Plant Species Evaluation Form

Carex arcta Boott

NORTHERN CLUSTERED SEDGE

Family: Cyperaceae (CNPS 2017) | **PLANTS Symbol:** CAAR2 (USDA 2017) | **Calif. Endemic:** No (CNPS 2017)

Synonyms/Other Names: *Carex arcta* was described by Francis M.B. Boott in 1867. The following names have been applied to this entity as some point in time: *C. canescens* Linnaeus var. *oregana* L. H. Bailey; *C. canescens* var. *polystachya* Boott; *C. heleonastes* Linnaeus f. var. *scabriuscula* Kükenthal; *C. kunzei* Olney; *C. laeviculmis* Meinsh (Ball and Reznicek 2003; Tropicos 2017).

Identification Issues: *Carex* taxa are challenging to identify (Zika et al. 2017). There are roughly 2,000 species worldwide. Homoplasy is is common across many sections. In addition, many characters used for identification are likely plesiomorphic (Hipp et al. 2006; Jimenez-Mejias et al. 2016). Accounts of hybridization are likely inflated, as specimens reported to be hybrids may be at the limits of variation within the morphological parameters of a given taxon (Jimenez-Mejias et al. 2016; Zika et al. 2017). Few hybrids have been reproduced experimentally (Ball and Reznicek 2003). The perigynium is a prominent feature of the genus *Carex*. The perigynium is a sac-like structure that surrounds individual female flowers (Jepson Flora Project 2017). The morphology of the perigynium is used to distinguish between many species of *Carex*. Mature perigynia are needed for accurate identification of *Carex* taxa (Zika et al. 2017).

Identifying *Carex arcta* is very much a process-of-elimination scenario. It is worth noting that *C. canescens* may appear similar to *C. arcta*. The former has grey-green foliage, fewer spikes on each inflorescence, and shorter perigynia beaks. These shorter beaks give the inflorescence of *C. canescens* a tighter and less aggressive appearance, contrasted by the appearance of *C. arcta* and its longer and “pointier” perigynium beaks (Wilson et al. 2008).

Taxonomy:

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Species In Genus: +- 2000 species: worldwide; important components of peat, forage. Etymology: (Latin: cutter, from sharp leaf, stem edges). Note: Difficult because of many species, morphologic and genetic variation, minute key characters. Peri around fully mature fruit needed for identification (long-persistent peri often atypical). Many herbarium specimens have immature peri, which lead to misidentification. 2-styled plants with peri +- flat adaxially, curved abaxially are planoconvex; peri curved +- equally on both surfaces are biconvex. Peri walls said to be translucent are easily punctured and/or do not completely conceal fruit within. Peri beaks generally measured from point of inflection, where peri margin changes from convex to concave, to its tip, but in a few taxa it is measured from fruit top to beak tip ("measured from fruit top" for those taxa). Peri (and fruit) shapes including beak; peri (and fruit) "body" excludes beak. Mid to

late season shoots often atypical in shape, color of inflorescence, bracts, peri. Number of peri given is per spikelet. Actual hybrids probably less frequent than reports of hybrids.

Genus Description – Habit: Perennial herb, cespitose to loosely cespitose to rhizomed with internodes > 1 cm; generally monoecious. Stem: generally sharp-3-angled, generally solid. Leaf: 3-ranked, generally glabrous except generally scabrous on midrib, margin; sheath closed, back (blade side of stem) green, ribbed, front (non-blade side of stem) generally thin, translucent, sometimes cross-wrinkled or flat, forming generally U-shaped mouth at top, sometimes extending above blade as a fragile sleeve-like "contraligule" (especially Groups 7, 11), sometimes disintegrating to a ladder- or lattice-like network or fringe of veins ("leaf sheath fronts fibrous"). Inflorescence: spikelets generally several to many, in spike, raceme, panicle, or head-like arrangement, each 1--many-flowered, generally unisexual, or bisexual, then staminate flowers distal to pistillate ("staminate/pistillate"), pistillate distal to staminate ("pistillate/staminate"), or otherwise, generally subtended by spikelet bract, lowest subtended by inflorescence bract, occasionally some additional pistillate spikelets on lateral shoots from basal nodes ("basal spikelets"); flowers subtended by flowering bract ("scale" in other literature, especially for pistillate). Flower: unisexual; perianth 0. Staminate Flower: stamens generally 3. Pistillate Flower: enclosed by sac-like structure (perigynium, abbreviated to "peri" here), occasionally next to bristle-like axis; style 1, stigmas 2--3(4), exserted. Fruit: 2--3(4)-sided, enclosed in peri, stalked or not, style base generally not persistent; peri body 2--3(4)-sided or round, often with marginal ribs, some with additional veins, papillate or not (determined at 20×), abruptly narrowed at base into stalk or not; peri beak abaxial flap (suture) prominent or generally inconspicuous or 0, tip open, often notched.

Species Description – Habit: Cespitose. Leaf: blade 2--4 mm wide; sheath fronts of lower leaves at least sparsely minute-red-dotted. Inflorescence: +- dense, 1.5--3 cm, green to brown; spikelets 7--15, distinct, 5--10 mm, upper occasionally narrow-tapered at base, lower +- separate; inflorescence bract < or > inflorescence; pistillate flower bract green, white, or light brown, obtuse to mucronate. Fruit: 1.2--1.6 mm, 0.8--1.1 mm wide; peri spreading to ascending, 2--3.4 mm, 1.1--1.5 mm wide, ovate, green, upper body +- papillate, wall filled with pithy tissue at base, generally upper body, beak 0.6--1.2 mm, > 1/4 body, conic, minute-serrate at 10×, not recurved, tip +- red. Chromosomes: 2n=60. eFlora Treatment Author: Peter F. Zika, Andrew L. Hipp & Joy Mastrogiuseppe.

Status:

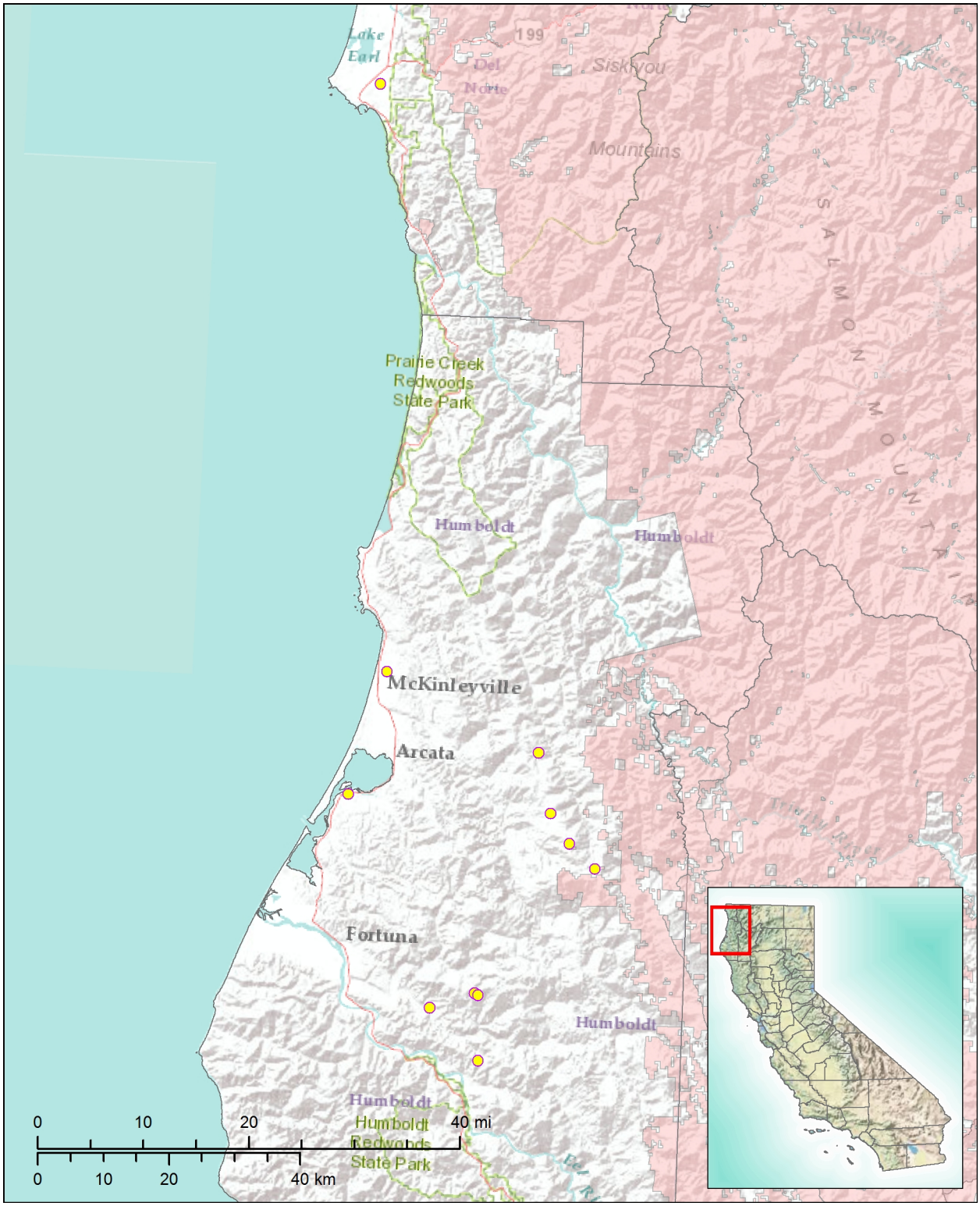
Note: Federally recognized Endangered, Threatened, Proposed, or Candidate species under the Endangered Species Act are omitted as they do not meet the definition of a Species of Conservation Concern (FSH 1909.12 § 12.52).

State Listing	G-rank	S-rank	CRPR	R5 FSS	NFP SM	CA BLM
CA: Not listed NV: Not listed OR: Not listed	G5	CA: S1 NV: Not listed OR: Not listed	2B.2	Not listed	Not listed	Not listed

SWAP:	NNHP:	NNPS:	ORBIC:	OCS:	IUCN:
Not listed	Not listed	Not listed	Not listed	Not listed	Least Concern

Expanded abbreviations and citations: State Listing=California Endangered Species Act Listing (CDFW 2017b), Nevada Division of Forestry Fully Protected Plant Species (NAC 527) (NDF 2012), Oregon Department of Agriculture Listed Plants (ODA 2014); G-rank=Global Conservation Status (CDFW 2017a; NatureServe 2017); S-rank=Subnational (state or province-level) Conservation Status (CDFW 2017a; NatureServe 2017; NNHP 2017; ORBIC 2016); CRPR=California Rare Plant Rank (CNPS 2017); R5 FSS=USDA Forest Service Region 5 Regional Forester Sensitive Plant Species List (USDA 2013); NFP SM=Forest Service and Bureau of Land Management Northwest Forest Plan Survey and Manage Species (USDA 2001); CA BLM=California Bureau of Land Management Designated Sensitive Species (BLM 2010); SWAP=California State Wildlife Action Plan Status (CDFW 2015); NNHP=Nevada Natural Heritage Program Status (NNHP 2017); NNPS=Nevada Native Plant Society Status (NNHP 2017); ORBIC=Oregon Biological Information Center Status (ORBIC 2016); OCS=Oregon Conservation Strategy Species (ODFW 2016); IUCN=International Union for Conservation of Nature Red List Status (IUCN 2017).

Distribution: North America, throughout Canada and northern and western United States (NatureServe 2017; Ball and Reznicek 2003). California occurrences are restricted to Humboldt County, with a single occurrence located in Del Norte County. Another occurrence is represented by a polygon that enters into Six Rivers NF. There are an additional four occurrences that are within five miles of the Six Rivers NF (CNDDB 2017; CCH 2017). These California occurrences are found in the Northern Franciscan Redwood Forest and Coastal Lowlands ecoregions (Griffith et al. 2016; CNDDB 2017).



Map Sources: *Layers*: USDA Forest Service, Pacific Southwest National Forests: CPAD 2016. California counties: CDF 2009. *Basemaps*: California inset map: © 2013 National Geographic Society, i-cubed (Esri 2017a). Main map: Esri, DeLorme, USGS, NPS (Esri 2012) and Esri, USGS, NOAA (Esri 2017b).

Locations within California:

(Note: Record numbers indicate sites that contain an individual, population, or groups of populations located within ¼ mile of each other (per the California Natural Diversity Database (CNDDB) definition of Element Occurrences in California). Official Element Occurrence (EO) numbers for plants in California are determined solely by the CNDDB and are included within the Reference (Source) column for CNDDB data. Duplicate records from the same site are given the same record number and included in red. The Population Info column includes total number of individuals and total number and size of populations/sub-populations when provided. Elevations in meters from source were converted to feet. If not provided in original source, Land Manager information was obtained using the California Protected Areas Database (CPAD 2016) and Quad information was obtained using 24K Quads, SDE Feature Class (CDFG 2013). All other information is directly from the Reference (Source) column unless additional citation is given.)

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
1	APPROXIMATELY 0.35 AIR MILE NW OF REDWOOD HOUSE, S OF YAGER CREEK.	Humboldt	Owl Creek (4012358)	CNDDB, May 2017 (EO 3)	18-Feb-2013	4-5 PLANTS LOCATED NEAR BOTTOM OF STOCK POND IN 2002. 15 PLANTS OBSERVED IN 2013 (1 PLANT WITH INFLORESCENCE).	TIMBER HARVEST. GRAZING IN THE AREA.	PVT-Humboldt Redwood Co.	2250
1	Near the Redwood House, on the road to head of Yager	Humboldt	Owl Creek (4012358)	CCH, Jan 2017 (POM160305)	5-Jul-1926				2001
1	near Redwood House (on road to head of Yager); Northern Coast Ranges	Humboldt	Owl Creek (4012358)	CCH, Jan 2017 (UC303008)	5-Jul-1926				2001
1	near Redwood House (on road to head of Yager); Northern Coast Ranges	Humboldt	Owl Creek (4012358)	CCH, Jan 2017 (UC79832)	5-Jul-1926				2001

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
2	REDWOOD CREEK. UPPER COURSE. E OF SNOW CAMP MOUNTAIN.	Humboldt	Board Camp Mtn. (4012366)	CNDDB, May 2017 (EO 4)	5-Jun-1987	ONLY SOURCE OF INFORMATION FOR THIS SITE IS A 1987 PYKALA COLLECTION. NEEDS FIELDWORK.		Six Rivers NF	3600
2	E of Maple Creek (SE of Snow Camp Mountain, upper course of Redwood Creek); Redwood Creek	Humboldt	Board Camp Mtn. (4012366)	CCH, Jan 2017 (UC1586919)	5-Jun-1987			Six Rivers NF	3609
3	EDGES OF SNOW CAMP LAKE.	Humboldt	Mad River Buttes (4012367)	CNDDB, May 2017 (EO 5)	3-Sep-2014	APPROXIMATELY 75 PLANTS ESTIMATED IN 2012. 10 CLUMPS ESTIMATED IN 2014; LIKELY MORE INDIVIDUALS IN AREA BUT DENSE HERBACEOUS COVER MADE DETECTION DIFFICULT. 1937 TRACY COLLECTION FROM "SNOW CAMP" IS ALSO ATTRIBUTED TO THIS SITE.	LAND IS MANAGED FOR TIMBER; SITE WITHIN RIPARIAN MGMT ZONE. TRAMPLING, HERBIVORY, COMPETITION FROM LARGER CAREX SPECIES.	PVT-Green Diamond Resource Co.	4600
3	Snow Camp.	Humboldt	Maple Creek (4012377)	CCH, Jan 2017 (DS260059)	12-Aug-1937				4600

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
3	Snow Camp	Humboldt	Mad River Buttes (4012367)	CCH, Jan 2017 (GH424016)	12-Aug-1937				
3	Snow Camp Lake; NW end of the lake	Humboldt	Mad River Buttes (4012367)	CCH, Jan 2017 (JEPS109966)	3-Aug-2006				4580
3	Snow Camp	Humboldt	Maple Creek (4012377)	CCH, Jan 2017 (RSA22378)	12-Aug-1937				
3	Snow Camp	Humboldt	Maple Creek (4012377)	CCH, Jan 2017 (UC585638)	12-Aug-1937				4600
3	Snow Camp Lake; NW end of the lake	Humboldt	Mad River Buttes (4012367)	Calflora, May 2017 (xr168782)	3-Aug-2006	1+ individuals			4593
4	EUREKA.	Humboldt | Pacific Ocean	Eureka (4012472)	CNDDB, May 2017 (EO 6)	24-Jul-1912	TRACY COLLECTIONS FROM "EUREKA" AND "IMMEDIATE VICINITY OF EUREKA" ATTRIBUTED TO THIS OCCURRENCE. NEEDS FIELDWORK TO GET MORE PRECISE LOCATION.		Unknown	500

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
4	Bed of Winter Pond	Humboldt	Eureka (4012472)	CCH, Jan 2017 (GH424018)	9-Aug-1903				
4	Bed of Winter Pond	Humboldt	Eureka (4012472)	CCH, Jan 2017 (GH424019)	30-Jun-1901				
4	immediate vicinity of Eureka	Humboldt	Eureka (4012472)	CCH, Jan 2017 (UC1103574)	9-Aug-1903				
4	at Eureka Northern Coast Ranges, Eureka	Humboldt	Eureka (4012472)	CCH, Jan 2017 (UC194807)	24-Jul-1912				
4	immediate vicinity of Eureka	Humboldt	Eureka (4012472)	CCH, Jan 2017 (UC50827)	30-Jun-1901				
5	DOWS PRAIRIE.	Humboldt	Arcata North (4012481)	CNDDB, May 2017 (EO 7)	13-Jul-1934	ONLY SOURCE OF INFORMATION FOR THIS SITE IS A 1934 TRACY COLLECTION. NEEDS FIELDWORK.		Unknown	200
5	Dow's Prairie.	Humboldt	Arcata North (4012481)	CCH, Jan 2017 (CAS233844)	13-Jul-1934				200

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
5	Dow's Prairie.	Humboldt	Arcata North (4012481)	CCH, Jan 2017 (DS253965)	13-Jul-1934				200
5	Dow's Prairie	Humboldt	Arcata North (4012481)	CCH, Jan 2017 (GH424017)	13-Jul-1934				
5	Dow's Prairie	Humboldt	Arcata North (4012481)	CCH, Jan 2017 (POM247166)	13-Jul-1934				
5	Dow's Prairie	Humboldt	Arcata North (4012481)	CCH, Jan 2017 (UC562279)	13-Jul-1934				200
6	HEADWATERS OF ROOT CREEK, NW END OF CLARK MOUNTAIN.	Humboldt	Redcrest (4012348)	CNDDB, May 2017 (EO 8)	21-Sep-2005	ABOUT 30 PLANTS OBSERVED BY LEPPIG AND LABANCA IN 2005. PLANTS ARE GRAZED BY DEER AND ARE PROBABLY MORE COMMON THAN IT APPEARS.	GRAZING BY DEER, TIMBER HARVEST.	Unknown	1400

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
6	Pacific Lumber Company land. Clark Mountain Fen, Headwaters of Root Creek on NW side of Clark Mt., UTM Zone 10, 423098E, 4477336N	Humboldt	Redcrest (4012348)	CCH, Jan 2017 (CHSC92463)	21-Sep-2005				1312
6	Pacific Lumber Company land; Clark Mountain Fen, Headwaters of Root Creek on NW side of Clark Mountain.	Humboldt	Redcrest (4012348)	CCH, Jan 2017 (HSC96377)	21-Sep-2005				1312
7	AT W EDGE OF LARGE SWAMP, E OF FOX CREEK AND N OF HIGHWAY 36, N OF RIVERSIDE PARK.	Humboldt	Owl Creek (4012358)	CNDDB, May 2017 (EO 9)	12-Jul-2002	4 PLANTS OBSERVED IN 2002. PLANTS TUFTED 4-6 DM TALL.	CLEARCUT LESS THAN 100 FEET TO THE EAST IN 2002.	PVT-Pacific Lumber Co.	226
7	PalCo land, .5 mi. W of Fox Creek Rd., W side of large swamp	Humboldt	Hydesville (4012451)	CCH, Jan 2017 (HSC95392)	12-Jul-2002				230

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
7	Pacific Lumber Company Land. L 35 Rd. 1/2 mile W of Fox Creek Road, W side of large swamp	Humboldt	Owl Creek (4012358)	CCH, Jan 2017 (CHSC85062)	12-Jul-2002				230
8	LAKE PRAIRIE; MARSHY AREA BETWEEN THE DAM AND THE COUNTY ROAD.	Humboldt	Maple Creek (4012377)	CNDDB, May 2017 (EO 10)	3-Aug-2006	SITE BASED ON A 2006 TAYLOR COLLECTION. A 1987 PYKALA COLLECTION FROM "E OF MAPLE CREEK, LAKE PRAIRIE, SWAMPY LAKESHORE, 3450 FT" IS ALSO ATTRIBUTED TO THIS SITE.		Unknown	3450
8	Lake Prairie; marshy area between the dam and the county road	Humboldt	Maple Creek (4012377)	CCH, Jan 2017 (CHSC98385)	3-Aug-2006				3471
8	E of Maple Creek, Lake Prairie	Humboldt	Maple Creek (4012377)	CCH, Jan 2017 (HSC95660)	5-Jun-1987				3451
8	Lake Prairie; marshy area between the dam and the county road	Humboldt	Maple Creek (4012377)	CCH, Jan 2017 (JEPS109914)	3-Aug-2006				3471

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
8	E of Maple Creek, Lake Prairie.	Humboldt	Maple Creek (4012377)	CCH, Jan 2017 (SEINET2 044695)	5-Jun-1987				3451
8	Lake Prairie; marshy area between the dam and the county road	Humboldt	Maple Creek (4012377)	Calflora, May 2017 (xr168786)	3-Aug-2006	1+ individuals			3484
9	S END OF CHRISTMAS PRAIRIE.	Humboldt	Maple Creek (4012377)	CNDDB, May 2017 (EO 11)	6-Jun-2011	15 PLANTS OBSERVED IN 2011; ALL TUFTS WELL DEVELOPED WITH MULTIPLE FLOWERING HEADS AND A LOT OF FOLIAGE.	LAND MANAGED FOR TIMBER. HERBIVORY/TRAMPLING, PROPOSED ROAD ACTIVITY AND WATER DRAFTING AREA.	PVT-Green Diamond Resource Co.	2370
10	TWO MILES E OF CRESCENT CITY.	Del Norte	Crescent City (4112472)	CNDDB, May 2017 (EO 12)	3-Jul-1936	ONLY SOURCE OF INFORMATION FOR THIS SITE IS A 1936 EASTWOOD & HOWELL COLLECTION. NEEDS FIELDWORK. ID OF SPECIMEN SHOULD PROBABLY BE VERIFIED; SITE IS ABOUT 50 MILES N OF OTHER CAREX ARCTA OCCURRENCES.		Unknown	

Rec. #	Locality	County	Quad	Reference (Source)	Date Last Observed	Population Info	Threats	Land Manager	Elev. (ft.)
10	2 miles E of Crescent City.	Del Norte	Crescent City (4112472)	CCH, Jan 2017 (CAS234957)	3-Jul-1936				

Distribution on National Forest System (NFS) Lands:

(Please see Reference column of Locations table above for references pertaining to Record Numbers indicated on NFS lands.)

National Forest System (NFS) lands	Record #s (from Locations table above)	CNDDB EOs	Non-CNDDB Records	Recent (seen in past 20 yrs.)	Historic (not seen in past 20 yrs.)	Most Recent Obs.	EOs/ Recs. (5 mile buffer)	Total Records on NFS lands
Angeles:	-	-	-	-	-	-	-	0
Cleveland:	-	-	-	-	-	-	-	0
Eldorado:	-	-	-	-	-	-	-	0
Inyo:	-	-	-	-	-	-	-	0
Klamath:	-	-	-	-	-	-	-	0
Lake Tahoe Basin MU:	-	-	-	-	-	-	-	0
Lassen:	-	-	-	-	-	-	-	0
Los Padres:	-	-	-	-	-	-	-	0
Mendocino:	-	-	-	-	-	-	-	0
Modoc:	-	-	-	-	-	-	-	0
Plumas:	-	-	-	-	-	-	-	0
San Bernardino:	-	-	-	-	-	-	-	0
Sequoia:	-	-	-	-	-	-	-	0
Shasta-Trinity:	-	-	-	-	-	-	-	0
Sierra:	-	-	-	-	-	-	-	0
Six Rivers:	2	1	0	0	1	5-Jun-1987	4	1
Stanislaus:	-	-	-	-	-	-	-	0
Tahoe:	-	-	-	-	-	-	-	0
Totals:	N/A	1	0	0	1	N/A	4	1

Demographic and Population Trends: Exactly five of ten (5/10; 50%) element occurrences have population count and size estimate information. A total of 139 plants have been observed across these five occurrences, for an average of 27.8 plants per occurrence and a median value of 15. A single occurrence (EO 3) accounts for over half (75/139; ~54%) of the total number of plants documented in California. Four of the total number of occurrences (4/10; 40%) are historic and have not been observed since at least 1987 (remaining historic records were last observed in 1912, 1934, and 1936) (CNDDB 2017; CCH 2017).

Life History: *Carex arcta* is a perennial and cespitose herb that blooms from June until September (Wilson et al. 2008; CNPS 2017). *Carex* taxa are considered adequately adapted for fire given their growth form and habitat preference. Shallowly rooted, upland sedges are most prone to mortality from fire. *Carex* taxa growing in mesic and wetland habitats often survive burn events, retaining metabolically active tissue below ground level.

Carex species are generally considered to be wind pollinated. All perigynia float, indicating an ability to disperse aquatically. All *Carex* perigynia stick to moist surfaces and can adhere to feet, shoes, feathers, or vehicles (Wilson et al. 2008). Seeds of *Carex* species are able to remain dormant for prolonged periods of time and are considered important components of soil seed banks. Seeds from 200 year-old buried perigynia of *C. bigelowii* were germinated during one study. Resulting seedlings were compared to seedlings from modern *C. bigelowii*. Differences were observed in most traits that were measured in the analysis, indicating that seed banks may harbor considerable genetic diversity in locations with low recruitment due to the occupation of longstanding clonal colonies.

Carex species are primary producers that are dominants in certain plant communities, providing a multitude of resources to wildlife (food, cover, nests, nesting material). Many bird species (ducks, rails, grouse, swamp sparrow, tree sparrow, snow bunting, Canada goose, mallard, American widgeon, cinnamon teal, blue-winged teal, wood duck, and others) are known consumers of sedges. Certain sedge species are important soil binders that establish where many plant species are unable to thrive (Newhouse et al. 1995). An extended discussion on general aspects of sedge ecology can be found in the document assembled by Newhouse et al. (1995) for the USDA Forest Service.

Diversity: The genus *Carex* is a globally distributed group of roughly 2,000 species. It is among the largest genera of vascular plants. *Carex* species are often major components of wetland habitats, also occurring in upland areas in arctic tundra, montane grasslands, montane forests, and other high elevation habitats (Ball and Reznicek 2003). Species that occupy the latter habitats are often regarded as upland sedges (Wilson et al. 2008).

The genus *Carex* has historically been broken into a number of subgenera that are further broken into as many as 71 sections, all of which are based on morphology. Molecular phylogenetic studies in recent decades have demonstrated the polyphyletic nature of many classically defined sections. Homoplasy and a heavy emphasis on plesiomorphic characters has obfuscated our understanding of the group. Groups are defined by these heavily weighted characters that have dictated taxonomic boundaries for many years (Hipp et al. 2006; Jimenez-Mejias et al. 2016).

Hybridization is not as common as suspected and has seldom been reproduced experimentally (Ball and Reznicek 2003; Wilson et al. 2008; Jimenez-Mejias 2016). Hybrids that do form are often sterile (Ball and Reznicek 2003). Characters that distinguish taxa exhibit considerable variation. Specimens considered hybrids may be individual representatives of solid species that occupy the limits of variation within the morphological parameters of an established taxon. That is, extreme plasticity of subtle characters may blur species boundaries (Jimenez-Mejias 2016).

There is a striking series of chromosome numbers among and within taxa in the genus *Carex*. These numbers range from n = 6 to n = 66, where every number is represented between 6 and 47. Over 100 species have multiple cytotypes. Some of these taxa span a range of up to 10 haploid chromosome counts. It is suspected that chromosomal structure has much to do with this variation. Members of the genus *Carex* have holocentric chromosomes with centromeres that are distributed along the length of the chromosome. Genomic fragments that are not inherited in organisms with monocentric chromosomes are thought to be passed along in organisms with holocentric chromosomes, providing a broader substrate for genomic modification and molecular variation among and within these taxa (Briggs and Walters 2016).

Habitat: Throughout its distribution, *Carex arcta* is known to occur in swampy woods, swampy thickets, woodlands, sphagnum bogs, and wet meadows (Wilson et al. 2008; Ball and Reznicek 2003; Zika et al. 2017). *Carex arcta* is often witnessed as a dominant member of wetland systems in the southern Cascade Range in Oregon. Although, it is generally observed in smaller and more isolated populations in such habitats (Wilson et al. 2008). California records of *C. arcta* document the plant growing in stock ponds, an alder/willow swamp, at lake margins, in a sedge swamp, a *Sphagnum* sp. dominated Redwood forest, a spring associated wetland, and in marshy locations. These California records document *C. arcta* growing alongside *Sequoia sempervirens, Sphagnum* sp., *Carex utriculata, C. rostrata, C. unilateralis, C. vesicaria, Sparganium emersum, Umbellularia californica, Oenanthe sarmentosa, Spiraea douglasii, Athyrium filix-femina, Alnus* sp., *Salix* sp., *Pseudotsuga menziesii, Veronica americana*, and *Notholithocarpus densiflorus* (CNDDB 2017).

Records from outside California, in the Pacific Northwest, document *C. arcta* in seasonally wet meadows, sloping subalpine meadows, near springs in wet substrates, exposed mudflats in a reservoir, fens, on floating logs in ponds, in silt deposition within streams, and on flats and hillsides in riparian areas. Plants associated with these records are reported to grow alongside *Juncus tenuis, J. confusus, J. articulatus, Carex utriculata, C. aquatilis, C. saxatilis, C. diandra, C. stipitata, C. vesicaria, C. pachystachya, C. lenticularis, C. nigricans, Sphagnum* sp., *Typha latifolia, Salix sitchensis, Artemisia rigida, Pinus ponderosa, Allium tolmiei, Gnaphalium* sp., *Eleocharis* sp., *Picea engelmannii, Stellaria borealis, Ranunculus gmelinii, Veronica scutellata, Drosera* sp., *Rubus pubescens, Galium trifidum, Salix sitchensis, Lycopus* sp., *Ludwigia palustris, Lysichiton americanus, Calamagrostis canadensis, Chamerion angustifolium, Leucanthemum vulgare, Pseudotsuga menziesii, Holodiscus discolor, Cornus sericea, Symphoricarpos albus, Prunella vulgaris*, and *Scirpus microcarpus* (CPNWH 2017).

Habitat Status or Trend: *Carex arcta* is distributed along the northern and western perimeter of the United States and is found throughout Canada, except in the province of Nunavut (NatureServe 2017; Wilson et al. 2008; Ball and Reznicek 2003). *Carex arcta* is considered Critically Imperiled (S1) in California, Wyoming, Alberta, Saskatchewan, Manitoba, New York, and Vermont (CNPS 2017; NatureServe 2017). It is Imperiled (S2) in the Yukon Territory and is Possibly Extirpated (SH) in Newfoundland. It is either Apparently Secure (S4), Secure (S5), or Not Ranked (SNR) throughout the remainder of its range (NatureServe 2017). Five of ten (5/10) CNDDB occurrence records indicate that timber harvest activities threaten plants at the

respective locations. Four of these ten (4/10) CNDDB occurrence records indicate that grazing/herbivory impact plants at the respective sites. Foot traffic and trampling is mentioned in reports from two separate occurrences. Road work and trail construction threaten plants from a single occurrence (CNDDB 2017).

Capacity for the Species to Disperse: Direct information on the dispersal capacity of *C. arcta* is not available. Perigynia are the primary units of dispersal among species of *Carex*. Ground nesting birds, waterfowl, and other small birds are known to consume *Carex* seeds. These seeds may be transported and dispersed within the digestive tracts of these animals. Flat and broad perigynia (common in section Ovales and Racemosae) are known to be wind dispersed. Perigynia that have robust and pointed beaks may adhere to animals and become entangled in their coats. Some upland sedges have succulent perigynium bases that get considerable attention from ants. All perigynia float, indicating an ability to disperse aquatically. In addition, all *Carex perigynia* stick to moist surfaces and can adhere to feet, shoes, feathers, or vehicles (Wilson et al. 2008).

Threats: Timber cultivation and harvesting, road construction and maintenance, herbivory, trampling, and competition from congenerics are listed as threats to *Carex arcta* (CNDDB 2017).

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January 18, 2018

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Formatting: Form is set up as 508 compliant. Please use the "styles" if further formatting is necessary.

Purpose: This is to maintain the best available science on a species that could be used by the Forest Service in a variety of functions. Specifically, there would be additional steps and evaluations to determine whether or not this species would be considered a Species of Conservation Concern under the 2012 Planning Rule or a Sensitive Species under the 1982 Planning Rule.

Additional Considerations at the Forest Level: Habitat amount and juxtaposition of both the species and habitat locations.