

Dichotomous Key to Ferns of Wisconsin

(Compiled by Tim Gerber/UW-La Crosse)

Sixty-six native species (excluding hybrids) make up the Fern flora of Wisconsin (Wetter et al., 2001). No exotic ferns are found growing in the wild in WI. Only species in the Checklist of Vascular Plants for Wisconsin are included here. This key relies on features found in Flora of North America (1993) and Gleason & Cronquist (1991); nomenclature follows Wetter et al. (2001). Groups of ferns found in Wisconsin include the Azolla Family (Azollaceae), Adder's Tongue Family (Ophioglossaceae), Royal Fern Family (Osmundaceae), Bracken Family (Dennstaedtiaceae), Spleenwort Family (Aspleniaceae), Wood Fern Family (Dryopteridaceae), Polypody Family (Polypodiaceae), Maidenhair Fern Family (Pteridaceae), and Marsh Fern Family (Thelypteridaceae). Wetland indicator status for those species indicated follows USFWS (1988), Region 3. [Note: This document should not be used to officially determine or assign a wetland indicator status.] The state's most common ferns (based on Taylor's key) are in bold type.

1	Plants floating in water or sometimes rooted in mud at edges of ponds or streams, or in wet meadows and vernaly inundated areas/ plants < 30 (50) cm. (Azollaceae)	2
1	Plants terrestrial, on rock, or epiphytic, if rooted in mud then leaves erect/ plants > 30 cm	3
2(1)	Megaspores not pitted, densely covered with tangled filaments (filosum). Notes: OBL , plant 2 – 5" long, Carolina mosquito-fern	<i>Azolla caroliniana</i>
2	Megaspores pitted, sparsely covered with a few long filaments (filosum). Notes: OBL , floating-fern	<i>Azolla mexicana</i>
3(1)	Sporangia fused laterally into 2-rowed, long-stalked linear units (synangia) and opening by double row of pores or slits/ sterile portions of blades entire. (Ophioglossaceae, in part) Notes: frond 1" – 6", adder's-tongue, Special Concern	<i>Ophioglossum pusillum</i>
3	Sporangia discrete, not fused into synangia/ sterile portions of blades often divided (walking fern entire)	4
4(3)	Sporangial capsules (excluding stalks) > 0.4 mm, opening by action of subterminal annulus or by thin-walled and poorly developed lateral patch, or annulus seemingly lacking/ sporangia usually with several hundreds to thousands of spores// sporangia sessile or with very short stalk with 4 ≥ cells in cross-section/// sporangia usually borne on non-laminate (not green) tissue or on naked or specialized stalks.	5
4	Sporangial capsules (excluding stalks) < 0.4 mm, opening by action of vertical or slightly oblique thick-walled annulus/ sporangia usually with 16 – 64 spores// sporangia short- to long- stalked with 1 – 3 rows of stalked cells in cross-section/// sporangia usually borne on blade tissue, rarely on non-laminate tissue.	20

5(4)	Fertile portions of leaves inserted near base of sterile portion, long-stalked/ sterile blades usually < 30 cm// spores transparent, thousands per sporangium (Ophioglossaceae , in part)	6
5	Fertile portions of leaves apical or in middle of sterile blades, or fertile and sterile leaves dimorphic/ sterile blades, or those with sterile portion, usually > 30 cm// spores green, hundreds per sporangium. (Osmundaceae)	18
6(5)	Leaf blades deltate, mostly 5 – 25 cm, commonly sterile, sporophores absent or misshapen/ plants mostly over 12 cm// leaf sheaths open or closed.	7
6	Leaf blades mainly oblong to linear, mostly 2 – 4 cm, all fertile, sporophores always present/ plants to 15 cm, mostly less than 10 cm// leaf sheaths closed.	11
7(6)	Trophophore blade thin, herbaceous/ leaf sheaths open// sporophores, when present, arising from base of trophophore blade high on common stalk/// leaves absent during winter. Notes: FACU , plant 4" – 20", frond 4" – 8", rattlesnake fern	<i>Botrychium virginianum</i>
7	Trophophore blades herbaceous or thick-papery to leathery/ leaf sheaths closed// sporophores, when present, arising near ground from basal portion of common stalk/// leaves present during winter.	8
8(7)	Terminal pinnules larger than lateral pinnules/ pinnae undivided except in proximal 1/2 – 3/4.	9
8	Terminal pinnules similar to or only slightly larger than lateral pinnules/ pinnae divided to tip.	10
9(8)	Pinnules obliquely ovate, margins finely denticulate to crenulate, apex rounded to acute/ trophophore blades green in winter. Notes: plant 4"–12", frond 4" – 8", blunt-lobed grape fern, Special Concern	<i>Botrychium oneidense</i>
9	Pinnules obliquely trowel-shaped or linear, margins denticulate to lacerate or coarsely cut, apex acute/ trophophore blades bronze in winter if exposed. Notes: FAC , plant 4" – 12", frond 4" – 8", cut-leaved grape fern	<i>Botrychium dissectum</i>
10(8)	Segments of blades rounded, nearly entire, plane/ texture leathery// n North America. Notes: FACU , plant 4", frond to 36", leathery grape fern	<i>Botrychium multifidum</i>
10	Segments of blades angular, ± dentate, somewhat channeled and concave abaxially/ texture semiherbaceous// Great Lakes and St. Lawrence Seaway region. Notes: plant 4", frond to 20", St. Lawrence grape fern, Special Concern	<i>Botrychium rugulosum</i>

11(6)	Trophophores linear to linear-oblong, simple to lobed, lobes rounded to square and angular, stalks usually 1/3-2/3 length of trophophore/ plants in deep shade under shrubs and trees.	12
11	Trophophores linear to deltate (narrowly oblong in <i>Botrychium minganense</i>), pinnate, rarely simple, lobes, if present, of various shapes, stalk usually less than 1/4 length of trophophore/ plants usually in exposed sites.	13
12(11)	Segments rounded/ plants herbaceous. Notes: FAC , frond 10"– 36", least moonwort	<i>Botrychium simplex</i>
12	Segments angular/ plants succulent. Notes: goblin fern, Endangered	<i>Botrychium mormo</i>
13(11)	Trophophores present/ basal pinnae or segments with venation like ribs of fan, midrib absent// basal pinnae fan-shaped to spatulate.	14
13	Trophophores present or replaced by sporophore if present, basal pinnae or segment venation pinnate/ midrib present// oblanceolate to linear to lanceolate to ovate.	17
14(13)	Basal pinnae broadly fan-shaped. Notes: FACW , plant 4"– 8", frond 12", common moonwort, Endangered	<i>Botrychium lunaria</i>
14	Basal pinnae narrowly fan-shaped, or cuneate to lanceolate or linear.	15
15(14)	Trophophores ± folded longitudinally when alive, usually to 4 × 1 cm/ pinnae to 5 pairs, most proximal pinnae 2-lobed. Notes: Iowa moonwort, Endangered	<i>Botrychium campestre</i>
15	Trophophores flat or folded only at base when alive, usually to 10 × 2.5 cm/ pinnae to 10 pairs, basal pinnae unlobed or if lobed, not usually 2-cleft.	16
16(15)	Blades narrowly oblong, firm to herbaceous/ pinnae nearly spheric to fan-shaped// margins shallowly crenate/// proximal sporophore branches 1-pinnate. Notes: plant 4"– 8", frond 12", Mingan moonwort, Special Concern	<i>Botrychium minganense</i>
16	Blades narrowly deltate, leathery/ pinnae spatulate to linear-spatulate// margins entire to very coarsely and irregularly dentate/// most proximal sporophore branches usually 2-pinnate. Notes: spatulate moonwort, Special Concern	<i>Botrychium spathulatum</i>

17(13)	Trophophore blades deltate/ sporophores divided proximally into several equally long branches. Notes: FACW , plant 4" – 12", frond 5"– 12", lance-leaved grape fern	<i>Botrychium lanceolatum</i>
17	Trophophore blades ovate to oblong/ sporophores with single midrib or 1 dominant midrib and 2 smaller ribs. Notes: FACU , plant 4" – 12", frond 2" – 18", daisy-leaf grape fern	<i>Botrychium matricariifolium</i>
18(5)	Fertile leaves with pinnae monomorphic, all spore-bearing/ tuft of hairs persistent on abaxial surface of pinnae near base.	19
18	Fertile leaves with pinnae dimorphic, some spore-bearing, some not/ tuft of hairs absent on abaxial surface of pinnae near base. Notes: FACW , frond 1' – 2', cinnamon fern	<i>Osmunda cinnamomea</i>
19(18)	Fertile pinnae apical, sterile leaves 2-pinnate. Notes: OBL , frond 2' – 4.5', American royal fern	<i>Osmunda regalis</i>
19	Fertile pinnae medial, sterile leaves pinnate-pinnatifid. Notes: FAC+ , frond 15"– 40", interrupted fern	<i>Osmunda claytoniana</i>
20(4)	Stems and petiole bases bearing hairs 1 cell wide, lacking scales $2 \geq$ cells wide/ sori marginal or nearly so// indusia cuplike, attached proximally and sometimes along sides, or formed by revolute blade margins. (Dennstaedtiaceae)	21
20	Stems and petiole bases bearing scales several cells wide/ sori marginal or well back from margin, or sporangia covering blade surfaces// indusia linear, reniform, or peltate, rarely cuplike, or absent, sometimes replaced by false indusium formed by reflexed, recurved or revolute margins.	22
21(20)	Sori continuous along margins of segments/ inner indusium, if present, hidden by reflexed margin of blade and maturing sporangia// blades usually broadly triangular. Notes: FACU , frond 1.5' – 5', bracken fern	<i>Pteridium aquilinum</i>
21	Sori distinct, not continuous along margins of ultimate segments/ inner indusium present or absent// blades narrowly deltate to lanceolate to ovate. Notes: plant 1' – 3', eastern hay-scented fern	<i>Dennstaedtia punctilobula</i>
22(20)	Sori elongate along veins, never marginal, usually with linear indusium	23
22	Sori variously shaped, often round, sometimes marginal, or sporangia covering surfaces, if elongate along veins then without indusium	56

23(22)	Scales on stems and petiole bases clathrate/ sori generally along 1 side of vein only// sporangial stalks 1 cell thick/// petioles with 2 back-to-back C-shaped vascular bundles in cross section, these fused into an X-shape distally. (Aspleniaceae)	24
23	Scales on stems and petiole bases not clathrate/ sori often on both side of veins or curved around end of vein// sporangial stalks 2 – 3 cells thick/// petioles vasculature various in cross section, if bundles 2 then C-shaped and fused into a U-shape distally. (Dryopteridaceae)	28
24(23)	Blades simple, pinnatifid, or forked (sometimes with free pinnae at base), not pinnate throughout.	25
24	Blades pinnate throughout or pinnatifid only in distal 1/3, pinnae undivided to 1 – 3-divided.	26
25	Veins anastomosing to form areoles/ blades rooting at tip. Notes: frond 2" – 12", walking fern.	<i>Asplenium rhizophyllum</i>
25	Veins free/ blades with apical buds or not but not rooting at tip. Notes: lobed spleenwort, Threatened	<i>Asplenium pinnatifidum</i>
26(24)	Pinnae with conspicuous basal auricles overlapping rachis/ sori inframedial// leaves ± dimorphic, upright and tall, or spreading and short/// plants often terrestrial. Notes: FACU , frond 6" – 12", ebony spleenwort.	<i>Asplenium platyneuron</i>
26	Pinnae bases not overlapping rachis/ sori medial to supramedial// leaves monomorphic/// plants mainly on rock.	27
27(26)	Rachises dark reddish brown throughout. Notes: frond 12" – 50", maidenhair spleenwort, Special Concern.	<i>Asplenium trichomanes</i>
27	Rachises dark in proximal 1/3–2/3 or only at base. Notes: UPL , frond 20" – 32", bright-green spleenwort, A synonym is listed as Endangered by WI DNR.	<i>Asplenium trichomanes-ramosum</i>
28(23)	Leaves strongly dimorphic, either fertile or sterile, the 2 types very dissimilar.	29
28	Leaves monomorphic, fertile and sterile similar in size and dissection, occasionally with somewhat contracted fertile pinnae on same leaf as sterile pinnae (as in <i>Polystichum acrostichoides</i>).	30
29(28)	Sterile blades pinnatifid to 1-pinnate at base/ venation areolate// fertile blades 2-pinnate/// sori enclosed in small, globose, hardened pinnules. Notes: FACW , frond 1.5' – 7', sensitive fern.	<i>Onoclea sensibilis</i>
29	Sterile blades 1-pinnate-pinnatifid/ veins free; fertile blades 1-pinnate// sori on linear pinnae/// sori enclosed by hardened pinna margin. Notes: FACW , frond 28" – 52", American ostrich fern.	<i>Matteuccia struthiopteris</i>

30(28)	Indusia completely surrounding receptacle and composed of filaments or scalelike segments arranged in cuplike fashion around sorus/ petiole base with 2 vascular bundles// scales absent on costae abaxially.	31
30	Indusia attached centrally or laterally, not completely surrounding receptacle, or indusia absent/ petiole base with 2 or more vascular bundles// scales absent or present on costae abaxially.	33
31(30)	Petioles articulate well above base, abscission zone visible as swollen node/ indusial segments uniseriate throughout, composed of cells that are many times longer than wide// pinnules entire or crenate, without acute teeth on margins. Notes: frond 1.5' – 4', rusty woodsia.	<i>Woodsia ilvensis</i>
31	Petioles not articulate above base, swollen abscission zone absent/ indusial segments usually multiseriate at base, composed of cells that are isodiametric or slightly longer than wide// pinnules dentate, with acute teeth on margins.	32
32(31)	Indusia composed of relatively broad segments, these multiseriate for most of length but often branched or divided distally. Notes: frond 6" – 12", blunt-lobe cliff fern.	<i>Woodsia obtuse</i>
32	Indusia composed of narrow, usually filamentous segments, these uniseriate for most of length. Notes: frond 2' – 4', Oregon cliff fern, A synonym is listed as Special Concern by WI DNR.	<i>Woodsia oregana</i>
33(30)	Indusia round, attached at center (peltate)/ sori round// petiole base with 3 or more vascular bundles.	34
33	Indusia round-reniform, reniform, linear, or absent, attached laterally at sinus/ sori round or elongate// petiole base with 2 or more vascular bundles.	36
34(33)	Fertile pinnae contracted, sori confluent, completely covering abaxial surface. Notes: frond 12" – 16", Christmas fern, Special Concern.	<i>Polystichum acrostichoides</i>
34	Fertile pinnae not contracted, sori often distinct.	35
35(34)	Leaves 1-pinnate. Notes: UPL , northern holly fern.	<i>Polystichum lonchitis</i>
35	Leaves 1-pinnate-pinnatifid or 2-pinnate. Notes:	<i>Polystichum braunii</i>
36(33)	Sori elongate, straight or hooked at one end, indusiate/ petiole base with 2 vascular bundles.	37
36	Sori round or nearly so, indusia present or absent/ petiole with 2 or more vascular bundles.	39

37	Adaxial grooves of costae shallow, not decurrent into rachis groove/ multicellular hairs borne along costae, especially adaxially// stems moderately long-creeping/// blades 1-pinnate-pinnatifid. Notes: FAC , frond 16" – 40", silvery glade fern.	<i>Deparia acrostichoides</i>
37	Adaxial grooves of costae deep, decurrent into rachis groove/ multicellular hairs absent on costae// stems short-creeping to erect/// blades 1-pinnate to 2-pinnate-pinnatifid.	38
38(37)	Blades commonly 2-pinnate or more divided/ proximal pinnae often slightly to greatly reduced// sori usually hooked at distal end. Notes: FAC , frond 12" – 40", lady fern.	<i>Athyrium filix-femina</i>
38	Blades 1-pinnate, 1-pinnate-pinnatifid, or 2-pinnate (if 2-pinnate then veins anastomosing)/ proximal pinnae not or slightly reduced// sori ± straight, not hooked at distal end. Notes: FAC- , frond 40", glade fern, Special Concern.	<i>Diplazium pycnocarpon</i>
39(36)	Indusia absent or laterally attached and hoodlike, arching over sori; petiole base with 2 vascular bundles.	40
39	Indusia attached at distinct sinus, round-reniform; petiole base with 3 or more vascular bundles.	48
40(39)	Indusia present but often inconspicuous in mature leaves, laterally attached and arching over sori/ stems decumbent, usually creeping, surface often visible through petiole bases and scales, scales less than 5 mm.	41
40	Indusia always absent/ segment margins entire or crenate but never serrate-dentate.	46
41(40)	Rachises, costae, indusia, and midribs of ultimate segments sparsely to densely covered by gland-tipped hairs/ leaf blades deltate to ovate, usually widest at or near base// rachises and costae often with bulblets.	42
41	Rachises, costae, indusia, and midribs of ultimate segments without glandular hairs/ leaf blades elliptic to lanceolate, generally widest at or just below middle of blade// rachises and costae without bulblets.	44

42(41)	Rachises and costae frequently with bulblets/ rachises, costae, indusia, and midribs of ultimate segments usually densely covered by gland-tipped hairs// leaf blades broadly to narrowly deltate, almost always widest at base, apex long-attenuate/// leaves seasonally bearing sori (earliest leaves lack sori, subsequent leaves with sori)//// petioles reddish when young, green or straw-colored in mature specimens///// spores usually 33 – 38 μm . Notes: FACW- , frond 12" – 24", bulblet bladder fern.	<i>Cystopteris bulbifera</i>
42	Rachises and costae occasionally with bulblets (often misshapen)/ rachises, costae, indusia, and midribs of ultimate segments usually sparsely covered by glandular hairs// leaf blades narrowly deltate to ovate-lanceolate, widest at or near base, apex short-attenuate/// nearly all leaves bearing sori//// petioles dark brown to straw-colored or green///// spores usually 38 – 60 μm .	43
43(42)	Blades ovate to lanceolate, usually widest above base/ spores usually 49 – 60 μm ; ne North America. Notes: frond to 20", Laurentian bladder fern, Special Concern.	<i>Cystopteris laurentiana</i>
43	Blades deltate to narrowly deltate, usually widest at or near base/ spores usually 38 – 48 μm ; e, c to sw North America. Notes: Tennessee bladder fern.	<i>Cystopteris tennesseeensis</i>
44(41)	Leaves clustered 1-4 cm behind protruding stem apex/ stems pubescent, hairs yellow; spores usually 28 – 34 μm . Notes: frond 6"- 12", creeping fragile fern.	<i>Cystopteris protrusa</i>
44	Leaves clustered at stem apex; stems lacking hairs/ spores usually 33 – 60 μm .	45
45(44)	Pinnae typically at acute angle to rachis, often curving toward blade apex/ pinnae along distal 1/3 of blades ovate to narrowly elliptic// margins of pinnae usually crenulate or with rounded teeth/// basal basiscopic pinnules of proximal pinnae cuneate to rounded at base. Notes: frond 6" – 12", MacKay's brittle fern.	<i>Cystopteris tenuis</i>
45	Pinnae typically perpendicular to rachis, not curving toward blade apex/ pinnae along distal 1/3 of blade deltate to ovate// margins of pinnae with sharp teeth/// basal basiscopic pinnules of proximal pinnae truncate to rounded at base. Notes: FACU , frond 6" – 12", northern fragile fern.	<i>Cystopteris fragilis</i>
46(40)	Adaxial blade surface glabrous or moderately glandular, abaxial blade surface and rachis moderately or densely glandular.	47
46	Adaxial and abaxial blade surfaces and rachis essentially glabrous. Notes: FAC , frond 8" – 18", common oak fern	<i>Gymnocarpium dryopteris</i>

47(46)	Blades glabrous on adaxial surface/ proximal pinnae and basispic pinnules of proximal pinnae curving toward apex of leaf and apex of pinna, respectively// pinnae of 2nd pair almost always sessile with basal pinnules \pm equal in length to adjacent pinnules. Notes: northern oak fern, Special Concern.	<i>Gymnocarpium jessoense</i>
47	Blades moderately glandular on adaxial surface/ proximal pinnae and basispic pinnules of proximal pinnae \pm perpendicular to rachis and costa, respectively// pinnae of 2nd pair usually stalked, or if sessile with basal pinnules shorter than adjacent pinnules. Notes: FACU , frond 8" – 18", limestone oak fern, Special Concern.	<i>Gymnocarpium robertianum</i>
48(39)	Blades densely scaly abaxially, aromatic-glandular; old leaves forming conspicuous gray or brown clumps/ leaves 6 – 25(–40) cm. Notes: frond 2' – 5', fragrant fern (A synonym is listed as Special Concern by WI DNR).	<i>Dryopteris fragrans</i>
48	Blades glabrous to sparsely scaly abaxially, not aromatic-glandular; old leaves not persisting in conspicuous gray or brown clumps/ leaves usually more than 25 cm.	49
49(48)	Blades 2-pinnate to 3-pinnate-pinnatifid at base.	50
49	Blades pinnate-pinnatifid to 2-pinnate at base.	52
50(49)	Basal pinnules of basal pinnae shorter than adjacent pinnules. Notes: FAC , frond 14" – 28", glandular wood fern.	<i>Dryopteris intermedia</i>
50	Basal pinnules of basal pinnae longer than adjacent pinnules.	51
51(50)	First basal basispic pinnule not much wider than 1st acroscopic pinnule on basal pinnae/ blades ovate-lanceolate. Notes: FACW- , frond 14" – 28", spinulose wood fern.	<i>Dryopteris carthusiana</i>
51	First basal basispic pinnule 2 times width of 1st acroscopic pinnule on basal pinnae/ blades ovate-deltate. Notes: FAC , northern wood fern, Special Concern.	<i>Dryopteris expansa</i>
52(50)	Sori at or near margins of segments/ petioles with dense tuft of pale tawny scales at base. Notes: FACU , frond 8" – 24", marginal shield fern.	<i>Dryopteris marginalis</i>
52	Sori midway between margin and midrib or closer to midribs of segments/ petioles with scattered tan to dark brown scales at base.	53
53(52)	Petioles less than 1/4 length of leaves, scales of 2 kinds, mixed, broad and hair-like. Notes: plant 1.5' – 2', male fern, Special concern.	<i>Dryopteris filix-mas</i>
53	Petioles 1/4 – 1/3 length of leaves, scales broad to narrow, but not hair-like.	54

54(53)	Basal pinnae ovate; blades ovate to ovate-lanceolate/ scales at base of petioles dark brown or with dark brown stripe. Notes: FAC , frond 30" – 40", Goldie's or giant wood fern.	<i>Dryopteris goldiana</i>
54	Basal pinnae deltate/ blades lanceolate with parallel sides; scales at base of petioles tan.	55
55(54)	Basal pinnae narrowly elongate-deltate; pinnae of fertile leaves nearly in plane of blade. Notes: FACW+ , frond 15" – 40", Clinton's shield fern, Special concern.	<i>Dryopteris clintoniana</i>
55	Basal pinnae deltate; pinnae of fertile leaves twisted nearly at right angles to plane of blade. Notes: OBL , frond 15" – 40", crested shield fern.	<i>Dryopteris cristata</i>
56(22)	Leaf blades pinnatifid or pinnatisect, rarely 1-pinnate/ leaves borne on short phyllopodia and cleanly abscising at their junction with age// sori without indusium/// spores bilateral, colorless or yellowish, often transparent. (Polypodiaceae) Notes: frond 4" – 12", common polypody.	<i>Polyopodium virginianum</i>
56	Leaf blades palmate, 1-pinnate, or commonly more divided, if pinnatisect, at least some of the lobes themselves pinnatifid/ leaves not borne on phyllopodia, petioles continuous, not cleanly abscising with age// sori with or without indusium/// spores bilateral to tetrahedral-globose, variously colored, usually opaque.	57
57(56)	Sporangia completely covering surfaces of fertile segments. (Pteridaceae)	58
57	Sporangia along veins or aggregated into discrete, round or oblong sori. (Thelypteridaceae)	63
58(57)	Sporangia borne directly on reflexed marginal lobes of ultimate segments, lobes separate and distinct/ veins of ultimate blade segments prominent, dichotomously branched, essentially parallel distally. Notes: FAC- , frond 6" – 36", northern maidenhair fern.	<i>Adiantum pedatum</i>
58	Sporangia borne on abaxial leaf surface or, if seemingly attached to marginal lobes of ultimate segments, lobes confluent and poorly defined/ veins of ultimate blade segments obscure or, if prominent, then pinnately branched and more divergent distally.	59

59(58)	Leaves strongly dimorphic, fertile leaves obviously longer than the sterile, with narrow, elongate, usually revolute ultimate segments/ petioles green to straw-colored distally, essentially glabrous// mature spores usually yellow. Notes: FACU , frond 1.5' – 5', slender cliff brake.	<i>Cryptogramma stelleri</i>
59	Leaves monomorphic to weakly dimorphic, either all alike and fertile or with a few sterile leaves poorly differentiated from the fertile/ petioles brown to black and glabrous or pubescent, or if lighter, then sparsely to densely pubescent// mature spores brown to black, rarely yellowish.	60
60(59)	Blades conspicuously pubescent and/or scaly, hairs or scales often concealing abaxial surface, farina lacking.	61
60	Blades glabrous or sparsely hirsute-pubescent or with whitish farina on abaxial surface, not conspicuously pubescent or scaly.	62
61(60)	Fertile ultimate segments nearly round, beadlike, 1 – 3 mm/ sporangia containing 32 spores// blades 3-pinnate near base. Notes: frond 10"– 30", slender lip fern.	<i>Cheilanthes feei</i>
61	Fertile ultimate segments elongate, not beadlike, usually 3 – 5 mm/ sporangia containing 64 spores// blades 2-pinnate-pinnatifid near base. Notes: frond 4"-12", hairy lip fern.	<i>Cheilanthes lanosa</i>
62(60)	Ultimate segments glabrous abaxially or with isolated hairlike scales on a few segments or, if sparsely villous, then rachises nearly glabrous/ pinnae or costae slightly decurrent on rachis// blades linear-oblong to lanceolate. Notes: frond 20" – 58", smooth cliff brake.	<i>Pellaea glabella</i>
62	Ultimate segments sparsely villous on abaxial costae/ rachises variously pubescent; pinnae or costae not decurrent on rachis// blades lanceolate, ovate, or deltate. Notes: frond 25" – 50", purple cliff brake, Special Concern.	<i>Pellaea atropurpurea</i>
63(57)	Blades 1-pinnate to deeply pinnate-pinnatifid/ costae grooved adaxially// veins meeting margin at or above sinus or united below sinus.	64
63	Blades 2-pinnatifid, with pinnae at least in distal 1/2 of blade connected by wings along rachis, or blades 2-pinnate-pinnatifid/ costae not grooved adaxially// veins commonly meeting margin above sinus.	65
64(63)	Segment veins often forked/ blades lacking glands// abaxial surface of costae with tan, ovate scales. Notes: frond 1' – 1.5', marsh fern.	<i>Thelypteris palustris</i>
64	Segment veins not forked/ blades bearing sessile glands abaxially// costae lacking scales. Notes: FACW , bog fern, Special concern.	<i>Thelypteris simulata</i>

65(63)	Proximal pair of pinnae (7–)10 – 20 cm, connected to those next above by wing along rachis/ scales on costae abaxially whitish to light tan, narrowly lanceolate, mostly 3 – 5 cells wide at base; hairs of costae abaxially mostly less than 0.25 mm, a few sometimes to 0.5 mm// segments of larger pinnae deeply lobed/// veins always forked to pinnate. Notes: broad beech fern.	<i>Phegopteris hexagonoptera</i>
65	Proximal pair of pinnae 3 – 10 (– 15) cm, sessile or slightly adnate to rachis/ scales on costae abaxially tan to often shiny brown, ovate-lanceolate, usually 6 – 12 or more cells wide at base// hairs of costae abaxially mostly more than 0.3 mm with many ca. 0.5 mm; segments of pinna entire or crenate, rarely shallowly lobed/// veins in segments of middle pinnae mostly simple. Notes: frond 10" – 18", narrow beech fern.	<i>Phegopteris connectilis</i>

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