Artemisia campestris
ssp. borealis
var. wormskioldii

Taxonomic Review

Prepared for
U.S. Fish and Wildlife Service
Region 1

Prepared by
Joseph Arnett

January 17, 2012
Artemisia campestris ssp. borealis var. wormskioldii

Taxonomic Review

Section 6, Segment 64

January 17, 2012

Joseph Arnett
Rare Plant Botanist
Washington Natural Heritage Program Botanist

Introduction
The taxonomy of the genus Artemisia (Asteraceae) is complex, and the classification of the variety that is the subject of this review has not escaped the nomenclatural challenges of the genus. However, as difficult as resolving taxonomic questions may be, classification influences conservation priorities and affects allocation of funds for research and conservation activities (U.S. Fish and Wildlife Service 1983), and so it is important to develop and promote classification that most accurately reflects the genetic relationships among the plants of Washington.

This review examines a variety of Artemisia included in the most recently published regional flora (Hitchcock and Cronquist 1973) as A. campestris ssp. borealis var. wormskioldii. The original description of variety wormskioldii included arctic and montane plants (Hooker 1833, Piper 1906), but modern floras (Cronquist 1955, Douglas et al. 1998, Hitchcock et al. 1955, Hitchcock and Cronquist 1973, Hulten 1968, Welsh 1974) are consistent in limiting the application of var. wormskioldii to a narrowly distributed Columbia River endemic. Arctic and montane plants have been assigned to other taxa. The classification above the level of variety, and between A. campestris and A. borealis, has been repeatedly revisited and resolved; Hitchcock et al. (1955) include 12 synonyms under A. campestris. Cronquist included varieties purshii (=var. borealis in 1955), scouleriana, and wormskioldii together in subspecies borealis within A. campestris (Hitchcock et al. 1955, Hitchcock and Cronquist 1973, Cronquist et al. 1994). The Oregon Flora Project (OFP) checklist includes var. wormskioldii as A. campestris var. wormskioldii (OFP 2012).

In the recent treatment of Artemisia in the Flora of North America (FNA), Shultz (2006) does not include variety wormskioldii. In personal communications in 2006, she said that her omission was not because she regarded the taxon as invalid, but rather because she had not been able to examine it; she recommended that we continue to recognize the variety, if our familiarity with it indicates that it is distinct. She has kindly offered to review specimens of this variety, but unfortunately she has not yet had the opportunity to do so. Consequently, she has not recommended whether it should be placed in A. campestris or A. borealis. Both species, as treated in FNA classification, occur in Washington.
Preliminary examination of herbarium specimens at the University of Washington indicates that variety *wormskioldii* is intermediate between varieties *scouleriana* and *purshii* (according to Cronquist’s 1973 nomenclature). With the montane variety *purshii* it shares the traits of larger involucres, dense spiciform panicles, low stature, and flowering time shortly after release from winter dormancy. With lower elevation var. *scouleriana* it shares habitat and identical leaf morphology, including sericeus pubescence. Using FNA keys, var. *wormskioldii* keys readily to A. borealis ssp. borealis. Overall, in my interpretation, variety *wormskioldii* appears much more similar to variety *purshii* than to variety *scouleriana*.

In 2007, the Washington Natural Heritage Program recognized Shultz’s elevation of ssp. borealis to the species level and included this variety as A. borealis var. *wormskioldii* on the Washington State rare plant list and in the recently published Field Guide to the Rare Plants of Washington (Camp and Gamon 2011). This combination was the one in Hooker’s original publication in 1833, but we no longer consider it valid because his circumscription included arctic and montane plants no longer considered to be part of variety *wormskioldii*.

Our present challenge is to recognize nomenclature, for variety *wormskioldii* and its other close relatives in Washington, that is consistent with both FNA and OFP, and which is also consistent with the characteristics of the plants we have observed in the field. We have found that it is not possible to do all three.

**Taxonomic History**
The following paragraphs give a brief summary of pertinent taxonomic treatments of variety *wormskioldii*:

1833. Hooker first described the taxon A. borealis var. *wormskioldii*. His circumscription included arctic and Rocky Mountain plants, as well as Columbia River shoreline and island plants collected by David Douglas.

1906. Flett included A. borealis *wormskioldii* in Flora of the State of Washington, referring to collections from the Olympic Mountains and Mount Rainier.

1948. Cronquist annotated a 1937 collection by Muenscher from the Olympic Mountains as A. campestris ssp. borealis var. *purshii*, indicating that he already regarded borealis as a subspecies of A. campestris.

1950. Cronquist placed variety *wormskioldii* in A. campestris, apparently taking it out of A. borealis, thus calling it A. campestris var. *wormskioldii*. His note from this date does not indicate whether the arctic and alpine species formerly within A. borealis remained there, or were also included in A. campestris.

1955. Cronquist placed varieties borealis, scouleriana, and *wormskioldii* in subspecies borealis within A. campestris.

1994. Cronquist et al. included ssp. borealis as a subspecies of A. campestris. He refers to A. campestris ssp. borealis var. scouleriana (Cronquist 1994). In referring to A. campestris var. scouleriana he said: “Our plants, as here described, represent the var. scouleriana (Besser) Cronquist, which is widespread in the western North American cordillera. Variety scouleriana may be considered a part of the circumboreal subsp. borealis (Pall.) H.M. Hall & Clem”.

2006. Shultz split ssp. borealis (as it was conceived of by Cronquist) and placed plants that he included within that subspecies into two different species; variety purshii was placed within A. borealis, and variety scouleriana was placed within A. campestris ssp. pacifica. She did not include var. wormskioldii in her treatment.

2007. The Washington Natural Heritage Program recognized the FNA elevation of ssp. borealis to the species level and began using the name A. borealis var. wormskioldii for the Columbia River endemics (Washington Natural Heritage Program 2012). This returns to the name published in 1833, the only publication of this combination.

2012. The draft list for the Oregon Flora Project uses A. campestris var. wormskioldii (OFP 2012).

Table 1. Comparison of taxonomic treatements including Artemisia campestris var. wormskioldii

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>A. borealis var. wormskioldii</td>
<td>A. campestris ssp. borealis var. wormskioldii</td>
<td>A. campestris ssp. borealis var. wormskioldii</td>
<td>not included</td>
<td>A. campestris var. wormskioldii</td>
<td>A. campestris var. wormskioldii</td>
</tr>
<tr>
<td>A. campestris ssp. borealis var. borealis</td>
<td>A. campestris ssp. borealis var. wormskioldii</td>
<td>A. borealis ssp. borealis</td>
<td>not in OR</td>
<td>A. campestris var. purshii</td>
<td>A. campestris var. purshii</td>
</tr>
<tr>
<td>not in the range of the flora</td>
<td>not in the range of the flora</td>
<td>A. borealis ssp. richardsoniana</td>
<td>not in OR</td>
<td>not in Washington</td>
<td>not in Washington</td>
</tr>
<tr>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>A. campestris ssp. pacifica</td>
<td>A. campestris var. scouleriana</td>
<td>A. campestris var. scouleriana</td>
<td>A. campestris var. scouleriana</td>
</tr>
</tbody>
</table>

Discussion
Several problems arise with placing variety wormskioldii in A. borealis. The first is that if we recognize the FNA treatment of var. scouleriana as part of A. campestris ssp. pacifica, it places these two apparently closely related varieties in different species. The second problem with using A. borealis var. wormskioldii as circumscribed by Hooker (1833) is that he included arctic and montane plants not included in current understanding of the variety. A third, practical problem, is that using A. borealis is inconsistent with the usage of the OFP. Though believed to have been extirpated from Oregon, variety wormskioldii was historically collected in that state, and large efforts are currently underway to reestablish the taxon in that part of its historical range. If the two neighboring states refer to this taxon, which is of high conservation concern, by different names, it creates unnecessary confusion within the conservation community.
Conversely, the main problem with placing variety wormskioldii in A. campestris, as circumscribed in FNA, is that it places this taxon in a different species from var. purshii (subspecies borealis in FNA), which appears to be a close relative; possibly closer, in our estimation, than var. scouleriana. Ken Chambers (personal communication), who has also studied these plants, expressed the view that variety wormskioldii appears to have been derived from alpine plants (based on stature and early flowering) and that placement of them in A. campestris only made sense to him if A. campestris also includes the other varieties of what Cronquist regarded as subspecies borealis.

Because variety wormskioldii appears closely related to both varieties scouleriana and purshii, based on Cronquist’s classification and our own observations in the herbarium and in the field, it does not seem satisfactory to assign variety wormskioldii to either species, as delineated in Shultz (2006), if doing so separates it from apparently close relatives.

**Nomenclatural Recommendation**

The genetic relationships among the plants being here reviewed are not clear. As Shultz (2006) recognizes, the boundary between A. borealis and A. campestris, in the 2006 FNA classification, appears indistinct especially when they come into contact, and they may intergrade. Variety wormskioldii occurs precisely in that overlap, and we are not able to confidently place the variety in either species as presented in FNA. Consequently, we are most comfortable with returning to the last published treatment of these plants (Hitchcock and Cronquist 1973), recognizing his delineation of subspecies borealis, including varieties scouleriana, purshii, and wormskioldii in Washington. Under this treatment, our variety is referred to as A. campestris ssp. borealis var. wormskioldii. This name is consistent with the OFP use of A. campestris var. wormskioldii; the International Code of Botanical Nomenclature, Section 5, Article 24 (2007) requires only the specific name and the infraspecific epithet; inclusion of the full classification between species and the lowest infraspecific rank is permitted but not required. However, this treatment remains unavoidably inconsistent with FNA (Shultz 2006), which treats A. campestris and A. borealis as distinct species.

We don’t presume that the centuries-long examination and revision of this genus is finished, and we look forward to subsequent revision of FNA to include variety wormskioldii. Our review does not address the relationship of the three Washington taxa with arctic taxa or others not found in the state; resolution of those relationships will have to be accomplished by researchers in a broader review of the genus.

Finally, although there is no formal process of adopting common names, nor do we recommend one (Arnett 2004), in this case we suggest that the common name “Wormskiold’s wormwood” would be explicit in referring to these plants and would remain independent of future changes in understanding about the relation of these plants to either A. borealis or A. campestris.

**Acknowledgements**

Many thanks to the botanists who have communicated with me on this complex taxonomy: Ken Chambers of the Oregon Flora Project and Oregon State University, John Gamon of the
Washington Natural Heritage Program, David Giblin from the University of Washington, Stephen Meyers of the Oregon Flora Project, and Leila Shultz from the Flora of North America and the University of Utah. Their attention to this topic has enriched my understanding of it; however, any mistakes in interpretation are mine.

References


**Personal Communications**

**From Ken Chambers, March 7, 2011:**

Dear Joe,

This is o.k. by me. We can always adapt the Oregon Flora treatment when it comes time to finalize the writing of that genus (that may be my future job, which I'm not looking forward to very much). Linking it with "borealis" is o.k., as long as it isn't made a simple variety of A. campestris without acknowledging the "ssp. borealis" connection.

Let me know what Schultz says, after you hear from her on this. She has some kind of conception of "borealis" as a species. I did know it was upstream near Beverly--someone had told me that. I'm still interested in someone doing the DNA comparison that I mentioned.

Best wishes, Ken

On 3/7/2011 4:17 PM, Joe Arnett (DNR) had written:
Hi Ken,

Many thanks for your careful reply. We decided in our 2007 rare plant list revision to use the name A. borealis var. wormskioldii, based on Shultz elevating ssp. borealis to the species level in FNA, since var. wormskioldii was considered by Hitchcock and Cronquist as part of ssp. borealis. When the deadline for the rare plant book came, we did not feel that the issue was clear enough yet to warrant switching back to campestris. If I had been aware in 2007 that the Oregon Flora was going to keep this variety as part of A. campestris, I might have just used their combination. I don't see it to be the Natural Heritage Programs' role to make nomenclatural decisions, but rather to reflect the most credible and recent publications.

I share your view that var. wormskioldii appears to have an affinity with alpine plants, because of its stature and early flowering. You may not know that it has also been found upstream in the vicinity of Beverly, on cobbles along the Columbia that were likely scoured even in flooding in the 1900s, let alone the big Bretz floods. On the other side of this, the vegetative similarity to Artemisia campestris var. scouleriana, common all along the Columbia and far beyond, is striking.

Leila Shultz has offered to look at specimens of var. wormskioldii when she has the chance, and I will be interested in what she thinks. I will keep you informed!

At least, from a practical perspective, while the phylogenetic relationships remain to be determined, I don't think there is any confusion about which plants we are referring to when we use var. wormskioldii.

Again, thanks for your review of this,

Joe

---

From: Kenton Chambers [mailto:chamberk@science.oregonstate.edu]
Sent: Monday, March 07, 2011 3:09 PM
To: ARNETT, JOSEPH (DNR)
Subject: Artemisia campestris wormskioldii question

Dear Joe,

You'd written me back in Dec. 2010 about my opinion on naming the var. wormskioldii of the Columbia River islands, etc. I see that you have published the Washington Rare Plant Species booklet now, so you evidently did pick a name to use in that work. Our treatment for Oregon Flora uses Artemisia campestris var. wormskioldii (Bess.) Cronquist. The complete citation that I favor is Art. campestris ssp. borealis var. wormskioldii, but the Ore. Flora usually doesn't go for quadrinomials like this. The plants are clearly related to the taxon borealis, which is sometimes made a species of Art. and sometimes a subspecies of Art. campestris (the more inclusive view). In the treatment of Art. by George Ward in Abrams Illustrated Flora of the Pacific States (v. 4, p. 410-411), var. wormskioldii is made a synonym of Art. c. ssp. borealis; in the recent FNA treatment by Leila Schultz, var. w. is not accounted for at all, it appears.
The known location of this variety, right along the Columbia River at the east end of the Gorge, is most peculiar, as the variety could not have originated (evolved) in such sites. The river there was swept by the 400-foot-deep glacial Spokane (Bretz) Floods between 12,000 and 15,000 years ago. It had to have an origin elsewhere and its seeds washed in and deposited along the river in the last 12,000 years. Since it is closely related to A. borealis, in fact is nothing more than a minor variant of that taxon, and A. borealis is common in the higher elevation mountains of the Columbia River drainage farther upstream, my favored hypothesis is that seeds from these upstream elevations were carried down the river and chanced to lodge and form populations where the plants we call var. wormskioldii are found today. A nice molecular-systematic study for some student would be to compare the DNA of var. worm. with various ssp. borealis populations from the mountains of Washington, B.C., Idaho, and Montana. It might be possible to specify its closest current relatives among these populations.

It is strange that none of the past taxonomists dealing with this variety have commented on its location in a flood-swept part of the Columbia River—but then, botanists may not have been alert to the significance of past massive flooding on the river, when it comes to plant species distributions. Recent molecular studies by Keith Caroly at Reed College, on species such as Delphinium nuttallii, do involve consideration of the floods’ effect on present-day distribution of identified DNA haplotypes of the species.

So this is my Artemisia lecture for the day, which you can file away for future consideration.

Best wishes, as always,
Ken

From Stephen Meyers, Oregon Flora Project, 18 October 2010:

It has come to my attention, through Kelly Amsberry of the Oregon Department of Agriculture, that there is some confusion (particularly in Washington) over whether populations of Artemisia in the Columbia River Gorge area should be referred to as Artemisia borealis var. wormskioldii or Artemisia campestris var. wormskioldii.

Perhaps a brief history of A. borealis and A. campestris and variety wormskioldii will clear up this confusion.

Both A. borealis and A. campestris are valid species recognized by most modern floras. As one might ascertain from the authorities of these species A. campestris (described by Linnaeus) is the older species name and A. borealis the more recent (described by von Pallas.)

Artemisia borealis and A. campestris are closely related and likely sister species. As a result of their close relationship some workers, in the past, have demoted A. borealis to a variety of A. campestris.

It was, however, during a period of time in which A. borealis was considered a species, that variety wormskioldii was described as a variety of A. borealis by Hooker (1833).
Due to the subsequent and numerous reclassifications of *A. borealis*, since the time of the original description of variety *wormskioldii*, that this later taxon has been referred to by several names, including *A. borealis* var. *wormskioldii*, *A. campestris* var. *wormskioldii*, *A. borealis* f. *wormskioldii* and *A. campestris* ssp. *borealis* var. *wormskioldii*.

Taxonomic clarity and nomenclatural correctness was finally brought to this taxon by Cronquist in 1950. Cronquist determined that Hooker had mistakenly assigned variety *wormskioldii* to *A. borealis*, when it should have been assigned to *A. campestris*. Thus, the correct name for this taxon is *A. campestris* var. *wormskioldii*.

The original and most recent (excluding FNA) descriptions for this taxon can be found in the following publications:

*Artemisia borealis* Pall. var. *wormskioldii* Besser in Hook. -- Fl. Bor.-Amer. (Hooker) 1: 327. 1833.


**Excerpts from Key References**

From Hooker, W. J. 1833, pp. 326 & 327.


There are still some specimens in my collection, which, from the extreme difficulty in characterizing the species of this genus, and the want of more perfect individuals, I am obliged to leave undetermined. Mr. Pursh gives the "A. Chinemnis; folii inferioribus cuneiformibus obtusiis trilobis, superioribus lineariis obtusiis, floribus globosis pedunculatis cernuis," (Willd.), as a native of the North-West coast, upon the authority of Mr. Lambert's Herbarium. I possess the true plant, gathered in Kamtschatka by Chamisso, but I have seen no American specimens. (H.)

From Shultz 2006;

Subgenus Dracunculus is clearly distinguished by molecular differences. Molecular analyses have helped define subgenera but have not clarified relationships between closely related species. The morphologic characters useful in distinguishing species tend to be variable and are often hard to assess (i.e., the sexuality of microscopic florets). Users of the keys will meet with frustrations; descriptions of subgenera and illustrations will help in defining the major groupings of species.

Molecular studies define subg. Dracunculus as a major clade that is ancestral to the majority of Artemisia.
Figure 1. Scan of herbarium specimen of Artemisia collected by Suksdorf in 1896. Note the annotation by A.C. (I assume this is Arthur Cronquist) as A. campestris ssp. borealis var. wormskiioldii.
### Artemisia specimens examined at the University of Washington Herbarium at the Burke Museum (WTU) January 2012 by Joe Arnett

<table>
<thead>
<tr>
<th>collector</th>
<th>number</th>
<th>label species</th>
<th>Annotation 2012</th>
<th>collection date</th>
<th>exam date</th>
<th>collection location</th>
<th>plant height (cm)</th>
<th>herbage pub.</th>
<th>invol (mm)</th>
<th>invol pubescence</th>
<th>inflorescence</th>
<th>notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arnot, M</td>
<td>681</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>25Aug1993</td>
<td>5Jan2012</td>
<td>Chelan</td>
<td>55</td>
<td>sericeus</td>
<td>3.5</td>
<td>glab</td>
<td>widely br pan</td>
<td></td>
</tr>
<tr>
<td>Calder, J.A. and Savile</td>
<td>11944</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>17Aug1953</td>
<td>11Jan2012</td>
<td>Kinbasket Lake BC</td>
<td>58</td>
<td>sericeus</td>
<td>4-4.5</td>
<td>glab</td>
<td>moderately narrow pan</td>
<td>large invol and intermediate infl more like A. borealis, but size more like var. scouleriana</td>
</tr>
<tr>
<td>Denton</td>
<td>3371</td>
<td>A. campestris</td>
<td>A. campestris</td>
<td>19July1973</td>
<td>5Jan2012</td>
<td>Deer Park, Olympics</td>
<td>70</td>
<td>sparsely sericeous</td>
<td>3</td>
<td>glab</td>
<td>broad pan</td>
<td>look like A. borealis</td>
</tr>
<tr>
<td>French, B.</td>
<td>07-17</td>
<td>A. campestris ssp. pacifica</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>21Sep2007</td>
<td>5Jan2012</td>
<td>Castle Is</td>
<td>70</td>
<td>sericeus</td>
<td>4</td>
<td>glab</td>
<td>spiciform pan</td>
<td>pan is robust, thick</td>
</tr>
<tr>
<td>Gardner, sn</td>
<td></td>
<td>A. canadensis</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>glab</td>
<td>spiciform pan</td>
<td>look like A. borealis</td>
</tr>
<tr>
<td>Hitchcock</td>
<td>20449</td>
<td>A. campestris ssp. borealis var. wormkioldii</td>
<td>A. campestris ssp. borealis var. wormkioldii</td>
<td>28May1955</td>
<td>5Jan2012</td>
<td>Mouth of John Day R</td>
<td>18</td>
<td>sericeus</td>
<td>4</td>
<td>glab</td>
<td>spiciform pan</td>
<td></td>
</tr>
<tr>
<td>Hitchcock</td>
<td>10565</td>
<td>A. campestris</td>
<td>A. campestris ssp. borealis var. wormkioldii</td>
<td>10Oct1937</td>
<td>11Jan2012</td>
<td>Port Townsend beach</td>
<td>nearly glab</td>
<td></td>
<td></td>
<td>glab</td>
<td>broad pan</td>
<td></td>
</tr>
<tr>
<td>Kemp, sn</td>
<td></td>
<td>A. campestris ssp. borealis var. wormkioldii</td>
<td>A. campestris ssp. borealis var. wormkioldii</td>
<td>6-7-1983</td>
<td>5Jan2012</td>
<td>Miller IS</td>
<td>25</td>
<td>sericeus</td>
<td>4</td>
<td>glab</td>
<td>spiciform pan</td>
<td>I presume date is June 7</td>
</tr>
<tr>
<td>Name</td>
<td>SN</td>
<td>Genus</td>
<td>Species</td>
<td>Variety</td>
<td>Collection Date</td>
<td>Location</td>
<td>Date</td>
<td>Miller IS</td>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td>--------</td>
<td>--------------------</td>
<td>------------</td>
<td>---------------</td>
<td>-----------------</td>
<td>-----------------</td>
<td>------------</td>
<td>-----------</td>
<td>--------------------------------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemp</td>
<td>sn</td>
<td>A. campestris</td>
<td>ssp. borealis var. scouleriana</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>6-7-1983</td>
<td>Miller IS</td>
<td>5Jan2012</td>
<td>sericeus</td>
<td>3.5 glab widely br pan infl only</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemp</td>
<td>80099</td>
<td>A. campestris</td>
<td>ssp. borealis var. scouleriana</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>27Aug1980</td>
<td>W of Maryhill bridge</td>
<td>5Jan2012</td>
<td>sericeus</td>
<td>3 glab somewhat spreading pub</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kemp</td>
<td>sn</td>
<td>A. campestris</td>
<td>ssp. borealis var. wormkioldii</td>
<td>A. campestris ssp. borealis var. wormkioldii</td>
<td>10-5-1983</td>
<td>Miller IS</td>
<td>5Jan2012</td>
<td>sericeus</td>
<td>4 glab spiciform pan I presume date is May 10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Komarkova</td>
<td>236</td>
<td>A. borealis</td>
<td>ssp. purshii</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>20July1976</td>
<td>Barrow</td>
<td>5Jan2012</td>
<td>long dense pub</td>
<td>4 pub spiciform pan annotated to A. campestris var. borealis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Krajina</td>
<td>sn</td>
<td>A. campestris</td>
<td></td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>28Aug1950</td>
<td>Mara Lake BC</td>
<td>11Jan2012</td>
<td></td>
<td></td>
<td>Ann. In 1990 to A.c. ssp. b var. scouleriana, but looks atypical. Lvs most all basal, narrow and fascicle, nearly glabrous, nearly 25cm,</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mastro-giuseppe</td>
<td>6649</td>
<td>A. campestris</td>
<td>ssp. borealis var. scouleriana</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lvs still pubescent but nearly glab</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muenscher</td>
<td>11042</td>
<td>A. campestris</td>
<td>ssp. borealis var. purshii</td>
<td>A. campestris ssp. borealis var. purshii</td>
<td>15July1937</td>
<td>Clallam Co, Blue Mt</td>
<td>5Jan2012</td>
<td>sericeus</td>
<td>4 sericeus, or longer pub spiciform pan</td>
<td>Determined by A. Cronquist in 1948; red tipped corollas and pub invol are distinctive, otherwise looks like wormskioldii. Overall pub slightly longer and coarser than wormskioldii</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collector</td>
<td>Date</td>
<td>Location</td>
<td>Scientific Name</td>
<td>Morphology</td>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>--------</td>
<td>-----------------------------------</td>
<td>-----------------</td>
<td>------------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naas</td>
<td>5547</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>17Sept1989</td>
<td>40 (broken off)</td>
<td>Co sericeus 3.5 glab spiciform pan corollas with red cast; narrow inflorescence not usual for scouleriana, longest pan br is 1.5cm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nicely, N</td>
<td>57</td>
<td>A. borealis</td>
<td>5June1970</td>
<td>Alaksa</td>
<td>look like A. borealis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peck</td>
<td>13753</td>
<td>A. campestris var. spithamaea</td>
<td>In rocks and sand, 30 miles above the Dalles</td>
<td>17 sericeus 4-5 long sparse pub middle of bracts spiciform pan</td>
<td>Annotated to A. campestris ssp. borealis var. wormkioldii by N. Arnot 11-1-90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Porsild &amp; Breitung</td>
<td>9489</td>
<td>A. borealis</td>
<td>14June1944</td>
<td>Yukon</td>
<td>18 sericeus, longer pub than usu 2.5, in bud glab spiciform pan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suksdorf</td>
<td>2686</td>
<td>A. borealis</td>
<td>23April1896</td>
<td>Sandy river bank, Bingen</td>
<td>35 sericeus 4 gen glab spiciform pan Annotated as A. campestris ssp. borealis var. wormkioldii by A.C. 1951</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suksdorf</td>
<td>2685</td>
<td>A. borealis var. Wormskioldii</td>
<td>27May1896</td>
<td>Sandy river bank, Bingen (rare)</td>
<td>26 sericeus 4 gen glab, occ sparse pub spiciform pan Some bracts with reddish cast</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suksdorf</td>
<td>2684</td>
<td>Artemisia canadensis</td>
<td>14Sept1895</td>
<td>bottomland, Bingen</td>
<td>90 sericeus 3-3.5 glab somewhat long branched pan Annotated to A. campestris ssp. borealis var. scouleriana by R. Taylor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson</td>
<td>561</td>
<td>A. spithamea</td>
<td>21July1938</td>
<td>Marble Mts BC</td>
<td>look like A. borealis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Name</td>
<td>Code</td>
<td>Species</td>
<td>Date</td>
<td>Location</td>
<td>Notes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>--------</td>
<td>------------------------</td>
<td>----------</td>
<td>------------------------------------</td>
<td>------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thompson</td>
<td>11022</td>
<td>A. spithamea</td>
<td>21July1934</td>
<td>Mt Constance, Jefferson Co WA</td>
<td>look like A. borealis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walker</td>
<td>286</td>
<td>A. campestris ssp. borealis var. scouleriana</td>
<td>10Sept2004</td>
<td>Ebeys Landing</td>
<td>80 sparsely sericeous 3-4 glab broad pan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>