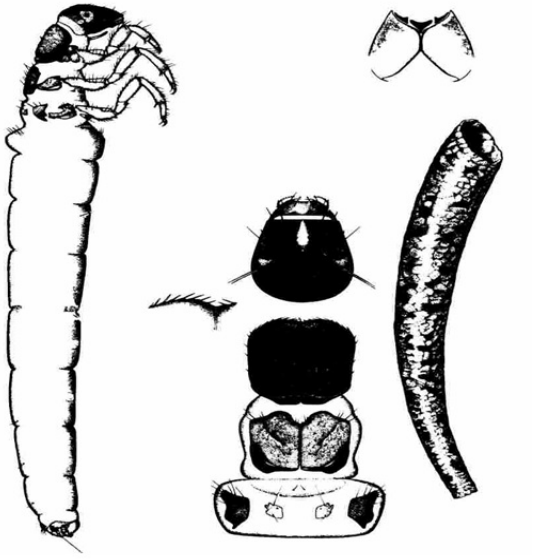
**BEFORE THE SECRETARY OF THE INTERIOR**

# PETITION TO LIST THE WONDER CADDISFLY (*Neothremma prolata*) AS AN ENDANGERED SPECIES



**Submitted By:**

**CENTER FOR BIOLOGICAL DIVERSITY**

**January 31, 2024**

**Notice of Petition**

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Pursuant to section 4(b) of the Endangered Species Act ("ESA"), 16 U.S.C. § 1533(b); section 553(e) of the Administrative Procedure Act ("APA"), 5 U.S.C. § 553(e); and 50 C.F.R. § 424.14(a), the Center for Biological Diversity ("Center") herby petitions the Secretary of the Interior, through the U.S. Fish and Wildlife Service ("Service"), to protect the wonder caddisfly (*Neothremma prolata*) as an endangered species under the ESA.

The Service has jurisdiction over this petition. This petition sets in motion a specific process, placing definite response requirements on the Service. Specifically, the Service must issue an initial finding as to whether the petition "presents substantial scientific or commercial information indicating that the petitioned action may be warranted." 16 U.S.C. § 1533(b)(3)(A). The Service must make this initial finding "[t]o the maximum extent practicable, within 90 days after receiving the petition." *Id.* Petitioner also requests that critical habitat be designated for the wonder caddisfly concurrently with the species being listed, pursuant to 16 U.S.C. § 1533(a)(3)(A) and 50 C.F.R. § 424.12.

The Center is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. Supported by more than 1.7 million members and online activists, the Center works to secure a future for all species, great or small, hovering on the brink of extinction.

Petitioner submits this petition on behalf of the Center for Biological Diversity, our staff, and our members who hold an interest in protecting the wonder caddisfly and preventing its extinction.

Submitted this 31st day of January 2024.

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## Executive Summary

The wonder caddisfly (*Neothremma prolata*) ("caddisfly") is an extremely rare and highly imperiled caddisfly found only on the Oregon side of the Columbia River Gorge ("Gorge"). The tiny caddisfly (measuring less than 1 cm) requires very specific habitat features that, if even only temporarily disturbed, could cause the caddisfly to disappear forever.

The only known population of wonder caddisflies exists in a limited area below Lancaster Falls in Wonder Creek in Hood River County, Oregon. Originally described in 1992 from collections below nearby Cabin Creek Falls, the wonder caddisfly has not been found in Cabin Creek since that time and is now considered extirpated from that location. Despite extensive survey efforts, no additional wonder caddisfly populations or locations have been found.

The wonder caddisfly's singular population, narrow range, and limited dispersal ability make the caddisfly particularly vulnerable to any changes to its habitat, even if those changes are only temporary. As a cold-water dependent aquatic insect that is adapted to a very specific habitat, the caddisfly is primarily threatened by habitat damage and loss. In particular, the caddisfly faces a significant extinction risk from drought and human disturbance, including from the maintenance of a power line clearcut, trail use and maintenance, pollution and runoff, and logging and other forestry activities that increase fine sediment delivery and raise temperatures instream. While the caddisfly's single extant population occurs east of the areas impacted by the 2017 Eagle Creek wildfire, future wildfires in the area are likely to harm this species and its narrow habitat. As a result, climate change and its effects are also significant threats to the caddisfly.

A species is determined to be endangered if the species is at risk of extinction in all or a significant portion of range. A species is threatened if the species is at risk of becoming endangered in the foreseeable future in all or a significant portion of range. The Service shall list a species if any one of five factors is present:

> (A) the present or threatened destruction, modification, or curtailment of its habitat or range;
> (B) overutilization for commercial, recreational, scientific, or educational purposes;
> (C) disease or predation;
> (D) the inadequacy of existing regulatory mechanisms; or
> (E) other natural or manmade factors affecting its continued existence.

This petition seeks ESA protection for this nationally and globally imperiled species based on the best scientific information and in the context of the five listing factors.

## Introduction

Across the globe, aquatic insects face significant threats. Over 30 percent of global aquatic insect species are threatened with extinction, and caddisflies are the most imperiled aquatic insect (Sánchez-Bayo & Wyckhuys 2019, pp. 16-18).

The Oregon-side wall of the Gorge abounds with diverse aquatic habitats that support many rare caddisflies that live nowhere else on Earth. Among these, the wonder caddisfly is notable as one of the rarest and most at risk of extinction.

Like other caddisflies, the wonder caddisfly begins its life as an aquatic larva that constructs a portable protective case out of stream sediments and emerges from the water when mature as a winged, moth-like adult. The caddisfly requires specific habitat features that exist in only a handful of streams at a very narrow elevation level in the Gorge. Larval caddisflies live at the base of mid-sized waterfalls on talus slopes—created by loose jumbles of rock—covered by moss and wetted by waterfall mist, and they depend on suitable stream substrates to construct their casings. Adults are not strong fliers and rely on streamside riparian vegetation for shelter.

Although the caddisfly was first described in 1992 from specimens collected below Cabin Creek Falls, the population there is now considered extirpated due to extended drought. An additional caddisfly population was discovered in 2015 below Lancaster Falls in Wonder Creek, in Hood River County, Oregon—hence the common name of this species: wonder caddisfly. Despite extensive surveys, however, no additional populations have been discovered.

With one population in a highly restricted range, the caddisfly is particularly vulnerable to extinction. The primary threat to this species is habitat loss due to drought and human disturbance. Additional threats include direct mortality and habitat disturbance from heavy recreational use, trail maintenance, maintenance of a power line clearcut, and other logging and forest management activities, all of which are likely to damage the caddisfly's habitat, increase instream sediment, and elevate water temperature. As a cold-water dependent species, the caddisfly is also threatened by the effects of climate change, including drought, increased water temperatures, reduced dissolved-oxygen levels, and increased wildfire severity and frequency. The caddisfly is not a strong flier and therefore has a limited ability to disperse to evade localized disruptions, weather events, wildfire, or other unfavorable habitat conditions, even if only temporary. The best available scientific evidence indicates that existing regulations and conservation actions are inadequate to protect freshwater invertebrate species like the wonder caddisfly (Strayer 2006, p. 271).

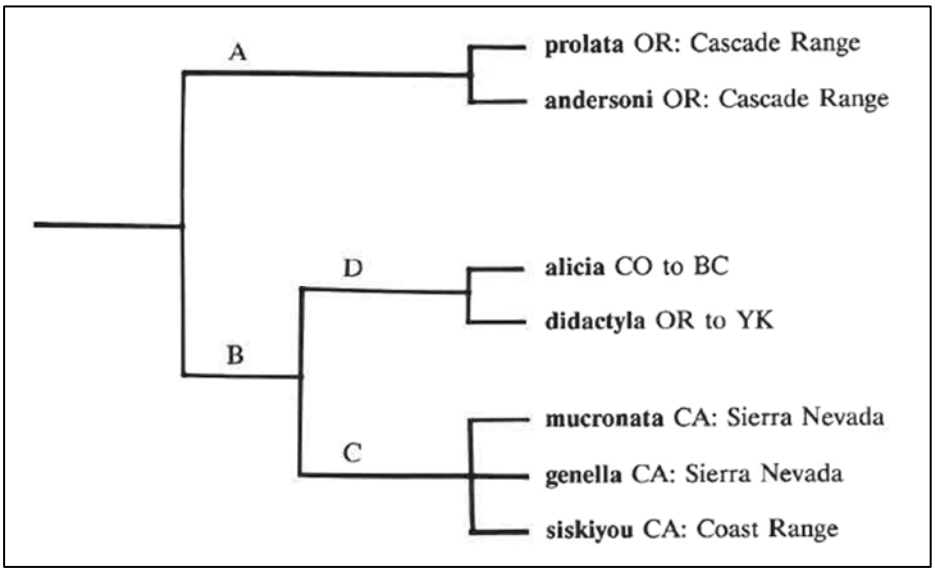
The caddisfly's global status is G1, national status is N1N2, and status in Oregon is S1S2.

## Biology

### Taxonomy:

*Neothremma prolata* was first described in 1992 from caddisfly specimens collected at the base of Cabin Creek Falls (Wiggins & Wisseman 1992, pp. 1063-1064; Wisseman 2018, p. 16).

Although the caddisfly was previously thought to exist only at Cabin Creek Falls, surveys in 2015 discovered a new population below Lancaster Falls on Wonder Creek.

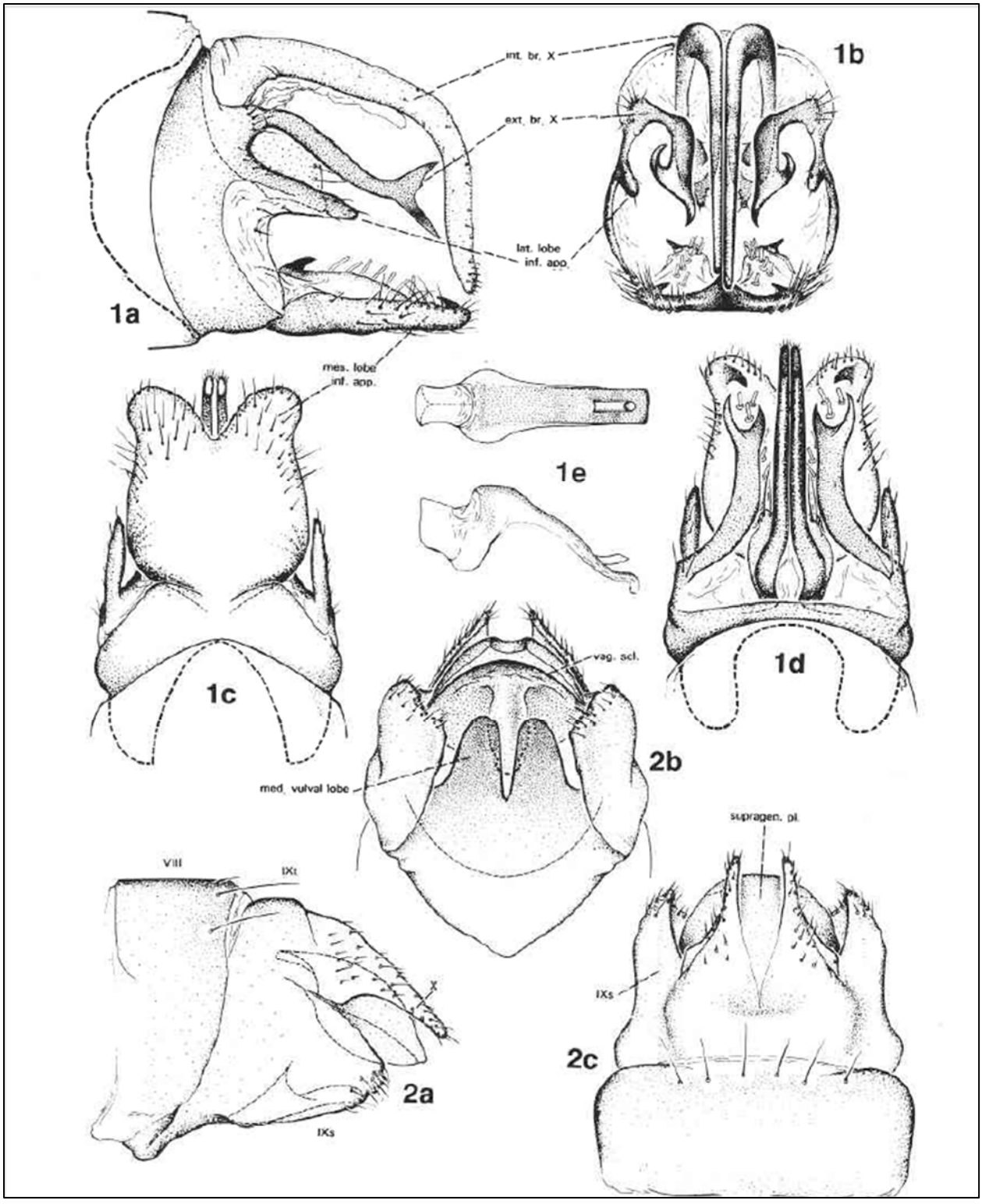



Gene-tree diagram (Wiggins & Wisseman 1992).

While this caddisfly appears to be a sister species to the *N. andersoni/N. new species A/N. new species B* caddisfly recently described in the mid-Columbia Gorge, it forms its own separate branch on the gene tree from other endemic Gorge caddisflies (Wisseman 2018, p. 15).

**Species Description, Life History, Reproduction, Diet, Behavior:**

Like other caddisflies in the order Trichoptera, wonder caddisflies are winged, moth-like insects with long antennae and with aquatic larvae that construct portable casings and emerge from the water when mature. At less than 0.39 in. (1 cm), the wonder caddisfly is a remarkably small caddisfly (Wiggins & Wisseman 1992, p. 1064). Positive identification at the species level for members of the *Neothremma* genus currently requires microscopic examination of the adult genitalia (see image below from Wiggins & Wisseman 1992), and these life stages are only present in a short and unpredictable seasonal window at any given site. Larvae are present in streams throughout the year (Fallon et al. 2016, p. 11).



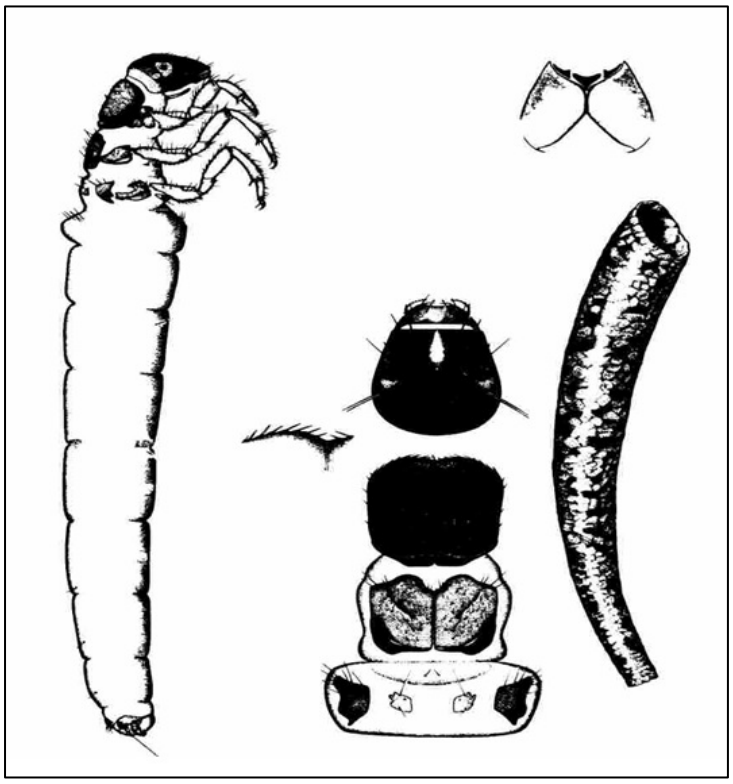

Microscopic *Neothremma prolata* Adult Male and Female Genitalia (Wiggins & Wisseman 1992).

The adult flight period of this species is unknown since only pupae and larvae have been collected in the field. The adults used to describe the species were lab reared from pupae collected at Cabin Creek at the end of May 1987 and emerged as adults in June (Wiggins &

Wisseman 1992, p. 1064). It is likely the wonder caddisfly has a similar flight period to the closely related *N. andersoni*, which has been collected from late May to mid-August. The duration of the life cycle (voltinism) of this species is unknown, but it is believed that it may be one or two years (Fallon 2017, p. 3). Most caddisflies in temperate latitudes are univoltine, developing from the egg through five larval instars, pupating, and emerging as adults within a single year (Morse et al. 2019, pp. 1-2).

***Larval Stage:***

Larvae of the wonder caddisfly are typical for the *Neothremma* genus—with a slender whitish body, dark head and sclerotized (hardened) parts, a pronotum with curved anterior margin and anterolateral edge, and with no abdominal gills.



*Neothremma* larvae and case (Wiggins 1996).

The tiny wonder caddisfly larvae (less than 5.5 mm in length) construct cases up to 7 mm long made of fine sand grains and rock particles, held together externally with silk (Wiggins & Wisseman 1992, p. 1064). Larvae in the *Neothremma* genus construct slender, smooth, somewhat curved cases, tapered almost to a point and up to 14 mm long (Fallon 2017, p. 2, citing Wiggins 1996). Cases are made of sand grains with a thin, silken lining over both the interior and exterior surfaces (Fallon 2017, p. 2, citing Morse & Holzenthal 2008).

*Neothremma prolata* tied larvae and pupae at Wonder Creek, Columbia River Gorge (Wisseman 2018).

*Neothremma* larvae are similar to other caddisfly larvae in the genus *Farula*, which can be found in the same or nearby habitats in the Gorge. In *Neothremma,* the filaments of the abdominal lateral fringe arise along half or more of most segments, as opposed to less than half in *Farula*, and *Neothremma* larval cases are usually less slender and lighter colored than those of *Farula* (Fallon 2017, p. 2, citing Morse & Holzenthal 2008; Wiggins 1996).

*Neothremma* larvae cannot be identified to the species level using macroscopic characters. Species level confirmation for larvae requires either pupal/adult associations at each site or DNA barcoding (Hebert et al. 2003, pp. 313-321).

The specific larval diet of this species is not known, but generally *Neothremma* larvae feed on algae on wetted surface rocks. According to Anderson (1976), the larvae in this genus appear to be specialized for scraping "cryptogamic ooze" off rocks and have been classified by Morse & Holzenthal (2008) as scrapers and collector-gatherers, feeding on periphyton and organic particles on rocks (Fallon 2017, p. 3).

***Adult Stage:***

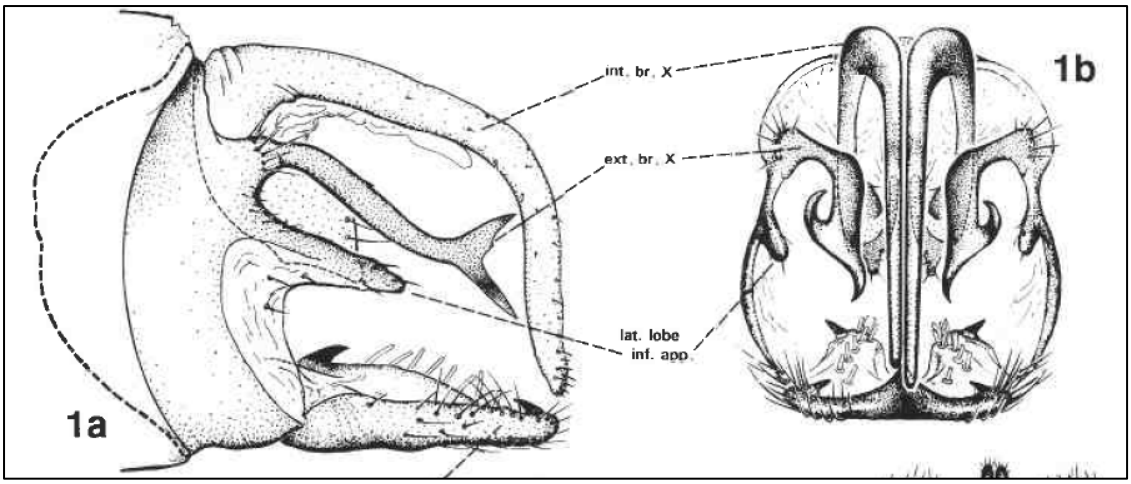
Adult wonder caddisflies emerge from the water as small, moth-like insects with long antennae and wings that they hold tent-like over the body. Unlike moths that have scales on their wings, however, caddisfly wings support numerous hairs, hence Tricho- (hairy) ptera (wings). The adult wonder caddisfly is typical of the Uenoidae family, characterized by large compound eyes and small simple eyes (ocelli) positioned forward on the head (Fallon 2017, p. 1). The very fine antennae on adults are slightly longer than the wings, and the adult legs have a tibial spur formula of 1,3,4 or 2,3,4 (Fallon 2017, p. 1, citing Schmid 1998).

*Neothremma* adults are small, less than 0.39 inches (1 cm) in overall length. They can be distinguished from others in the family Uenoidae by examining the discoidal cell of the hind wing, which is barely longer than it is wide, rather than twice as long as it is wide (Fallon 2017,

p. 1, citing Schmid 1998), and the head having the long axes of the setal warts parallel instead of convergent (Fallon 2017, p. 1, citing Wiggins et al. 1985).

*Neothremma prolata* adults have uniformly colored medium brown forewings about 5 mm long, with the body and appendages light brown in color. Adults are similar in appearance to the more widely distributed species *N. alicia* and *N. didactyla* (Fallon 2017, p. 2)

Standard species-level identification for individual members of this genus requires microscopic examination of the adult male or female genitalia. Identification through DNA barcoding is also possible, though confirmed DNA sequences for all *Neothremma* species is not yet complete (Fallon 2017, p. 2). The following publications contain detailed descriptions and illustrations of all described *Neothremma* species and are necessary for valid identifications: Denning 1966; Ross 1949; Schmid 1998; Wiggins et al. 1985; Wiggins & Erman 1987; and Wiggins & Wisseman 1992.




Male genital capsule of *Neothremma prolata*. The exterior branch of the 10th tergite (ext. br. X) differs substantially among the 4 gorge endemics (Wiggins & Wisseman 1992).

*Neothremma prolata* may display a similar pattern in adult activity and dispersal capabilities as adults of *N. andersoni*, which appear to be day-fliers and may only travel limited distances along the stream channel (Fallon 2017, p. 3). Eggs are likely laid on the underside of cobble or rubble in shallow water or in splash zone areas of falls and cascades.

**Habitat Requirements:**

Caddisfly larvae typically have highly specific habitat preferences, particularly regarding water temperature, velocity, dissolved-oxygen levels, and substrate characteristics.

Like other *Neothremma* caddisflies, the wonder caddisfly has been found only in small, cold, high gradient, montane streams—along relatively moist, cool upland slopes below timberline dominated by large coniferous trees. These perennial streams must maintain consistent flow and be situated near springs, seeps, and low-intensity waterfalls, and they must also include talus slopes—naturally occurring jumbles of loose, fallen rocks that form below waterfalls. Cool-cold year-round stream temperatures are required to support *Neothremma* populations. Although

small spring-stream-waterfalls are common on the Oregon side of the Gorge, each of these habitat patches is essentially an island with diminished connectivity between adjacent watersheds (Wisseman 2018, p. 5).

Wonder caddisfly larvae live on rocks or wood that is consistently wetted by splashing water and mist from waterfalls or by the thin streams or springs of water running on the surfaces of the talus slope. These areas are known as “madicolous” habitats, characterized as having films of flowing water no deeper than 2 mm. Larvae also cling to vertical rock surfaces at the base of the falls, but only along the wetted margins and not in the full force of the waterfall’s torrential flow. Pupae are most often found in rock aggregations in madicolous habitat at the base of falls or beneath rocks in the talus slope zone (Fallon et al. 2016, p. 11).

Cabin Creek Falls, talus slope below waterfall with small pool. Type locality for *Neothremma prolata* in Hood River County, Oregon (Fallon 2017, p. 6).

Lancaster Falls on Wonder Creek, Hood River County, Oregon (Fallon 2017, p. 7).

Wonder caddisfly larvae have not been found at larger waterfalls with higher winter discharges, in part because the stronger flows from these falls create plunge pools at their bases instead of the talus slope habitat that is critical for this species. Torrential habitat at the base and to the sides of high-intensity falls is not suitable for the species, as higher flow force is simply too great for larvae to withstand. However, the talus slopes where wonder caddisflies have been found (Cabin Creek Falls and Lancaster Falls) occur below waterfalls that are larger than those preferred by neighboring Gorge endemic caddisfly *Farula constructa* (Fallon et al. 2016, p. 13).

Adult wonder caddisflies are typically found in riparian vegetation near the stream emergence site, are day active (diurnal), and do not appear to be strong fliers that can readily disperse between watersheds (Fallon et al. 2016, p. 11).

**Current and Historical Range:**

The wonder caddisfly is endemic to a very narrow area on the east end of the Gorge in Oregon. Although the caddisfly was initially collected at the base of Cabin Creek Falls by Wisseman in 1987, subsequent surveys in 2015 and 2017 found no *Neothremma* caddisflies at this site (Wisseman 2018, p. 16).

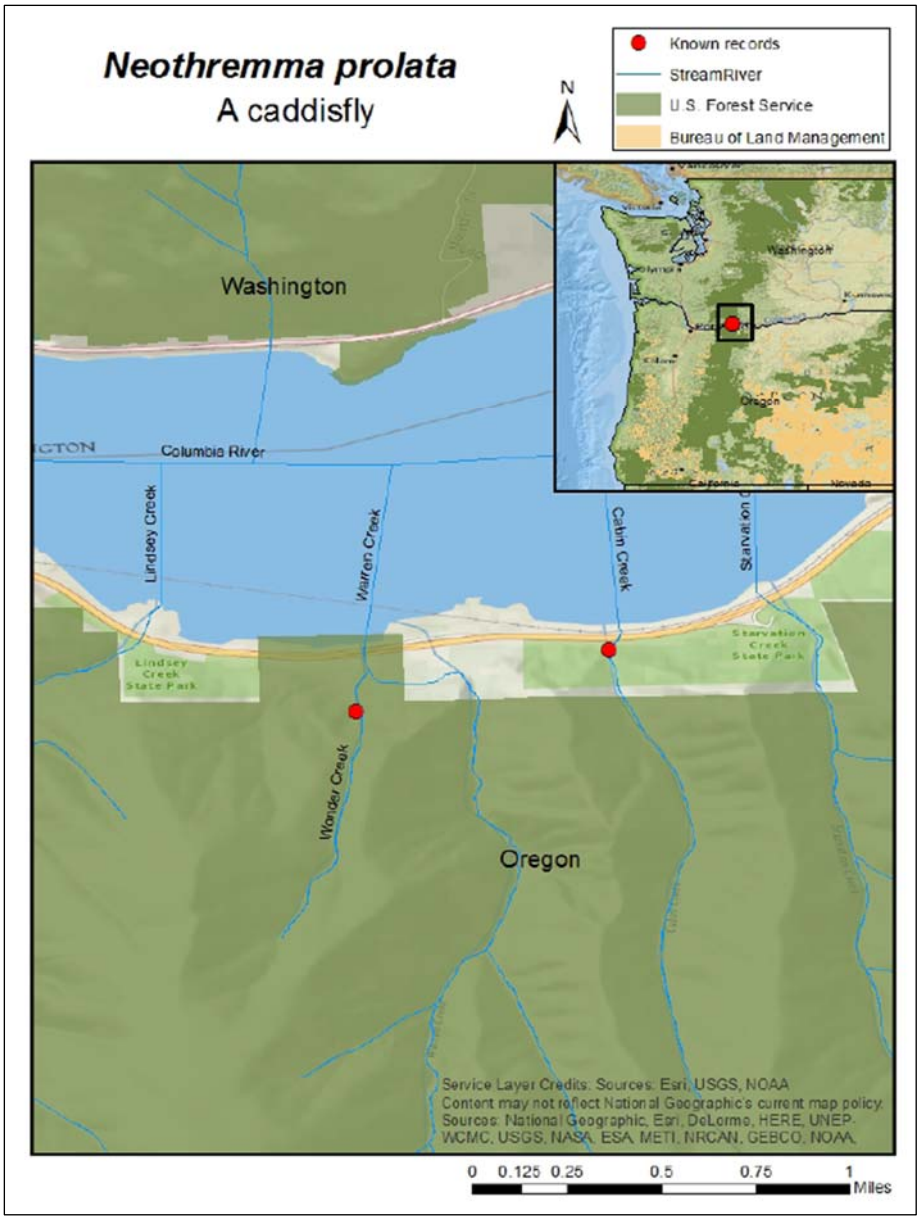
In the severe drought year of 2015, most of the stream channel exiting the plunge pool at the base of Cabin Creek Falls had gone subsurface, and *Neothremma* larvae could not survive under such dry conditions, as they feed on algae on wetted surface rocks (Wisseman 2018, p. 16). In 2017, there was surface flow evident below the plunge pool, but again, after extensive searching, no *Neothremma* were found in Cabin Creek (Wisseman 2018, p. 16). Wisseman (2018) theorizes that the population at the base of Cabin Creek Falls could be a satellite population that is particularly susceptible to extirpation during extended drought cycles (Wisseman 2018, p. 16).

Wisseman's 2015 surveys led to the discovery of a second *Neothremma prolata* population in Wonder Creek below Lancaster Falls, about 0.5 mi west of Cabin Creek (Fallon et al. 2016, p. 15). Wonder Creek is a cool-cold, perennial stream that likely originates from a spring at the top of the Gorge wall. Below Lancaster Falls at the bottom of the Gorge wall is an extensive, steep talus slope, across which Wonder Creek flows for several hundred meters downhill before disappearing into the ground just above the bike path in the Columbia River floodplain.

At present, Wonder Creek has the only known significant and permanent wonder caddisfly population (Wisseman 2018, p. 19). Wonder Creek is densely shaded by mature conifer-hardwood forest from the base of Lancaster Falls downstream about 25 meters. Mt. Defiance Trail #413 crosses through Wonder Creek below Lancaster Falls, allowing hikers to walk through the caddisfly's sensitive stream habitat. Immediately below the trail crossing, however, is a powerline corridor clear-cut about 75 to 100 meters wide. The stream then re-enters mature conifer-hardwood forest and flows downhill for another 75 meters before going subsurface (at low-moderate flows) about 25 to 50 meters above the bike path. Wisseman's 2017 surveys found many wonder caddisflies in the forested reach just below Lancaster Falls and in the upper area of the powerline corridor. By the bottom of the powerline corridor, however, larvae were rare. Wisseman also extensively surveyed the stream channel in the wooded area below the powerline corridor but found no wonder caddisflies (Wisseman 2018, p. 19).

Thus, the wonder caddisfly population appears to be restricted to a stream reach that is less than 100 meters long downstream of Lancaster Falls. Although the powerline corridor includes the steep, talus slope habitat that could be ideal for the caddisfly, the clear-cut appears to be harmful and limiting to the population, as larval densities fade quickly in the stream reach crossing the corridor (Wisseman 2018, p. 19).

Despite extensive survey efforts since the 1980s, no *Neothremma prolata* have been found at other sites in the Gorge (Wisseman 2018, p. 19).




Known records of *Neothremma prolata* in Oregon, relative to Forest Service and BLM land (Fallon 2017).

**Population Status:**

As discussed above, the only known wonder caddisfly population exists in a less than 100-meter segment of Wonder Creek below Lancaster falls and above a clear-cut powerline corridor (Wisseman 2018, p. 19). Although specific abundance estimates for the caddisfly are not known, the only known population is highly localized and restricted to a single talus slope microhabitat in the Gorge (Fallon et al. 2016, p. 3). Given the species' specific habitat requirements, its narrow range that is further restricted by the powerline corridor and Mt. Defiance Trail crossing, and the compounding effects of climate change, including wildfire and drought, the wonder caddisfly is a species is of highest conservation concern (Wisseman 2018, p. 19).

## Threats to the Wonder Caddisfly (Five Listing Factors)

Of the endemic and sensitive caddisflies in the Gorge, the wonder caddisfly may be the rarest and most vulnerable to extinction (Fallon et al. 2016, p. 3). The single population below Lancaster Falls on Wonder Creek is particularly vulnerable and would benefit from protection, as this site is heavily impacted by human activity, with a major hiking-trail crossing and a clear-cut powerline corridor immediately downstream of the falls (Fallon et al. 2016, pp. 3, 15).

Lancaster Falls, Mt. Defiance Trail #413, and Powerline Clearcut. Photo by M. Townsend (2023).

### Present or Threatened Destruction, Curtailment, or Modification of Habitat or Range:

The wonder caddisfly is highly vulnerable to any change to its habitat due to its extremely small population size and narrow, isolated habitat. The caddisfly is particularly sensitive to changes in water temperature, velocity, dissolved-oxygen levels, and substrate characteristics in its stream habitat. Larvae and pupae of this species are highly sensitive to any pollution and to disturbance of the mineral substrate in the streams they inhabit, as well as to increased inputs of fine sediment, increased water temperatures caused by removal of the forest canopy and shifts in algal community composition (Fallon 2017, p. 7).

The scenic and heavily trafficked Historic Columbia River Highway crosses the only stream occupied by the caddisfly, as do several major hiking and biking trails. Lancaster Falls is one of three waterfalls along Mt. Defiance Trail #413 in the central Columbia River Gorge National Scenic Area, which crosses Wonder Creek just below Lancaster Falls in sensitive habitat. Sedimentation, eutrophication, and chemical pollution caused by road construction and impervious surface run-off are likely to harm this species, and trampling is also a concern.

The heavy recreational use that is typical in the Gorge is expected to intensify in the future, due to local population growth and national recreation trends (Halofsky et al. 2022, p. 321, citing Cordell 2012). Sedimentation and bank erosion by heavy recreational activity, landslides (*see* Salem-News 2008, p. 1), and wildfires (*see* USFS 2018, p. 3) are likely to negatively impact the caddisfly, as such events occur with increasing severity within the caddisfly's habitat in the Gorge.

Because the caddisfly is only found in and around a single stream within a forested area, its population is likely to be harmed by human activities that involve trail maintenance, vegetation clearing, and timber harvesting in the watershed (Fallon 2017, p. 7). Trees provide the shade necessary to maintain the appropriate water level and temperature for larval and pupal development, and the loss of trees through logging, including ongoing logging to maintain the clearcut powerline corridor, remains a limiting factor inhibiting the growth and expansion of the caddisfly population and poses a significant unabated threat to the population.

**Other Natural or Manmade Factors Affecting the Continued Existence of the Species:**

As a highly restricted species, the wonder caddisfly's small and isolated population makes the species particularly vulnerable to extinction (Fallon et al. 2016, p. 15). Heavy recreational use, timber harvest, and other land management practices are likely to adversely affect all aspects of this species' life cycle. The Lancaster Falls site on Wonder Creek is heavily affected by human activity, both with the trail crossing and the clear-cut powerline corridor immediately below the falls. Online hiking blogs include reports of efforts to hike off-trail higher up on Wonder Creek to see "Upper Lancaster Falls," signaling that ongoing human access to the site could harm any caddisflies present in the area and disturb or harm caddisfly habitat on the talus slope.

Climate change and its effects, including drought, increased water temperatures, and wildfire, pose significant and growing threats to the caddisfly, particularly as a cold-water-dependent species. Climate change is projected to increase the severity and frequency of wildfire and drought in the region, reduce snowpack that feeds river flows, increase siltation in streams, increase air and water temperatures, and reduce dissolved oxygen levels (Field et al. 2007), all of which could negatively impact this endemic species' narrow habitat and long-term survival.

In particular, the effects of climate change on hydrology in the area of the Gorge where the caddisfly lives will be significant, primarily because decreased snowpack and earlier snowmelt will shift the timing and magnitude of streamflow, peak stream flows will be higher, and summer low flows will be lower (Halofsky et al. 2022, pp. iii, v, vi-viii, xi, 43-84). Projected changes in climate and hydrology will continue to affect aquatic and terrestrial ecosystems, especially as the

frequency of extreme climate events (e.g., drought, low snowpack) and ecological disturbances (e.g., flooding, wildfire) increase (Halofsky et al. 2022, pp. iii, 58).

Wildfire is known to affect aquatic insect populations (Malison & Baxter 2010, p. 1324, citing Minshall et al. 1997). The direct, immediate effects of wildfire on aquatic insects include intense heating of water, exposure to smoke and toxins, and the replacement of food sources with ash and charcoal, any of which can lead to short-term increases in insect mortality (Malison & Baxter 2010, p. 1324 citing Minshall 2003). In the midterm (5–10 years post-fire), the greatest effects of wildfire on aquatic insects can result from disturbance by flooding or mass sediment movements during spring runoff or following periodic rains in the years after fire (Malison & Baxter 2010, p. 1324, citing Minshall 2003, Vieira et al. 2004, Arkle et al. 2010). Stream insect populations are harmed by such disturbance when patches of the streambed are scoured, insects are removed, and recolonization proceeds (Malison & Baxter 2010, p. 1324, citing Resh et al. 1988, Townsend 1989, Lake 2000). The increasing frequency and intensity of wildfire in forests increases the likelihood of direct and indirect habitat damage, including loss of adult caddisfly habitat in the riparian zone and post-fire management actions upstream that may increase instream temperatures and turbidity (ISAB 2007, p. 33). Post-wildfire sedimentation can also reduce the quality of instream habitat available to aquatic insect larvae, which may delay or severely restrict the successful recolonization by displaced species (Malison & Baxter 2010, p. 1324).

The 2017 Eagle Creek Fire burned through more than 49,000 acres in Oregon's Columbia River Gorge National Scenic Area (Halofsky et al. 2022, p. 384). It is unclear the extent to which the Eagle Creek Fire may have impacted the wonder caddisfly and other endemic caddisflies of the Gorge. Nevertheless, the increased likelihood of future wildlife in the area poses a significant threat to the caddisfly's tiny cold-water habitat.

**Inadequacy of Existing Regulatory Mechanisms:**

Existing regulatory mechanisms are entirely inadequate to protect the wonder caddisfly. The species' habitat receives no substantial protection from human disturbance or drought, which will only become more frequent and intense with climate change. The habitat-limiting powerline corridor, unless removed, will continue to prevent the caddisfly's expansion in ways that no current regulatory mechanisms can adequately remedy.

The designation of the Columbia River Gorge National Scenic Area provides no substantive protections for the caddisfly, and neither does the caddisfly's presence on lands within the Mount Hood National Forest. Although powerline facilities on National Forest System lands are required to have an approved permit and operating plan that complies with section 512 of the Federal Land Policy and Management Act, 43 U.S.C. 1761(b)(1), those permits provide no buffer requirements for vegetation management actions around streams. Vegetation management actions can involve use of herbicides and pesticides to maintain and inhibit growth of vegetation, as well as mechanical removal of larger trees and shrubs, all of which are likely to cause or contribute to the harm to the wonder caddisfly's narrow and sensitive habitat.

An endangered listing under the ESA would provide the wonder caddisfly with a recovery plan, as well as long-term funding for conservation efforts called for by scientists as being necessary for the caddisfly to have any chance of persistence.

**Request to Designate Critical Habitat for the Wonder Caddisfly Concurrent with Listing**

Petitioner requests and strongly recommends that the stream, riparian vegetation, and talus slopes of Wonder Creek below Lancaster Falls and Cabin Creek below Cabin Creek Falls, as well as any other nearby habitat deemed necessary for the survival and recovery of the caddisfly within the Gorge, be designated as critical habitat concurrent with listing.

As required by the ESA, the Secretary shall designate critical habitat concurrent with determination that a species is endangered or threatened (16 U.S.C. §1533(a)(3A)). Critical habitat is defined by Section 3 of the ESA as:

> (i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 1533 of this title, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and
>
> (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 1533 of this title, upon a determination by the Secretary that such areas are essential for the conservation of the species.

16 U.S.C. §1532(5).

Protecting the caddisfly's habitat, which is particularly sensitive and vulnerable to any human or natural disturbance, may assist in preventing the extinction of this species. Wonder Creek and its adjacent springs, seeps, and tributaries are high priority sites for protection given the presence of wonder caddisflies there, the diversity of endemic sensitive aquatic invertebrates present (Fallon et al. 2016, pp. 3, 17), and the high level of recreational use in the area. Cabin Creek below Cabin Creek Falls may also be important for the protection of this species. Nearby rivers that may also contain critical habitat include Warren Creek, Starvation Creek, and Lindsey Creek.

Undisturbed buffers of coniferous forest around stream habitat are critical to the survival of this species. Protecting the streamside habitats used by adult wonder caddisflies—including by securing riparian vegetation, maintaining and enhancing water quality, improving substrate conditions, and increasing canopy cover to safeguard instream temperatures—are likely to benefit and protect this species. Managers should also consider limiting or further discouraging off trail access to sensitive habitats, such as springs or access above springheads.

## Conclusion

The wonder caddisfly is an extremely rare aquatic insect that is gravely in need of protection. With highly specific habitat needs and sensitivities, and with only one known population in a narrow range in a highly trafficked area that is also limited by a clear-cut powerline corridor, the caddisfly is extremely vulnerable to any habitat destruction or loss. The best available science indicates that drought is a significant threat to the caddisfly and its unique, sensitive habitat. Accordingly, climate change also threatens the caddisfly due to the projections for more frequent and intense droughts in the region. No regulatory mechanisms that adequately address these threats. In the context of the five listing factors, the caddisfly warrants ESA protection and an endangered listing because it faces imminent extinction due to threats to its highly sensitive habitat—including drought, land management activities, and climate change—and because it is particularly vulnerable to these threats due to its single, extremely small population and highly restricted range. There are no existing regulatory mechanisms that ameliorate the threats facing the caddisfly. Thus, Petitioner urges the Service to propose the caddisfly for listing as an endangered species and to designate critical habitat concurrently with listing to ensure that it survives for future generations.

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