

**OVERLOOKED DIVERSITY IN EXOTIC TARAXACUM IN
BRITISH COLUMBIA, CANADA.**

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OVERLOOKED DIVERSITY IN EXOTIC *TARAXACUM* IN BRITISH COLUMBIA, CANADA.

CURTIS R. BJÖRK

Beaty Biodiversity Centre

University of British Columbia

2212 Main Mall

Vancouver, BC, V6T 1Z4, Canada

crbjork@gmail.com

ABSTRACT

In almost all North American literature, including in British Columbia, weedy *Taraxacum* species have been named as *T. officinale* and *T. erythrospermum* (or *T. laevigatum*). This coarse taxonomic approach ignores great diversity in morphology, ecology and geographical distributions among the exotic established species. Taxonomic refinement would facilitate floristics and ecological studies when exotic *Taraxacum* species are involved, and the taxonomy of native *Taraxacum* must first determine which are and which are not native species, which in turn requires knowledge of sectional identity of any specimen. Exotic *Taraxacum* specimens were identified to species and taxonomic sections using refined species and sectional concepts that align with taxonomic standards used in the native ranges of the species in Europe. Seven exotic sections and one informally named group are found to be present in British Columbia (*Borea*, *Boreigena*, *Celtica*, *Erythrosperma*, *Hamata*, *Naevosa*, *Taraxacum*, and the *T. fulvicarpum* group). The number of exotic *Taraxacum* species known to occur in British Columbia to date exceeds 100. A key to the exotic sections of British Columbia *Taraxacum* is presented and the sections are characterized. Species known to date are listed by their sectional placement. Notes are also presented on distinguishing native from exotic *Taraxacum* in British Columbia.

KEYWORDS: *Taraxacum*, invasive species, North America, British Columbia.

INTRODUCTION

Little is known about British Columbian and North American *Taraxacum*, and studies are lacking that treat the exotic species. In most North American floras, only two introduced *Taraxacum* species are treated, usually named as *T. officinale* F.H.Wigg, and *T. erythrospermum* Andr. ex Besser (or *T. laevigatum* DC. in older floras). Treating only two exotic species (or in some North American treatments one or very few additional exotic species) results in great confusion as it has often been impossible to apply either name to specimens, even under a very coarse taxonomy of extremely inclusive species

concepts. Keys and descriptions in regional floras also have presented shuffled characteristics among the exotic and native species to such a degree that it has been difficult even to know whether a species is native. The application of the above two names in North America has in all cases been attempted without an understanding of their characteristics, leading to further confusion.

In North American herbaria, specimens of exotic *Taraxacum* are almost always incorrectly identified, the exceptions being the small number of specimens annotated by European taraxacologists such as Doll or van Soest. Even in those cases, the identifications are often incorrect, at least due to the use of broader-sense names that on more contemporary study were refined to stricter species concepts.

Clearly, *Taraxacum* in North America has been a taxonomic frontier. Venturing to document the diversity of exotic *Taraxacum* species, focusing on British Columbia, Canada resulted in an astonishing array of species of multiple sections. Similarly, ongoing work on native *Taraxacum* of North America reveals a rich and neglected diversity of both the exotic and native species. Progress toward a continent-wide *Taraxacum* monograph is ongoing by the present author.

Taxonomic sections of *Taraxacum*

Taraxacum species, even given a well-honed taxonomy, can be difficult to identify. The present study applies taxonomic standards used by European taraxacologists (i.e., Kirschner and Štěpánek 1987; Dudman and Richards 1997), which allow for more accurate and meaningful identifications of *Taraxacum* specimens either to the level of section or to the level of species. Accordingly, a taxonomic framework of sections is presented here for application in British Columbia. Learning the sections of *Taraxacum* can allow easier species identification by reducing possible species matches to only the members of a single section. When it is not possible to identify a specimen to the level of species (due to poor condition of the specimen, or when the specimen represents a species previously unknown within the

geographical scope of an identification guide), it should be named to the level of section and filed in the herbarium accordingly. This is the favoured alternative to using the names *T. erythrospermum* or *T. officinale*, which are the names applied almost universally to specimens of exotic *Taraxacum* species in British Columbia, and even to many native species.

Care must be taken to distinguish exotic from native species. As far as is currently known, all *Taraxacum* sections present in British Columbia and elsewhere in North America include either exotic or native species but not both (though some specimens from Alaska strongly resemble section *Boreigena* and the possibility that they are native there cannot at this time be ruled out). The correct sectional placements of North American native *Taraxacum* is as yet unknown. The only published sectional schema of North American native species places all in either section *Arctica* or section *Borealia* (Kirschner et al. 2014). Including all those species in those two sections expands the morphological scope of the sections so greatly that they become poorly defined. Sectional classification of North American *Taraxacum* will be handled in a forthcoming study by the present author. The present study focuses only on the exotic sections in British Columbia.

METHODS

All exotic *Taraxacum* sections reported here as introductions to the British Columbia flora include species that are well established, growing without cultivation. Specimens studied for the exotic sections were gathered mostly in urban habitats: lawns, landscaping, roadsides, and other disturbed sites. But a few were collected from undisturbed or semi-wild vegetation. Collecting efforts were biased toward a full representation of morphological diversity rather than to represent relative abundance of each species. Hence, there may be as many specimens of a rarely encountered exotic species as one that is very common and widespread. All specimens of exotic *Taraxacum* at the herbaria UBC and V (and hb. Björk and collections in the personal herbaria of Quentin Cronk, and Andrew Simon) were examined, as were high-resolution scans of all North American type specimens of the genus, when available (ITHAKA

2018). A total of 557 specimens were examined, and many unvouchered observations were also examined by the author; collections were made mostly to document species diversity rather than distributions and abundances of species.

All specimens were gathered while in early flower in spring (February-April for coastal regions, and April-June for interior regions), and were dried in the press rapidly with heat and ventilation. Photographs (to document colour of fresh plants, positions of leaves and scapes, position of outer bracts, etc.) were taken for almost all specimens before pressing. Photographs generally show habit, an involucre in side-view, and a capitulum in top-view. Specimens gathered for the present study are housed in hb. Björk, with duplicates deposited at the herbarium UBC. Photographs are archived in Morphobank (<http://morphobank.org/permalink/?P3346>).

Identifications of British Columbian specimens to the level of section were based on published descriptions of each section and by comparative studies of the morphology of species placed in each section. Identifications to the level of species were first attempted using *Dandelions of Great Britain and Ireland* (Dudman and Richards 1997), and original species descriptions.

When specimens could not be identified perfectly using guides, floras and other literature, further identification efforts were made. As it is the case that all exotic *Taraxacum* species so far known in North America are European in origin and because examination of Asian species resulted in no applicable names, those listed in the Euro+Med Database (2018) were considered to comprise the entire realm of possible species matches. Type specimen scans were examined when available (ITHAKA 2018) for species in the Euro+Med checklist. Sketches of leaves and notes for each species were compiled into a species menu. Possible matches were made between specimens and entries in this “menu”, and these possibilities were more closely examined to employ a process of elimination, thus reducing the possible matches to a single species. Species are reported herein only if all diagnostic characters observed are

those described in contemporary European literature, and/or if the specimens in hand are a good match to type specimens. For specimens that have no clear match, further work is pending and they are treated as morphospecies and are not reported here.

The morphological terms used comply largely with that in the introduction in Dudman and Richards 1997. Definition of those terms and a useful overall introduction to taraxacology is provided by Dudman and Richards, including guidance on methods of collection and preservation of *Taraxacum* specimens.

RESULTS AND DISCUSSION

Over 100 species of exotic *Taraxacum* were collected for the present study, all of them having European origins. Several additional species have been identified from other herbarium specimens. These exotic species are seldom found intermixed with native species. The exact number of exotic species present in British Columbia is not yet known, but the total number continues to rise steeply, as it remains easy to find further additions, and many species, especially in interior regions, are identified only as morphospecies, with as yet no clear species identity.

Taraxacum erythrospermum was not found, though that species so commonly appears in North American floras. I have not yet seen this species among specimens from elsewhere in North America. As correctly applied, the name *T. erythrospermum* refers only to a diploid sexual species of limited geographical distribution in its native range (Vašut 2003, citing Kirschner pers. comm.). Sexually reproducing European *Taraxacum* species seldom show weedy tendencies, and are not expected to occur in British Columbia or anywhere else in North America. Also, no specimens were found that can be identified as *T. rubicundum* (Dahlst.) Dahlst., the type species of section *Erythrosperma*. That leaves no species name to apply as a sensu latissimo to encompass the entire section as it is represented in British Columbia. Thus specimens of the section in the region must be named either as “*Taraxacum* sect. *Erythrosperma*”, or as the correctly matching one of the strict-sense species present in British Columbia.

Taraxacum officinale is lectotypified based on a specimen of section *Taraxacum* that is of ambiguous species identity (Kirschner and Štěpánek 2011), and thus it can be used if all species of its section (section *Taraxacum*) are treated as a single species. But as such a vastly broad species concept is biologically unrealistic, numerous species in the section should be recognized. Similarly to the case of section *Erythrosperma*, specimens of section *Taraxacum* should be identified as “section *Taraxacum*” or, for ambitious identifiers, as strict-sense species. Though use of the name *T. officinale*, unlike *T. erythrospermum*, is legitimate in British Columbia and North America, it should be avoided as it falsely suggests species identity.

Species of exotic *Taraxacum* so far known to be naturalized in British Columbia belong to seven sections (*Borea*, *Boreigena*, *Celtica*, *Erythrosperma*, *Hamata*, *Naevosa*, and *Taraxacum*) plus one aggregate, the *T. fulvicarpum* group. The species of the *T. fulvicarpum* group have been placed in section *Celtica* (i.e., Dudman and Richards 1997), but they differ in having involucre morphology and ecological preferences similar to those found in section *Erythrocarpa*, and unlike any member of section *Celtica*, their cypselae are pink-brown. Hence they are treated here as a distinct group, albeit without taxonomic rank. Additionally, four species of section *Palustria* are known to occur in eastern North America, though none of these has been found in British Columbia or anywhere else in western North America.

None of the native species of British Columbia or elsewhere in North America clearly belong to any of the sections of exotic, naturalized *Taraxacum*. However, some species of North American native *Taraxacum* belong to sections that occur natively in both hemispheres. The native species of North America should be classified in numerous sections, most of which are soon to be published (Björk in prep.), and others of which belong to sections *Arctica* s. str. (type species *T. arcticum*) and *Borealia* s. str. (type species *T. hjeltii*). The native species are not further discussed presently.

Distribution of exotic Taraxacum Sections in British Columbia -- Most Eurasian plants introduced into North America have broad ecological amplitudes that allow them to occupy regions of highly dissimilar climates. Exotic *Taraxacum* species in British Columbia are an exception to this rule. Of the seven exotic sections present in the province, only two, *Erythrosperma* and *Taraxacum*, occur in both coastal and interior regions, and no species of either of those two sections has yet been found to occur in coastal regions as well as interior regions.

In coastal British Columbia, at least some species of sections *Celtica*, *Hamata*, *Naevosa*, and the *T. fulvicarpum* group are common and widespread, especially in the constantly mild and wet climates near marine shores, yet no species of any of these sections has yet been found in interior regions, even in the wettest and coolest interior climates. Likewise, some species of sections *Borea* and *Boreigena* are among the most common and widespread species in interior British Columbia, yet none is so far known to occur in coastal regions of the province.

In Europe, species of sections *Celtica*, *Hamata*, *Naevosa*, and the *T. fulvicarpum* group are distributed mostly in regions having a maritime climate. Conversely, species of sections *Borea* and *Boreigena* are distributed as native plants in Europe primarily in interior, north temperate to subarctic climates (Richards 1985). Thus the distribution patterns of species in these sections as native plants in Europe are reflected in their distribution patterns as exotic introductions in British Columbia.

Key to sections of exotic Taraxacum in British Columbia -- The following keys to sections of *Taraxacum* of British Columbia includes only exotic groups, though with guidance on differentiating the exotic from native sections. Note that older keys to North American *Taraxacum* were incorrect in not allowing for native species to have recurved or reflexed bracts, or for exotic species to have corniculate bracts or appressed or erect outer bracts.

1a Plants usually growing in wild vegetation at high elevations or latitudes; bracts sometimes strongly corniculate, the outer ones mostly erect to appressed, sometimes recurved or spreading; leaves mostly either weakly lobed or with simple lobes ...**(Native groups, not treated here)**

1b Plants mostly in disturbed vegetation, mostly at low to middle elevations and latitudes; bracts not corniculate or with small, inconspicuous horns, the outer ones mostly spreading, recurved or reflexed; leaves mostly deeply lobed, the lobes in most cases longer than wide and often again lobed ...**2 (Exotic sections)**

2a Outer bracts erect and appressed, blackish green, ovate and with blunt apices; plants usually in wet sites; not documented from British Columbia, but to be sought ...[Section *Palustria*]

2b Outer bracts spreading to recurved, or if appressed, then apices acute to acuminate; habitat various, but usually not in wet sites ...**3**

3a Inner and/or outer bracts minutely corniculate; outer bracts mostly <10 mm long, mostly thin and pale, usually pinkish ...**4**

4a Cypsel cone slender, scarcely tapered, usually >0.7 mm, cypsel body often red- or purple-brown ...**Section *Erythrosperma***

4b Cypsel cone stout and upwardly tapered, usually <0.7 mm, cypsel body pink-brown
...***Taraxacum fulvicarpum* group**

3b Inner and outer bracts not at all corniculate (though sometimes with 1-2 minute ridges at apex; outer bracts various, but often >10 mm long and usually opaque or dark and without pink tones ...**5**

5a Involucre often distinctly glaucous (alive), blackish green and glossy (dried); outer bracts ovate, lanceolate or sometimes oblong-lanceolate ...**6**

6a Leaves mostly olive-green, lateral lobes usually 4 per side and hamate; outer bracts comparatively abruptly tapered; mostly robust plants ...**Section *Hamata***

6b Leaves mostly dark bluish green, lateral lobes usually <4 per side and mostly not hamate; pollen often absent ...**7**

- 7a** Leaves not spotted (except often at the internodes, or spotted due only to injury); pollen often lacking; locally common ...**Section *Celtica***
- 7b** Leaves purple spotted, the adaxial spots corresponding to abaxial ones; pollen present (ours); rarely encountered ...**Section *Naevosa***
- 5b** Involucre rarely glaucous, not appearing blackish or varnished in the pressed state; outer bracts mostly oblong or lance-oblong ...**8**
- 8a** Outer bracts mostly >10 mm long; leaves mostly crisped and/or rugose, summer leaves almost always complexly lobed; pollen rarely absent ...**Section *Taraxacum***
- 8b** Outer bracts mostly <10 mm long; leaves often not crisped and mostly not rugose; summer leaves mostly weakly lobed or merely dentate; pollen often absent ...**9**
- 9a** Petioles with no wings or wings narrow; summer leaves usually oblanceolate or obovate in outline; capitula usually comparatively small; ligules deep yellow, the outer ones with dark abaxial stripes ...**Section *Borea***
- 9b** Petioles with broad green wings to base or nearly so; summer leaves often oblong; capitula usually comparatively large; ligules often comparatively pale, the outer ones often with pale abaxial stripes ...**Section *Boreigena***

Section *Borea* A.J.Richards

Taxon 34: 639. 1985. Type species: *Taraxacum boreum* Dahlst. Fig. 1.

Description: Plants mostly small or medium sized, usually arachnoid or strigillose; leaves mostly ascending to erect, in most species light to medium green, more or less flat to moderately crisped, smooth or rugose, lobes mostly dentate, sometimes coarsely so, mostly strongly heterophyllous, terminal lobe ampliate or not at flowering time, later-season leaves usually less distinctly lobed and with a more ampliate terminal lobe or often only obscurely lobed; involucre small to medium sized; outer bracts mostly 7-11 mm long, mostly not distinctly graduated, recurved or reflexed, oblong-lanceolate, tapering

or abruptly contracting to a more or less rounded or even truncate apex, not glaucous (at least ours), abaxially olive-green to pink, more or less opaque, scarcely changing colour on drying, never corniculate, though sometimes with a pair of minute ridges at apex; ligules yellow, outer ones (at least our species) striped abaxially, stripes brown or red-brown; pollen abundant or (often) absent or scarce; stigmas upon drying yellow, sordid or blackish; cypselae light to medium brown or olive-brown, mostly spinulose distally or sometimes merely tuberculate, cone concolorous with the body, narrowly conical, mostly 0.4-0.7 mm long.

This poorly known section occurs mostly in inland Fennoscandia and northwest Russia (Richards 1985). It is introduced in British Columbia to north temperate to subarctic climates (Fig. 15), where it appears to be the most common section. Most of interior northern British Columbia, like northern Europe, is cold to frigid in winter, with a reliable annual snow pack that persists into the spring months, and cool to mildly warm, humid summers with frequent rainfall. Thus, it may be unsurprising that species of section *Borea* would become established in such a similar region. No species of section *Borea* have yet been identified from coastal regions anywhere in British Columbia or elsewhere in North America.

In overall appearance, species of section *Borea* resemble those of section *Taraxacum*, but are generally smaller, with flatter (i.e., less crisped) leaves, smaller capitula, and shorter outer bracts, and many species of section *Borea* lack pollen, unlike nearly all species of section *Taraxacum*. Section *Borea* is poorly defined and some species may best be moved to other sections.

Species of section *Borea* occur mostly along roads, hiking trails, ski runs, and in lawns. Some of the species are shade tolerant and are the most frequently observed *Taraxacum* species in forest understory in interior British Columbia. They appear to be less demanding of organic soils than species of section *Taraxacum*. For example, species of section *Borea* are common in roadside gravel, while species of section *Taraxacum* are uncommon in this habitat or on similar mineral soils.

The taxonomy of section *Borea* is evidently poorly understood. Many British Columbia specimens remain unnamed, treated as morphospecies. This suggests that there may be undescribed species in Europe that have become common and widespread elements of the British Columbia Flora. A fuller treatment of the section as it occurs in North America is in preparation. Species of section *Borea* recorded so far in British Columbia are: *Taraxacum acutidens* H.Lindb., *T. biformatum* H.Lindb., *T. boreum*, *T. caespitans* Dahlst., *T. canaliculatum* H.Lindb., *T. cuspidatum* Markl. *T. expandens* Lundev. & H.Øllg., *T. holmgrenii* G.E.Haglund, *T. obnuptum* Lundev. & H. Øllg., *T. ostenfeldii* Raunk., *T. pallidulum* H.Lindb., *T. praecox* Puol., *T. pullum* Puol., *T. rhodopodum* Dahlst. ex M.P.Christ. & Wiinst., *T. spilophylloides* Dahlst., and *T. triangulare* H.Lindb. Additional unnamed morphospecies occur. It is not yet clear which species of this section might be most common and widespread, but so far the most frequently collected in British Columbia are *T. boreum*, *T. caespitans*, *T. cuspidatum*, *T. expandens*, *T. obnuptum*, *T. ostenfeldii*, *T. pallidulum*, *T. praecox*, *T. spilophylloides*, and *T. triangulare*.

Representative specimens – *Taraxacum boreum* B.C., Upper Clearwater Valley, 26 km north of town of Clearwater, Edgewood Blue, edge of gravel driveway, 51° 52' 8"N 120° 1' 19"W, 28 April 2016, *Björk* 39607 (UBC). *Taraxacum expandens* B.C., North Thompson Valley, Raft Falls, along powerline right-of-way access approach from the McLennan Mt. Road, grassy, disturbed ground, open, 51° 38' 18"N 119° 58' 6"W, 19 April 2016, *Björk* 39552 (UBC). *Taraxacum ostenfeldii* B.C., Thompson Plateau, between Logan Lake and Kamloops, north of Highway 970, ca. 600 m east of the Paska Lake Road, roadside weed, 50° 28' 36"N 120° 38' 48"W, 6 May 2016, *Björk* 39728 (UBC).

Section *Boreigena* Dahlst. ex G.E.Haglund

Nytt Mag. Naturvidensk. 82: 97. 1941. Type species *Taraxacum hirtellum* Dahlst. Fig. 2.

Description: Plants mostly medium to large sized, often sparsely arachnoid; leaves ascending to erect, in most species bright green, more or less flat, mostly weakly rugose, lateral lobes generally broad-based and deltate on early leaves, and shorter, fewer or indistinct on late-season leaves, terminal lobe usually oblong-sagittate, often ampliate on early leaves and greatly larger on late-season leaves, leaf outline mostly oblong to oblong-ob lanceolate; involucre medium to large sized; outer bracts mostly 10-15 mm long, mostly not distinctly graduated, recurved to reflexed, oblong to oblong-ob lanceolate, abruptly rounded to a minutely rounded or truncate apex, opaque, pale to medium green, not or weakly glaucous, not corniculate; inner bracts mostly medium green, not or weakly glaucous, apices never corniculate; ligules pale to medium yellow, outer ones striped pale to medium grey, purple or brown; pollen abundant, scarce or absent; stigmas on drying yellow or sordid; cypselae light to medium brown or olive-brown, spinulose distally, cone concolorous with the body, narrowly conical, mostly 0.4-0.8 mm long.

Section *Boreigena* could easily be confused with species of section *Taraxacum*, both having mostly robust growth and large capitula. Some species of section *Boreigena* can be differentiated from section *Taraxacum* by their relatively pale yellow ligules and pale ligule stripes. The oblong leaf shape of many of the species is unexpected for most species of section *Taraxacum*. Also, very few species of section *Taraxacum* have such pronounced seasonal leaf dimorphism. The summer leaves of section *Boreigena* are characteristically weakly lobed or they may even lack distinct lobes.

Section *Boreigena* is an uncommon or locally common member of the weed flora in north temperate to boreal British Columbia, limited to interior regions (Fig. 16), possibly occurring only north of 51° latitude. Species of this section occupy forest understory and clearings, trail margins, road sides, stream margins, and garden waste dump sites. Ecologically, the section resembles section *Borea* in tolerating nitrogen-poor soils, this in contrast to section *Taraxacum*.

Species of section *Boreigena* could easily be mistaken for strongly heterophyllous species of section *Taraxacum*, having essentially the same involucre morphology, large stature, and large capitula. Recognizing the species as members of section *Boreigena* will be easy should any species be found having pale yellow ligules and/or no stripes on the outer ligules. Otherwise, the section may be recognized by their combination of weakly lobed or unlobed leaves and often very long terminal segment. Also, species of section *Taraxacum* tend to grow on richer soils and more often in heavily disturbed habitats.

Species of section *Boreigena* identified in British Columbia so far include *T. extensum* Dahlst., *T. nylandicum* Sonck & H.Øllg., *T. perattenuatum* H.Lindb., and additional morphospecies similar to *T. cochleatum* G.E.Haglund and *T. subopacum* Dahlst. Each of these is locally common if not widespread in northern interior British Columbia. Some type specimens of species named from Alaska appear similar to species of section *Boreigena*. It remains unclear whether these might be native species there. Alternately, they may be introduced species of section *Boreigena*. Ongoing studies in Europe of the taxonomy of this section should consider the names based on these Alaskan type specimens as being possibly applicable there.

Representative specimens – *Taraxacum extensum* B.C., Upper Clearwater Valley, Mailbox Ridge, pullout along the Clearwater Valley Road, at edge of Green Mountain viewpoint, weedy slope, old dump site, open, 27 April, 2016, 51° 54' 42"N 120° 2' 21.5"W, *Björk* 39598 (UBC). *Taraxacum nylandicum* B.C., Rocky Mountain Trench, ca. 2.5 km NW of Lagrand, east side of Yellowhead Highway, weed along spur road, 5 May 2016, 53° 24' 54"N 120° 25' 25"W, *Björk* 39701 (UBC). *Taraxacum perattenuatum* B.C., Cariboo Plateau, Bridge Lake area, near south end of McNeil Lake, along Mahood Lake Road, roadside weed, 9 May 2016, 51° 45' 5"N 120° 47' 4"W, *Björk* 39786 (UBC).

Section *Celtica* A.J.Richards

Taxon 34: 639. 1985. Type species: *Taraxacum celticum* A.J.Richards. Figs. 3-4.

Description: Plants mostly small or medium sized, usually only sparsely arachnoid or glabrate; leaves prostrate to ascending, seldom erect, in most species dark, often bluish green, more or less flat, not or weakly rugose, lobes entire or dentate, if dentate then usually finely so, lobes usually not hamate, terminal lobe ampliate or not, most species not heterophyllous; involucre small to medium sized; outer bracts mostly 7-12 mm long, mostly not distinctly graduated, erect, spreading or recurved, not reflexed, outline deltate-ovate to deltate-lanceolate, tapering to a minutely rounded apex, often densely glaucous, abaxially dark, drying dark and glossy as if varnished, sometimes slightly translucent when dry, never corniculate; inner bracts dark, often densely glaucous, apices never corniculate; ligules yellow, outer ones (our species) striped abaxially; pollen abundant or (often) absent or scarce; stigmas upon drying yellow, sordid or blackish; cypselae light to medium brown or olive-brown, mostly spinulose distally or sometimes merely tuberculate, cone concolorous with the body, narrowly conical, mostly 0.4-0.7 mm long.

Species of section *Celtica* are not aggressively weedy, shunning recently disturbed sites or over-nitrified soils (Quentin Cronk, pers. comm.). They occur mostly in moist, mossy, often partly shaded lawns or in gardens and landscaping. In British Columbia, the frequency and species diversity of the sections decreases precipitously with increasing distance from marine shores (Fig. 17). In the greater Vancouver metropolitan area, I observed most of the species of this section on the campus of the University of British Columbia. In the suburbs south of Vancouver (Delta, Richmond, western Surrey), I found few examples of this section, and none eastward along the Lower Fraser River through the suburbs of eastern Surrey, Chilliwack, Langley, or Abbotsford. They also occur on southern Vancouver Island, in and near Victoria, north along the Saanich Peninsula and on the Gulf Islands.

Numerous species of section *Celtica* occur in British Columbia: *T. bracteatum* Dahlst., *T. celticum*, *T. hesperium* C.C.Haw., *T. inane* A.J.Richards, *T. lainzii* Soest, *T. polium* Dahlst., *T. porteri* C.C.Haw., *T. subbracteatum* A.J.Richards, *T. tamesense* A.J.Richards, *T. zevenbergenii* Soest. The most commonly encountered of these species in British Columbia are *T. bracteatum*, *T. celticum*, and *T. porteri*. Though it is classified in section *Naevosa* (Euro+Med 2018), the regionally common *T. duplidentifrons* Dahlst. is probably best placed in section *Celtica* (see notes under section *Naevosa*, below).

Representative specimens – *Taraxacum bracteatum* B.C., urban Vancouver, University of British Columbia, southwest of the Chan Centre, lawn weed, 4 April 2015, 49° 16' 8"N 123° 15' 21"W, *Björk* 38414 (UBC). *Taraxacum celticum* B.C., Vancouver Island, Saanich Peninsula, Island View Beach, among grass at edge of trail, 4 March 2016, 48° 34' 35"N 123° 22' 8"W, *Björk* 39411. *Taraxacum inane* B.C., Urban Vancouver, University of British Columbia, NW corner of Woodward Library, weed in landscaping, 19 April 2015, 49° 15' 51.4"N 123° 14' 56.7"W, *Björk* 38435 (UBC). *Taraxacum polium* B.C., urban Vancouver, near intersection of Clark Drive and 13th, at north edge of small park, roadside weed along alleyway, 27 April 2015, 49° 15' 31"N 123° 4' 38"W, *Björk* 38446 (UBC). *Taraxacum porteri* B.C., Vancouver Island, Saanich Peninsula, Elk Lake Park, lawn weed, 31 March 2015, 48° 30' 37"N 123° 23' 8"W, *Björk* 38400 (UBC). *Taraxacum tamesense* B.C., urban Vancouver, University of British Columbia, 2061-2065 Mail Mall, weed in lawn, wet soil, 5 March 2016, 49° 15' 24.0"N 123° 14' 36.6"W, *Björk* 39426 (UBC).

Section *Erythrosperma* (H.Lindb.) Dahlst.

Acta Fl. Suecicae 1: 36. 1921. Type species: *Taraxacum rubicundum* (Dahlst.) Dahlst. Figs. 5-6.

Description: Plants mostly small, often sparsely arachnoid; leaves prostrate to ascending, in most species dull or dark green, more or less flat, not or scarcely rugose, lateral lobes linear to deltate or hamate, often

secondarily lobed, terminal lobe deltate, sagittate or trilobate, usually not ampliate, leaf outline mostly oblanceolate to narrowly elliptic; involucre mostly small, sometimes medium sized; outer bracts mostly 5-10 mm long, mostly not distinctly graduated, mostly recurved, obovate to oblanceolate, abruptly rounded to a minutely rounded or truncate apex, opaque, pale to medium green and usually with a pinkish or purplish blush on the adaxial face, sometimes glaucous, many or all minutely corniculate; inner bracts mostly medium green, sometimes glaucous, apices sometimes corniculate; ligules medium yellow, outer ones striped grey, purple or brown; pollen abundant or absent; stigmas on drying yellow, sordid or blackish; cypselae light to darkish brown, pinkish brown, red-brown, purplish brown, or olive-brown, spinulose distally, cone concolorous with the body or the apex paler, almost cylindric with little taper, mostly 0.6-1 mm long.

Section *Erythrosperma* has long been known to be widespread and weedy in North America, where nearly always they have been misnamed *T. erythrospermum* or *T. laevigatum*. Not all specimens named by those two species belong to this section however, as a variety of unrelated North American weedy *Taraxacum* species with small capitula and small stature has been assumed to be of this affinity, especially species of sections *Borea*, *Celtica*, and the *T. fulvicarpum* group. Occasionally, species of section *Erythrosperma* have been identified as native species, as keys in old North American floras generally segregated native from exotic *Taraxacum* species by the presence/absence of horns on the bracts.

Section *Erythrosperma* has a wide distribution in British Columbia (Fig. 18), primarily where the climate is warm and dry. The section is known for its tendency to grow in dry and/or warm habitats, often on nitrogen-poor soils, both in the native ranges of the species, and where introduced. They tend to occur on roadside gravels, sand dunes, rock outcrops, in poorly irrigated lawns and landscaping. They are as a class tolerant of recent disturbance, and most shun shaded sites, though *T. scanicum* often grows in forest understory.

Species of section *Erythrosperma* found so far in British Columbia are *T. brachyglossum* (Dahlst.) Raunk., *T. disseminatum* G.E.Haglund, *T. dissimile* Dahlst., *T. lacistophyllum* (Dahlst.) Raunk., *T. plumbeum* Dahlst., and *T. scanicum* Dahlst. Additionally, one unnamed morphospecies similar to *T. russum* Kirschner & Štěpánek (described from a Chinese type specimen and placed in section *Erythrocarpa* by the species' authors) is known. Most common of these in British Columbia are *T. disseminatum*, *T. lacistophyllum*, *T. plumbeum*, and *T. scanicum*. The first and last of these most common species are also among the most frequently encountered regional exotic *Taraxacum* species in wild vegetation far from disturbance loci. *Taraxacum lacistophyllum* is the sole representative in the section yet found in Coastal British Columbia, and other than this species, the section appears to be scarce or absent in cool/wet climates.

Representative specimens – *Taraxacum brachyglossum* B.C., Clearwater Valley, Star Lake Road, 5.5 km W of centre of town of Clearwater, roadside weed, 3 May 2016, 19 April 2015, 51° 39' 34"N 120° 8' 29"W, *Björk* 39766. *Taraxacum disseminatum* B.C., Chilcotin Plateau, Marble Range, east above Marble Canyon, cliffy slopes over Crown Lake, sparsely treed, dry slopes on limestone, 4 June, 2014, 50° 50' 57"N 121° 41' 38"W, *Björk* 34122. *Taraxacum lacistophyllum* B.C., Vancouver Island, Victoria area, Langford, Skirt Mountain, Understory of *Quercus*-*Pseudotsuga* forest at roadside, 28 March 2015, 48° 27' 51"N 123° 31' 51"W, *Björk* 38395. *Taraxacum scanicum* B.C., North Thompson Valley, North Thompson Regional Park, gritty soil at edge of road, 29 April 2016, 51° 37' 32"N 120° 5' 15"W, *Björk* 39649.

Section *Hamata* H.Øllg.

Plant Systematics and Evolution 141: 201. 1983. Type species: *Taraxacum hamatum* Raunk. Figs. 7-8.

Description: Plants mostly medium to large sized, usually only sparsely arachnoid or glabrate; leaves prostrate to ascending or erect, in most species medium olive green, more or less flat, not rugose, lobes entire or dentate, if dentate then usually finely so, lobes hamate, terminal lobe ampliate or not, most species not heterophyllous; involucre medium sized; outer bracts mostly 8-12 mm long, spreading or recurved, mostly not distinctly graduated, deltate-lanceolate, abruptly narrowing or sometimes tapering to a minutely rounded apex, often densely glaucous, abaxially dark, drying dark and glossy, as if varnished, sometimes slightly translucent when dry, never corniculate; inner bracts dark, often densely glaucous, apices never corniculate; ligules yellow (rarely orangish yellow), outer ones striped grey, brown or purplish abaxially; pollen abundant; stigmas upon drying yellow or sordid; cypselae light to medium brown or olive-brown, mostly spinulose distally or sometimes merely tuberculate, cone concolorous with the body, narrowly conical, mostly 0.4-0.7 mm long.

Many species can be recognized as belonging to section *Hamata* at a glance by their usually four (per side) hamate lateral leaf lobes and nearly flat, somewhat olive-green leaves. Their outer bracts are also characteristic, usually intermediate in shape between the slender, lanceolate outer bracts of most species in sections *Celtica* and *Naevosa* and the more oblong outer bracts of most species of section *Taraxacum*. However, some species of section *Hamata* have characteristics that may lead to errors in identification. For example, *Taraxacum boekmanii* Borgv. and *T. quadrans* H.Øllg. could be misidentified as species of section *Celtica* by their darker green leaves and non-hamate lateral lobes. However, both of those species have a broader outer bract shape than nearly all species of section *Celtica*, and unlike many species of that section, these species bear abundant pollen. *Taraxacum atactum* Sahlin & Soest and *T. sahalinianum* Dudman & A.J.Richards, which also have lateral lobes not or scarcely hamate, may appear similar to species of section *Taraxacum* in that their leaves are more textured than is usual in section *Hamata*. Again, examining the outer bracts should make identification as section *Hamata* easy with those two species.

In herbaria, species of this section are generally misnamed as *T. officinale*. The large size of many of the species is comparable to many large species of section *Taraxacum*. In nearly all cases, though, the distinction can be made from section *Taraxacum* easily based on the dark, tapered outer bracts and the flatter leaves.

Section *Hamata* is very common and diverse in coastal British Columbia (Fig. 19). The species of this section often grow intermixed with species of section *Celtica*, favouring similar less-disturbed sites without excessive nitrogen enrichment. The *Taraxacum fulvicarpum* group is also a frequent associate.

Species of section *Hamata* documented in British Columbia so far include *T. atactum* Sahlin & Soest, *T. boekmanii* Borgv., *T. fusciflorum* H.Øllg., *T. hamatiforme* Dahlst., *T. hamatum*, *T. hamiferum* Dahlst., *T. kernianum* Hagend. et al., *T. lancidens* Hagend. et al., *T. marklundii* Palmgr., *T. pruinatum* M.P.Christ., *T. pseudohamatum* Dahlst., *T. quadrans* H. Øllg., and *T. sahlinianum* Dudman & A.J.Richards. *Taraxacum kernianum*, having narrow, acuminate outer bracts and dark leaves, may be better placed in section *Celtica*, and *T. prionum*, placed in section *Taraxacum* in Euro+Med (2018), is better placed in section *Hamata*, where it was treated in Dudman and Richards (1997).

Representative specimens – *Taraxacum atactum* B.C., urban Vancouver, University of British Columbia, next to bus loop, weed in landscaping, 20 April 2015, 49° 15' 56.9"N 123° 14' 51.9"W, *Björk* 38445. *Taraxacum hamatiforme* B.C., urban Vancouver, along old rail line at Arbutus and 12th, 11 March, 2016, 49° 15' 39"N 123° 9' 9"W, *Björk* 39455. *Taraxacum hamiferum* B.C., urban Vancouver, University of British Columbia, WSW of Shuswap Hall, 12 March 2015, 49° 15' 32"N 123° 15' 7"W, *Björk* 38392. *Taraxacum kernianum* B.C., urban Vancouver, Kitsilano Neighbourhood, corner of Broadway and MacDonald, weed at roadside, 9 April 2016, 49° 15' 50.8"N 123° 10' 6.0"W, *Björk* 39484. *Taraxacum*

quadrans B.C., urban Vancouver, University of British Columbia, northwest corner of Woodward Library, weed in landscaping 19 April 2015, 49° 15' 51.4"N 123° 14' 56.7"W, *Björk* 38433.

Section *Naevisa* M.P.Christ.

Botany of Iceland 3: 303. 1942. Type species: *Taraxacum naevosum* Dahlstr. Figs. 9-10.

Description: Plants small to large, mostly puberulent or hirsutulous and often also arachnoid; leaves prostrate to erect, in most species dark green, more or less flat, smooth or rugulose, lobes entire or dentate, if dentate then usually finely so, lobes usually not hamate, terminal lobe ampliate or not, most species not heterophyllous; involucre small to medium sized; outer bracts mostly 7-12 mm long, mostly not distinctly graduated, erect, spreading, recurved, or reflexed, deltate-lanceolate to oblong-lanceolate, tapering to an acute or minutely rounded apex, often densely glaucous, abaxially dark, drying dark and glossy as if varnished, sometimes slightly translucent when dry, never corniculate; inner bracts dark, often densely glaucous, apices never corniculate; ligules yellow, outer ones striped abaxially; pollen abundant or (often) absent or scarce; stigmas upon drying yellow, sordid or blackish; cypselae light to medium brown or olive-brown, spinulose distally or sometimes merely tuberculate or even smooth, cone narrowly conical, mostly 0.5-0.9 mm long.

All three species of section *Naevisa* so far known from British Columbia could be mistaken for section *Celtica*, especially *Taraxacum dupidentifrons*, which has often been placed in that section. These species all have slender, lanceolate outer bracts and dark colouration as is generally true of section *Celtica*. However, unlike species of section *Celtica*, all three of these species have short, crisped hairs on the leaf adaxial surface and/or a relatively firm leaf texture.

Species of section *Naevosa* observed in British Columbia are limited to maritime regions (Fig. 20), where they occur in habitats similar to those preferred by species of section *Celtica*. Compared to that section though, section *Naevosa* may be even more demanding of the ecological conditions near marine shores.

Only three species of section *Naevosa* have yet been identified from British Columbia, only from coastal regions. Two of these appear to be rare (*T. adamii* C.Claire and *T. naevosiforme* Dahlst.), co-occurring in a small mixed population adjacent to a marine beach. The third species, *T. duplidentifrons* Dahlst. is common in the more maritime neighborhoods of urban Vancouver as well as in Victoria and on the adjacent Gulf Islands. However, *Taraxacum duplidentifrons* is perhaps better treated in section *Celtica*, where it was placed in Dudman and Richards (1997).

Representative specimens -- *Taraxacum adamii* B.C., urban Vancouver, Kitsilano area, Jericho Beach, shortly NE of north end of Trimble Street, 23 March 2016, 49° 16' 30.5"N 123° 12' 19.1"W, Björk 39507. *Taraxacum duplidentifrons* B.C., Victoria, shortly east of the Royal B.C. Museum, weed in lawn, 2 March 2016, 48° 25' 11.7"N 123° 21' 54.7"W, Björk 39409. *Taraxacum naevosiforme* B.C., urban Vancouver, Kitsilano area, Jericho Beach, shortly NE of north end of Trimble Street, 23 March 2016, 49° 16' 30.5"N 123° 12' 19.1"W, Björk 39506.

Section *Taraxacum* F.H.Wigg.

Type species: *Taraxacum officinale* F.H.Wigg. Figs. 11-12.

Description: Plants mostly medium sized to large, mostly arachnoid, sometimes also puberulent; leaves prostrate to erect, light to medium or sometimes dark green, mostly crisped, usually with at least slight undulations at the internodes and some adaxial curvature, smooth or (more often) rugulose, lobes entire or dentate, if dentate then usually finely so, sometimes secondarily lobed, lobes usually not hamate, terminal

lobe ampliate or not, some species heterophyllous; involucre medium sized to large; outer bracts mostly 10-14 mm long, not distinctly graduated, mostly recurved or reflexed, mostly oblong to oblong-lanceolate, usually abruptly contracted to a rounded apex, usually not glaucous, abaxially usually olive green or greyish green, not changing much in colour upon drying, opaque when dry, never corniculate; inner bracts mostly olive green or greyish green, sometimes glaucous, apices never corniculate; ligules yellow or sometimes orangish, outer ones striped abaxially; pollen abundant or (rarely) absent; stigmas upon drying yellow, sordid or blackish; cypselae light to medium brown or olive-brown, spinulose distally, cone narrowly conical, mostly 0.4-0.8 mm long.

Section *Taraxacum* includes more species than any other section of the genus. The centre of diversity of section *Taraxacum* occurs in central Europe (den Nijs et al. 1989), though apparently all species of this section so far known from British Columbia originated in or are also introduced in northern Europe. In British Columbia, species of section *Taraxacum* are most abundant in temperate climates, but the section is widespread (Fig. 21). In boreal climates, species of this section are less common than species of section *Borea* and *Boreigena*.

The habitats of section *Taraxacum* are diverse, but generally, they prefer open sites on nitrogen-rich soil. They are common in landscaping, edges of fields, lawns, pastures, fence rows and other anthropogenic habitats. Section *Taraxacum* is usually absent from higher elevations, but they are occasionally observed in subalpine to alpine environments, usually but not always in disturbed habitats. Well-lit habitats are preferred by species of this section; they are seldom observed in forest understory.

Species of section *Taraxacum* found so far in British Columbia are: *Taraxacum aberrans* Hagend. et al., *T. acutifidum* M.P.Christ., *T. acutifrons* Markl., *T. aequilobum* Dahlst., *T. arrhenii* Palmgr., *T. aurulosum* H.Lindb., *T. breviflorum* Dahlst., *T. capnocarpum* Dahlst., *T. densilobum* Dahlst., *T. dilatatum* H.Lindb., *T. edmondsonianum* H.Øllg., *T. ekmanii* Dahlst., *T. exacutum* Markl., *T. expallidiforme* Dahlst., *T.*

fagerstroemii Såltn., *T. fasciatum* Dahlst., *T. haematicum* H.Øllg. & Wittzell, *T. homoschistum* H. Øllg., *T. huelphersianum* G.E.Haglund, *T. idiomorphum* Markl., *T. ingens* Palmgr., *T. insigne* M.P.Christ. & Wiinst., *T. interveniens* G.E.Haglund, *T. intumescens* G.E.Haglund, *T. lagerkrantzii* G.E.Haglund, *T. latisectum* H.Lindb., *T. leucopodium* G.E.Haglund, *T. lunare* M.P.Christ., *T. maculatum* Jord., *T. melanthoides* M.P.Christ. & Wiinst., *T. mimulum* H.Lindb., *T. multicolorans* Hagend. et al., *T. nitidum* Hagend. et al., *T. oblongatum* Dahlst., *T. pachymerum* G.E.Haglund, *T. pallidipes* Markl., *T. pannulatum* Dahlst., *T. parasemum* G.E.Haglund & Saarsoo, *T. pectinatiforme* H.Lindb., *T. planum* Raunk., *T. poliophytum* G.E.Haglund, *T. prasinescens* G.E.Haglund, *T. pseudoretroflexum* M.P.Christ., *T. pulcherrimum* H.Lindb., *T. remanens* G.E.Haglund, *T. retroflexum* H.Lindb., *T. rhamphodes* G.E.Haglund, *T. scotiniforme* G.E.Haglund, *T. scotophyllum* Saarsoo, *T. speciosum* Raunk., *T. subhuelphersianum* M.P.Christ., *T. subxanthostigma* H. Øllg., *T. trilobatum* Palmgr., *T. undulatiflorum* Dahlst., *T. undulatifforme* Dahlst., *T. undulatum* H.Lindb. & Markl., *T. vanum* H. Øllg. Two morphospecies, one that may best be named as *T. pannulatum* sensu Dudman & Richards (1997) and one similar to *T. sublongisquameum* M.P.Christ., are also present.

The most common and widespread species of section *Taraxacum* observed in British Columbia so far are as follows. Coastal regions: *Taraxacum dilatatum*, *T. edmondsonianum*, *T. ekmanii*, *T. homoschistum*, *T. interveniens*, *T. nitidum*, *T. oblongatum*, *T. pannulatum* sensu A.J.Richards (1997), *T. planum* *T. pseudoretroflexum*, *T. sellandii*, and *T. trilobatum*. Interior regions: *T. ingens*, *T. parasemum*, *T. prasinescens*, and *T. retroflexum*. As exploration continues, more species will likely come to light as common and widespread. The sampling conducted so far has mostly been for the goal of inventory rather than to gather collections that are representative of abundance.

Representative specimens – *Taraxacum ekmanii* B.C., urban Vancouver, University of British Columbia, NE corner of Beaty Biodiversity Centre, weed in landscaping 4 April 2015, 49° 25' 11.7"N

123° 21' 54.7''W, *Björk* 38421. *Taraxacum ingens* B.C., North Thomspon Valley, west side of Highway 5 between Blue River and Valemount, crossing of TumTum Creek weed at road side, 6 May 2016, 52° 22' 54''N 119° 10' 57''W, *Björk* 39688. *Taraxacum oblongatum* B.C., urban Vancouver, 10th avenue at the Kitsilano Diversion, weed in landscaping, 22 March 2016, 49° 15' 47.5''N 123° 10' 9''W, *Björk* 39481. *Taraxacum parasemum* B.C., Cariboo Plateau, Bridge Lake area, near south end of McNeil Lake, along Mahood Lake Road, 9 May 2016, 51° 45' 5''N 120° 47' 4''W, *Björk* 39785. *Taraxacum retroflexum* B.C., Robson Valley, Sugarbowl-Grizzly Den Provincial Park, Sugarbowl Creek, shortly upstream from Highway 16, cobbly creek shore, 15 June 2017, 53.87946°N 121.61287° W, *Björk* 46211. *Taraxacum trilobatum* B.C., urban Vancouver, University of British Columbia, south side of "The Rusty Shack" near the Beaty Biodiversity Museum, 4 April 2015, 49° 15' 47''N 123° 14' 57''W, *Björk* 38423.

The *T. fulvicarpum* group Unranked

Figs. 13-14.

Description: Plants small to medium sized, glabrate; leaves prostrate to weakly ascending, medium to dark green, flat or slightly crisped, smooth, usually complexly lobed, not or somewhat heterophyllous, lobes mostly dentate and sometimes also secondarily lobed, lateral lobes hamate, terminal lobe often ampliate; involucre small to medium sized; outer bracts about 9 mm long, not distinctly graduated, ascending to (mostly) recurved, not reflexed, deltate-ovate, tapering to a minutely rounded apex, medium olive-green, more or less glaucous, corniculate; inner bracts medium to dark olive-green, more or less glaucous, at apex calloused or minutely corniculate; ligules yellow, outer ones striped red-brown abaxially; pollen present (ours) or absent; stigmas sordid upon drying; cypselae light pink-brown, spinulose distally, cone broadly conical, ca. 0.5-0.7 mm long.

Taraxacum fulvicarpum Dahlst. is possibly the most abundant and widespread exotic *Taraxacum* in coastal British Columbia, at least in the areas studied (mostly urban Vancouver and southeast Vancouver Island). It is so far unknown from elsewhere in North America, but it should be sought in both Atlantic and Pacific coastal regions.

Taraxacum fulvicarpum occurs in British Columbia only in southern coastal regions (Fig. 22), in a wide variety of habitats, including lawns, dry gravel flats, curbsides, landscaping, upper beach margins, and in both shaded and open habitats. Its great morphological variation may be a consequence of its diverse ecological settings. That variation can lead to confusion with section *Erythrocarpa*, or could give the impression of multiple species. But the characteristic hamate leaf lateral lobes provide easy recognition, and the characteristic pink-brown cypselae with a short, stout cone further distinguish this species from those of section *Erythrosperma*.

The presence of pollen in British Columbian *Taraxacum fulvicarpum* is contrary to published descriptions of the species. The types of this species and the related *T. unguilobum* (which is said to differ in having appressed outer bracts and stigmas yellow when dried), and those of species synonymized there have perhaps been misinterpreted. Further study is needed in this group to correctly delimit species and to assign a name to the plants present in British Columbia.

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I am grateful to Quentin Cronk for pointing out the need for a taxonomy of North American *Taraxacum* and for providing guidance on study of this genus, as well as specimens for study. Peter Ball, Bruce Bennett, Jason Hollinger, Michael Oldham, and Andrew Simon also sent specimens for study, and Jason Hollinger kindly provided the basemap. I am thankful for the encouragement and advice of Teuvo Ahti, Jan Kirschner and Jan Štěpánek. And John Richards generously examined my first batch of *Taraxacum*

specimens collected for this study, and I am grateful for his early instruction on proper collection and study of dandelions.

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Figure 15. Map of the known distribution of *Taraxacum* section *Borea* in British Columbia. Solid circles represent collections; open circles represent unvouchered observations. Basemap created by Jason Hollinger from sources in the public domain.

Figure 16. Map of the known distribution of *Taraxacum* section *Boreigena* in British Columbia. Solid circles represent collections; open circles represent unvouchered observations. Basemap created by Jason Hollinger from sources in the public domain.

Figure 17. Map of the known distribution of *Taraxacum* section *Celtica* in British Columbia. Solid circles represent collections; open circles represent unvouchered observations. Basemap created by Jason Hollinger from sources in the public domain.

Figure 18. Map of the known distribution of *Taraxacum* section *Erythrosperma* in British Columbia. Solid circles represent collections; open circles represent unvouchered observations. Basemap created by Jason Hollinger from sources in the public domain.

Figure 19. Map of the known distribution of *Taraxacum* section *Hamata* in British Columbia. Solid circles represent collections; open circles represent unvouchered observations. Basemap created by Jason Hollinger from sources in the public domain.

Figure 20. Map of the known distribution of *Taraxacum* section *Naevosa* in British Columbia. Solid circles represent collections; open circles represent unvouchered observations. Basemap created by Jason Hollinger from sources in the public domain.

Figure 21. Map of the known distribution of *Taraxacum* section *Taraxacum* in British Columbia. Solid circles represent collections; open circles represent unvouchered observations. Basemap created by Jason Hollinger from sources in the public domain.

Figure 22. Map of the known distribution of the *Taraxacum fulvicarpum* group in British Columbia. Solid circles represent collections; open circles represent unvouchered observations. Basemap created by Jason Hollinger from sources in the public domain.



Figure 1.



Figure 2.



Figure 3.



Figure 4.



Figure 5.



Figure 6.



Figure 7.



Figure 8.



Figure 9.



Figure 10.



Figure 11.



Figure 12.



Figure 13.



Figure 14.

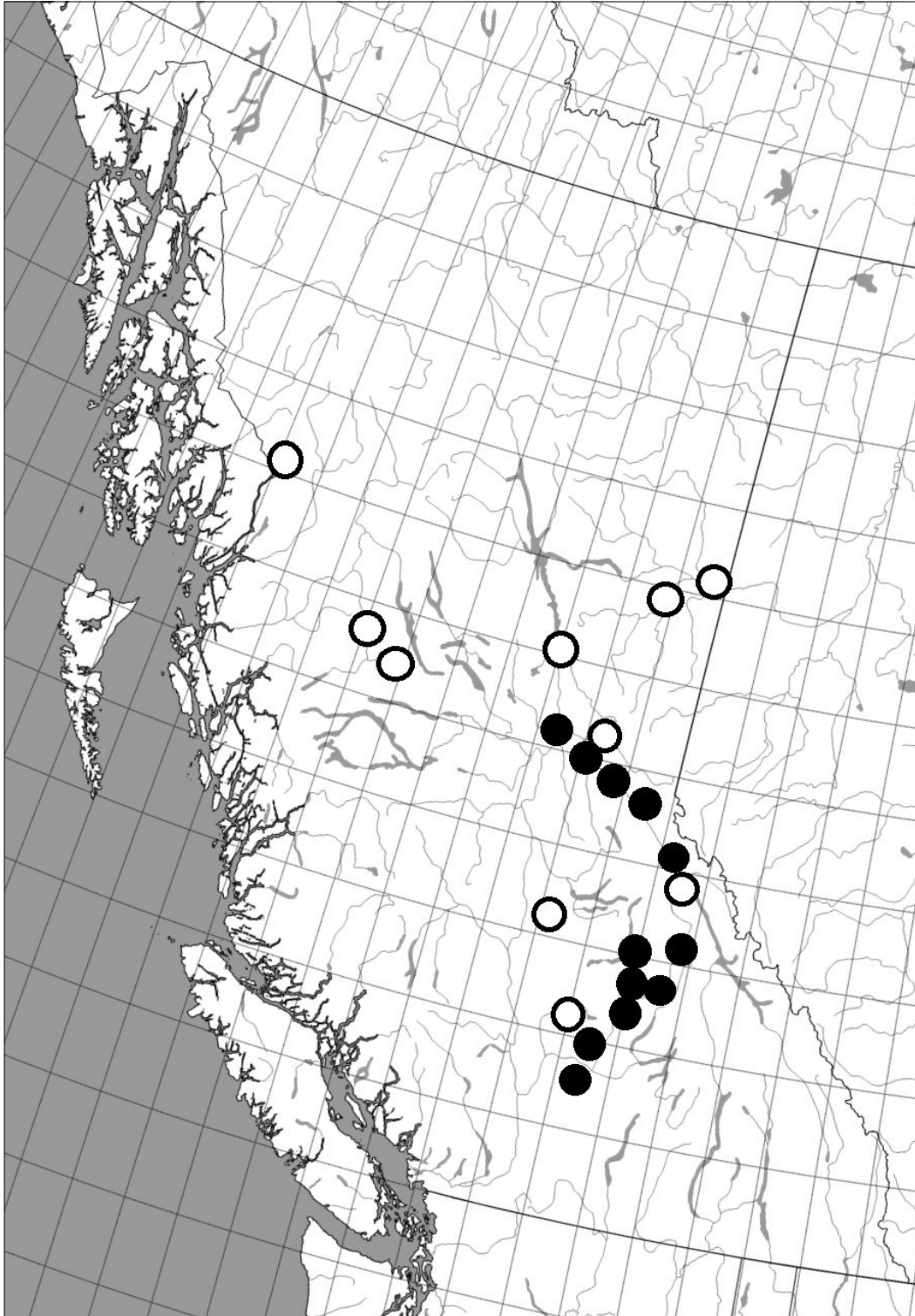


Figure 15.

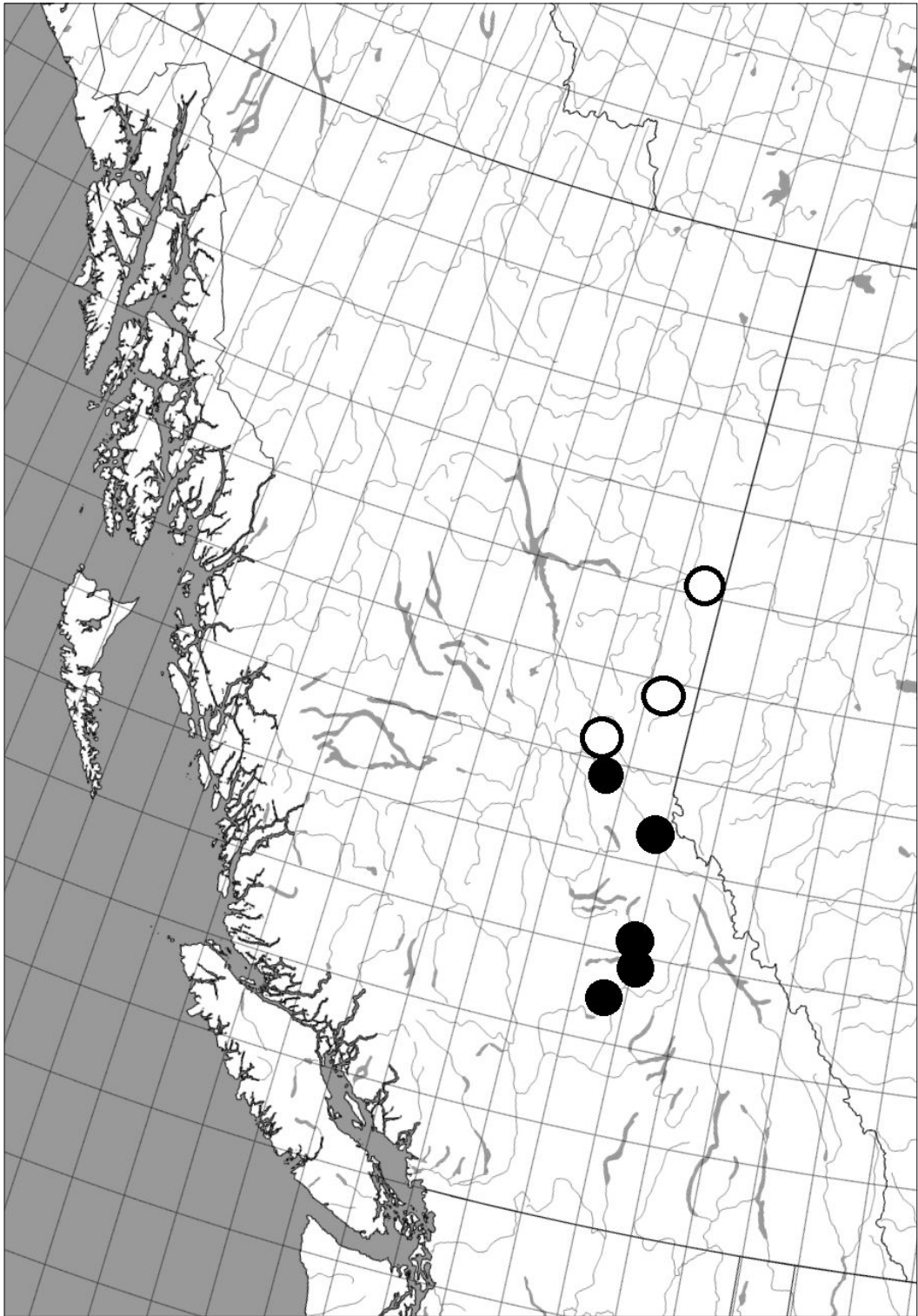


Figure 16.

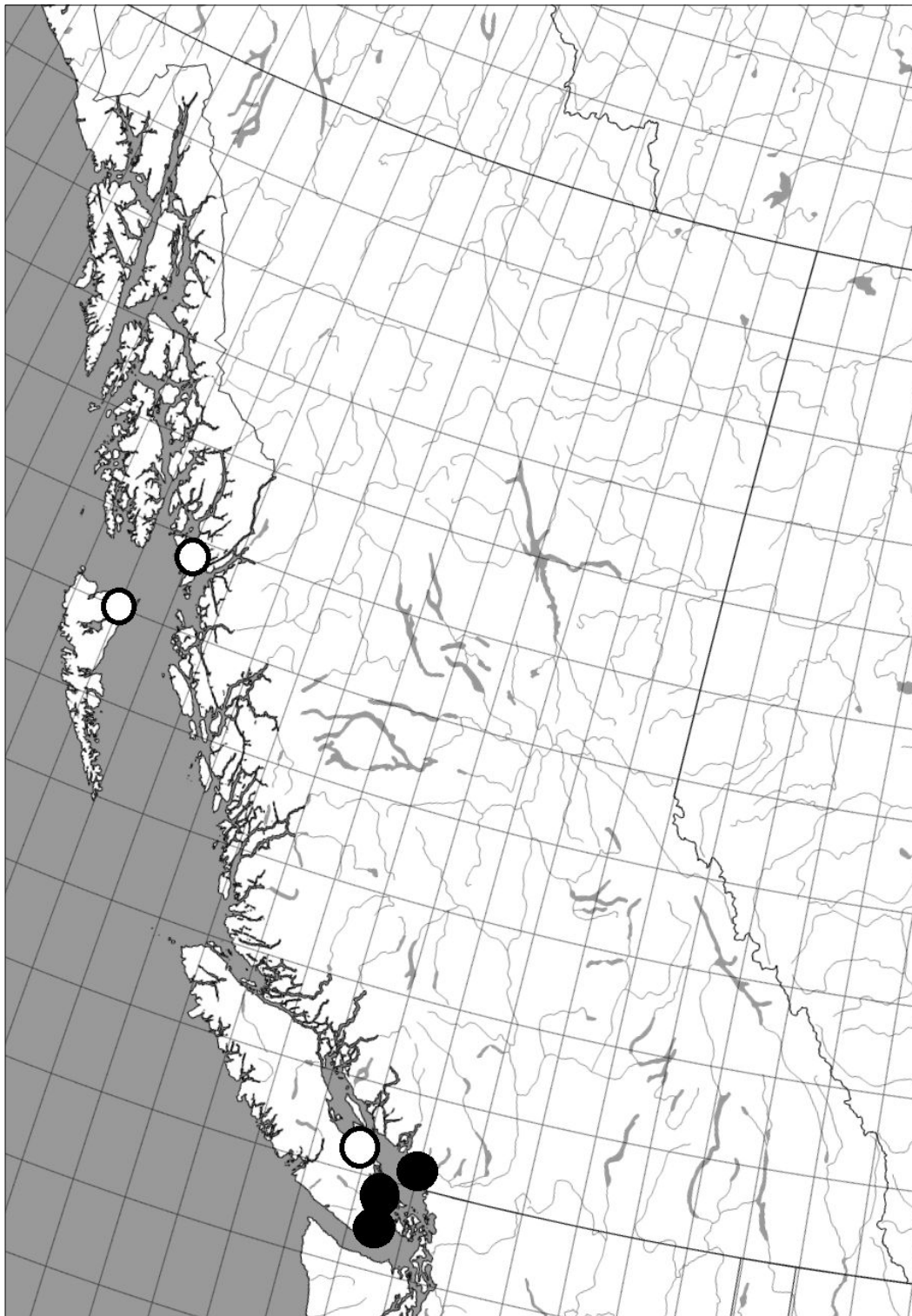


Figure 17.

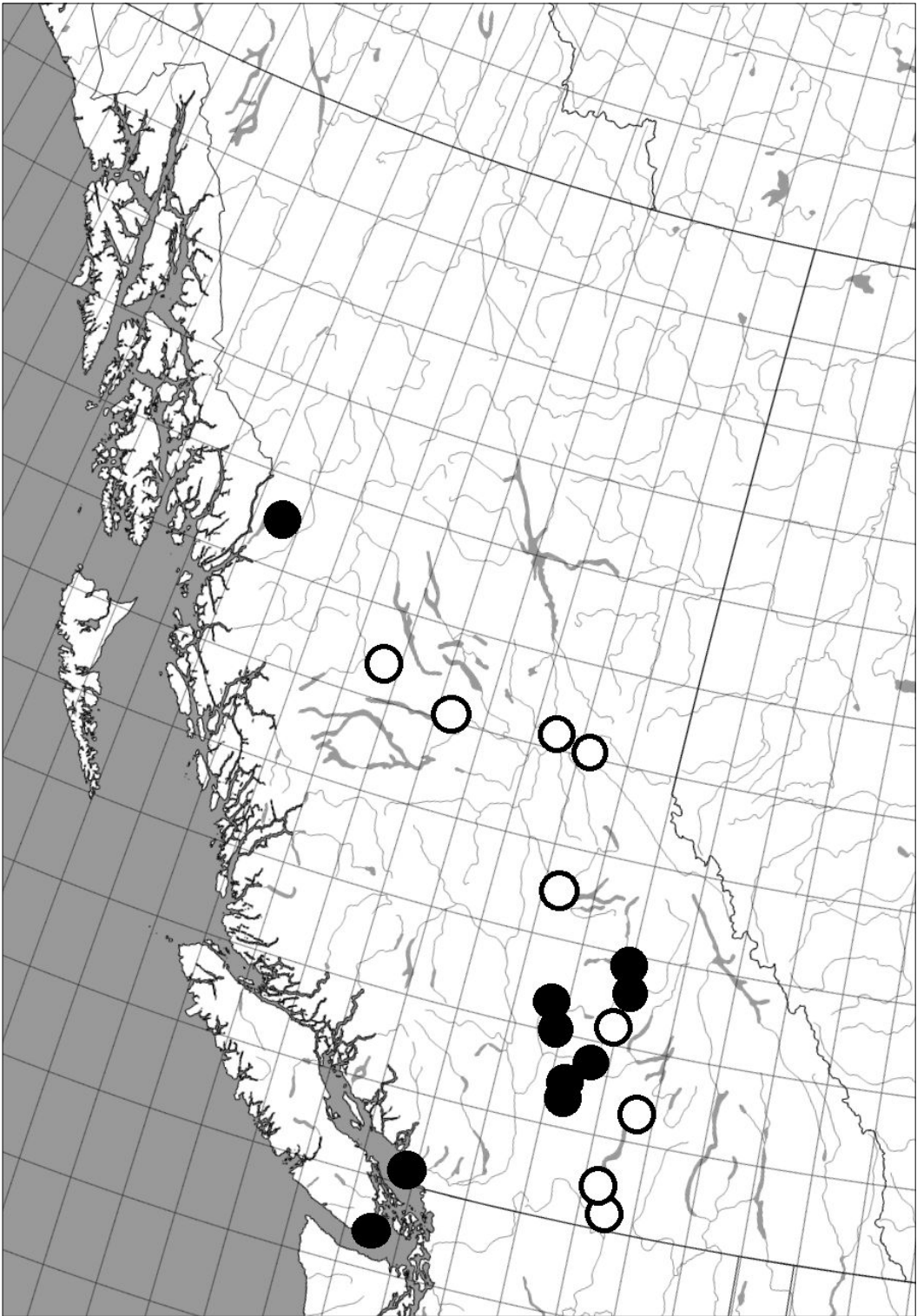


Figure 18.

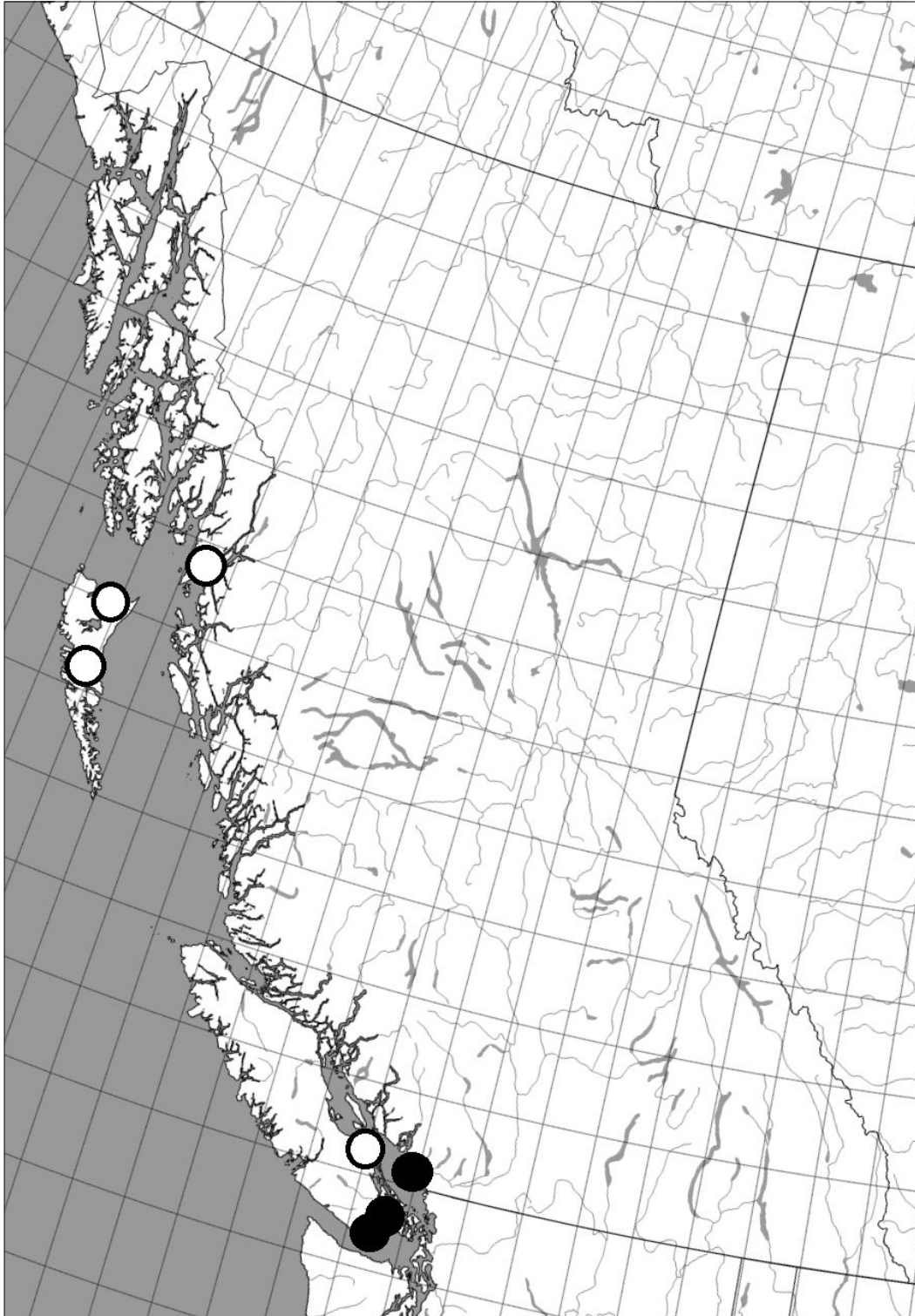


Figure 19.



Figure 20.

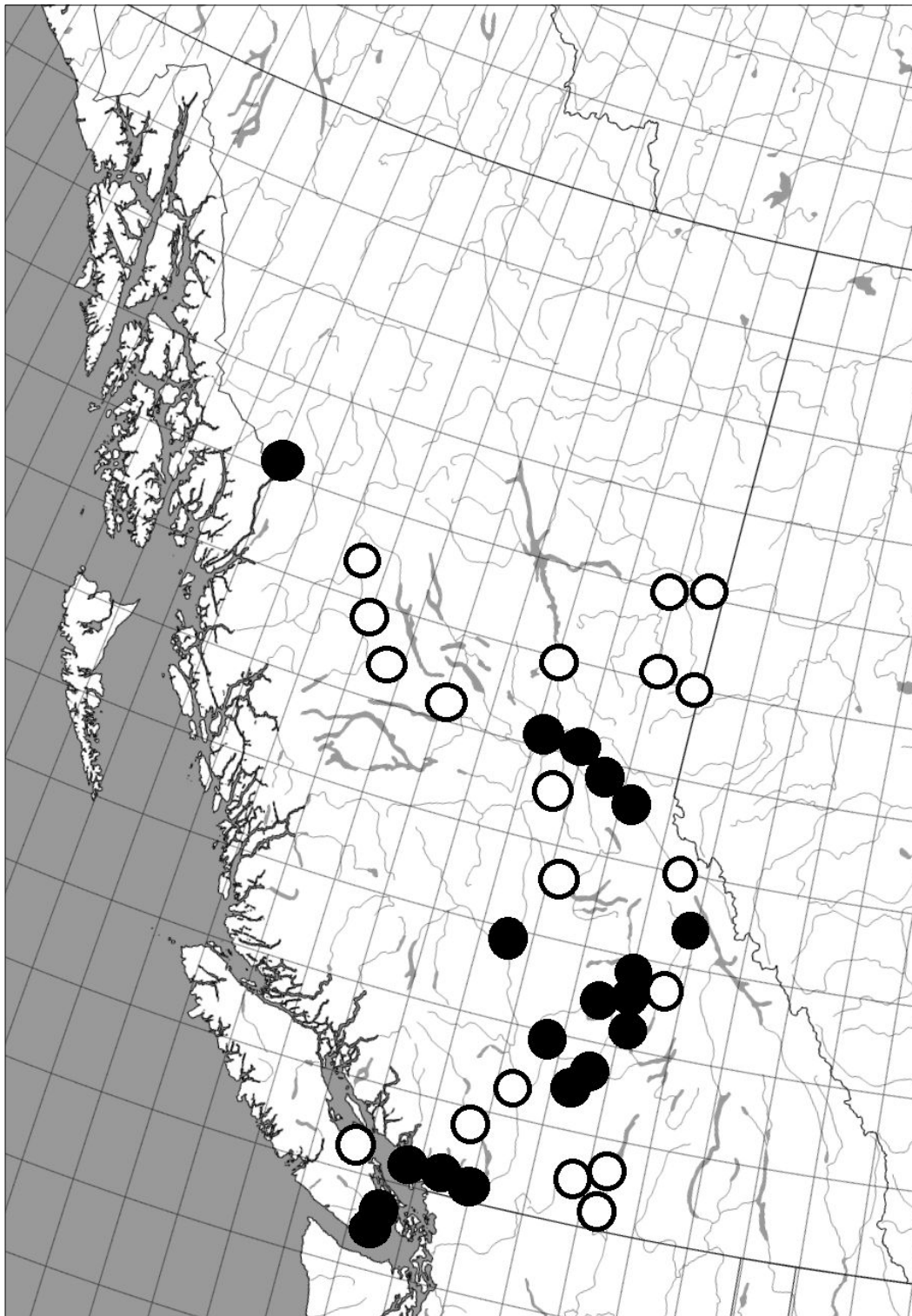


Figure 21.



Figure 22.



Graphical Abstract

101x89mm (300 x 300 DPI)