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A SURVEY OF THE DIVERSITY OF BUTTERFLIES IN KING COUNTY, WASHINGTON, USA

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2 tables, 3 figures

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ABSTRACT

A five year field survey of the butterflies (Rhopalocera) of King County, Washington was conducted from August 2017 to August 2022 to compare the current butterfly fauna with historical records from the previous 140 years, and to expand our knowledge of butterfly diversity and distribution in this highly urbanized county. King County (5478 km^2) is the most populous county in the state and has a wide variety of ecosystems, including three Level III ecoregions. For this survey, 73 sites were sampled for butterfly species occurrence, from sea level to 1700m (5600ft) elevation and with multiple sites in each ecoregion. The species recorded during this survey are compared to those recorded historically (pre-1996) from King County in Hinchliff (1996), as well as with the sum of currently known King County records. Notable changes in species diversity and the impacts of urbanization are discussed. All records and literature pertaining to the species not recorded during this survey but known to have occurred in King County are reviewed. A total of 63 species were recorded, including six species and one subspecies which were first records for King County. A total of 87.7% of the species recorded in Hinchliff (1996) and 85.1% of all recorded King County species were found during this survey. The history of the literature relating to the study of butterflies of King County is also discussed, as well as the notable species found during this survey.

Additional key words: historical comparison, species occurrence, urbanization, ecoregions

INTRODUCTION

King County is located in western Washington (Fig. 1). It has three Level III ecoregions (Fig. 1, Pater et al. 1998) containing a wide variety of ecosystems, including subalpine meadows, montane forests, and riverine lowlands. The Puget Lowland ecoregion is the most heavily urbanized in King County (Fig. 1), resulting in the loss of nearly all late successional (old growth) forests (Fuerstenberg et al. 2008), negatively impacting obligate species such as the butterfly *Callophrys johnsoni* (Skinner, 1904) (Pyle & LaBar 2018). Aside from urban areas, the remaining portions of this ecoregion in King County are primarily forested, dominated by *Tsuga heterophylla* (Raf.) Sarg. (western hemlock), *Thuja plicata* Donn *ex* D. Don (western redcedar), and *Pseudotsuga menziesii* (Mirb.) Franco (Douglas-fir) (Fuerstenberg et al. 2008). Powerline rights of way provide open, sunny habitat where butterflies can be found amid the forests. The Cascades ecoregion in the southeast quarter of the county includes elevations up to 1730m (5700ft) and is defined by volcanic rock mountains such as Kelly Butte. It has been heavily impacted through logging (Fuerstenberg et al. 2008), but some old growth forest and multiple subalpine meadows remain. The lowlands and valleys of this ecoregion have forests of *T. heterophylla*, *T. plicata* and *P. menziesii*, while at high elevations *Abies amabilis* Douglas *ex* J. Forbes (Pacific silver fir), *Abies procera* Rehder (noble fir), and *Tsuga mertensiana* (Bong.) Carrière (mountain hemlock) appear (Pater et al. 1998). Much of the North Cascades ecoregion, defined by granite mountains, is covered by the Alpine Lakes and Wild Sky wildernesses in the northeast quarter of King County. This ecoregion has had comparatively little human impact compared to the other two ecoregions. The lowland forests, occurring in the upper river valleys of northeast King County (e.g. Middle Fork Snoqualmie River), are like the forests of the Puget Lowlands. At montane elevations, from 850–1700m (2800–5600ft), *Callitropsis nootkatensis*

(D.Don) Oerst. (Alaskan cedar), *A. amabilis*, and *T. mertensiana* appear (Fuerstenberg et al. 2008). The subalpine/alpine zone in this ecoregion ranges from 850–2400m (2800–7900ft) and is restricted to the vicinity of the Cascade crest, where forests are dominated by *T. mertensiana* intermixed with subalpine meadows. Truly alpine ecosystems are only found on the highest, most exposed ridges.

King County has been explored by lepidopterists since the 1880s, and several published papers and books include records of King County butterflies. Edson (1913) published the first work on the butterflies of Washington. Her thesis notably illustrates a *Hesperia juba* (Scudder, 1874) collected in Seattle, King County. Leighton (1946) authored a trailblazing paper on the butterflies of Washington State. This detailed list with location data is an invaluable resource, with a majority of the King County butterfly records verifiable from voucher specimens in the University of Washington Burke Museum collection (UWBM). Next, Collman et al. (1986) documented 24 frequently recorded species, all found in lowland King County at the time of publication. The next comprehensive review of butterfly records in Washington was published by Hinchliff (1996) and followed in the footsteps of Leighton (1946). It included all known records from the 1880s through 1995 and mapped them by township (Public Land Survey System). These and all records to the present time were summarized as a county checklist in Pelham et al. (2022), and in a database of Washington butterfly records (Pelham 2022).

The primary goal of this survey was to record as many species as possible from King County over a period of five years, and to compare the species diversity found both with historic (pre-1996) species diversity data (Hinchliff 1996) and with the current sum of all King County records (Pelham et al. 2022). This survey allows for an analysis of the shifts in the butterfly

species composition and distribution over the past 140 years in King County. A secondary goal of this survey was to record taxa not previously known from King County and also to provide a current list of the known and extant taxa. King County was ideal for this project, as it has a strong but haphazard set of historical records, and the current survey establishes the first systematic assessment of the diversity of King County butterflies.

METHODS

Field observations and voucher specimens were collected from 73 sites between August 2017 and August 2022. Sites varied in elevation from sea level to 1700m (5600ft) (Fig. 1, Table 1) and were selected to optimize sampling of a broadly representative suite of geographically and elevationally distinct ecosystems in the county. Sampling was repeated at most sites at different times of year and in different years.

For all taxa recorded in this survey, voucher specimens were collected by net, properly curated, and deposited in the author's personal collection. When voucher specimens could not be collected at a given site, species were documented from sight observations made with high confidence in the correct species identification. The taxonomy used for this study follows Pelham et al. (2022) and includes several segregates.

Additional recent (1996–2022) records were reviewed from the online platforms of iNaturalist, Butterflies and Moths of North America (BAMONA), and BugGuide. Records from these sources contain images, making verification of the identifications possible. University and museum collection records in the Symbiota Collections of Arthropods Network (SCAN) were

also reviewed, but many of the records were unverifiable due to the lack of photos. The other historical (pre–1996) records used in this paper are recorded in Pelham (2022). Together with the present study, these datasets form our current knowledge of King County butterflies.

RESULTS

A total of 63 species (64 total taxa) were recorded during this survey, including 11 species that were only recorded from single individuals (Table 2). Hinchliff (1996) documented 65 species in King County, 57 of which (87.7%) were duplicated by this survey (Table 2). Six species and one subspecies were new King County records: *Hesperia colorado manitoba* (Scudder, 1874), *Parnassius smintheus magnus* W. G. Wright, 1905, *Papilio indra indra* Reakirt, 1866, *Tharsalea heteronea klotsi* (W. D. Field, 1936), *Icaricia lupini lutzi* (dos Passos, 1938), *Agriades glandon megalo* (McDunnough, 1927), and *Boloria chariclea rainieri* (W. Barnes & McDunnough, 1913) (Fig. 2). The North Cascades and Cascades ecoregion sites at mid-high elevations, above 850m (2700ft), had the highest species diversity sites in the county and are the ecoregions where all the county records were found.

Three notable species were also encountered during this survey; *Polites sonora sonora* (Scudder, 1872) was only found at two general locations in King County: Tunnel Creek and the Government Meadow area. The population at Government Meadow is hundreds of individuals at peak flight, with many exhibiting an unusual aberration, with notably exaggerated markings in the forewing and hindwing discal areas (Fig 3a-b). Between 1 in 10 to 1 in 100 individuals in this population exhibited this unusual aberration, with individuals collected on all three trips to the site: 2 August 2017, 4 August 2017, and 10 August 2020. The King County population of

Euphydryas anicia (E. Doubleday, 1847) Chumstick segregate, at Stevens Pass, represents the southernmost record of the species west of the Cascade Crest in Washington state (Pyle & LaBar 2018, Pelham 2022). The identification was confirmed by genitalia dissection of a male voucher specimen (Fig. 3c) per Ehrlich & Ehrlich (1961). *Erebia vidleri* Elwes, 1898, a regional endemic found only from the northern Cascades and Olympic Mountains in Washington to central British Columbia (Guppy & Shepard 2001), was found in low numbers at multiple subalpine sites in King County (e.g. Fig. 3d). Two of the sites are just north of Snoqualmie Pass along the Pacific Crest Trail and are among the southernmost populations of this species worldwide.

Fifteen taxa known from King County (Hinchliff 1996, Pelham et al. 2022) were not found during this survey, resulting in an 85.1% total species diversity of all recorded King County species. These taxa are: *Epargyreus clarus* ssp. (Cramer, 1775), *Thorybes pylades indistinctus* (Austin & J. Emmel, 1998), *Erynnis persius* (Scudder, 1863) Puget-Olympic segregate, *Carterocephalus skada skada* (W. H. Edwards, 1870), *Hesperia colorado* (Scudder, 1874) Salish segregate, *Polites sonora siris* (W. H. Edwards, 1881), *Euphyes vestris vestris* (Boisduval, 1852), *Pontia beckerii* (W. H. Edwards, 1871), *Callophrys johnsoni* (Skinner, 1904), *Danaus plexippus plexippus* (Linnaeus, 1758), *Euptoieta claudia* (Cramer, 1775), two subspecies of *Argynnis cybele* (Fabricius, 1775), *Argynnis zerene picta* McDunnough, 1924, and *Cercyonis oetus oetus* (Boisduval, 1869) (Table 2).

For the King County checklist presented (Table 2), taxa from Hinchliff (1996) have been converted to follow the taxonomy of Pelham et al. (2022) with four minor adjustments. First, Hinchliff (1996) records *Epargyreus clarus californicus* MacNeill, 1975 from King County,

which is the native subspecies that occurs in western Washington state (Pyle 2002). However, *Epargyreus clarus clarus* (Cramer, 1775) has been documented as an introduced taxa in western Washington state, which means the King County records could potentially represent *E. c. clarus* and are therefore treated here as *Epargyreus clarus* ssp. (Pelham 2022). Second, Pelham et al. (2022), listed two segregates of *Erynnis persius*: Puget-Olympic and Cascadian. Although Hinchliff (1996) listed all the King County records as *Erynnis persius* ssp., individuals of both these segregates are identifiable from the range map given. Third, two subspecies of *Polites sonora* occur in King County: montane *P. s. sonora* and Puget Lowland *P. s. siris*. Hinchliff (1996) only recorded *P. s. sonora*, but from the locality shown on the map, this record clearly falls in the Puget Lowland ecoregion, and is thus *P. s. siris*. Fourth, Hinchliff (1996) marked all King County records of *Parnassius clodius* Ménétriés, 1857 as subspecies *P. c. claudianus* Stichel, 1907, but *P. c. pseudogallatinus* Bryk, 1913 also occurs in montane parts of the county and is demonstrably recorded pre-1996 by some of the localities shown in Hinchliff (1996).

Some historic records attributed to King County are considered erroneous or highly questionable and were therefore not included in the species totals provided here. The "Checklist of County Records" in Hinchliff (1996, Appendix D) included *C. s. skada, Satyrium saepium saepium* (Boisduval, 1852), and *Callophrys spinetorum spinetorum* (Hewitson, 1867) for King County. However, these species were not recorded on the corresponding range maps in Hinchliff (1996) and no King County specimens or otherwise verifiable records are known to exist (Table 2). Additionally, six other taxa are listed in Pelham et al. (2022) as questionable for King County: *Burnsius communis communis* (Grote, 1872), *Polites sabuleti alkaliensis* Austin, 1987, *Polites mardon mardon* (W. H. Edwards, 1881), *Amblyscirtes vialis* (W. H. Edwards, 1862),

Icaricia icarioides blackmorei (W. Barnes & McDunnough, 1919), and *Argynnis zerene bremnerii* W. H. Edwards, 1872. *B. c. communis* was recorded from "Seattle" by O.B. Johnson, and also from an unverifiable National Museum of Natural History specimen, with no collector or date. All of O.B. Johnson's records from "Seattle" were discarded, as some are obvious alien taxa (Leighton, 1946), making all O. B. Johnson records unreliable. The *P. s. alkaliensis* record from the University of Washington Campus in 1959 was apparently mislabeled by a student, and was actually from the Soap Lake area, in eastern Washington (Jonathan Pelham, Burke Museum of Natural History and Culture, personal communication). *P. m. mardon* was illustrated from "Seattle" in Comstock (1927), but no specimen is known (Jonathan Pelham, Burke Museum of Natural History and Culture, personal communication). The *A. vialis* and *I. i. blackmorei* from "Seattle" are O.B. Johnson records (Pelham 2022). There is a potential King County *A. z. bremnerii* record from Cedar Mountain (Leighton 1946). However, no specimens are present in the Leighton collection at the UWBM and this record is therefore unverifiable. Based on this information, these six taxa are not considered valid records and were therefore not included in the King County checklist presented here (Table 2).

DISCUSSION

The differences between the taxa found in this study and those historically recorded pre-1996 point to clear changes in the diversity of butterflies in King County over the last 100 years. Urbanization negatively impacts butterfly species richness (Clark et al. 2007), with the urbanization of King County over the last 140 years being a prime example. Previously recorded

species from the lowlands of King County have altogether disappeared, probably mostly due to urbanization. One notable species with a changed distribution is *Anthocharis julia flora* W. G. Wright, 1892, which was frequently recorded throughout the Puget Lowlands in King County up through the late 1980s (Pyle 1974). However, it was not found at any Puget Lowland locations sampled during this survey, and there are no post 1980s records in Pelham (2022). *A. j. flora* appears to be now extirpated from the Puget Lowland ecoregion in King County, and now only occurs at higher elevations, above 850m (2800ft), in the Cascade Mountains in King County. Another notable example of changing species distributions in King County are the low elevation Hesperiidae, with seven of the taxa recorded not found in this survey, including 4 taxa not recorded since before Hinchliff (1996). Habitat loss has likely been key in the decline/disappearance of many of these Hesperiidae species, as all seven taxa only occur/occurred in the now urbanized Puget Lowlands portion of King County. Many other obligate Puget Lowland butterfly species face similar challenges in neighboring counties due to widespread habitat loss (Schultz et al. 2011).

Of the fifteen taxa not recorded in this survey, seven are only known from pre-1996 records: *E. clarus* ssp., *T. pylades indistinctus*, *Erynnis persius* Puget-Olympic segregate, *P. s. siris, C. johnsoni*, *Argynnis cybele leto* Behr, 1862, and *C. oetus* (Hinchliff 1996, Pelham 2022). The only records of *Epargyreus clarus* ssp. in King County are all from Seattle, where it was last recorded in 1982 (Pelham 2022). *Thorybes pylades indistinctus* was only recorded once in King County: a single specimen collected in Seattle in 1897 (Pelham 2022). It is likely extirpated from the county as none have been recorded since. *Erynnis persius* Puget-Olympic segregate, which has been historically recorded from lowland King County (Hinchliff 1996), was not located

during this survey. The sole specimen is from Seattle, 1930 (Pelham 2022), and the identification to this segregate is not certain. The only verifiable record of *Carterocephalus skada skada* in King County is from Scatter Creek in 2013 (Jeff Dreier, iNaturalist). This species was not located during this survey and it was not possible to visit the recorded location to confirm if it was still present there, due to the location being on private land. *Hesperia colorado* Salish segregate is recorded from King County, but was not located during this survey. There are two recent records of *H. colorado* Salish segregate from Enumclaw in 2022 (Jeff Bartlett, iNaturalist), and a single historic record from Seattle in 1937 (Pelham 2022). *Polites sonora siris* was not found in King County during this survey, and is only known from Bothell in 1944 (Pelham 2022). It is a Salish Lowlands obligate in the Puget Sound area (Pelham 2022) with a similar range to *H. colorado* Salish segregate, and given the intensive urbanization in Bothell, is likely extirpated from King County. *Euphyes vestris vestris* was not located during this survey, despite repeated visits to the accessible sites of its few specific locations: High Point/Tiger Mountain in 1983 (Pelham 2022) and Rattlesnake Mountain in 2007 (Lynette Elliott, BugGuide). This accounts for a total of 7 Hesperiidae taxa not being recorded during this survey.

Only one species each from Pieridae and Lycaenidae were not found during this survey. The sole King County record of *Pontia beckerii* is from Enumclaw in 2021 (Jeff Bartlett, iNaturalist). *P. beckerii* normally occurs at lower elevations in eastern Washington (Pyle & LaBar 2018), with rare strays westward. *Callophrys johnsoni* is an old growth forest obligate (Pyle & LaBar 2018) and was last recorded at Tunnel Creek in 1995 (Pelham 2022). After repeated visits to this site, as well as to another old growth forest fragment at Money Creek, no verifiable *C. johnsoni* were found (*C. johnsoni* is similar enough to *Callophrys gryneus*

plicataria K. Johnson, 1976 that sight records are uncertain). There is very little of its original habitat remaining over its entire range (James & Nunnallee 2011), especially in King County, and *C. johnsoni* spends much of its time in the canopy (Pyle & LaBar 2018). These factors make it difficult to locate any remaining populations.

A total of six taxa from Nymphalidae were not recorded during this survey. *Danaus plexippus plexippus* is a rare migratory species in western Washington (Pyle & LaBar 2018). In King County, individuals from the northward migration would be expected in June, and those from the southward migration in September (David James, Washington State University Department of Entomology, personal communication). There are three post-1995 records that are from the correct seasons to represent wild individuals, with the most recent record being from West Seattle in 2015 (David James, Washington State University Department of Entomology, personal communication). *Euptoieta claudia* is a very rare immigrant to Washington state (Pyle & LaBar 2018) and has been recorded from King County on a single occasion in 2021 (Scott Ramos, iNaturalist). Two subspecies of *Argynnis cybele* are recorded from King County, neither of which was encountered during this survey. *A. c. leto* is known only from two records from Stevens Pass in 1959 and 1961 (Pelham 2022). It was not found during this survey after multiple trips to the Stevens Pass area. *Argynnis cybele pugetensis* (F. Chermock & Frechin, 1947) occurs at low elevations in King County, with unverifiable pre-1996 records at Cedar Mountain and Maple Valley (Leighton 1946) and North Bend (Hardwick 2010). The only verifiable records are post-1996, from the Black River Riparian Forest in 2013 (Oli Veliz, iNaturalist) and Enumclaw in 2021 (Jeff Bartlett, iNaturalist). However, *A. c. pugetensis* was not found at Cedar Mountain or any other low elevation sites sampled during this survey. *Argynnis zerene picta* has been

recorded twice in King County: Pratt Lake in 1975 (Pelham 2022) and Enumclaw in 2022 (Jeff Bartlett, iNaturalist). Both individuals likely represent strays from eastern Washington where breeding populations occur. *Cercyonis oetus oetus* has been recorded twice in King County: at Snoqualmie Pass in 1940 (Pelham 2022) and at Stevens Pass in 1967 (Western Washington University, SCAN). These also likely represent strays from eastern Washington, as no individuals were located in this survey at either location and the normal range of *C. o. oetus* is in eastern Washington (Pyle & LaBar 2018).

Seven taxa recorded during this survey were new records for King County (Fig. 2). *Hesperia colorado manitoba* was found at two subalpine sites: first at Kendall Katwalk and subsequently at another location slightly further south. Previously, the southernmost records were in the Sawtooth Range north of Lake Chelan in Chelan County. This discovery represents a significant range extension to the south for this subspecies. *Parnassius smintheus magnus* was recorded from a single individual collected in a dry rocky meadow, dominated by *Eriogonum compositum* Douglas ex Benth. and *Sedum* ssp. L. near Kelly Butte. A single *Papilio i. indra* was found at mud along Tye Rd, at Stevens Pass. *Tharsalea heteronea klotsi* was found at two adjacent sites: first in the Stevens Pass Ski Area and second nectaring on *Eriogonum umbellatum* Torr., its likely host plant, on the ridgeline above Stevens Pass. *Icaricia lupini lutzi* was recorded from a single individual found at Kendall Katwalk. *Agriades glandon megalo* was first discovered from the scree fields on Kelly Butte, and was subsequently found at other locations around Kelly Butte and also at Silver Peak. A colony of *Boloria chariclea rainieri* was discovered at Gravel Lake, north of Snoqualmie Pass. These new records, along with the three notable finds (Fig. 3), will be added to Washington Butterfly Survey (run by Jonathan Pelham,

Burke Museum of Natural History and Culture). The county records have been added to Pelham et al. (2022).

It is clear from this five year survey that there is much still to learn about King County butterflies. All seven county records from this survey are from poorly sampled areas in the Cascades in King County. It follows that the number of recorded species will certainly grow as more research is conducted, especially into remote areas only accessible by backpacking. This survey demonstrates the value of having a good baseline of records to understand species diversity changes over time, as well as exploring new locations to find previously unrecorded species.

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FIGURE CAPTIONS

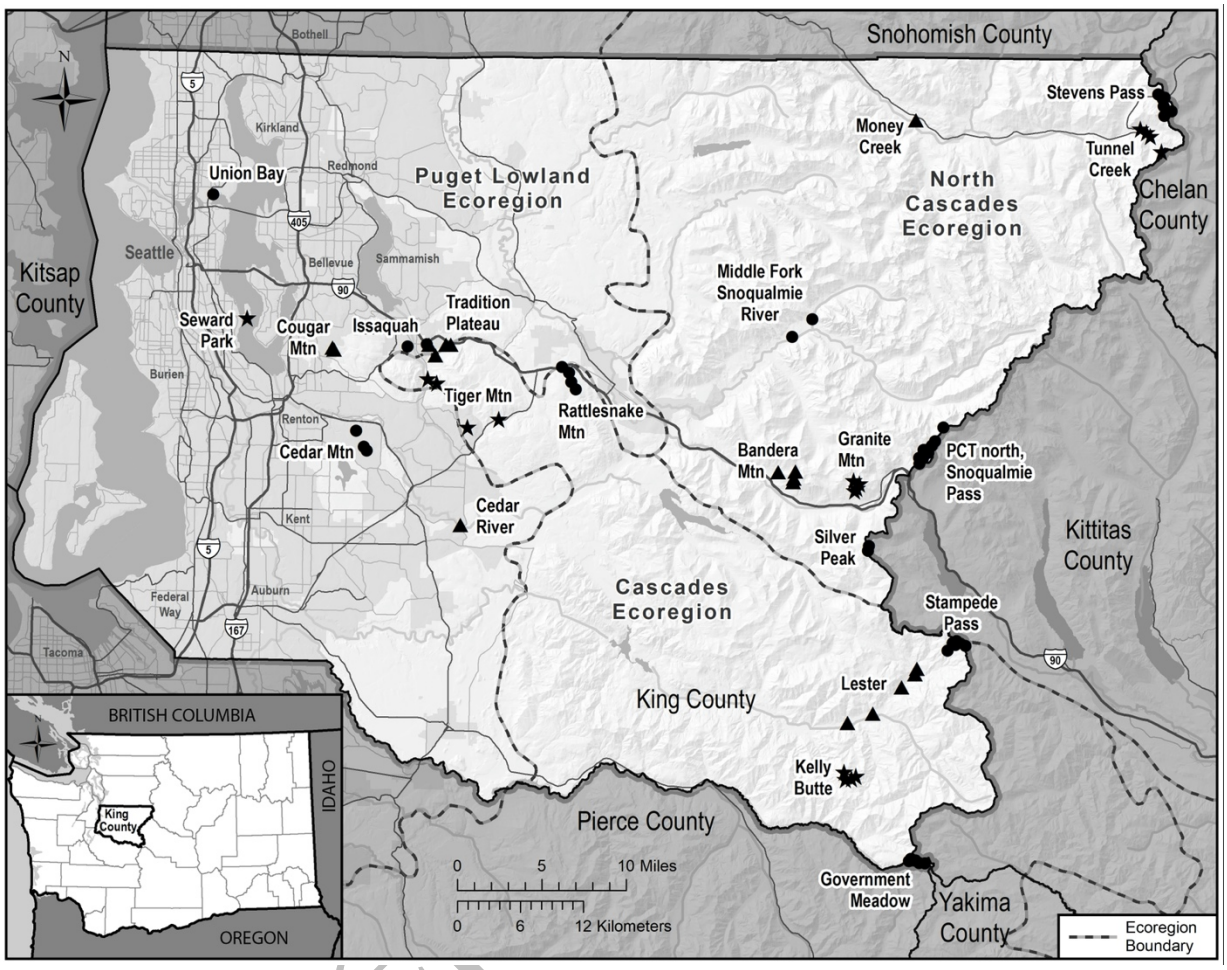

Figure 1. Map of King County showing all sample sites grouped by general location.

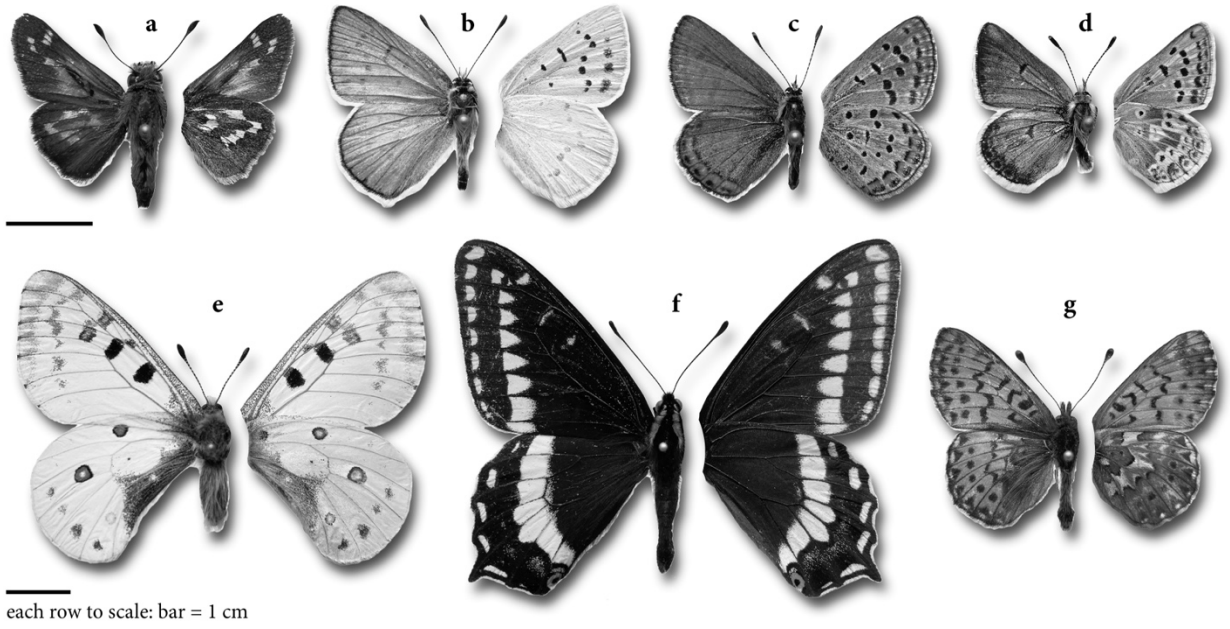

Figure 2. King County records: **a)** *Hesperia colorado manitoba* male, Kendall Katwalk, 31–July–2019; **b)** *Tharsalea heteronea klotsi* male, Stevens Pass, 17–August–2022; **c)** *Icaricia lupini lutzi* male, Kendall Katwalk, 31–July–2022; **d)** *Agriades glandon megalo* male, Kelly Butte, 8–July–2018; **e)** *Parnassius smintheus magnus* male, Kelly Butte, 5–July–2021; **f)** *Papilio indra indra* male, Tye Rd, 14–July–2022; **g)** *Boloria chariclea rainieri* male, Gravel Lake, 31–July–2019. The attached wings show the dorsal side, the detached wings show the ventral side.

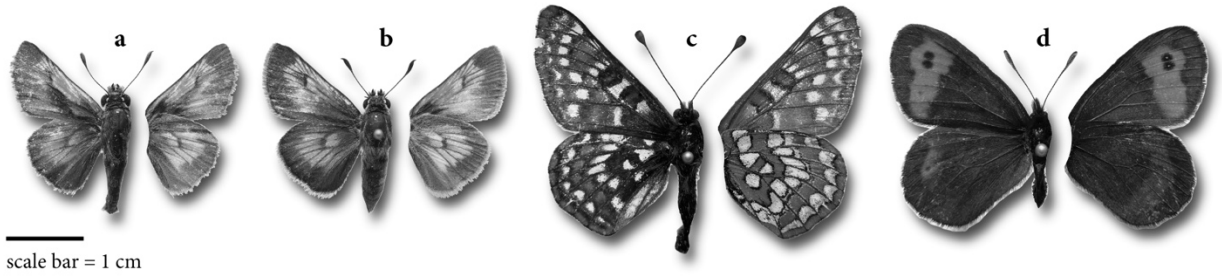

Figure 3. Notable species: **a-b)** *Polites sonora sonora* "aberration" male (a) and female (b) from Government Meadow on 2–August–2017 and 4–August–2017, respectively; **c)** *Euphydryas anicia* male, Stevens Pass, 17–August–2022; **d)** *Erebia vidleri* male, near Kendall Katwalk, 31–July–2019. The attached wings show the dorsal side, the detached wings show the ventral side.

TABLES

TABLE 1. General locations sampled in King County for this survey. An '*' denotes two locations sampled on more than 10 different dates, with the sample years shown. These two locations were both sampled every month from March through September.

Ecoregion	Location	Elevation Range	Site Latitude, Longitude	Sample Dates
Cascades	Government Meadow	1400–1500m (4600–4900ft)	47.0901, -121.3877 47.0905, -121.3952 47.0919, -121.4077 47.0925, -121.3996 47.0940, -121.4056	2017: 2–Aug, 4–Aug; 2020: 10–Aug
Cascades	Kelly Butte	1325–1625m (4400–5400ft)	47.1613, -121.4886 47.1622, -121.4811 47.1641, -121.4753 47.1677, -121.4904	2018: 8–Jul; 2021: 5–Jul
Cascades	Lester	500–675m (1600–2200ft)	47.2099, -121.4865 47.2181, -121.4548 47.2407, -121.4186 47.2522, -121.4021 47.2568, -121.3997	2022: 24–Jul, 25–Aug

Cascades	Rattlesnake Mountain	275–625m (900–2100ft)	47.4930, -121.8339 47.4990, -121.8397 47.5072, -121.8428 47.5118, -121.8515	2020: 26–Jun; 2022: 19–Jul, 30–Jul
Cascades	Tiger Mountain	50–525m (200–1700ft)	47.4593, -121.9704 47.4665, -121.9309 47.4967, -122.0100 47.5001, -122.0215	2018: 29–May; 2019: 30–Jul, 4–Aug
Cascades/North Cascades	Stampede Pass	1075–1200m (3500–4000ft)	47.2723, -121.3610 47.2765, -121.3385 47.2773, -121.3511 47.2790, -121.3549 47.2805, -121.3498	2022: 24–Jul, 25–Aug
Cascades/Puget Lowland	Tradition Plateau	125–175m (400–600ft)	47.5205, -122.0122 47.5294, -122.0204 47.5297, -121.9930 47.5297, -121.9988	2018, 2019, 2020*
North Cascades	Bandera Mountain	775–1275m (2600–4200ft)	47.4157, -121.5575 47.4187, -121.5567 47.4241, -121.5768 47.4248, -121.5550	2018: 18–Jul; 2021: 25–Jun

North Cascades	Granite Mountain	1075–1700m (3600–5600ft)	47.4085, -121.4802 47.4107, -121.4774 47.4145, -121.4739 47.4173, -121.4813	2019: 22–Jul
North Cascades	Middle Fork Snoqualmie River	300–325m (1000–1100ft)	47.5401, -121.5606 47.5551, -121.5354	2021: 29–May, 18–Jun
North Cascades	Money Creek	275m (900ft)	47.7266, -121.4060	2022: 23–Jun
North Cascades	Pacific Crest Trail (PCT) north of Snoqualmie Pass	1150–1650m (3800–5400ft)	47.4324, -121.3982 47.4366, -121.3937 47.4373, -121.3987 47.4416, -121.3873 47.4441, -121.3932 47.4446, -121.3870 47.4477, -121.3826 47.4517, -121.3788 47.4634, -121.3684	2019: 26–Jul, 31–Jul, 27–Aug; 2020: 14–Jul; 2021: 25–Jul; 2022: 31-Jul
North Cascades	Silver Peak	1575–1700m (5200–5600ft)	47.3575, -121.4626 47.3615, -121.4613	2020: 31–Jul

North Cascades	Stevens Pass	1175–1675m (3900–5500ft)	47.7313, -121.0901 47.7350, -121.0811 47.7393, -121.0909 47.7458, -121.0925 47.7467, -121.0898 47.7495, -121.0981	2022: 14–Jul, 28–Jul, 17–Aug
North Cascades	Tunnel Creek	850–1300m (2800–4200ft)	47.7004, -121.0937 47.7135, -121.1080 47.7168, -121.1129 47.7199, -121.1208	2018: 1–Aug; 2022: 23–Jun, 14–Jul, 28–Jul
Puget Lowland	Cedar Mountain	200–275m (600–900ft)	47.4379, -122.0973 47.4411, -122.1008 47.4548, -122.1110	2018: 8–May, 22–May, 18–Aug; 2021: 11–May
Puget Lowland	Cedar River	175m (500ft)	47.3755, -121.9773	2020: 6–Sep
Puget Lowland	Cougar Mountain	300–350m (1000–1100ft)	47.5239, -122.1407 47.5256, -122.1428	2019: 4–Jun
Puget Lowland	Issaquah	75–100m (200–300ft)	47.5275, -122.0473 47.5298, -122.0234	2017, 2018, 2019, 2020*
Puget	Seward Park	0–25m (0–100ft)	47.5497, -122.2514	2022: 16–Jun

Lowland				
Puget Lowland	Union Bay	0m (0ft)	47.6550, -122.2973	2022: 21–Jun

TABLE 2. King County checklist comparing records between this survey (August 2017–August 2022), pre-1996 records (Hinchliff 1996), and the current sum of records (Pelham et al. 2022). Pelham et al. (2022) includes three species only recorded after 1995 and not found during this survey: *Carterocephalus skada skada* (W. H. Edwards, 1870), *Pontia beckerii* (W. H. Edwards, 1871), and *Euptoieta claudia* (Cramer, 1775). Species only recorded from a single individual during this survey are marked with 'X*'. Taxonomy follows Pelham et al. (2022).

King County Butterfly Taxa	**This survey**	**Pre-1996 records**	**Current sum of records**
HESPERIIDAE			
Thorybes pylades indistinctus (Austin & J. Emmel, 1998)		X	X
Epargyreus clarus ssp. (Cramer, 1775)		X	X
Pyrgus ruralis ruralis (Boisduval, 1852)	X	X	X
Erynnis icelus (Scudder & Burgess, 1870)	X*	X	X
Erynnis persius (Scudder, 1863) Puget-Olympic segregate		X	X
Erynnis persius (Scudder, 1863) Cascadian segregate	X	X	X
Carterocephalus skada skada (W. H. Edwards, 1870)			X
Euphyes vestris vestris (Boisduval, 1852)		X	X
Polites sonora siris (W. H. Edwards, 1881)		X	X

Polites sonora sonora (Scudder, 1872)	X		X
Hesperia colorado (Scudder, 1874) Salish segregate		X	X
Hesperia colorado manitoba (Scudder, 1874)	X		X
Hesperia juba (Scudder, 1874)	X	X	X
Ochlodes sylvanoides sylvanoides (Boisduval, 1852)	X	X	X
PAPILIONIDAE			
Parnassius clodius claudianus Stichel, 1907	X	X	X
Parnassius clodius pseudogallatinus Bryk, 1913	X	X	X
Parnassius smintheus magnus W. G. Wright, 1905	X*		X
Papilio indra indra Reakirt, 1866	X*		X
Papilio zelicaon Lucas, 1852	X	X	X
Pterourus rutulus (Lucas, 1852)	X	X	X
Pterourus eurymedon (Lucas, 1852)	X	X	X
PIERIDAE			
Colias occidentalis occidentalis Scudder, 1862	X	X	X
Colias eriphyle W. H. Edwards, 1876	X*	X	X
Colias eurytheme Boisduval, 1852	X	X	X

Anthocharis julia flora W. G. Wright, 1892	X	X	X
Neophasia menapia tau (Scudder, 1861)	X	X	X
Pontia occidentalis occidentalis (Reakirt, 1866)	X	X	X
Pontia beckerii (W. H. Edwards, 1871)			X
Pieris rapae rapae (Linnaeus, 1758)	X	X	X
Pieris marginalis marginalis Scudder, 1861	X	X	X
LYCAENIDAE			
Tharsalea heteronea klotsi (W. D. Field, 1936)	X		X
Tharsalea mariposa cascadia (Pyle and Hammond, 2018)	X	X	X
Tharsalea helloides (Boisduval, 1852)	X	X	X
Strymon melinus atrofasciata McDunnough, 1921	X	X	X
Callophrys johnsoni (Skinner, 1904)		X	X
Callophrys gryneus plicataria K. Johnson, 1976	X	X	X
Callophrys augustinus iroides (Boisduval, 1852)	X	X	X
Satyrium sylvinus nootka M. Fisher, 1998	X	X	X
Glaucopsyche lygdamus columbia (Skinner, 1917)	X	X	X
Celastrina echo (W. H. Edwards, 1864)	X	X	X

Cupido amyntula amyntula (Boisduval, 1852)	X*	X	X
Icaricia lupini lutzi (dos Passos, 1938)	X*		X
Icaricia saepiolus rufescens (Boisduval, 1869)	X	X	X
Icaricia icarioides montis (Blackmore, 1923)	X	X	X
Agriades glandon megalo (McDunnough, 1927)	X		X
Plebejus anna ricei Cross, 1937	X	X	X
NYMPHALIDAE			
Danaus plexippus plexippus (Linnaeus, 1758)		X	X
Euptoieta claudia (Cramer, 1775)			X
Boloria chariclea rainieri (W. Barnes & McDunnough, 1913)	X		X
Boloria epithore chermocki E. Perkins & S. Perkins, 1966	X	X	X
Argynnis cybele leto Behr, 1862		X	X
Argynnis cybele pugetensis (F. Chermock & Frechin, 1947)		X	X
Argynnis coronis simaetha (dos Passos & Grey, 1945)	X	X	X
Argynnis zerene picta McDunnough, 1924		X	X
Argynnis hydaspe minor (dos Passos & Grey, 1947)	X	X	X

Argynnis mormonia washingtonia W. Barnes & McDunnough, 1913	X	X	X
Limenitis lorquini burrisonii Maynard, 1891	X	X	X
Aglais milberti subpallida (Cockerell, 1889)	X	X	X
Nymphalis californica californica (Boisduval, 1852)	X	X	X
Nymphalis antiopa antiopa (Linnaeus, 1758)	X	X	X
Polygonia satyrus neomarsyas dos Passos, 1969	X	X	X
Polygonia oreas silenus (W. H. Edwards, 1870)	X*	X	X
Polygonia gracilis zephyrus (W. H. Edwards, 1870)	X	X	X
Polygonia faunus rusticus (W. H. Edwards, 1874)	X	X	X
Vanessa annabella (W. D. Field, 1971)	X*	X	X
Vanessa virginiensis (Drury, 1773)	X*	X	X
Vanessa cardui (Linnaeus, 1758)	X	X	X
Vanessa atalanta rubria (Fruhstorfer, 1909)	X	X	X
Euphydryas editha colonia (W. G. Wright, 1905)	X	X	X
Euphydryas colon (W. H. Edwards, 1881) Central Cascades segregate	X	X	X

Euphydryas anicia (E. Doubleday, 1847) Chumstick segregate	X	X	X
Chlosyne hoffmanni manchada Bauer, 1960	X	X	X
Phyciodes pulchella owimba J. Scott, 1998	X*	X	X
Phyciodes mylitta mylitta (W. H. Edwards, 1861)	X	X	X
Coenonympha california insulana McDunnough, 1928	X	X	X
Cercyonis pegala incana (W. H. Edwards, 1880)	X	X	X
Cercyonis oetus oetus (Boisduval, 1869)		X	X
Erebia vidleri Elwes, 1898	X	X	X
Oeneis nevadensis nevadensis (C. Felder & R. Felder, 1867)	X*	X	X