Forest Service

Mt. Hood National Forest

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File Code: 1950 **Date:** December 19, 2013

Subject: Timberline Ski Area Mountain Bike Trails and Skill Park - New Information Review

To: Bill Westbrook, District Ranger, Zigzag Ranger District

In November 2012, the Mt. Hood National Forest completed a Decision Notice and Finding of No Significant Impact for the Timberline Ski Area Mountain Bike Trails and Skills Park. Due to delays resulting from litigation, the construction of the mountain bike trails and skills park has not yet occurred.

Since the Environmental Analysis (EA) was completed, survey work on the Zigzag Ranger District was conducted in the summer of 2013 for two species identified on the Regional Forester's Special Status Species list: 1) Scott's apatanian caddisfly (*Allomyia scotia*); and 2) western bumble bee (*Bombus occidentalis*). Both of these species are considered "sensitive" under Forest Service Manual 2670. The primary objectives for managing sensitive species is to ensure that actions do not contribute to a loss of viability or cause a significant trend toward listing under the Endangered Species Act. In considering this new survey information, I have requested my staff to consider whether or not the survey data gathered is within the scope and range of the effects considered in the original analysis (FSH 1909.15, Chapter 10, Section 18.1).

Proposed Action

The Proposed Action for this project includes a 17-mile mountain bike trail network and a separate skills park that would encompass about 0.2 acres. This lift-assisted, downhill-only mountain bike trail system and skills park would be within the southern portion of the Timberline Ski Area permit boundary. The bike trails and skills park would be a fee-based system, similar to using lift tickets for downhill skiing, and would be managed and maintained by RLK under the terms and conditions of an operating plan as part of their special use permit.

The Proposed Action also includes watershed restoration activities designed to offset the sediment generated from the Bike Park into the Still Creek and West Fork Salmon drainages. The restoration activities would decommission and/or stabilize approximately 2.1 miles of native surface roads and restore seven sites for a total of approximately six acres of restoration within or adjacent to the project area. These activities were started this past summer and will continue into summer 2014.

A more detailed description of the Proposed Action can be found in the EA on pages 19 to 29. As of October 2013, there has been no construction on developing the mountain bike trail system or the skills park. However, almost all of the restoration activities and a progress report on these activities have been completed. A copy of this report, Phase 1 of the Restoration Activities associated with Timberline Ski Area Mountain Bike Trails and Skills Park Progress Report (Wanner 2013), is available in the project record which is located at the Zigzag Ranger District. I have reviewed this information and understand that the completion of this work is expected in the summer of 2014.

New Survey Information for the Western Bumble bee

Because the western bumble bee was not included on the 2008 Regional Forester's Sensitive Species List, it was not analyzed in the Timberline Ski Area Mountain Bike Trails and Skills Park EA or Biological Evaluation. The western bumble bee was, however, added to the 2011 Sensitive Species List. In a letter issued by the Regional Forester officially updating the species list on December 9, 2011, instructions stated that all projects initiated *prior* to the date of this letter may use the species list that was in effect when the project was initiated. The letter continues to define "initiated" as having as signed, dated document, such as a project scoping letter, being completed for the project. Since a scoping letter for this project was issued in June 2010 and the notice and comment period began in March 2011, the decision was made to continue to use the 2008 Regional Forester's Sensitive Species List.

In late July and early August of 2013, a Xerces Society survey crew, sponsored by the Oregon Zoo, located western bumble bees at the Timberline Ski Area, Lodge, and Mountain Bike Trails and Skills Park analysis area. Since the survey crew located the species in the Timberline area, I asked the Forest Wildlife Biologist, Alan Dyck, to review the found locations and consider this information in regards to the analysis and decision made for the mountain bike project. Alan visited the sites on September 20 and 23, 2013 and found that the sites were all adjacent to existing roads and near Timberline Lodge. None of the sites are located where mountain bike trails would be constructed.

An analysis of the new survey data and information was completed and is enclosed with this letter; see Western Bumble bee (*Bombus occidentalis*) at Timberline Ski Area (Dyck & Willhite, 2013). The surveys found that none of the known foraging locations would be directly impacted by the project, and all known sites are more than 20 feet from the proposed mountain bike trails. Additionally, the project would ground-disturb approximately 12 acres, of which approximately 10 acres are considered early seral habitat. The restoration portion of this project that is currently underway restores 5.9 acres, resulting in a net loss of 3.2 acres of undisturbed early seral habitat, which represents 4% of the currently available early seral habitat in the project area (3.2 of 80 acres). The restored acreage would be seeded with native plant species, including several of the identified floral associates of the western bumble bee. Such a low level of early seral habitat disturbance is unlikely to impact foraging habitat for the western bumble bee to such a degree as to negatively affect populations, especially in this instance where the configuration of the disturbance is quite narrow and linear as opposed to blocked and the project area is surrounded by large contiguous acreages of undisturbed natural area. Finally, because the populations found were also adjacent to roads and the lodge, where many people are hiking and walking, the analysis shows that human presence should not contribute to disturbing the populations. As such, the effects determination for this project on the western bumble bee is *may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability of the population or species* for the following reasons.

The analysis recommended that three additional project design criteria (PDC) be added to the decision in order to minimize the impacts to western bumble bee and local population (see table below). These PDC would be added to those discussed in Table 3 in Section 2.3.7 Project Design Criteria and Monitoring in the Final Environmental Assessment. As such, these would be part of the Proposed Action and required during project implementation.

PDC #	Monitoring and Project Design Criteria (PDC)	Construction or Operation?	Monitoring Plan?
Wild-4	Construction should be delayed until after the first western bumble bee in or near the project area is observed, or until July 1, whichever is earlier, and should be stopped in mid-September.	Construction	No
Wild-5	To maximize effectiveness, pre-disturbance surveys will be done within seven days of ground disturbing activities and contractors will actively look for nests during ground disturbing activities.	Construction	No
Wild-6	If any western bumble bee nest sites are identified during construction of the trail, the trail should be rerouted. The trail is moved 15 to 20 feet if a nest is discovered. The new trail location will be reviewed by the Interdisciplinary Team and approved by a line officer.	Construction	No

New Survey Information for the Scott's Apatanian Caddisfly

Since the Scott's apatanian caddisfly was included on the 2008 Regional Forester's Sensitive Species List, it was analyzed in the EA on pages 106 to 107, 113, and 115. It was concluded in the analysis that the project elements and design criteria would minimize effects to habitat or individuals in the analysis area. Therefore, the effects determination for this project on the Scott's apatanian caddisfly is *may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability of the population or species.*

Although surveys were conducted in the summer of 2010 as part of the mountain bike project, the Zigzag fisheries staff conducted additional surveys in August 2013 in order to better understand how widely distributed Scott's apatanian caddisfly is in the Mount Hood area. The intent of the study, which was funded by the Region 6 and DOI Bureau of Land Management Interagency Special Status/Sensitive Species Program (ISSSSP), was to determine the entire distribution and measure of relative abundance of the Scott's apatanian caddisfly in its entire known range in an elevation band around Mt. Hood between 4,000 to 5,500 feet.

A total of 217 samples were taken in 62 streams targeting caddisflies around Mt. Hood. A total of 28 Scott's apatanian caddisflies were collected in Sand Canyon Creek, Little Zigzag River, a tributary to the Muddy Fork of the Sandy River, and an egg case was found in a tributary to McGee Creek. No Scott's apatanian were collected in Still Creek, West Fork Salmon River, or South Fork Iron Creek; however, samples were not taken in the same locations where they were previously recorded. For more information about the study, a progress report is enclosed with this letter.

While the new surveys resulted in additional locations of Scott's apatanian caddisfly, it did not find them widely distributed within the survey area. The sampling methodology only provided evidence of species presence. In streams where surveys did not detect Scott's apatanian, we

cannot conclude that they were absent, nor did the surveys determine appropriate habitat for this species. As such, the effects determination stated in the EA on page 115 of *may impact individuals or habitat, but will not likely contribute to a trend towards Federal listing or loss of viability of the population or species* is still applicable for this project.

Consistency Finding

Based on this review of new survey information for the western bumble bee and Scott's apatanian caddisfly, I find that the effects of implementing the Proposed Action are still consistent with the findings in the 2012 EA and decision with the addition of the three project design criteria described above. I also find the project, as analyzed in the 2012 EA, is consistent with the agency's policy as stated in Forest Service Manual 2670 for sensitive species. Because the new survey data has shown to be within scope and range of the effects considered in the original analysis, it is my decision that a correction, supplement, or revision of the 2012 EA or wildlife and fisheries reports is not necessary.

LISA A. NORTHROP
Forest Supervisor

Enclosures: 1) Assessment Report by Alan Dyck, "Western Bumble bee (Bombus occidentalis) at Timberline Ski Area, Lodge, and Mountain Bike Park Analysis Area", dated September 24, 2013; and 2) Progress Report by Greg Wanner and Kathryn Arendt, "Caddisfly Survey around Mt. Hood: Search for Scott's apatanian and other sensitive caddisfly species", dated October 30, 2013.

cc: Michelle Lombardo, Jennie O'Connor Card, Greg Wanner, Alan Dyck

Western Bumble bee (*Bombus occidentalis*) at Timberline Ski Area

Alan Dyck, Forest Wildlife Biologist, USFS Mount Hood National Forest
Beth Willhite, Entomologist, USFS Forest Health Protection

December 10, 2013

The western bumble bee was not on the 2008 Regional Forester's Sensitive Species List (RFSSS), which was current management direction when the scoping letter for the Timberline Ski Area Mountain Bike Trails and Skills Park Environmental Assessment was signed by District Ranger Bill Westbrook on June 29, 2010. The western bumble bee was not added to the Regional Forester's Sensitive Species List until December 1, 2011. Instructions in the December 9, 2011 cover letter titled, **Update of the Regional Forester's Special Status Species List**, state: *"The updated RFSSS list (with the exception of Strategic species) included in Enclosure 1 will apply to all projects initiated on or after the date of this letter. Projects initiated prior to the date of this letter may use the updated RFSSS list transmitted in this letter or the RFSSS list that was in effect when the project was initiated. For the purpose of this letter, "initiated" means that a signed, dated document such as a project initiation letter, scoping letter, or Federal Register Notice has been completed for the project.*"

However, the newly documented presence of western bumble bee in and around the Mountain Bike Trails and Skills Park project area warrants additional consideration. This document serves as additional analysis of the effects of the Mountain Bike Trails and Skills Park project on the western bumble bee for consideration by the responsible official for this project.

Methodology

Surveys for the western bumble bee, *Bombus occidentalis*, were conducted by The Xerces Society for the Conservation of Invertebrates in high-elevation meadows on the Mount Hood National Forest in 2013. The western bumblebee is a formerly widespread and common native species in Oregon, Washington, and California that has become rare since the late-1990's in the western portions of these states. The surveys, which were funded by the Oregon Zoo Foundation's Future for Wildlife Grant Program, documented the occurrence of western bumble bees at Timberline Ski Area, Devil's Half Acre Meadow, Alpine Campground, and Olallie Meadows.

In late July and early August, crews led by Rich Hatfield and Candace Fallon, conservation biologists for the Xerces Society, conducted bumble bee surveys over a six week period at 34 locations on the Mount Hood National Forest. These surveys included timed surveys at 16 patches of suitable habitat to document all species of bumble bees present and 18 locations where point searches for the western bumble bee on small patches of suitable habitat were conducted (Hatfield et al. 2013).

These surveys documented 12 different species of bumble bee at 16 Forest locations. They also documented the western bumble bee at eight localities - seven new locations and one historical locality - detecting a total of 22 individual western bumble bees at four different timed survey locations and four different point search locations (Hatfield et al. 2013).

No nest site locations were identified during the 2013 Xerces Society surveys, as the surveys were focused upon foraging bees. In general, bumble bee nest sites are notoriously difficult to locate and easily overlooked (Schweiter et al. 2012). In addition, bumble bees nest in new locations each year.

Existing Conditions

Andrews (2012) describes the following existing conditions:

> *Bombus occidentalis* was widespread and common throughout the western United States and western Canada before 1998 (Xerces Society 2009). The former range of U.S. states included: northern California, Oregon, Washington, Alaska, Idaho, Montana, western Nebraska, western North Dakota, western South Dakota, Wyoming, Utah, Colorado, northern Arizona, and New Mexico. Unfortunately, since 1998 populations of this bumble bee have declined drastically throughout parts of its former range. In Alaska and east of the Cascades in the Canadian and U.S. Rocky Mountains, viable populations still exist. Populations of the western bumble bee in central California, Oregon, Washington and southern British Columbia have mostly disappeared. It is difficult to accurately assess the magnitude of these declines since most of this bee's historic range has not been sampled systematically . (p. 3)
>
> Bumble bees will visit a range of different plant species and are important generalist pollinators of a wide variety of flowering plants and crops (Goulsen 2003a; Heinrich 2004). Although bumble bees do not depend on a single type of flower, some plants rely solely on bumble bees for pollination. In addition, native bees, such as bumble bees are adapted to local conditions (Goulsen 2003b). For example, bumble bees can forage in cold, rainy conditions. (p. 3)
>
> There are several threats which face bumble bees and are leading to their decline. The following threats and conservation considerations are from a status review, co-authored by Robbin Thorp, Elaine Evans, and Scott Hoffman (Thorp et al. 2008):
>
> <u>Commercial bumble bee rearing</u>
> Rearing bumble bees for commercial use may be one of the greatest threats to *B. occidentalis*. Colonies of *B. occidentalis* and *B. impatiens* were reared for pollination between 1992 and 1994 after being shipped to European rearing facilities from the U.S. The colonies were produced and then shipped back to the U.S. It has been hypothesized by Thorp that these bumble bee colonies contracted a disease (*Nosema bombi)* from the Buff-tailed Bumble bee (*Bombus terrestris*), a European bee which was in the same rearing facility. Since the North American bumblebees would not have resistance to this pathogen because they had not prior contact with it, they likely spread the disease to wild populations of *B. occidentalis* and *B. franklini* in the west when infected populations of commercially reared *B. occidentalis* came into contact with wild populations. Biologists

began noticing that these wild bumble bee populations were rapidly declining in the late 1990's.

Habitat alteration

Habitat alterations including those that could destroy, fragment, alter, degrade or reduce the food supply produced by flowers, as well as destruction of nest sites and hibernation sites for overwintering queens, such as abandoned rodent burrows and bird nests, adversely affect these bees. Agriculture and urban development alter landscapes and habitat required by bumble bees while grazing livestock pose a threat since these animals remove flowering food sources, disturb nest sites and alter the vegetation community. The size of bumble bee populations diminish and inbreeding becomes more common as habitats become altered and fragmented. This in turn decreases the genetic diversity and increases the risk of population decline.

Insecticides

Foraging bumble bees are directly threatened by insecticide applications when used in agricultural settings. Bumble bees can be indirectly harmed when the flowers that they normally use for foraging are removed by the application of broad-spectrum herbicides.

Invasive Plants and Insects

When exotic plants invade and dominate native grasslands, they may threaten bumble bees by competing with the native nectar and pollen plants relied upon by bumble bees. A small invasive parasite of the honeybee, the small hive beetle (Aethina tumida), can also infest bumble bee colonies. Although it has not been well studied, it could severely impact bumble bee colonies.

Global Climate Change

There is some evidence indicating that some bumble bees adapted to cool temperatures are in decline while ranges of bees adapted to warmer temperatures are expanding. To obtain a more thorough understanding of the true impact of climate change on bumble bees, long term monitoring and baseline data are necessary.

Conservation Considerations:

To control the spread of the disease *Nosema bombi,* reduce the movement of the eastern species *B. impatiens* into new areas which have been reared in Europe and have possibly acquired the disease. These bees appear to act as carriers of the disease and are not as severely affected by the disease as some other species of *Bombus* such as *B. occidentalis.* Habitat, which supports populations of bumble bees needs to be conserved so that adequate food sources can continue to thrive, and nesting and hibernation sites can be utilized. Insecticides need to be closely monitored and used according to recommendations. The invasion of exotic plants and insects should be restricted as much as possible by reducing the rate of introduction of new species and by controlling populations of invasives. (p. 4, 5)

The relevant threats to the western bumble bee as related to this project include habitat alteration and invasive plants. This project has no association with commercial bumble bee rearing and will not impact global climate change. Also, this project will not spray any insecticides or introduce

any invasive insects. As such, the only threats that were considered in this analysis were habitat alteration and invasive plants. The decision includes a project design criteria (PDC Veg-16) to minimize the introduction of new invasive plant species and control the spread of known populations by including a washing station for mountain bikes. The remainder of this report will address the project's impacts on western bumble bee habitat.

Proposed Action

The Proposed Action consists of an approximately 17-mile trail network and a separate skills park that would encompass approximately 0.2 acre, for a total amount of ground disturbance of approximately 12 acres. In addition to the proposed mountain bike park, restoration actions have been developed and are underway with the collaboration of RLK and are included in the Proposed Action. The restoration activities are decommissioning and/or stabilizing approximately 2.1 miles of native surface roads and restore seven sites for a total of approximately six acres of restoration within or adjacent to the project area (Timberline Ski Area Mountain Bike Trails Skills Park Environmental Assessment, Nov. 2012, Section 2.3 Proposed Action).

The proposed action would include 5.9 acres (2.1 miles) of restoration in both the Still Creek and West Fork Salmon drainages. In the Still Creek drainage, a total of approximately 1.4 miles (4.3 acres) of roads and disturbed areas would be treated. In the West Fork Salmon drainage, approximately 0.7 mile (1.6 acres) would be treated. Decommissioning the approximately two miles of existing service roads would include grading the roadway surface to match natural topographic contours. The decommissioned service roads would be topped with topsoil or amended local material, and seeded with native plant species or suitable stabilizing cover.

Additional information on the Proposed Action, including a full list of the project design criteria, is available in the Decision Notice/Finding of No Significant Impact and corresponding Environmental Assessment.

Effects Analysis

There are no indications that the operation of the bike trails would pose a threat to bumble bees and thus effects analysis is limited to the construction phase of this project.

The western bumble bee requires foraging habitats with rich supplies of floral resources blooming continuously from spring to autumn and nests primarily underground, typically in abandoned rodent nests located from six to eighteen inches below the surface, but occasionally on the surface in areas such as clumps of grass on the ground (Thorp et al. 2008). Unlike honeybees, bumble bees initiate new nesting sites every year. In the project area, suitable foraging habitat occurs primarily in areas classified as early seral habitat (openings in the forest with forbs and herbs), and nesting habitat would be most closely tied to the locations of abandoned rodent nests.

The Mountain Bike Trails and Skill Park project area is approximately 160 acres, half of which is early seral habitat, the habitat type in the project area most likely to provide suitable foraging habitat for the western bumble bee. The wildlife biological evaluation and specialist report for the Timberline Mountain Bike project describes early seral habitat on pages 43 and 44 of the wildlife biological evaluation. Trails built by this project range from 16 inches to 99 inches in

width. Trails cross both forested and early seral habitat. The project would ground-disturb approximately 12 acres, of which approximately 9.9 acres are considered early seral habitat. The restoration portion of this project that is currently underway restores 5.9 acres, resulting in a net loss of 3.2 acres of undisturbed early seral habitat, which represents 4% of the the currently available early seral habitat in the project area (3.2 of 80 acres). The restored acreage would be seeded with native plant species, including several of the identified floral associates of the western bumble bee. Such a low level of early seral habitat disturbance is unlikely to impact foraging habitat for the western bumble bee to such a degree as to negatively affect populations, especially in this instance where the configuration of the disturbance is quite narrow and linear as opposed to blocked and the project area is surrounded by large contiguous acreages of undisturbed natural area.

September 20 and 23, 2013 on-site reviews were conducted by Alan Dyck, Forest Wildlife Biologist. He found that none of the known foraging locations (i.e. documented in the 2013 Xerces Society surveys) would be directly impacted by the project, and all known sites are more than 20 feet from the proposed mountain bike trails. It also showed that proximity to roads does not appear to be a factor negatively affecting bumble bee presence in the area. The documented sites are located adjacent to roads and near Timberline Lodge where many people are hiking and walking by the foraging sites.

In an e-mail dated October 1, 2013, Rich Hatfield expressed that his concerns regarding project impacts were higher for potential nest disruption than for foraging habitat: “I have a few thoughts about the potential impacts that this park may have on bumble bees, but it is hard for me to comment without specific knowledge about the construction and project extent. The gist of those concerns is that I don’t think that foraging locations are the primary concern for bumble bees. My bigger concern is the disruption of nesting habitat. Since bumble bees are social animals, destroying one or a few nests could have a significant impact on this species.” (Rich Hatfield, personal communication).

On November 21, 2013, Rich Hatfield and Sarina Jepsen, representing the Xerces Society for Invertebrate Conservation, provided additional feedback to assist with conservation of the western bumble bee at the Timberline Mountain Bike Trails and Skill Park project. Their recommendations are summarized and addressed here:

1. “We recommend that a thorough survey for western bumble bee nests be done within the entire project area (with special attention to the areas where trails will be built, and construction vehicles will travel) before construction begins. The ideal time to survey for bumble bee nests in that location would be in mid-late August as colonies will be large enough to make nest site detection possible.

2. If western bumble bee nests are found, we suggest that the location of the trails and paths for construction vehicles be altered to avoid the nesting areas, as well as a significant buffer of at least 25 meters on all sides of the nests.

3. In the absence of surveys, we suggest waiting until several weeks after all of the snow has melted from the park boundaries, and stopping operation/construction in mid-

September, since bumble bee queens may be overwintering near the surface of the ground from September through June.

4. We recommend a thorough survey of western bumble bee foraging habitat within the project boundaries. Surveys should be repeated throughout the flight season to identify preferred nectar and pollen host plants from the beginning of the season to the end. This survey would provide information to allow key foraging habitat and a buffer area of ~10 meters to be avoided during construction and operation of the mountain bike park.

5. We recommend that the potential impacts of the mountain bike park on all ground nesting mammals within the project boundaries be reviewed."

The Forest Service has considered this feedback and wishes to achieve the intent of the recommendations. Timing constraints and distances recommended for moving the trails in the event of a nest being discovered could cause additional impacts to both the bumble bees and to other resources. Since a delay in starting the construction could move into additional years for completion, there is the potential of impacting multiple years of nesting for the bumble bees as well as other wildlife species. Moving the trails by 25 meters would likely require additional engineering and impacts to other resources; these additional impacts could result from tree removal or moving to areas with other species of concern or heritage resources. A change in the trail location will be reviewed by the interdisciplinary team and approved by a line officer to ensure that the impacts are within the scope of the original decision and environmental analysis. Three additional project design criteria should serve to adequately conserve bumble bees in the project area. The following addresses the comments in the same order outlined above:

1. The Forest Service will do additional pre-work monitoring to identify foraging western bumble bees in or near the project area after snow melt and as it becomes warm enough for western bumble bees to become active, to identify when western bumble bee queens emerge from hibernation. The commencement of trail construction should be delayed until after the first western bumble bee is observed, or until July 1, whichever is earlier, to avoid harming spring overwintering queens and construction will be stopped in mid-September to avoid harming autumn overwintering queens.

2. Trail segments and associated feature locations will be surveyed for bumble bee nests (any species) within seven days prior to construction. Surveys should be conducted when temperatures are warm enough for bumble bee flight. Surveyors will be required to determine if the species of bumble bees in detected nests are western bumble bees and mark all detected bumblebee nest locations, using a unique designation to indicate western bumble bee nests. In addition, the contractors building the trails will be required to actively look for additional unmarked bumble bee nests during construction activities and reroute the trail around any additional western bumble bee nests that are found. Construction crews will be provided training on how to locate and identify western bumble bee nests.

3. Studies are lacking to support a requirement of 25 meter (about 82 feet) buffers around western bumble bee nests. Based on the professional judgment and personal experiences of the entomologist and wildlife biologist, a buffer of 4.5 to 6 meters is judged adequate

to provide nest protection given the nature of project activities. When a western bumble bee nest is identified within the proposed construction corridor, the trail should be rerouted 4.5 to 6 meters (15-20 feet) away from the nest or as far as practical depending on constraints presented by topography and conditions. Any change in trail location beyond this distance would require engineering redesigns.

4. There is no shortage of forage plants in the project area and the restoration piece of the project will help to offset about half of the trail-associated disturbance in existing early seral habitat. The scale of the trails' impact relative to the amount of undisturbed area is too small to warrant avoiding or buffering forage areas during construction of the trail system. In addition there are no indications that the operation of the bike trails would pose a threat to western bumble bees or their foraging habitat. However, because of shared concerns over recent declines in western bumble bee populations in the western areas of California, Oregon, and Washington, if possible (perhaps through the use of volunteers), the Forest Service is interested in gathering additional information on the western bumble bee's foraging habitat and nesting sites in the project area during the next several years.

5. Small mammals will continue to use the trail area and their populations will not be altered as a result of the project. Small mammals will continue to make tunnels throughout the project area, providing the same level of opportunities for nesting western bumble bees as before project implementation.

Recommendations

The National Environmental Policy Act defines "mitigation" as avoiding, minimizing, rectifying, reducing, eliminating or compensating project impacts. The following design criteria and mitigation measures are recommended to minimize the impacts to bumble bees as outlined in this report.

PDC #	Monitoring and Project Design Criteria (PDC)	Construction or Operation?	Monitoring Plan?
Wild-4	Construction should be delayed until after the first western bumble bee in or near the project area is observed, or until July 1, whichever is earlier, and should be stopped in mid-September.	Construction	No
Wild-5	To maximize effectiveness, pre-disturbance surveys will be done within seven days of ground disturbing activities and contractors will actively look for nests during ground disturbing activities.	Construction	No
Wild-6	If any western bumble bee nest sites are identified during construction of the trail, the trail should be rerouted. The trail is moved 15 to 20 feet, if a nest is discovered. The new trail location will be reviewed by the interdisciplinary team and approved by a line officer.	Construction	No

Conclusion

The analysis shows no convincing evidence indicating significant negative impacts to western bumble bee populations by the proposed mountain bike trails or skills park project. Restoration work is expected to benefit local bumble bee populations by rehabilitating road surfaces to a more natural state using native vegetation that includes western bumble bee floral associates. Rodent populations that create important nesting habitat will be unaffected by the project. Project design criteria should help to minimize or eliminate the loss of bumble bee queens and nests. The amount of foraging habitat loss will be minor. The proposed action will reduce early seral habitat by 3.2 acres (4%) but does not directly affect the sites of known occurrence. As western bumble bees may also utilize the remainder of the mountain bike trails area, restrictions on the timing of contract operations and surveys conducted before and during construction will be implemented to reduce the risk of damage to nests or overwintering queens. As such, the effects determination is that the project ***May Impact Individuals, but not likely to Cause a Trend to Federal Listing***.

ATTACHMENTS:

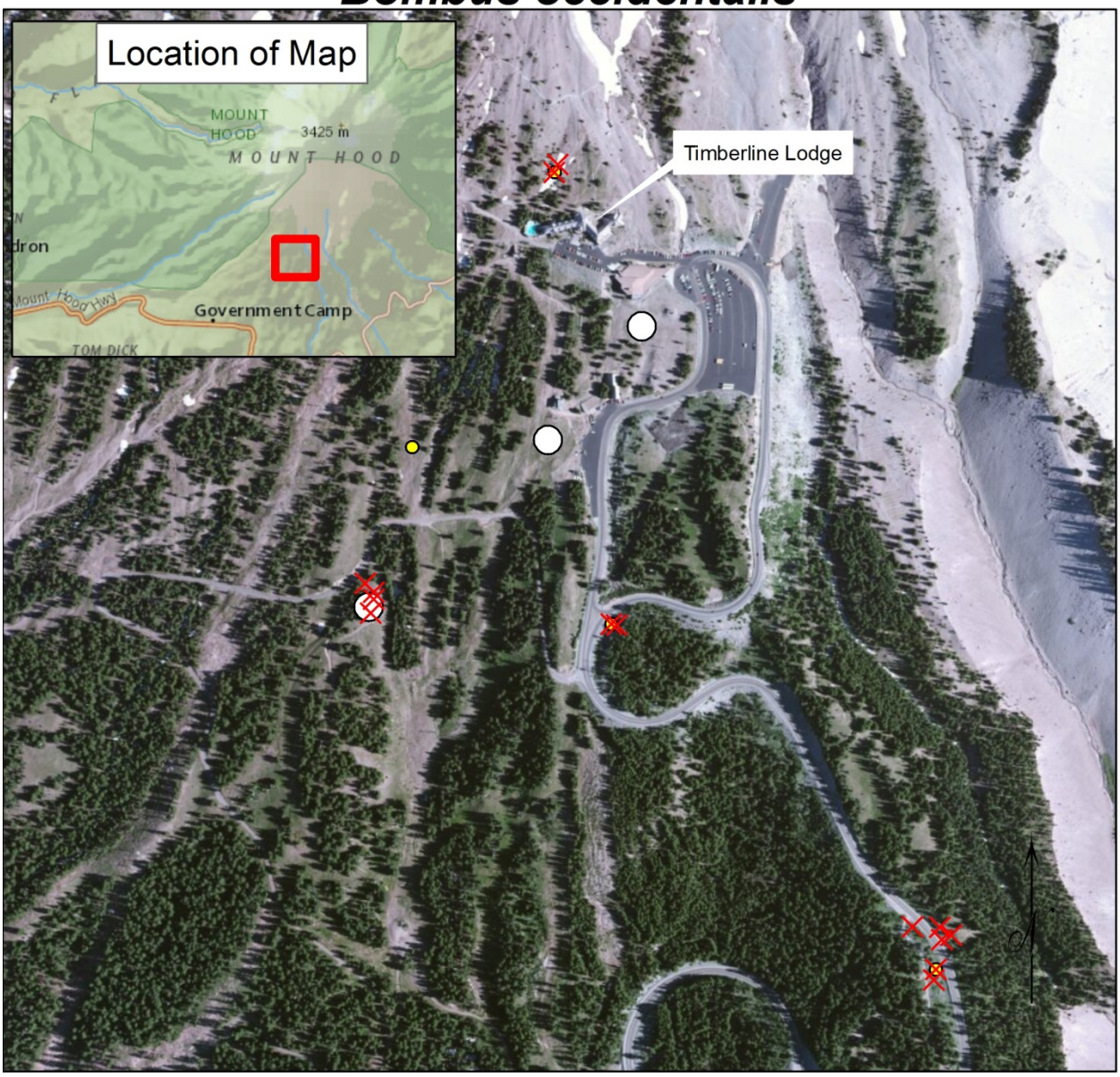
(1) Photo of *Bombus occidentalis*
(2) Map of Survey Sites and Confirmed Locations Around Timberline Ski Area
(3) Map of Proposed Mountain Bike Trail and Skills Park Locations
(4) Spreadsheet showing all detections of western bumble bees on the Mt Hood National Forest during 2013 surveys
(5) Information sources

ATTACHMENT 1: Photo of *Bombus occidentalis (Xerces Society photo)*

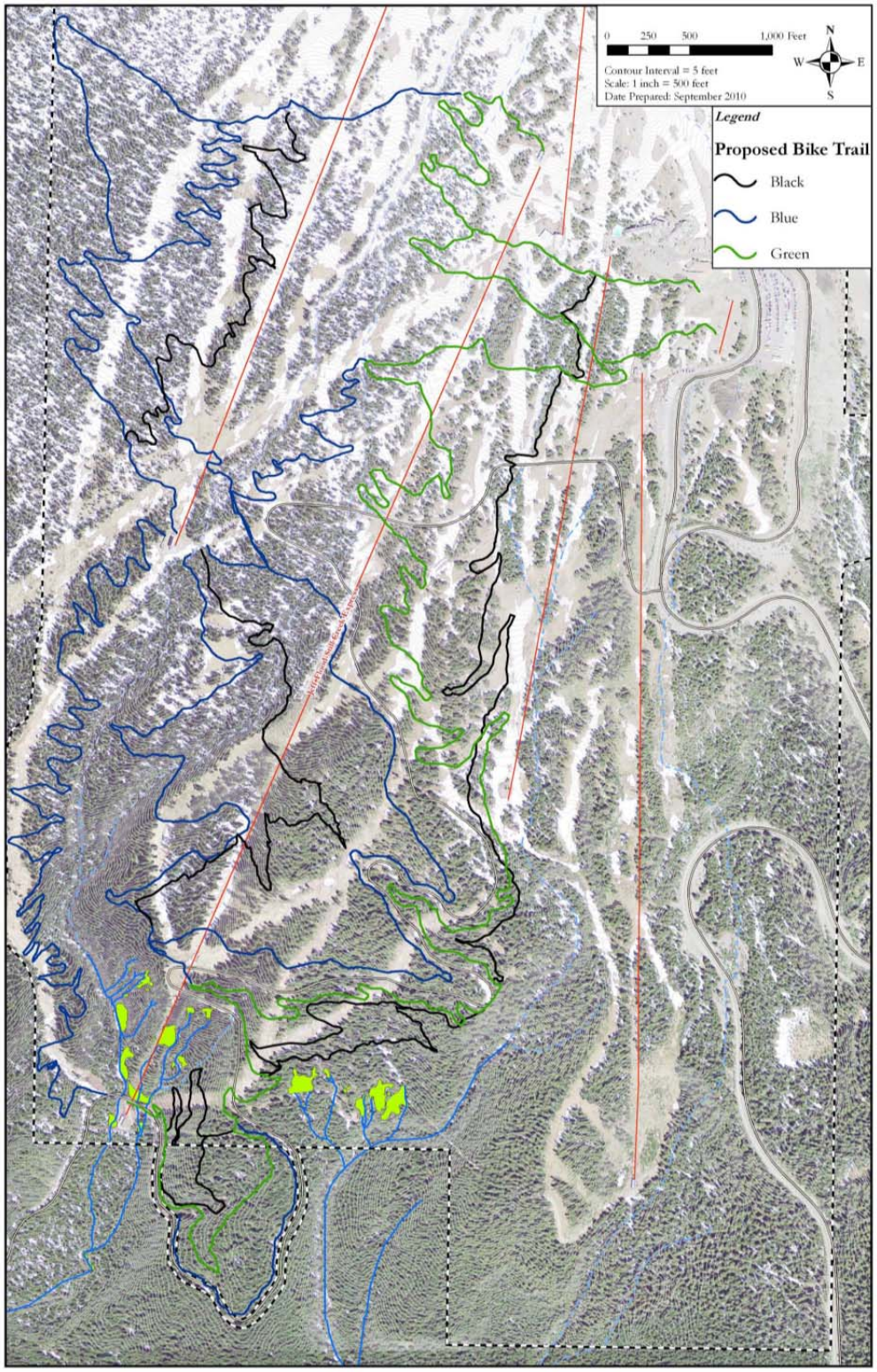
Western bumble bee by Derrick Ditchburn.

Attachment 2:

Surveys Near Timberline Lodge, Mt. Hood
Bombus occidentalis



Attachment 3:



ATTACHMENT 4:

Date	species	Observer	State	County	Location	Latitude	Longitude	Elevation (m)	Precision	Notes	caste	Specimen Notes	Floral Host
7/31/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Timberline Rd 850 m S of Timberline Lodge	45.325846	-121.710616	1730	0-5 m	from GPS	worker	Photo voucher	*Lupinus latifolius*
7/31/2013	*Bombus occidentalis*	Candace Fallon	Oregon	Clackamas	Timberline Rd 850 m S of Timberline Lodge	45.325833	-121.710521	1730	0-5 m	from GPS	worker	Photo voucher	*Lupinus latifolius*
7/31/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Meadows above Timberline Lodge	45.331973	-121.711633	1765	0-5 m	from GPS	worker	Photo voucher	*Lupinus latifolius*
7/31/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Meadows above Timberline Lodge	45.33187	-121.711701	1765	0-5 m	from GPS	worker	Photo voucher	*Lupinus latifolius*
7/31/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Hood River	Devil's Half Acre Complex	45.273604	-121.679488	1170	0-5 m	from GPS	worker	Photo voucher	*Agastache urticifolia*
7/31/2013	*Bombus occidentalis*	Candace Fallon	Oregon	Hood RIver	Devil's Half Acre Meadow	45.271554	-121.681797	1160	0-5 m	from GPS	worker	Xerces 2013rgh49	*Solidago canadensis*
7/31/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Hood River	Devil's Half Acre Meadow	45.271361	-121.681155	1160	0-5 m	from GPS	worker	Photo voucher	*Solidago canadensis*
7/31/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Hood River	Devil's Half Acre Meadow	45.270742	-121.681357	1160	0-5 m	from GPS	worker	Photo voucher	*Aster*
7/31/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Hood River	Barlow Butte	45.273423	-121.667649	1420	0-5 m	from GPS	worker	Photo voucher	*Lupinus latifolius*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Just S of W Leg Road, on "Walt's Baby ski run"	45.326387	-121.715284	1720	0-5 m	from GPS	worker	Photo voucher	*Aster*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Just S of W Leg Road, on "Walt's Baby ski run"	45.326274	-121.715132	1720	0-5 m	from GPS	worker	Photo voucher	*Aster*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Just S of W Leg Road, on "Walt's Baby ski run"	45.32618	-121.715132	1720	0-5 m	from GPS	worker	Photo voucher	*Aster*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Just S of W Leg Road, on "Walt's Baby ski run"	45.325993	-121.715179	1720	0-5 m	from GPS	male	Photo voucher	*Aster*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Alpine CG	45.321806	-121.704392	1650	0-5 m	from GPS	worker	Photo voucher	*Solidago canadensis*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Alpine CG	45.321699	-121.704174	1650	0-5 m	from GPS	worker	Photo voucher	*Solidago canadensis*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Alpine CG	45.321639	-121.704354	1650	0-5 m	from GPS	worker	Photo voucher	*Solidago canadensis*

Date	species	Observer	State	County	Location	Latitude	Longitude	Elevation (m)	Precision	Notes	caste	Specimen Notes	Floral Host
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Alpine CG	45.321813	-121.704906	1650	0-5 m	from GPS	worker	Photo voucher	*Solidago canadensis*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Alpine CG	45.321244	-121.704468	1650	0-5 m	from GPS	worker	Photo voucher	*Solidago canadensis*
8/7/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Clackamas	Alpine CG	45.321104	-121.704506	1650	0-5 m	from GPS	male	Photo voucher	*Solidago canadensis*
8/14/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Marion	Olallie Meadows	44.859152	-121.772929	1390	0-5 m	from GPS	worker	Photo voucher	*Gentiana sceptrum*
8/14/2013	*Bombus occidentalis*	Joanna Hatfield	Oregon	Marion	Olallie Meadows	44.86065	-121.77043	1390	0-5 m	from GPS	male/worker	Photo voucher	*Aster*
8/14/2013	*Bombus occidentalis*	Rich Hatfield	Oregon	Marion	Olallie Meadows	44.86028	-121.770248	1390	0-5 m	from GPS	worker	Photo voucher	*Aster*

ATTACHMENT 5: Information Sources

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Thorp, R.W., D.S.H. Jr. and L.L. Dunning. 1983. Bumblebees and cuckoo bumblebees of California. University of California Press, Berkeley, Los Angeles, London. 3 pp.

Xerces Society. Bumblebees: western bumblebee (*Bombus occidentalis*). Profile prepared by R. W. Thorp, E. Evans and S. H. Black. Web. 9 Dec. 2013. < http://www.xerces.org/western-bumble-bee/ >.

Personal Communication with Rich Hatfield on 10/1/2013:

Hi Alan,

Thanks for the update. I realize that you are probably not working due to the government shut down, but hopefully you will receive this when you return to work.

I have a few thoughts about the potential impacts that this park may have on bumble bees, but it is hard for me to comment without specific knowledge about the construction and project extent. The gist of those concerns is that I don't think that foraging locations are the primary concern for bumble bees. My bigger concern is the disruption of nesting habitat. Since bumble bees are social animals, destroying one or a few nests could have a significant impact on this species.

Would you like our input on how the proposed project might affect the western bumble bee?

All the best,

Rich

Caddisfly Survey around Mt. Hood: Search for Scott's apatanian and other sensitive caddisfly species

Progress Report

Prepared for USDA Forest Service – Region 6 and DOI Bureau of Land Management Interagency Special Status/Sensitive Species (ISSSSP) Coordinator

By Greg Wanner and Kathryn Arendt

U.S. Department Agriculture Forest Service, Mt. Hood National Forest – Zigzag Ranger District, Zigzag, Oregon 97049

October 2013

Introduction

Considerable developments such as road building, water supply, trail construction, and vegetation clearing associated with ski area operations, timber thinning, and wildfires with associated fire suppression activities has occurred adjacent to and upslope of the headwater tributaries of Mt. Hood, Oregon. These activities have increased fine sediment inputs to stream channels from the highly erodible volcanic soils (Crandell 1980) and resulted in negative impacts to streams. Anthropogenic increases in sediment to streams are one of the most important causes of lotic system degradation (USEPA 1990). Fine sediment inputs from human activities and natural disturbances may eventually cause sufficient habitat alteration to adversely impact caddisfly populations (Lemly 1982; Waters 1995) that are present in streams around Mt. Hood.

Scott's apatanian caddisfly *Allomyia scottia*, is a rare species and is endemic only to Mt. Hood, Oregon (Brenner 2005). This caddisfly species is a glacial relict, surviving the latest glaciation period and currently in isolated populations on Mt. Hood. Like other caddisfly species, Scott's apatanian is likely sensitive to habitat alteration caused by unnatural sediment inputs. The larva of this caddisfly species is distinctive with its horned head that it is easily identifiable, but has thus far only been documented in a narrow band of elevation ranging from 3,800 to 5,000 feet in three stream locations on the southeast flanks of Mt. Hood (Wisseman 2010). These collections have been from high gradient streams that are about 2 m in width from springs supplied by permanent snowfields around the summit of Mt. Hood. These streams are clear, cold (2ºC in July), and boulder dominated with dense growths of a wiry moss (Brenner 2005). A recent survey suggests that the habitat requirements for this species may be very narrow as it was documented in the headwater tributaries of the West Fork Salmon, and not in the nearby (< 800 feet) Still Creek headwaters (Wisseman 2010).

Unknown is how widely distributed Scott's apatanian caddisfly is in the Mount Hood area. Only limited surveys have occurred at easily accessible areas along major roads (Anderson 1976). No comprehensive survey has been conducted to evaluate the range or status of Scott's apatanian caddisfly (Brenner 2005). Therefore, the objectives of this study are to determine the distribution and a measure of relative abundance of the Scott's apatanian caddisfly within its known range in an elevation band around Mt. Hood between 4,000 to 5,500 feet. This study will also describe the distribution and relative abundance of five other sensitive (Caddisfly *Namamyia plutonis*) and strategic (Tombstone prairie caddisfly *Oligophlebodes mostbento*, One-spot rhyacophilan caddisfly *Rhyacophila unipunctata*, a caddisfly *Moselyana comosa*, and a caddisfly *Lepania cascada*) caddisflies identified by the USDA Forest Service – Region 6 and DOI Bureau of Land Management Interagency Special Status/Sensitive Species Program (ISSSSP) (www.fs.fed.us/r6/sfpnw/issssp), as well as all other caddisfly species around Mt. Hood within that elevation range. This study delivers a baseline for the distribution and relative abundance of caddisfly species; thus allowing for follow up studies to assess habitat restoration projects and management of land use activities. This information is critical to effective conservation and management of each species and its habitat.

Study Area

Mt. Hood, located 50 miles east of Portland, is the highest peak in Oregon (11,239 feet) and the fourth highest among the volcano peaks in the Cascade Range. Mt. Hood is home to 12 named glaciers or snowfields. This caddisfly study area targeted a band between 4,000 and 5,500 feet around Mt. Hood (Figure 1) in perennial 1st through 3rd order clear water streams (non-glacial).

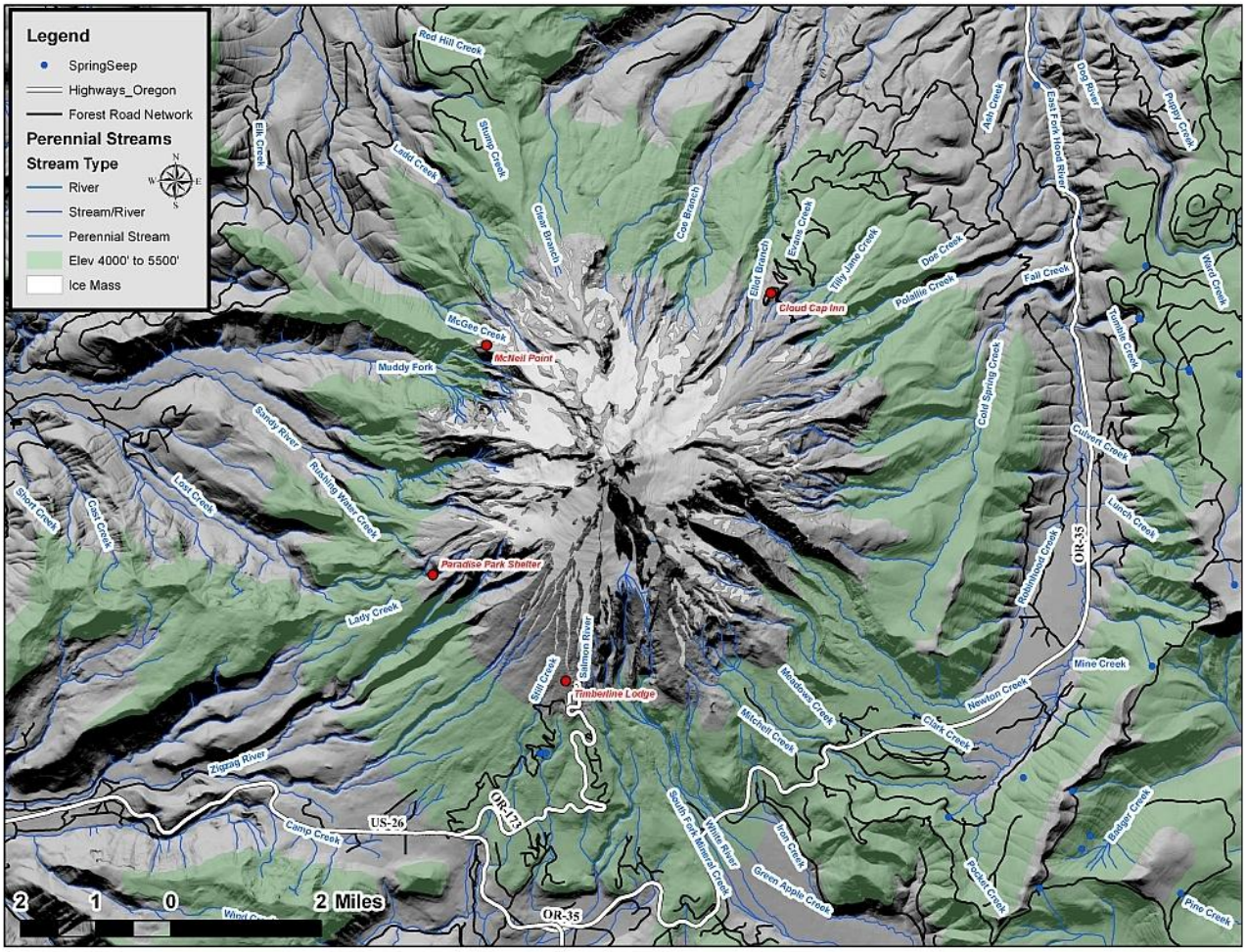

Figure 1. Map of Mt. Hood and perennial streams at elevations between 4,000 and 5,500 feet (shaded green).

Most of the clear water streams within this band originate from springs and seeps either directly out of the mountain or from wet meadows above. Annual precipitation at this elevation band ranges from 80 to 120 inches. Most sampling for caddisflies occurred at elevations where the Pacific silver fir *Abies amabilis* plant association zone (3,150 – 5,700 feet) was the dominant over-story (Cain and Diaz 2002). Sampling also occurred in the mountain hemlock *Tsuga mertensiana* zone (5,600 – 6000 feet) and immediately above the timberline where little vegetation was observed.

Methods

Larval caddisflies were sampled in perennial 1st through 3rd order clear water streams within the range of 4,000 and 5,500 feet elevation on Mt. Hood (Figure 1). We attempted to sample streams near 4,000 feet, near 5,500 feet, and sites in between to fully encompass the expected known range of Scott's apatanian caddisfly. However due to steep terrain, most sample sites were accessed by hiking trails and roads while other sites were accessed across less steep terrain between hiking trails. Sampling occurred in August 2013, which allowed for snow levels to recede up Mt. Hood. Extreme care was taken to avoid disrupting stream banks and vegetation while sampling. A D-frame kick-net was used to acquire multi-habitat kick net samples from a 50-ft stream reach with a minimum of three sub-samples at each collection site. 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 feet 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. 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. 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. Samples were placed in white tubs and repeatedly elutriated with stream water to separate organic material and invertebrates from mineral substrates. 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 95% alcohol.

Water temperature, depth, wetted width were measured at each sub-sample site. A Garmin Montana 600 or a Garmin GPSmap 60Cx GPS was used to collect UTM coordinates and elevation. Additionally, qualitative habitat data was acquired at each sub-sample location, which included: percent sand, gravel, cobble, and boulder, instream vegetation, and over-story vegetation.

Results and Discussion

A total of 217 sub-samples were taken with a D-frame kick net in 62 streams targeting larval caddisflies around Mt. Hood in August 2013 (Figure 2). Samples were collected from an elevation at 3,672 feet in a tributary to the Cold Springs Creek on the east flank of Mt. Hood up to 5,855 feet in the Little Zigzag River near the Timberline Trail on the south flank of Mt. Hood. Mean elevation of sample sites was 4,722 feet (SD = 605) (Table 1).

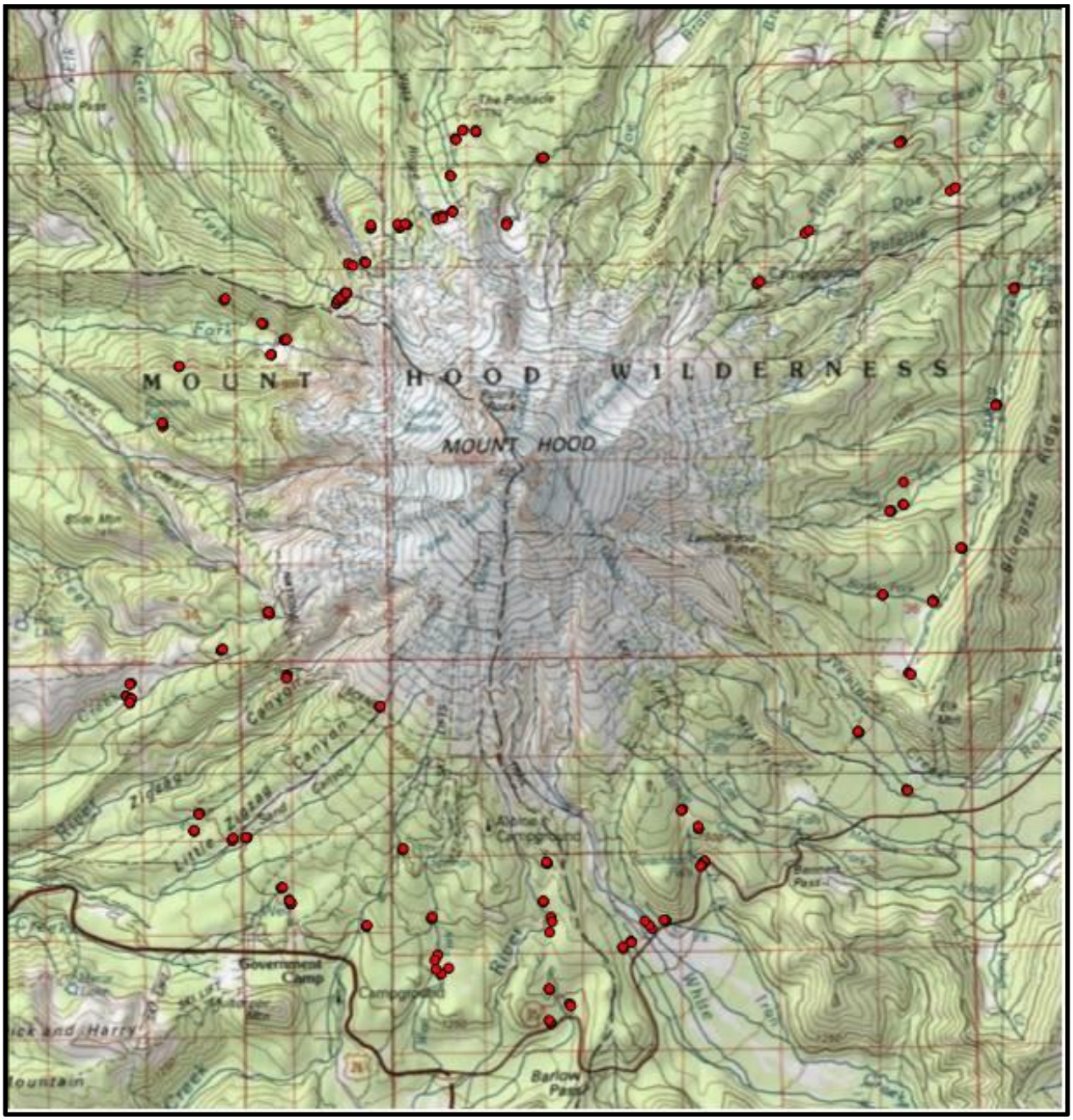

Figure 2. Caddisfly larvae survey locations around Mt. Hood in August 2013.

Habitat at sample sites

Minimum water temperature ranged from 3 °C in Sand Canyon Creek to 15 °C in a tributary to the Clear Branch. Overall, the average temperature at our sample sites was 7.4 °C (Table 1). Streams sampled ranged from 2 to 45 cm (average = 13 cm) in depth and 5 to 575 cm (average = 104) in width (Table 1). Many of the sample sites had mixed substrate; however, over 71% of the sites had gravel (2 – 64 mm) as the dominant (≥ 50%) substrate type, while only

12% of the sites were dominated by cobble (64– 256 mm) and 7% dominated by sand (< 2 mm) (Table 1).

Most streams have moss or liverworts as the dominant instream vegetation with 54%. Detritus dominated 27% of our samples and 19% of the sites had no vegetation or detritus. We did observe differences in the types of moss. Most streams have moss with short strands that are attached tightly to the substrate. Other streams had a much more "wiry" type of moss and some streams had a spongy type of moss. In hindsight, we should have attempted to document the types of moss observed while sampling, which likely influences the types and densities of caddisfly populations around Mt. Hood.

The over-story vegetation cover was dominated by Pacific silver fir plant association community in the 4,000 to 5,500 feet elevation band around Mt. Hood. Over 65% of the streams where caddisfly sampling occurred were in large tree (21"- 32" dbh) stands that was the driving ecological feature in the riparian area. Other sample sites observed were 23% in small tree (9"- 21" dbh), 6% in shrubs (1"- 5" dbh), 5% in mature forest (≥ 32" dbh), and only 2% where there was no over-story vegetation at sample sites above the timberline.

Table 1. Average elevation, water temperature, depth, wetted width, percent sand, gravel, cobble, and boulder at the survey sites for streams sampled in each 6th field watershed around Mt. Hood in August 2013.

Stream	Elevation (ft.)	Water temp. (°C)	Depth (cm)	Wetted width (cm)	% Sand	% Gravel	% Cobble	% Boulder
			Upper Salmon River					
East Fork Salmon River	4359	9.5	8	43	15	65	7	0
Trib1 to East Fork Salmon River	4038	11.9	8	68	17	70	13	0
Trib2 to East Fork Salmon River	3966	11.0	5	65	13	78	8	0
Mono Creek	4534	5.8	26	112	13	63	17	7
Trib1 to Salmon River	4784	7.6	7	97	23	68	8	0
West Fork Salmon River	4244	7.5	15	165	40	60	0	0
Trib1 to West Fork Salmon River	4186	10.7	16	195	70	28	2	0
			Still Creek					
Trib1 to Still Creek	4283	8.2	10	93	7	53	30	10
Trib2 to Still Creek	4913	7.9	14	72	10	80	10	0
			Zigzag Canyon					
Camp Creek	4188	4.8	8	76	10	43	47	0
Trib1 to Camp Creek	4133	4.6	17	150	17	63	17	3
Trib2 to Camp Creek	4143	4.6	12	65	17	57	27	0
Lady Creek	4030	8.8	16	157	0	60	40	0
Trib1 to Lady Creek	5064	7.0	14	45	17	67	17	0
Trib2 to Lady Creek	4318	4.7	14	155	17	80	7	0
Trib3 to Lady Creek	4229	7.0	10	53	0	80	20	0
Trib4 to Lady Creek	4219	9.5	12	90	0	63	37	0
Little Zigzag River	4968	4.9	23	130	12	50	33	5
Sand Canyon Creek	4165	3.0	12	78	13	83	3	0
Trib1 to Hidden Lake	3874	6.5	12	82	80	20	0	0
Trib1 to Zigzag River	4113	6.0	15	78	13	60	27	0
Trib2 to Zigzag River	4810	8.2	10	48	13	67	13	7

Table 1 continued.

Stream	Elevation (ft.)	Water temp. (°C)	Depth (cm)	Wetted width (cm)	% Sand	% Gravel	% Cobble	% Boulder
Sandy River Headwaters								
Lost Creek	5368	4.0	28	153	3	53	40	3
Trib1 to Lost Creek	5402	7.2	18	42	3	73	23	0
Trib1 to Muddy Fork	4351	8.3	4	37	13	80	7	0
Trib2 to Muddy Fork	4268	8.8	8	72	7	80	17	0
Trib3 to Muddy Fork	4196	7.3	18	267	3	20	23	53
Trib4 to Muddy Fork	4106	6.0	24	142	13	67	13	7
Trib5 to Muddy Fork	4134	5.0	7	97	10	80	10	0
Trib6 to Muddy Fork	3845	9.0	19	318	0	67	23	7
Upper West Fork Hood River								
Trib1 to Ladd Creek	5580	6.8	18	323	7	63	30	0
Trib2 to Ladd Creek	5329	6.0	9	62	13	63	23	0
Trib3 to Ladd Creek	5461	6.0	9	42	3	57	40	0
Trib4 to Ladd Creek	5555	3.0	11	50	10	57	33	0
McGee Creek	5451	10.0	11	52	0	63	37	0
Trib1 to McGee Creek	5433	5.5	4	53	20	67	13	0
Trib2 to McGee Creek	5457	4.0	8	310	0	10	90	0
Trib3 to McGee Creek	5490	6.0	9	63	0	30	70	0
Trib4 to McGee Creek	5576	13.5	5	42	7	30	63	0

Table 1 continued.

Stream	Elevation (ft.)	Water temp. (°C)	Depth (cm)	Wetted width (cm)	% Sand	% Gravel	% Cobble	% Boulder
Upper Middle Fork Hood River								
Clear Branch	5825	7.6	8	23	27	60	13	0
Trib1 to Clear Branch	5834	9.3	9	42	7	70	23	0
Trib2 to Clear Branch	5832	10.6	6	52	23	40	27	10
Trib3 to Clear Branch	5146	15.0	6	40	10	50	35	5
Trib4 to Clear Branch	5158	14.0	9	37	3	40	40	17
Trib5 to Clear Branch	5541	4.8	9	57	3	33	63	0
Trib1 to Coe Branch	5260	5.5	20	105	23	62	13	2
Trib1 to Pinnacle Creek	5130	13.0	12	102	10	63	23	3
Middle East Fork Hood River								
Cold Springs Creek	5136	8.0	11	88	20	73	7	0
Trib1 to Cold Springs Creek	4797	5.5	17	67	17	47	13	3
Trib2 to Cold Springs Creek	3769	5.3	20	110	3	50	33	13
Doe Creek	3957	6.2	6	45	57	43	0	0
North Fork Cold Springs Creek	4401	7.8	20	322	1	33	48	18
Trib1 to North Fork Cold Springs Creek	4946	10.0	12	202	15	78	7	0
South Fork Cold Springs Creek	5081	6.4	21	120	26	63	11	0
Tilly Jane Creek	4851	7.9	10	77	27	47	14	1
Upper East Fork Hood River								
Trib1 to Clark Creek	4440	5.6	25	125	15	58	18	8

Table 1 continued.

Stream	Elevation (ft.)	Water temp. (°C)	Depth (cm)	Wetted width (cm)	% Sand	% Gravel	% Cobble	% Boulder
			Upper White River					
Green Apple Creek	4291	9.7	10	175	2	93	5	0
North Fork Iron Creek	4754	8.0	17	58	35	63	2	0
Trib1 to North Fork Iron Creek	4717	6.4	8	38	49	29	22	0
North Fork Mineral Creek	4278	9.0	16	58	30	70	0	0
South Fork Iron Creek	4249	4.5	16	137	13	52	32	3
South Fork Mineral Creek	4234	9.9	13	62	10	80	10	0
Average for all streams	**4722**	**7.4**	**13**	**104**	**17**	**58**	**22**	**3**

Caddisflies collected

Caddisflies were collected in 96% of the kick net samples. Of the nine samples that did not contain any caddisflies, six of those samples were from streams that had glacial influence with a high sediment load and periodic drying of the channel during cold evenings when there was little to no runoff. Caddisflies were identified to species when possible; otherwise they were identified to genus or group. A total of 2,575 caddisflies were collected from 10 families (Table 2).

A total of 28 Scott's apatanian caddisfly (sensitive species) was collected in Sand Canyon Creek, Little Zigzag River, a tributary to the Muddy Fork of the Sandy River, and a case was found in a tributary to McGee Creek (Figure 3). Surprisingly, no Scott's apatanian were collected where they were previously recorded in Still Creek, West Fork Salmon River, or South Fork Iron Creek. However, we did not sample in the same locations where they were previously recorded. Scott's apatanian caddisfly were collected at elevations ranging from 4,096 to 4,180 feet with the one case collected at 5,438 feet (Table 3). These caddisflies were collected in cold streams (3 to 6 °C), at depths of 6 to 40 cm and widths of 60 to 170 cm. The instream vegetation was either dominated by wiry moss or detritus with large trees (21"- 32" 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 (Table 3).

A total of 24 Tombstone prairie caddisfly (strategic species) was only collected in a tributary to the Muddy Fork in the Sandy River Basin (Figure 3). This caddisfly was collected near 4,200 feet elevation, in a cold 7.3 °C, wide stream (250 – 300 cm), with no instream vegetation or detritus and a shrub dominated over-story, and dominated by boulder substrate (Table 3).

Only two caddisfly *Lepania cascada* (strategic species) were collected in Camp Creek (Figure 3). This caddisfly was collected in one sample at an elevation of 4,183 feet, at 4.8 °C, in a small stream (10 cm deep and 95 cm wide), with detritus as the dominate instream vegetation, a mature forest canopy in the riparian area, and with 70% gravel as the dominant substrate (Table 3).

The one-spot rhyacophilan caddisfly (strategic species) has not been described at the larval stage. To accurately describe the populations of this species around Mt. Hood, adult males are needed to identify this species. However, we likely collected this species during this study as we sampled numerous springs and first order streams above 3,700 feet where this species occurs (Scheuering 2006).

No caddisfly *Namamyia plutonis* (sensitive species) or caddisfly *Moselyana comosa* (strategic species) were collected during this study. It was surprising that we did not collect the caddisfly *Namamyia plutonis* as they have been described in the Cascade Range in sand and gravel substrate streams at 4,000 to 5,000 feet elevation. However, this species has never been recorded in Clackamas or Hood River counties (Andrews 2010a). Caddisfly *Moselyana comosa* have been documented on Mt. Hood (Andrews 2010b). This species of caddisfly has been recorded with localized populations in seeps at elevations from 3,000 to 6,000 feet. We sampled relatively few seeps during this study, which may account for none sampled.

A total of one Mt. Hood primitive brachycentrid caddisfly *Eobrachycentrus gelidae* was collected during this study (Figure 3). This caddisfly species is also a glacial relict such as Scott's apatanian. This species currently is not listed as a sensitive or strategic species but was at one time and was a candidate as an Endangered or threatened species by the U.S. Fish and

Wildlife Service in 1984 (Wisseman 2010). We collected this species in a small (15 cm deep and 80 cm wide) tributary to Hidden Lake in the Zigzag Watershed (Table 3). Sampling at this location was immediately above the lake in a marshy area with high detritus and sand as the dominant substrate.

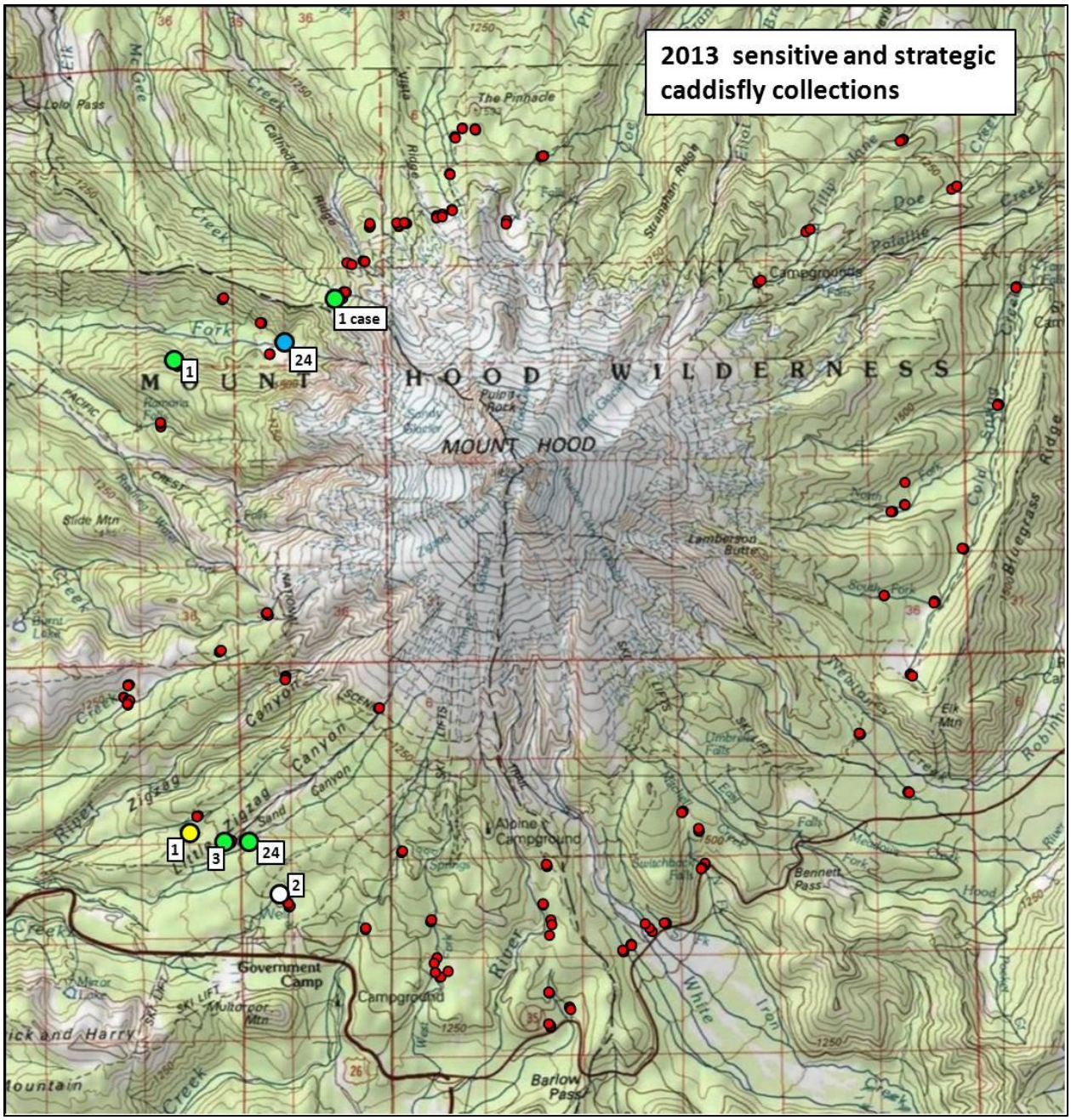

Figure 3. Red circles indicate all kick net sampling locations, green circles indicate confirmed numbers and locations of Scott's apatanian caddisfly, blue circles are Tombstone prairie caddisfly, white circles are a caddisfly *Lepania cascada*, and yellow circles are Mt. Hood primitive Brachycentrid caddisfly collected in August 2013.

Table 2. Caddisflies identified in each 6th field watershed.

Taxa	Middle East Fork Hood River	Upper Sandy River	Still Creek	Upper East Fork Hood River	Upper Middle Fork Hood River	Upper Salmon	Upper West Fork Hood River	Upper White	Upper White River	Zigzag Canyon	Grand Total
Apataniidae											
Allomyia sp.		1			57	1	2				61
Allomyia scotti		1								27	28
Brachycentridae											
Eobrachycentrus gelidae										1	1
Micrasema	18	1	17	3	2	6		3		18	68
Glossosomatidae											
Anagapetus	1	1						3			5
Anagapetus bernea			1								1
Goeridae											
Goeracea genota			1								1
Lepania cascada										2	2
Hydropsychidae											
Parapsyche almota complex	1		2							2	5
Parapsyche elsis	63	92	28	11	17	50	3	58	9	102	433
Lepidostomatidae											
Lepidostoma hoodi group	27	42	6	1		15	1	22		25	139
Limnephilidae											
Limnephilidae pupae/early instars	8	690		2	26		2	5		6	739
Cryptochia	12	2	1		2	4	11	1		10	43
Ecclisocosmoecus scylla	11	7		8	4	7	6	4		9	56
Ecclisomyia		1						6			7
Eocosmoecus frontalis	5	2	1		1	10	9	7	1	4	40
Homophylax					3		3	3			9
Philocasca			1								1
Psychoglypha	34	7			133	15	87	160	2	11	449

Table 2 continued.

Taxa	Middle East Fork Hood River	Upper Sandy River	Still Creek	Upper East Fork Hood River	Upper Middle Fork Hood River	Upper Salmon	Upper West Fork Hood River	Upper White	Upper White River	Zigzag Canyon	Grand Total
Philopotamidae											
Dolophilodes	1	3				2		2		4	12
Dolophilodes pallidipes	1										1
Wormaldia	1					3					4
Rhyacophilidae											
Himalopsyche phryganea			1								1
Rhyacophila (pupae/early instar)	1	1	4		1	1	1				9
Rhyacophila alberta group	1				2	1					4
Rhyacophila betteni group	10	15		2	6	10	12	6		13	74
Rhyacophila perda							1				1
Rhyacophila brunnea/vemna group	4	3	2	2	2	4	2	3		4	26
Rhyacophila vemna					3			1			4
Rhyacophila grandis	1					2			2		5
Rhyacophila hyalinata group	3	7			7	1	5	2		1	26
Rhyacophila sibirica group	2	4	1		2	1	1	1			12
Rhyacophila rotunda group			2				1				
Rhyacophila vagrita group		6						7		3	16
Rhyacophila verrula group	3	1				1	3	4		10	22
Rhyacophila rickeri					1		1				2
Rhyacophila visor group		3					3			1	10
Rhyacophila vofixa group	6	2	7	8	9	2	13	3	1	7	58
Uenoidae											
Farula		56	37				26				119
Neophylax splendens	1	1				1		2			5
Neothremma	6	7				2	2	7		15	39
Neothremma didactyla			12							1	13
Oligophlebodes		24									24

Table 3. Region 6 sensitive and strategic species collections by stream, date, UTM coordinates, elevation, water temperature (°C), stream depth and width, instream (L = liverwort or moss, D = detritus, and N = none) and over-story (LT = large tree [21”- 32” dbh], SS = shrubs [1”- 5” dbh], and MT = mature forest [≥ 32” dbh]) vegetation, and percent sand, gravel, cobble, and boulders at the sample site.

Stream	N	Date	UTM E	UTM N	Elevation	Water Temp	Stream Depth (cm)	Stream Width (cm)	Instream Vegetation	Over-story vegetation	% Sand	% Gravel	% Cobble	% Boulder
						Scott's apatanian caddisfly								
Trib to McGee Creek	1 case	12-Aug	599083	5027982	5438	6	6	60	L	LT	0	40	60	0
Sand Canyon Creek	1	15-Aug	597550	5019128	4156	3	10	95	D	LT	20	70	10	0
Sand Canyon Creek	2	15-Aug	597538	5019126	4159	3	12	65	D	LT	10	90	0	0
Sand Canyon Creek	21	15-Aug	597536	5019125	4181	3	14	75	D	LT	10	90	0	0
Little Zigzag River	1	15-Aug	597311	5019092	4113	3.8	30	95	L	LT	20	60	20	0
Little Zigzag River	1	15-Aug	597306	5019072	4080	3.8	35	95	L	LT	10	40	40	10
Little Zigzag River	1	15-Aug	597317	5019113	4069	3.8	40	60	L	LT	0	50	40	10
Trib to Muddy Fork	1	27-Aug	596437	5026862	4190	5	8	170	L	LT	10	80	10	0
						Tombstone prairie caddisfly								
Trib to Muddy Fork	5	27-Aug	598155	5027290	4177	7.3	20	300	N	SS	0	10	20	70
Trib to Muddy Fork	15	27-Aug	598165	5027284	4174	7.3	15	250	N	SS	0	10	20	70
Trib to Muddy Fork	4	27-Aug	598201	5027301	4236	7.3	20	250	N	SS	10	40	30	20
						caddisfly *Lepania cascada*								
Camp Creek	2	15-Aug	598109	5018297	4184	4.8	10	95	D	LT	10	70	20	0
						Mt. Hood primitive Brachycentrid caddisfly								
Trib to Hidden Lake	1	15-Aug	596684	5019231	3886	6.5	15	80	D	MT	80	20	0	0

Some species such as caddisfly *Parapsyche elsis*, in the net-spinning Hydropsychidae family, was extremely common in our study and recorded in all 6th field watersheds around Mt. Hood. A total of 433 individuals of this species was collected and at least one was found in over 50% of our samples. The *Micrasema spp.*, *Cryptochia spp.*, *Ecclisocosmoecus scylla*, *Eocosmoecus frontalis,* and *Psychoglypha spp.* caddisflies were collected in almost every 6th field watershed, but at much lower numbers (Table 2).

Management recommendations

It is widely understood that caddisflies may be negatively affected by activities which degrade stream habitats and the associated over-story since most species of Trichopterans have very specific preferences regarding water temperature, flow, oxygen levels and substrate characteristics. Protection and management of riparian habitat including maintenance of shading, water quality, and sediment control would be beneficial to caddisfly species.

Although 62 streams were sampled in elevations at 4,000 to 5,500 feet around Mt. Hood, more sampling is needed to document the full extent of rare caddisfly species. Our sampling methodology only provided evidence of species presence. In streams that did not detect rare species, we cannot conclude that species was absent. A more thorough investigation is required to determine if Scott's apatanian and other rare caddisfly species are present at higher and lower elevations. This is especially true in streams where these rare species were detected either in this study or from past records. Additionally, larval caddisfly surveys need to be accompanied by adult surveys such as net sweeps and light traps over streams. Many species are detected best by collecting adults and many species such as those in the Rhyacophilidae family have never had the larva form described.

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Anecdotal information:

Three surveyors hiked and estimated total of 72.5 miles each over a three week period collecting caddisfly samples around Mt. Hood. To improve efficiency and decrease fatigue, the surveyors would begin the larval caddisfly sampling at high altitudes then hike generally in a downhill direction. For example, surveyors would stage a vehicle at FS Road 2639 and then start the survey from Timberline Lodge heading west along the Timberline Trail #600 (~ 5,800 feet) then down the Hidden Lake Trail #779 to the staged vehicle (3,500 feet) while conducting surveys along the way.

August is the height of yellow jacket *Vespula spp.* season around Mt. Hood. Yellow jackets and bald-faced hornets *Dolichovespula maculata* are extremely protective of their nests and will sting repeatedly if disturbed. Three people were stung a total of nine times while sampling for caddisflies. We likely encountered yellow jackets and hornets at a high rate due to the lack of water and food available during that time of year.

On average, 12 caddisflies (range = 0 – 347) were collected in each sub-sample. Sample jars should not be filled more than half way with caddisflies or debris when preserved in alcohol. We recommend using 2 to 30 mL sample jars.

We came across an abandoned marijuana grow operation. Safety should be considered doing these remote samples on Mt. Hood.