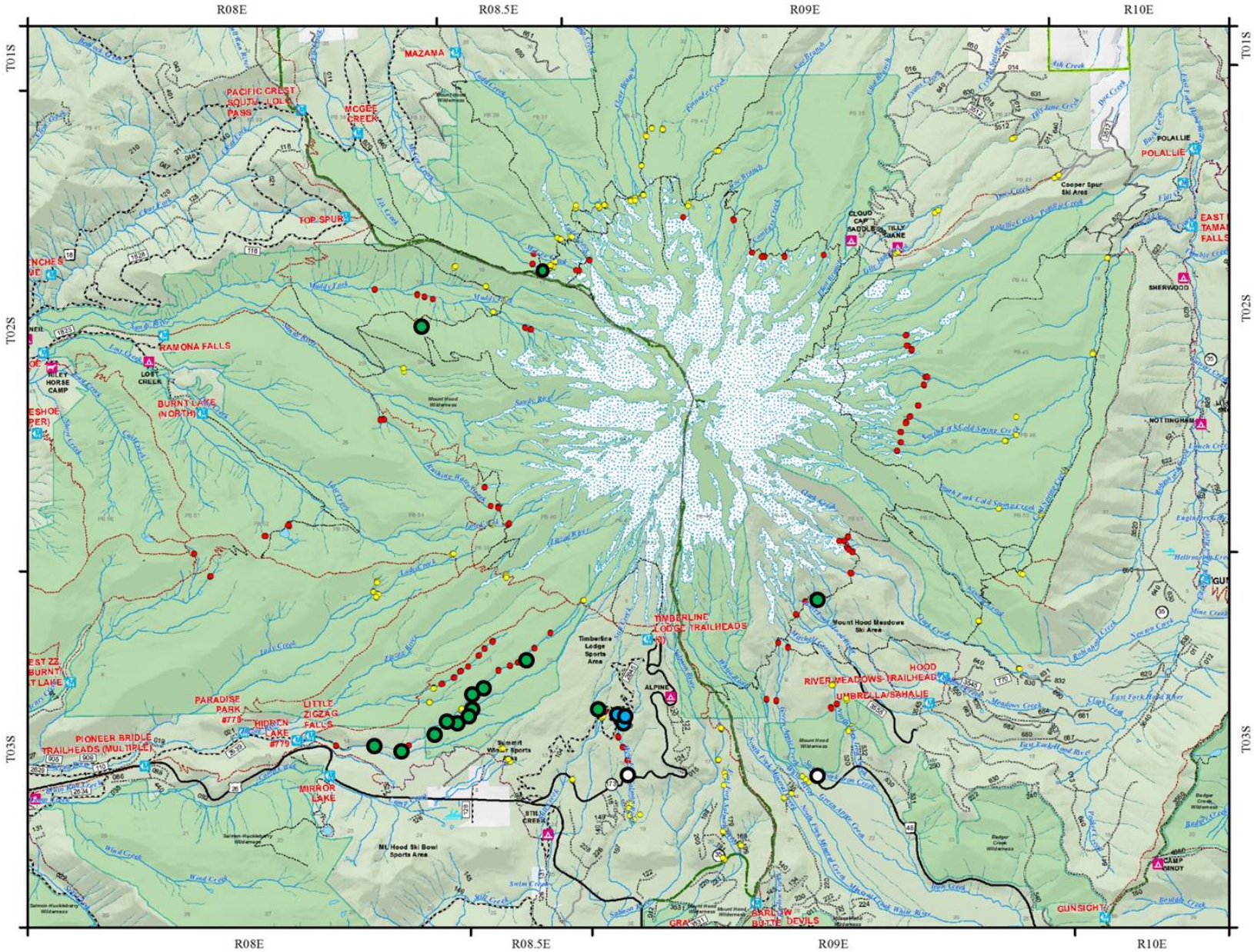
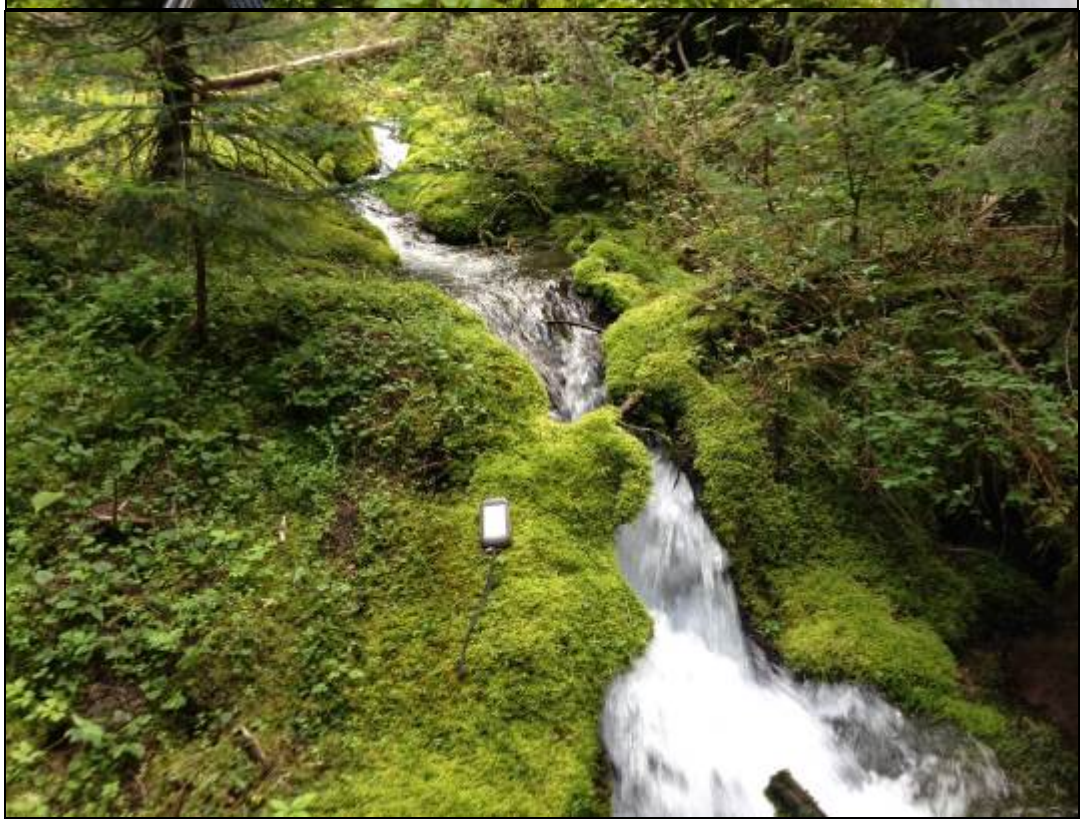
ATTACHMENT 3: Map of larval *A. scotti* collections. White circles indicate where *Allomyia scotti* were collected in 1964 and 1966 (Wiggins 1973b), blue circles are 2010 collections (Wisseman 2010), and green circles are collections in 2013 and 2014 (Wanner and Arendt 2015). Yellow circles were sample sites in 2013 and red circles were sample sites in 2014 illustrating the range of recent larval caddisfly surveys.



ATTACHMENT 4: Photos of typical *A. scotti* habitat. Sand Canyon Creek near 4,100 feet elevation.



ATTACHMENT 4 continued: Top photo of *A. scotti* habitat in Sand Canyon Creek at 4,120 feet elevation where perennial flow comes out of the mountain. Bottom photo of the headwaters of Still Creek at 4,920 feet elevation.

ATTACHMENT 4 continued: *A. scotti* habitat in Little Zigzag River near 4,200 feet elevation.

ATTACHMENT 5: Photos and description of survey techniques for caddisflies.
Sweep nets or a beating net for collecting adult caddisflies. Adult Trichoptera (caddisflies) can be captured in an insect sweep net by walking along a stream and sweeping the net over the top of the water, through vegetation along and overhanging streams, and beating the underside of logs or bridges over a stream. A beating net can also be used to collect adult caddisflies. This is done by placing or holding a white sheet under vegetation while the vegetation is beaten with a stick or pole. Captured adults can be placed directly into a vial containing 70 to 90% ethyl alcohol. Adults are likely active after snow melts in late Spring and early Summer. Adult *A. scotti* have only been collected from April through July (Wiggins 1973b). Field identification requires taxonomic expertise and is not practical for the inexperienced.

ATTACHMENT 5 continued: Photos and description of survey techniques for caddisflies. The D-net had a heavy cotton and polyester bag with non-rotting thread secured to 12 inch wide D-rim by hog rings with a nylon mesh bottom 8 inches below rim. The cotton and polyester bag extended 4 inches to protect the mesh from snags and wear. The D-net was equipped with a 5-foot hardwood handle. The D-frame net had a mesh size fine enough to retain small larvae (0.5 mm). A standard kick-net technique was applied by holding the net vertically with the opening facing upstream and the flat side pressed tightly against the bottom substrate, so that water flows neither under nor over the net. Large rocks and wood substrate immediately upstream of the net and up to 5 feet upstream were disturbed with hands, feet, or a stick while the current carried the uncovered and dislodged caddisflies and material into the net. A standardized sample area was 5 ft^2 for each sub-sample using this method. The stream bottom was disturbed to a depth of 4 – 6 cm (1.2 – 2 in.) for about 30 to 60 seconds, following which the net was removed from the water for specimen retrieval. The bottom of the frame was swept forward in a scooping motion to prevent caddisflies from escaping when the net was removed from the stream.

ATTACHMENT 5 continued: Photos and description of survey techniques for caddisflies. D-frame kick net contents were then rinsed into a shallow white tray to search for larvae more easily, as they are often quite cryptic and can be difficult to see if they are not moving (Wisseman 2010). Samples were placed in white tubs and repeatedly elutriated with stream water to separate organic material and invertebrates from mineral substrates. Patience should be employed as larval caddisfly and their cases will typically start moving around the bottom of the shallow tray of water among the organic debris within a few seconds up to a few minutes. Mineral substrates were checked for the presence of cased caddisfly larva. Organic material was then refloated with stream water and all identified caddisflies were removed with tweezers and preserved in 70 to 95% alcohol in 2 to 30 mL sample bottles.