PETITION TO EMERGENCY LIST
TAYLOR'S (WHULGE) CHECKERSPOT BUTTERFLY
(Euphydryas editha taylori)
AS AN ENDANGERED SPECIES
UNDER THE U.S. ENDANGERED SPECIES ACT

Photos by Dana Ross

Submitted by

The Xerces Society,
Center For Biological Diversity,
Oregon Natural Resources Council,
Friends of the San Juans,
and
Northwest Ecosystem Alliance

December 10, 2002

Ms. Gale Norton
Secretary of the Interior
Office of the Secretary
Department of the Interior
18th and C Street N.W.
Washington D.C., 20240

Dear Ms. Norton:

The Xerces Society, Center for Biological Diversity, Oregon Natural Resources Council, Friends of the San Juans, and the Northwest Ecosystem Allicance hereby formally petition to list the Taylor's checkerspot (whulge checkerspot) *(Euphydryas editha taylori)* as endangered pursuant to the Endangered Species Act, 16 U.S.C. 1531 *et seq.* This petition is filed under 5 U.S.C. 553(e) and 50 CFR 424.14 (1990), which grants interested parties the right to petition for issue of a rule from the Assistant Secretary of the Interior.

Petitioners also request that critical habitat be designated concurrent with the listing, as required by 16 U.S.C. § 1533(b)(6)(C) and 50 CFR 424.12, and pursuant to the Administrative Procedures Act (5 U.S.C. 553).

The Taylor's checkerspot *(Euphydryas editha taylori)* has a limited, disjunct geographic range and its habitat is under significant and immediate threat. For these reasons, as further elaborated below, we request an emergency listing and emergency critical habitat designation pursuant to 16 U.S.C. § 1533(b)(7) and 50 CFR 424.20.

We are aware that this petition sets in motion a specific process placing definite response requirements on the U.S. Fish and Wildlife Service and very specific time constraints upon those responses. 16 U.S.C. § 1533(b).

Sincerely,

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The Xerces Society is an international nonprofit organization dedicated to preserving the diversity of life through the conservation of invertebrates. The Society works with scientists, land managers, and citizens to protect invertebrates and their habitats by producing information materials, presenting educational activities, implementing conservation projects, and advocacy.

Center for Biological Diversity
Combining conservation biology with litigation, policy advocacy, and an innovative strategic vision, the Center for Biological Diversity is working to secure a future for animals and plants hovering on the brink of extinction, for the wilderness they need to survive, and by extension for the spiritual welfare of generations to come.

Oregon Natural Resources Council's mission is to aggressively protect and restore Oregon's wild lands, wildlife and waters as an enduring legacy. One of our top goals it to protect and restore habitat for native species, including rare and imperiled species such as butterflies.

Northwest Ecosystem Alliance was established in 1988 and is a non-profit 501(c)(3) public interest organization incorporated in the State of Washington. NWEA and its members are dedicated to the protection and restoration of biological diversity. NWEA conducts research and advocacy to promote the conservation of sensitive and endangered wildlife and their habitat in the northern Pacific region.

Friends of the San Juans works to protect and promote the health and future of the San Juan Islands: land, water, natural and human communities.

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I. EXECUTIVE SUMMARY

The Taylor's (Whulge) checkerspot (*Euphydryas editha taylori*) is in imminent danger of going extinct. We are certain of the existence of only four populations, three of which contain fewer than fifty individuals based on surveys conducted in 2002. In this petition, we clearly document the decline of this species, which is best exemplified by (1) its recent extirpation from British Columbia and (2) the recent loss of a Washington site that in 1997 had close to 7,000 individuals. The Taylor's checkerspot is threatened most by the degradation and destruction of its habitat. Agricultural and urban development, encroachment of trees, and spread of invasive plants all continue to threaten the native grasslands in which it is found. In addition, pesticide use and recreational activities pose a direct threat to the butterflies themselves.

These threats, the small number of extant populations, and the natural instability of small populations, lead us to conclude, unequivocally, that Taylor's checkerspot is immediately threatened with extinction and must be given emergency protection under the Endangered Species Act.

II. CANDIDATE BACKGROUND, STATUS, AND LISTING HISTORY

The Taylor's checkerspot butterfly was designated a candidate for state endangered species status by Washington State in 1991.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) ranked the Taylor's checkerspot as endangered in 2000.

In October of 2001, the U.S. Fish and Wildlife Service classified the Taylor's checkerspot butterfly as a candidate for Endangered Species Act protection with a listing priority number of 6 (50 CFR Part 17, Vol. 66, No. 210, 2001). This candidate status was reviewed and upheld in June of 2002 (50 CFR Part 17, Vol. 67, No. 114, 2002).

The Natural Heritage Programs of Oregon, Washington, and British Columbia all rank the Taylor's checkerspot butterfly as Critically Imperiled.

III. SPECIES DESCRIPTION

A. Adult

The Taylor's checkerspot *(Euphydryas editha taylori)* is the darkest subspecies of the Edith checkerspot *(Euphydryas editha)* (Dornfeld, 1980). It is a medium-sized, colorfully checkered butterfly with a wingspan less than 2.25 inches. The ventral surface of the wings are primarily orange with bands of white cells. The dorsal surface of the wings has a "proportionate mix of black, orange, and white" (Pyle, 2002). *E. e. taylori* is one of the smallest and the darkest of the *E. editha* ssp., with the stubbiest, roundest wings. The dorsal side of the wings have more black separating the spot-bands than other subspecies (Pyle, 2002; see also Dornfeld, 1980).

B. Immature

The eggs, deposited in a mass, are yellow when first laid. The web-building, early instar larvae are adorned with many black branching bristles, which have an orange base. Mature larvae are black, with white speckles that form mid-dorsal and lateral lines (Dornfeld, 1980). The chrysalis is white with black and orange markings.

IV. TAXONOMY

The Taylor's checkerspot (*Euphydryas editha taylori*) is in the family Nymphalidae. This is a diverse family that contains many of the best known butterflies, such as monarchs and painted ladies. The status of *Euphydryas editha taylori* Edwards, 1888 (Nymphalidae), as a recognized subspecies is uncontroversial, upheld by every expert who has looked at it since it was described in 1888 (Shepard, 2000). Shepard (2000) also writes that *E. e. taylori* belongs to a "group of related coastal subspecies, but is disjunct from the others in its group and would never be synonymized." All of these coast range subspecies are imperiled. Both the Quino checkerspot (*E. e. quino* Behr [= *E. e. wrighti* Gunder (Emmel et al., 1998)]) from the San Diego area and the Bay checkerspot (*E. e. bayensis* Sternitzky) from south of San Francisco are listed as endangered by the U.S. Fish and Wildlife Service. *E. e. insularis* T. and J. Emmel, limited to Santa Rosa Island, California, and *E. e. baroni* Edwards, from north of San Francisco, both have very limited distributions and Shepard (2000) believes they should be given protected status.

V. POPULATION DISTRIBUTION AND STATUS

A. Historic Distribution

The Taylor's checkerspot is a prairie species once found throughout grasslands in the Willamette Valley, Puget Sound, and south Vancouver Island. The historic range and abundance of the Taylor's checkerspot is not precisely known because exhaustive searches did not occur until recently. Northwest grasslands were formerly more common, larger, and interconnected – conditions that would have supported a greater distribution and abundance of Taylor's checkerspot. Before its dramatic decline, the Taylor's checkerspot was documented at more than seventy sites in British Columbia, Washington, and Oregon (see Appendix I). These sites included coastal and inland grasslands (prairies) on southern Vancouver Island and surrounding islands in British Columbia and the San Juan Island archipelago (USA), as well as open prairies on post-glacial gravelly outwash and balds in Washington's Puget Trough and Oregon's Willamette Valley (Pyle, 2002). There were at least 23 recorded sites in British Columbia, 33 in Washington, and fourteen in Oregon from which this subspecies had been either collected or observed over the last century (Shepard, 2000; Evergreen Aurelians, 2002; Potter, pers. comm., 2002; Ross, pers. comm., 2002).

B. Current Distribution

The range of the Taylor's Checkerspot has contracted severely. Currently, it is extirpated from British Columbia and all but one locale in Oregon's Willamette Valley (Miskelly, pers. comm., 2002; Potter, pers. comm., 2002; Ross, pers. comm. 2002). In 1989, Pyle reported that fewer than fifteen populations remained in the Pacific northwest and, as of October 2002, there are only four confirmed populations. It may exist at three additional locales. Most of the remaining Taylor's

checkerspot sites are a considerable distance from one another, likely well beyond dispersal distance. Re-colonization is unlikely if populations were to be eliminated.

British Columbia:
All populations apparently have been extirpated from British Columbia. Shepard (2000) reported that, after being extirpated from ten sites in the greater Victoria area and one site on the Mill Bay to Shawnigan Lake Road, "the subspecies is presently known to exist only on Hornby Island, B.C." When scientists returned to these three remaining Hornby Island sites in 2001 and 2002, no Taylor's checkerspots were found (Miskelly, pers. comm., 2002).

Washington:
In Washington, there are only three confirmed sites that harbor this subspecies. One population in Pierce county (Pierce-6) is known to exist on Department of Defense-managed property at Fort Lewis. In Thurston county, two populations and a possible third (Thurston-11 and –12, and possibly Thurston-13) are currently found in the Bald Hills (Potter, pers. comm., 2002).

It is unknown if the butterfly still resides at an additional three sites in the state. The number of extant Washington populations is not precisely known due to (1) uncertainty as to whether sightings of a small number of butterflies in Thurston county near Thurston-11 and –12 constitute a separate population, (2) denied access to a site on private property in San Juan county that supported a large colony in 1978, and (3) uncertain status of a Pierce county population that supported more than 7,000 individuals in 1997, but where none were found in 2001 (Potter, pers. comm., 2002).

Between 1999 and 2002, surveys conducted of the three extant populations in Thurston and Pierce Counties, Washington (i.e., Thurston-11, -12, and Pierce-6) by the Washington Department of Fish and Wildlife (WADFW), Washington Department of Natural Resources (WADNR), The Nature Conservancy of Washington (WATNC), and Fort Lewis Land Condition and Trend Analysis Program found only 7 to 40 individuals at each site (Potter, pers. comm., 2002).

Oregon:
According to collecting records, Taylor's checkerspot occurred at sites in Benton, Polk, and Lane counties of Oregon's Willamette Valley (Evergreen Aurelians, 2002). Today, it is found at only one Benton county site, on a grassy bald and powerline right-of-way area owned by Weyerhaeuser. This site is close to the McDonald-Dunn State Forest northeast of the city of Corvallis (Ross, pers. comm., 2002). Taylor's checkerspot had been considered extinct in Oregon until Andrew Warren discovered this site in 1999 (Pyle, pers. comm., 2002). The powerline right-of-way is maintained by the Bonneville Power Administration. This population is likely the strongest one remaining, with over 1,000 individuals estimated in 2002 (Ross, pers. comm., 2002).

VI. HABITAT REQUIREMENTS

A. Overview

The Taylor's checkerspot is known from open grasslands and grass/oak woodland sites where food plants for larvae and nectar sources for adults are available. In the United States, these sites include coastal and inland prairies on post-glacial gravelly outwash and balds in Washington's Puget Trough and Oregon's Willamette Valley (Pyle, 2002). In British Columbia, these sites were often the driest and rockiest areas around Garry oaks (*Quercus garryana*) (Shepard, 2000).

In Washington, these sites only occur around Puget Sound and include "maritime prairies and shorelines along the Strait of Juan De Fuca, the post-glacial gravelly outwash and mounded prairies of the Puget Trough, and open island prairies with a dominance of original vegetation." (Larsen, et al., 1995). In Oregon, *E. e. taylori* historically occupied grassland and grass/oak woodland sites similar to Washington and British Columbia (McCorkle and Hammond, pers. comm., 2002). The remaining Oregon site, a clearing in the Weyerhaeuser-owned forest near the McDonald-Dunn State Forest, formerly was a mosaic of prairie and oak woodland, and more recently trees have grown in around the edge of site (Ross and Potter, pers. comm., 2002; Pyle, 2002).

B. Diet

Larvae:

Many butterflies have very specific requirements for larval food plants. Taylor's checkerspot larvae have been documented feeding on members of the figwort or snapdragon family (Scrophulariaceae), including paintbrush *(Castilleja hispida*) (Potter, pers. comm., 2002), as well as native and non-native *Plantago spp.* in the plantain family *(*Plantaginacea) (Guppy and Shepard, 2001; McCorkle, pers. comm., 2002; Potter, pers. comm., 2002).

According to recent surveys conducted by the Washington Department of Fish and Wildlife, Taylor's checkerspot larvae in Pierce-6 feed primarily on the drought-resistant *Castilleja hispida,* as do those larvae at Thurston-11 and Thurston-12 (Potter, pers. comm., 2002). It appears that the formerly large population recently extirpated from Pierce-2 was dependent upon the introduced *Plantago lanceolata,* although *C. hispida* likely occurred at the site at some time in the past (Potter, pers. comm., 2002). The last remaining population in Oregon also depends upon *P. lanceolata* (Ross, pers. comm., 2002). None of the remaining inland sites could have used the native *P. maritima* or *P. macrocarpa* because the range of these plantains does not overlap with these extant sites (Hitchcock and Crongquist, 1974). Thus, it is likely that the native plantains were only used by coastal populations of Taylor's checkerspot. For example, the recently extirpated populations on Hornby Island, British Columbia, were documented to feed on *P. maritima,* as well as *P. lanceolata* (Guppy and Shepard, 2001).

Adults:

When characterizing high-quality habitat that can sustain a population of the Taylor's checkerspot, nectar sources play a particularly important role. Egg production in *E. e. bayensis* [a related subspecies found in California] appears to depend upon available nectar sources (Murphy et al., 1983). According to Murphy (cited in Shepard 2000), when nectar is plentiful, up to double the number of eggs are laid. High egg production is particularly important for this butterfly because of the significant mortality of larvae during their first four instars (Shepard,

2000). Thus, suitable habitat must not only include an abundance of larval hostplants, but an abundance and variety of nectar sources. In British Columbia, the primary nectar source appeared to be spring gold (*Lomatium utriculatum*), but Taylor's checkerspot would use wild strawberry (*Fragaria* spp.) when spring gold was not available (Shepard, 2000). Pyle (2002) notes that the species, *E. editha*, has been recorded nectaring on camas, stonecrop, phacelia, pussypaws, spring gold, composites, and others. In addition, a study by Hays, et al. (2000) found *E. e. taylori* preferentially nectaring on *Camassia quamash* (Blue camas) and *Lomatium triternatum* (spring gold). Flowering Scotch broom was abundant at this site, but was almost totally unused by nectaring adults (Hays, et al., 2000).

To put the importance of adult nectar sources in perspective, Guppy and Shepard (2001) indicate that loss of adult nectar sources, specifically spring gold, may have resulted in the extirpation of Taylor's checkerspot from two locations in British Columbia: the Beacon Hill and Uplands Parks populations. At these sites, larval host plants (in this case, the introduced rib-wort plantain, *P. lanceolata*) were still plentiful, but the spring gold was pushed out by introduced grasses (Shepard, 2000; Guppy and Shepard, 2001). Thus, because this species does not move a long distance when foraging or laying eggs, site managers should make certain that both specific larval host plants (e.g. *Castilleja hispida* and/or *Plantago* spp.) and adult nectar sources (e.g. *Lomatium utriculatum*) are available in abundance.

C. Life Cycle

E. e. taylori produces one brood a year (univoltine). Adults appear in the spring, during April and May (Dornfeld, 1980), to mate and lay eggs, sometimes in clusters of up to 1,200 (Pyle, 2002). Larvae emerge and grow until the fourth or fifth instar. Those larvae feeding on *Castilleja* in Washington's Puget Trough have been documented to enter diapause between mid-June and early July (Potter, pers. comm., 2002), hibernating through the winter. *E. editha* in California have been observed crawling under small rocks and into the base of tufts of grass when preparing to diapause (Singer, 1971). The next spring, the larvae finish maturing, pupate, and emerge as adults from mid-April to mid-May to complete the cycle (Guppy and Shepard, 2001).

D. Habitat Status

Grasslands once common across much of the lowland landscape from southern Vancouver Island south through western Washington and into the Willamette Valley of Oregon are now much reduced. Prairies covered hundreds of thousands of acres of pre-settlement south Puget Sound (Crawford and Hall, 1997). Today, less than 3% of that original landscape remains and much of it is degraded or bears competing human uses (Crawford and Hall, 1997). The upland prairie in the Willamette Valley has seen similar, perhaps greater, degradation. Less than 1% of upland prairie habitat in the Willamette Valley remains (USFWS, 2000). The vast majority of this grassland habitat was lost during the past 150 years because of agricultural and urban development, fire suppression and forest encroachment, livestock grazing, and invasion by native and non-native plants.

Within the entire range of the Taylor's checkerspot, prairie habitat was historically maintained, in part, through periodic burning by Native Americans (Norton, 1979; Boyd, 1986; Fuchs, 2001). Active habitat management methods – including controlled burning and mowing – prevent the establishment of many trees and shrubs and are often necessary to maintain these open, grassland

plant communities. Some sites in southern Vancouver Island persisted through the 1990s in very dry grasslands. Miskelly (pers. comm., 2002) believes these dry sites may have benefited *E. e. taylori* because they were most resistant to forest succession, whereas wetter areas more easily allowed the encroachment of trees. However, because they were the driest sites, *Plantago* spp. may have senesced too early for the larvae that were feeding upon them during drought years, which may have led these populations to extirpation from British Columbia.

E. Current Conservation Efforts

No Conservation Agreements have been developed for the Taylor's checkerspot. Restoration of *some* grasslands in the southern Puget Sound region of Washington and in Oregon's Willamette Valley has resulted in control of Scotch broom and other invasive woody plants through the use of herbicides, mowing, grazing, and fire. WATNC, with assistance and cooperation from Fort Lewis, WADNR, and the U.S. Fish and Wildlife Service (USFWS), has conducted restoration projects on grassland habitat at several sites, and WADNR takes Taylor's checkerspot into account when managing some Natural Area Preserves. However, there has been no specific effort to restore habitat for reintroductions of this butterfly.

VII. CURRENT AND POTENTIAL THREATS – SUMMARY OF FACTORS FOR CONSIDERATION

A. The present or threatened destruction, modification, or curtailment of its habitat or range.

The Taylor's checkerspot depends upon native grassland habitat, with abundant host and nectar plants. However, in western Washington, for example, less than three percent of the original estimated 150,000 acres of pre-European settlement grasslands remains (Crawford and Hall, 1997). In the Willamette Valley, this figure is less than 1% (USFWS, 2000). Puget Sound prairie habitat has been lost primarily to urban development (33%), forest succession (32%), and agriculture (30%) (Crawford and Hall, 1997) and with it have gone most populations of Taylor's checkerspot.

1. Grassland succession to forest (fire suppression).

Prairies in the southern Puget Sound of Washington have been lost at an average rate of approximately 100 acres per year since the 1850s due to the rapid conversion of grassland to Douglas-fir forest (Kruckeberg, 1991). In pre-settlement times, prairies were maintained by periodic fires that helped curtail conversion to forest by restricting the establishment of Douglas-fir along forested edges with grasslands. Fires also contributed to the maintenance of the native grass (Idaho fescue) and forb-dominated plant communities that formed on the glacial outwash soils of southern Puget Sound.

In the San Juan archipelago, Washington, and the Georgia Straits of British Columbia, the coastal grassland communities are being encroached by Douglas-fir, rose, and snowberry. At these sites, scientists speculate that forest encroachment has occurred more rapidly on wetter portions, thus leaving behind open areas that are especially prone to drying out and premature plant senescence during times of drought. It is thought that, perhaps, these dry, marginal sites left no refugia for populations of *E. e. taylori* on Hornby Island, B.C. during

severe drought, and resulted in the extirpation of this butterfly from British Columbia (Miskelly, pers. comm., 2002).

In some cases, management plans may need to be developed to selectively and carefully remove some trees. However, logging adjacent to meadows with checkerspot habitat could degrade habitat and kill individuals as a result of heavy equipment use, trampling of habitat, eggs, larvae or pupae, piling of log slash, burning of log piles in meadow habitat, and the increased risk of fire that accompanies logging. Thus, any efforts to remove woody debris should be undertaken with great care and alternatives to tree removal, such as girdling trees and leaving them standing, should be considered.

2. Introduced invasive species.

Invasion and dominance of native grasslands by exotic plants is a common issue that threatens grassland butterflies (Warren, 1993; Schultz, 1998) and has occurred at several locations supporting the Taylor's checkerspot. Much of the remaining grassland habitat for the Taylor's checkerspot has been degraded or destroyed by the encroachment of nonnative, woody shrubs like Scotch broom *(Cytisus scoparius*), exotic sod-forming grasses like colonial bentgrass (*Agrostis tenuis*), common velvet grass (*Holcus lanatus*), sweet vernalgrass (*Anthoxanthum ordoratum*), and Kentucky bluegrass (*Poa pratensis*), or other invasives, including hairy cats ear (*Hypochaeris radiata*), oxeye-daisy (*Leucanthemum vulgare*), common St. Johns-wort (*Hypericum perforatum*), sheep sorrel (*Rumex acetosella*), teesdalia (*Teesdalia nudicaulis*), and tall oat grass (*Arrhenatherium elatius*). These introduced plants threaten the Taylor's checkerspot in several ways. In addition to directly competing with larval and adult food plants, many invasive shrubs, forbs, and grasses prevent or obscure access to nectar plants (Potter et al., 1999; Hays et al., 2000) and lead to wildfires that burn with a higher intensity than would normally occur in a grassland.

On Puget Sound sites, the invasive shrub Scotch broom poses a particular threat to prairies because of its ability to form dense stands, which exclude native grassland species. In addition, Scotch broom is highly flammable, and increases vulnerability of native plants and butterflies to high intensity fires. In British Columbia, Scotch broom is implicated specifically in the extirpation of at least one population, the Shawnigan Lake to Mill Bay Road population (Shepard, 2000). This site had been managed as a Christmas tree farm, at which time it supported a thriving population of at least 1,000 individuals butterflies. However, when this management stopped, "Scotch broom quickly invaded and the population became extirpated" (Shepard, 2000). Furthermore, broom was also implicated in the extirpation of *E. taylori* at the site Polk-1 and may threaten the only remaining *E. e. taylori* population in Oregon (Ross, pers. comm., 2002).

Vegetation management practices currently attempt to eliminate non-native species in some Puget Sound areas. Though the long-term effects will probably benefit the Taylor's checkerspot, short-term effects can be directly lethal to butterflies. Mowing likely kills some sessile larvae and pupae, especially when it occurs while the larvae are active from late winter to early July, and hand pulling may result in trampled eggs, larvae, or pupae. The use of fire as a habitat management tool poses similar threats to butterflies. However, one of the only remaining prairie habitats still dominated by native vegetation, and supporting a healthy

population of Taylor's checkerspot, undergoes regular, patchy, low-intensity burns. These burns typically occur during the drier, later months of the summer, after the larvae have gone into diapause (Potter, pers. comm., 2002).

3. Agriculture and urban development.

In western Washington, 63% of native grassland communities have been lost to agriculture or development for residential and commercial purposes. Historical sites are known to have been covered by the spread of cities. The Pierce-7 site, for example, is known to have been displaced by a shopping mall (Bidwell, pers. comm., 2002). And, many other sites disappeared anonymously with the development of cities like Olympia and Spanaway, WA and Eugene, OR were noted only when Taylor's checkerspot stopped nectaring in rural backyards (e.g. site Pierce-4).

Even today, the few remaining populations continue to be lost to agriculture. For example, site Thurston-8 supported excellent checkerspot habitat. However, starting in the 1990s, large quantities of dairy waste manure were regularly spread across this remnant native prairie. Taylor's checkerspots have not been seen recently at this site (Potter, pers. comm., 2002).

4. Prairie management

Recent efforts to maintain and restore native prairies in south Puget Sound have met with some initial success; however, restoration goals and methods have primarily focused on general weed control across grasslands rather than specific needs of rare wildlife species. Erhlich (1992) suggests that the quality of a butterfly's habitat is much more important than its extent. Management and restoration of habitat for Taylor's checkerspot likely will require small-scale, site specific treatments focused on augmenting food and nectar plants. These types of projects are infrequently conducted for rare butterflies due to their cost and long-term nature (Schultz, 1997). Current funding for prairie management efforts is well below levels that are needed to ensure restoration efforts will succeed (Potter et al., 1999).

Unfortunately, methods used to maintain and restore plant communities can negatively affect Taylor's checkerspot. Mowing likely kills some sessile larvae or pupae, and hand-pulling of invasive plants may trample eggs, larvae, or pupae (Erhardt, 1985). Fire also may pose a danger to Taylor's checkerspot larvae (Dana, 1991; Schultz and Crone 1998). Although prairies and Taylor's checkerspot evolved with fire, fuel loads (e.g., from Scotch broom) are significantly greater now than they were historically, resulting in more intense and larger fires that can kill checkerspot eggs, larvae, pupae, or adults (Dana, 1991). Grazing has been recommended for maintaining butterfly habitat where tall introduced grasses are a problem (Warren 1993). However, as non-selective grass browsers, cattle have the potential for adverse impacts to native as well as introduced grasses (Pickering, 1997). Although all of these prairie management techniques may pose threats to the Taylor's checkerspot, the long-term persistence of this butterfly at any site depends, in part, upon the judicious use of necessary habitat management practices (e.g. fire, hand clearing, etc.) and careful consideration of the scale and intensity of appropriate restoration efforts.

B. Other natural or manmade factors affecting its continued existence

1. Recreational use .

Taylor's checkerspot eggs, caterpillars, pupae and adults are likely killed by direct trampling during recreational activities such as walking, horseback riding, and off-road vehicle driving. Recreation may have been a factor in the recent extirpation of Taylor's checkerspot from at least two locations. At Thurston-15 and –16 horses trampled much of the area containing *Castilleja hispida* (the larval hostplant) and may have played a role in the extirpation of Taylor's checkerspot from this site.

The only remaining Oregon site receives low level visitation by recreational hikers, bikers, dogs, and horses, which seems to have a low impact on butterflies at the site. However, Benton County is planning to develop the dirt road that divides this *taylori* habitat for public recreational use. This likely will bring many more visitors and impacts to this Taylor's checkerspot habitat (Ross, pers. comm., 2002).

2. Pesticides.

Btk *(Bacillus thuringiensis* var. *kurstak*i), a Lepidoptera-specific larvicide, has become the pesticide of choice to treat defoliators in western forests (Wagner and Miller, 1995). Btk is a bacterium, which when ingested is lethal to butterfly and moth larvae. Species such as the Taylor's checkerspot that are single-brooded with spring-active larvae that feed during the application period for the target species are especially vulnerable to Btk (Wagner and Miller, 1995). Taylor's checkerspot's current patchy distribution on isolated sites leads to increased threats from any Btk applications due to the very low probability of re-colonization. The threat of Btk is heightened because Btk has been shown to drift at toxic concentrations for distances greater than two miles from target spray areas (Barry, et al., 1993; Whaley, et al., 1998). As a result, aerially spraying even relatively small areas with Btk can have significant adverse effects on nearby Taylor's checkerspot populations.

The application of *Bacillus thuringiensis* var. *kurstaki* (Btk) for control of the Asian gypsy moth may have contributed to the extirpation of three historic locales for the species in Pierce County (Pierce-4, –5, and –7). In 1992, spraying of Btk occurred close to these sites (WA Dept. of Agric., 1992).

In addition, for some of *E. e. taylori*'s remaining habitat, the application of Malathion and other mosquito adulticides may be a problem. At least one site, Pierce-2, is located near wetlands that may be targeted for application of pesticides to control mosquitoes that may carry the West Nile virus. Recently, the Environmental Protection Agency stated it will allow spraying of pesticides on water to kill mosquitoes without a permit under the Clean Water Act. This policy change opens the door for unregulated use of pesticides in areas close to habitat occupied by endangered insects species, including Taylor's checkerspot.

3. Military Activities.

In the Puget Prairie, one remaining Taylor's checkerspot site is located along the edge of the Artillery Impact Area on Fort Lewis. If there were any alterations from the current pattern of shelling, tracked vehicle training, or planned firing ranges, the population could be destroyed (Potter, pers. comm., 2002). Because specific records describing the timing and type of

training that has taken place in and around prairie environments on Fort Lewis are not available, it is difficult to determine their historic impact.

However, it is possible to find general information on the extent of training activity at Fort Lewis. Between the late 1970s and 1991, the 9th Infantry Division was stationed on Fort Lewis with a battalion of tracked vehicles. In 1992, the 9th Infantry Division was inactivated, but other units located at Fort Lewis continued to use tracked vehicles since the mid-1990s. Currently, more heavy mechanized vehicles are stationed on Fort Lewis than ever before (Stedman, pers. comm., 1999).

It is expected that training on prairie, with or without tracked vehicles, could have impacts on suitable *E. e. taylori* habitat, including direct mortality (were checkerspots present), loss or degradation of habitat, and soil disturbance that allows for introduction and spread of invasive weeds. Increased training or presence of heavy machinery and tracked vehicles can be expected to pose increased risk to Taylor's checkerspot habitat, and, potentially, the remaining population at Fort Lewis.

4. Additional factors.

In addition, there are a number of potential threats to Taylor's checkerspot populations for which little information is available. Competition from introduced insects, diseases affecting larval host plants and butterflies, and predation by introduced wildlife have adversely affected other butterfly species, but no information on their potential impacts to the Taylor's checkerspot is available and they are not discussed further in this petition.

C. Overutilization for scientific, or educational purposes.

1. Scientific study.

Scientific studies may have negatively affected a Taylor's checkerspot population. At a location on Fort Lewis Military Reservation in Pierce County, Washington (Pierce-2), where over 1000 individuals were observed as recently as 1997, only 6 adults were observed during field year 2000 surveys and no adults were found in year 2001 surveys. In the late 1990's, potentially poorly designed mark-recapture studies were conducted at this location. It is difficult to know whether this factor caused the sharp decline in the population; however, mark-recapture studies of the bay Edith's checkerspot *(Euphydryas editha bayensis*) were considered a contributing factor in the extirpation of a population from a Stanford University nature preserve (McGarrahan, 1997).

2. Collecting.

In general, because of the high fecundity of individual insects, the collection of insects poses little threats to their populations. However, in the case of some endangered species, such as the Taylor's checkerspot, which may have less than ten individual adults flying at any one of its remaining populations, the collection of even a single female could significantly reduce production of offspring. Because this butterfly is so rare, collection by overzealous lepidopterists is a potential threat.

D. The inadequacy of existing regulatory mechanisms.

Currently the Taylor's checkerspot is listed as a candidate endangered species under the Federal Endangered Species Act. It is also designated a candidate endangered species by Washington State. These designations provide no substantive protection for habitat or take under federal law or Washington state law. In addition, although it is listed as endangered by the Committee on the Status of Endangered Wildlife in Canada, this status grants the species no legal protection under Canadian law.

VIII. CONCLUSION

The Taylor's checkerspot needs to be given emergency protection under the federal Endangered Species Act. Its former range and available habitat has been reduced to a fraction of what it once was, and continues to be threatened by forest encroachment, urban and agricultural development, and invasive species. Poorly executed research projects, horse riding, dog-training, recreational off-road vehicle use, pesticides, and, potentially, overcollecting also pose an immediate threat to the few remaining populations of Taylor's checkerspot. While disease and predation haven't been shown to be major sources of mortality, we also can't rule these causes out. We simply don't know what role disease or predation plays in the population dynamics of Taylor's checkerspot, although, their impact seems minor in comparison to the drastic loss of habitat. What little grassland remains is under constant pressure and, as of October 2002, no existing regulations are in place to protect these butterflies or their habitat.

For the foregoing reasons, the Taylor's checkerspot meets four criteria under the Endangered Species Act for consideration as an endangered species: 16 U.S.C. § 1533 (a)(1)(A,B,D,E) (Section 4).

(A) The present or threatened destruction, modification, or curtailment of its habitat or range.
(B) Overutilization for Commercial, Recreational, Scientific, or Educational Purposes
(D) The inadequacy of existing regulatory mechanisms.
(E) Other natural or manmade factors affecting its continued existence.

Due to the threat of extinction and because of the Taylor's checkerspot's small population size, limited distribution, isolation, and the numerous factors threatening the species and its remaining habitat, the **Xerces Society, Center for Biological Diversity, Oregon Natural Resources Council, Northwest Ecosystem Alliance, and Friends of the San Juans** formally petition for emergency listing of the Taylor's checkerspot butterfly (*Euphydryas editha taylori)* as an endangered species. Furthermore, petitioners strongly request the Service to use their authority to establish Critical Habitat based on the facts presented to prevent further decline of this vulnerable butterfly species.

If all of these threats are not addressed in the immediate future, and federal protection is not immediately established, then the extirpation of Taylor's checkerspot from British Columbia will have been a clear sign that this butterfly is fated to go extinct because of our inattention to, and impact on, the Pacific northwest's native grassland habitat.

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APPENDIX I. LOCATIONS OF RECORDED POPULATIONS OF TAYLOR'S CHECKERSPOT

Table of known localities where Taylor's checkerspot (*Euphydryas editha taylori*) has been observed or collected since 1893. Data include a pseudonym for each site, the current status of the site (to the best of our knowledge), and the date when Taylor's checkerspot was collected, or last collected, at each site. The final column includes the available information on number of butterflies observed on each occasion, who collected the data, and other notes about the record. Appendix 6 of Shepard (2000) includes all of the same information for British Columbia. We chose to abbreviate that information here.

Bold font indicates the four known sites that currently support populations of Taylor's checkerspot.

Location	Current Status	Date	Number of butterflies observed, observer, and notes.
Washington			
Clallam-1	Presumed extirpated	1970	A few (Hinchliff record: Pyle)
		1999	None: One search (McMillan and Hays, WDFW)
		2000	None: One search (McMillan, WDFW)
		2002	None: One search (McMillan and Potter, WDFW)
		2003	Plan to resurvey (WDFW)
Clallam-2	Presumed extirpated	1972 (?)	At least one (Hinchliff record: Pelham)
		1993	At least one (Frost record via Pyle)
		1998	Possible sighting: One search (McMillan, WDFW)
		2000	None: One search (McMillan, WDFW)
		2002	None: One search (McMillan, WDFW)
		2003	Plan to resurvey (WDFW)
Clallam-3	Presumed extirpated	1972 (?)	May be same as Clallam-2
Clallam-4	Presumed extirpated	1985	Several observed, six collected – may be *E. e. colonia* (Frost record via Pyle)
		1986	Several observed, two collected– may be *E. e. colonia* (Frost record via Pyle)
		1988	Several observed, four collected – may be *E. e. colonia* (Frost record via Pyle)
		2003	Plan to resurvey (WDFW)
Island-1	Unknown	Old	At least one (Hinchliff record: Leighton)
		1997	Habitat scouting - outside of flight period (Fleckenstein, DNR)
Lewis-1	Presumed	1983	At least one (Hinchliff record: Pyle)

	extirpated	2003	Plan to resurvey (Pyle)
Lewis-2	Presumed extirpated	1993	At least one (Hinchliff record: Pyle)
		1998	None: One search (Potter, WDFW)
		2000	None: One search (Potter and Hays, WDFW)
Mason-1	Presumed extirpated	1971	At least one (Hinchliff record: VanBuskirk)
		1997	None: One survey at airport (extant prairie in area) (Fleckenstein, DNR)
Pierce-1	Extirpated	1947	At least one (Hinchliff record: Newhouse)
		2002	Area developed
Pierce-2	Presumed extirpated	1991	Three males (Hinchliff record: Pelham)
		1994	47 individuals: Limited time/area count (Char and Boersma 1995)
		1995	206 individuals: Limited time/area count (Char and Boersma 1995)
		1996	679 individuals: Limited time/area count (Oliver 1996)
		1997	Estimate of abundance for portion of site with highest density: approx. 7,000 individuals (WDFW and WA TNC)
		1998	Estimate 100+ individuals (Potter and Hays, WDFW)
		1999	Estimate 30+ individuals (Potter and Hays, WDFW)
		2000	Estimate 10+ individuals (Hays, WDFW)
		2001	None: Multiple searches (Potter, WDFW and Ft Lewis LCTA)
		2003	Plan to resurvey (WDFW and Ft Lewis LCTA)
Pierce-3	Extirpated	1980	Common, eight counted (Hinchliff record: Hardwick)
		2002	None (Hardwick and WA TNC) Gravel pit put in 1990's destroyed site. Nearby areas surveyed.
Pierce-4	Extirpated	1980	One (Hinchliff record: Hardwick)
		2002	None seen for years (Hardwick). Edge of 1992 USDA Btk (Asian gypsy moth control) spraying
Pierce-5	Extirpated	1986	One (Hinchliff record: Hardwick)
		2002	None seen for years (Hardwick)
Pierce-6 (Owned by U.S. Department of Defense)	**Extant**	**1999**	**One: One search (Fleckenstein, DNR and Ft Lewis LCTA)**
		2000	**Four: Estimate pop. 10-20 individuals. Multiple searches (WDFW, DNR, Ft Lewis LCTA)**
		2001	**Four: Estimate pop. 10-20 individuals. Multiple searches (WDFW and Ft Lewis LCTA). Fire with ignition points in area mid-March.**
		2002	**19: Estimate pop. 30-40 individuals. Multiple searches (WDFW and Ft Lewis LCTA)**

		2003	Plan to resurvey (WDFW and Ft Lewis LCTA)
Pierce-7	Extirpated	1955	Large numbers (Bidwell)
		1995 1996	None – edge of 1992 USDA Btk (Asian gypsy moth control) spraying, almost no butterflies of any species seen (WA TNC)
Pierce-8	Extirpated	1952-54	Several observed over three year period (Bidwell)
		2002	Habitat replaced by shopping mall complex
San Juan-1	Unknown	1978	Abundant (Hinchliff record: Pyle)
		1999	None: One survey during poor weather (WDFW and Fleckenstein, DNR)
		2002	Site on private land – permission to visit denied (WDFW)
Thurston-1	Presumed Extirpated	? & 1929	At least one – name refers to a town and large historic prairie area, exact location unknown (possibly Thurston-15) (Hinchliff records: AMNH)
Thurston-2	Extirpated	1967	At least one (Hinchliff record: Willey)
		1970	At least one (Hinchliff record: Pyle). Pyle also describes a regularly observed, strong pop. in *Watching WA Butterflies* (1974)
		1980	At least one (Hinchliff record: Hinchliff)
		1993	Three (Char and Boersma) Large portion of site burned 1992
		1994	None: Multiple surveys (Char and Boersma)
		1995	At least one: Multiple surveys (WA TNC)
		1996	One – likely from nearby Thurston-14 pop. Multiple surveys (Potter)
		1997	None: Multiple surveys (DNR)
		2001	None: Multiple surveys (LaMarr)
Thurston-3	Extirpated	1947 to 1976	At least one seen during each of ten visits in nine separate years (Hinchliff records: Frechin, Carney, Newcomer, Pelham)
		1982	16 (Hinchliff record: Pelham and Peterson)
		1983	Many (Hinchliff record: Pelham)
		1998 to 2002	None: Three searches (WDFW, WA TNC)
Thurston-4	Extirpated	1929 to 1985	At least one seen during each of eight visits in seven separate years. Name refers to a town and large historic prairie area, exact locations unknown (possibly T-3 or T-8) (Hinchliff records: Newcomer, Hopfinger, McCorkle, Shepard).
		1997 to 2001	Searched local suitable habitat in last 5 years – none seen (WDFW, DNR, WA TNC)

Thurston-5	Presumed Extirpated	1972	One. Exact location unknown, near Thurston-7 (possibly Thurston-7) (Hinchliff record: Hinchliff)
		1973	Seven (Hinchliff record: Hinchliff)
Thurston-6	Presumed Extirpated	?	Several. Exact location unknown (possibly Thurston-7) (Hinchliff record: Jewett)
Thurston-7	Presumed Extirpated	1983	Four (Hinchliff record: Pelham)
		1988	16 Hinchliff record: Crabo)
		1997	One: Multiple visits (Bidwell)
		1998 to 2002	None: Multiple visits each year (Bidwell)
		2003	Plan to resurvey (Bidwell)
Thurston-8	Extirpated	1983	More than 100 (Hinchliff record: Pelham)
		1985	46 (Hinchliff record: Pelham)
		1986	At least one (Hinchliff record: Kirk)
		1997	Site revisited and found destroyed, covered with deep layers of dairy waste (WDFW)
Thurston-9	Presumed Extirpated	1893 to present	Name refers to a city and large historic prairie area, exact location unknown, may refer to another Thurston Co site (Hinchliff record: ?)
		1995 to 2002	Most of possible habitat has been checked – none found (WA TNC, DNR, WDFW)
Thurston-10	Extirpated	1988	Common; none seen after 1988 (Hinchliff record: Moores)
Thurston-11 (Owned by WA Dept. of Nat. Res.)	**Extant**	**1996**	**Estimate 20-50 present (Fleckenstein)**
		1997	**Four (Fleckenstein)**
		2000	**Four (Gilbert)**
		2002	**30 to 40: Multiple searches (DNR, WDFW, WA TNC)**
		2003	**Plan to resurvey (DNR, WDFW, WA TNC)**
Thurston-12 (Owned by WA Dept. of Nat. Res.)	**Extant**	**1999**	**6-20 (McCallum)**
		2002	**Seven: complete site search (Potter and McCallister)**
		2003	**Plan to resurvey (Potter and McAllister)**
Thurston-13 (Owned by WA Dept. of Nat. Res.)	**Extant**	**2002**	**Scattered individuals located – not yet tied to one site (McAllister)**
		2003	**Plan to resurvey (Potter and McAllister)**
Thurston-14		1995	21: transect count (Bidwell)

	Presumed Extirpated	1996	115: transect count (Bidwell)
		1997	131: transect count (Bidwell)
		1998	Nine: transect count (Bidwell)
		1999 - 2002	Regular surveys – none seen (Bidwell)
		2003	Plan to resurvey (Bidwell)
Thurston-15	Presumed Extirpated	1993	Three (Char and Boersma)
		1994	Three (Char and Boersma)
		1997	20: Multiple surveys (Potter)
		2000	One (Hays): Multiple surveys (Potter)
		2001	None: Multiple surveys (Potter)
		2002	None: Multiple surveys (Potter)
		2003	Plan to resurvey (Potter)
Thurston-16	Presumed Extirpated	1997	Six (Potter)
		1998	One (Potter)
		1999	None: Multiple surveys (Potter)
		2000	None: Multiple surveys (Potter)
		2001	None: Multiple surveys (Potter)
		2002	None: Multiple surveys (Potter)
		2003	Plan to resurvey (Potter)
Oregon			
Benton-1	Extirpated	1957 to 1980	One to 58 collected during 23 visits in 15 separate years (Hinchliff record: Dornfeld, Baker, Woodley, Mays, Crowe, Hinchliff, Ferris, Pelham, Jewett, Lindberg).
		1990's	None seen during regular visits (McCorkle)
		1996	One male collected – likely from Cardwell Hill site (Ross)
		2000 to 2002	None seen during regular visits (McCorkle)
Benton-2	Presumed Extirpated	1940, 58, 59, 60, 64	1 to 18 collected during five visits in five separate years (Hinchliff record: Jewett, Hopfinger, Wooodley, Baker, Dornfeld). Site name refers to a town and an historic prairie area, exact locations unknown (possibly Benton-1).
Benton-3	Extirpated	1939	At least one (Hinchliff record: Bollinger) Name refers to large geographic area, exact location unknown
Benton-4	Extirpated	1970's	Regularly observed pop. (McCorkle)
		1990's	None: Regular surveys (McCorkle)
Benton-5	Extirpated	1946	At least one (Hinchliff record: Nerdham)
		2002	None: Area has been regularly surveyed in recent years (Hammond)
	Extant	**1999**	**Many (Warren)**

Benton-6 **(Owned by Weyerhaeuser)**		**2000 to 2002**	**Population near 1,000 (Dana Ross, OSU). Strong population, regularly observed (Warren, McCorkle, Ross, Severns)**
Lane-1	Presumed Extirpated	1940	Name refers to a city and historic prairie area, exact location unknown, possibly Lane-2 or Lane-3 (Hinchliff record: Ellsworth, Jewett, Baker)
Lane-2	Extirpated	?	Regularly observed (Rice)
		1990's	None: Regular surveys (Hammond)
Lane-3	Extirpated	?	Regularly observed (Rice)
		1980's	None: Trees have grown in and now dominate site (Rice)
Polk-1	Presumed Extirpated	1966, 67, 71, 73	Regularly observed (Hinchliff record: McCorkle)
		2002	Possibly some habitat remaining. Site in part on recently developed private land, access has been discouraged (McCorkle)
Polk-2	Extirpated	1980's	At least one (Hammond)
		2002	None: Visited during intervening years (Hammond)
Polk-3	Extirpated	1969	At least one (Hinchliff record: McCorkle)
		2002	None: Habitat lost to succession (McCorkle)
Polk-4	Extirpated	1979	Small colony (McCorkle)
		2002	None: Visited during intervening years (McCorkle)
British Columbia (for details, see Shepard, 2000)			
Victoria area-1	Extirpated	1901	Last observed
Victoria area-2	Extirpated	1952	Last observed
Victoria area-3	Extirpated	1954	Last observed
Victoria area-4	Extirpated	1932	Last observed
Victoria area-5	Extirpated	1964	Last observed
Victoria area-6	Extirpated	1953	Last observed
Victoria area-7	Extirpated	1954	Last observed
Victoria area-8	Extirpated	1953	Last observed
Victoria area-9	Extirpated	1954	Last observed
Victoria area-10	Extirpated	1958	Last observed
Victoria area-11	Extirpated	1951	Last observed
Victoria area-12	Extirpated	1957	Last observed
Victoria area-13	Extirpated	1957	Last observed
Victoria area-14	Extirpated	1950's	Last observed
Victoria area-15	Extirpated	1928	Last observed
Victoria area-16	Extirpated	1953	Last observed
Vancouver Is.-1	Extirpated	1931	Last observed

Vancouver Is.-2	Extirpated	1978	Last observed
Vancouver Is.-3	Extirpated	1989	Last observed
Vancouver Is.-4	Extirpated	1952	Last observed
Hornby Island-1	Extirpated	1996	Last observed
Hornby Island-2	Extirpated	1996	Last observed
Hornby Island-3	Extirpated	1996	Last observed