Inventory, Monitoring, and Assessment of Relict *Carex* spp. Populations on Olympic National Forest, WA

Report prepared for the Interagency Special Status / Sensitive Species Program
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Introduction

Olympic Peninsula occurrences of *Carex anthoxanthea, Carex pauciflora, Carex circinata,* and *Carex stylosa* are all relict populations from the last Ice Age, with these remnant populations being at the southern-most extent of their known range (Wilson et al, 2008). All four of these species are on the Regional Foresters Special Status Species List (USDA, 2011) for the Olympic National Forest (ONF) as either documented or suspected to occur on the Forest. Since the rarity of these species in Washington State is a direct result of the gradual northern retreat of these species after the warming associated with the end of the last Ice Age, it is likely that these contemporary populations are particularly vulnerable to current global climate change. As such, they could be a "canary in the coal mine" for ecosystem change that is projected for the region.

Related to these populations being relicts, they also represent peripheral populations of each of these taxa, meaning that they occur on the geographic edge of their ranges. These types of populations are of particular interest for conservation because they are living evolutionary experiments in that they are more likely to experience different selective pressures than more central populations, which can in turn instigate a process that can be a precursor to speciation. They also have a high potential for being genetically distinct from central populations due to the increased influence of population bottlenecks, founder effects, and genetic drift (Leppig and White, 2006). These populations are of interest not only for the preservation of biodiversity in the region, but also to maintain overall genetic diversity within the species.

In light of the factors discussed above, it was determined that completing the following objectives would be important for the successful management and conservation of relict sedges on the Olympic National Forest: (1) Collect baseline information on the current status of known occurrences, (2) Survey appropriate habitat for new occurrences, and (3) Assess current conditions and determine if there are any existing threats that can be mitigated.

Species Accounts

Descriptions and nomenclature follow Field Guide to Pacific Northwest Sedges (Wilson et al, 2008) and Flora of North America (accessed online, Nov. 2011).

Carex anthoxanthea is a rhizomatous sedge, often forming loose clumps in the Pacific Northwest. Culms are 5 – 40 cm long, delicate, and longer than the leaves. Leaves are flat, straight, and 1.5 – 2.5 mm wide, with the lowest leaves reduced to bladeless sheaths. Culms bear a single, unbranched spike which is 1 – 2.7 cm long and lacks inflorescence bracts. Each spike is usually has only male or female flowers, but occasionally spikes are androgynous. Pistillate scales are persistent, and shorter than or equaling the perigynia, so that the perigynia beak and distal most body is exposed. Perigynia are ascending, linear-lanceolate, 3 – 4.3 mm long and 0.8 – 1.1 mm wide. Perigynia have several veins and 2 ribs; distal margins smooth and the beak tip is dark. Typically, female flowers have 3 stigmas, but rarely only two stigmas are present. Achenes are trigonous (rarely lenticular).

Figure 1: 2270 road population of *Carex anthoxanthea;* a) rocky seep habitat on roadcut, b) robust individual growing in ditch along road edge, and c) spindly individuals growing on wet rock face.

Prior to the completion of these surveys, *C. anthoxanthea* was known in Washington State from a single occurrence in Grays Harbor County, where it grows on a cool, rocky seep at 2600 ft elevation along the side of the 2270 road (Figure 1), just outside the Three Peaks Botanical Area, within ONF. This population is the most southerly occurrence of this sedge, and is likely among the last remnants of much larger and more widespread populations that were likely present in Washington in the past. Further north to Alaska, it is typically found in fens, bogs, muskegs, and wet meadows (Wilson et al, 2008). Current threats include ground disturbing activities, invasive plants, hydrologic alterations to wetlands, and climate change.

Carex pauciflora is a long rhizomatous sedge, with 10 – 40 cm long, delicate culms, which arise singly or in loose tufts. Lowest leaves reduced to bladeless or nearly bladeless sheaths, only 1 -3 leaves with blades, these are shorter than or equaling the culms and 0.5 – 1.6 mm wide. One spike per culm, androgynous, lacking inflorescence bracts, and 0.3 – 1.0 cm long. Scales of female flowers are deciduous and shorter than the perigynia. Perigynia are lanceolate, 5.9 – 7.8 mm long and 0.7 – 1.1 mm wide with persistent and exerted styles and 3 stigmas. Perigynia are ascending when young, but become spreading to reflexed upon maturation.

C. pauciflora is known from scattered populations on the eastern Olympic peninsula, Puget Sound, and northern Cascades of Washington, including one occurrence in the Cranberry Bog Botanical Area of ONF (Figure 2). This species is typically found growing in moss mats in *Sphagnum* bogs. Some Washington

Figure 2: Cranberry Bog Botanical Area population of *Carex pauciflora*; a) Habitat and associated species, including *Ledum groenlandicum*, and *Sphagnum* sp. b) *C. pauciflora* inflorescence.

State populations already appear to be declining (Wilson et al, 2008). Of concern, part of the wetland that supports the ONF occurrence has in recent years been invaded by a variety of aggressive weeds, including reed-canary grass (*Phalaris arundinacea*) and bull thistle (*Cirsium vulgare*). Efforts are currently underway to control and eventually eradicate these invasive plants at this location (Bartlett, 2011), but until these surveys it was unknown what affect the presence of these non-native plants have had on this population of *C. pauciflora*.

Carex circinata is a cespitose to very short rhizomatous sedge that grows in dense tufts. Culms are 5-25 cm long, delicate, and as long as or longer that the leaves. Leaves are involute, arching and somewhat curled. Spikes are 1.5 – 2.5 cm long, androgynous, lack inflorescence bracts, and occur singly on culms. Perigynia are ascending and linear lanceolate to narrowly fusiform, each with a persistent bract that exposes only the beak . Typically, perigynia are 9 times as long as wide (4.5 – 6 mm long and 0.7 – 0.9 mm wide), with finely serrulate distal margins, and a hyaline beak tip. Three stigma with triangular achenes is typical, but occasionally 2 stigmas and lenticular achenes are seen.

Figure 3: *Carex circinata*; photo by Matt Goff, from http://wiki.seaknature.org/Carex_circinata

C. circinata (Figure 3) is known in Washington from only three occurrences on the Olympic Peninsula, two of which are within ONF. The first of these is in the Colonel Bob Wilderness, and the other in the Three Peaks Botanical Area. The ONF populations are the most southerly of all known occurrences, and are associated with several other populations of sensitive species, including *Ranunculus cooleyae, Erigeron aliceae,* and *Parnassia palustris* var. *neogaea*. Typical habitat includes moist N – NW facing cliffs and talus slopes, and wet meadows at 3200 – 4500 feet elevation. Although specific threats have not yet been identified, climate change and recreational activities (trampling) are probably the biggest threats to this sedge (Wilson et al, 2008; WDNR et al, 2005).

Figure 4: *Carex stylosa*; photo by Ivar Heggelund, from http://www.nordaflora.no/carex_stylosa.htm

Carex stylosa is a loosely cespitose sedge which forms large spreading clumps. Culms are 15 – 50 cm tall, and leaves are 2 – 4 mm wide. Each culm typically has (2) 3 – 4 (5) spikes, each of which are 0.7 – 2 cm long; lateral spikes are female, and the terminal spike is either male or has a mix of male and female flowers. Pistillate scales are purplish black or brown with hyaline margins, shorter and narrower than perigynia, and have a raised, prominent midvein that is lighter colored than body. Perigynia are spreading and range in color from green to yellow-brown to dark like the scales. Perigynia are veinless (except for two marginal ribs), papillose, elliptic, and 2.5-3.5 x 1.5-1.75 mm. Beak is either very short (0.2-0.3mm) and abrupt, or the perigynia is beakless. Style eventually deciduous, but can be moderately persistent after the three stigmas have been shed. Achenes are trigonous, and nearly fill the perigynia.

C. stylosa has not been documented on ONF, but it is suspected here since appropriate habitat does exist, and there are two known populations in Olympic National Park. In addition to this, a population has been reported from the Buckhorn Wilderness of the ONF (L. Potash, pers. comm.), but this has not been confirmed and documented. In Washington, this sedge is typically found in high elevation bogs, but has also been found in marshes, wet meadows, fens, and along stream banks in more northern populations (Wilson et al, 2008).

Methods

The first objective of this effort was to revisit the known populations of the species described above, two of which had a single known occurrence on the Forest, and the other with two known occurrences. There are currently no known *Carex stylosa* populations on the Forest, although there are anecdotal reports of a population near Marmot Pass in the Buckhorn Wilderness (Potash, pers. comm). It appears that none of the known populations have been "officially" visited and documented by the Forest Service for between 10 and 30 years, and surveys specifically targeting these species have never been conducted on the ONF.

The ***Carex anthoxanthea*** population was relocated - after two previous failed attempts – and documented on September 22, 2011. The first attempt failed due to a very late snow pack, which made the population unexpectedly inaccessible well into August, and the second attempt failed because the location information in our various databases is incorrect and showed the population as occurring in a forested area approximately 400 feet south of the 2270 road, between the 420 and the 440 spurs, just inside the Three Peaks Botanical Area. These spurs were diligently searched, since all the descriptions of the occurrence indicated that it was on a seepy road cut. It was later discovered that the population is actually on the 2270 road, about 0.5 miles past the 400 spur, just before the hairpin turn at the 420 spur junction just outside the boundary of the Three Peaks Botanical Area. Only the area upslope from the road was

searched, since down slope was very steep and there appeared to be no appropriate habitat located within sight of the road.

The Cranberry Bog population of ***Carex pauciflora*** was initially visited on July 21, 2011 but was not assessed at that time because very few of the plants were in flower, making them difficult to distinguish from *Eriophorum chamissonis*, which is abundant in the area. This visit did, however, provide a search image for this inconspicuous, and easy to overlook sedge, and the habitat it is found in. The population was visited a second time on August 31, 2011 when many more plants were in flower, and distinguishing characters of the vegetative plants could be identified to differentiate it from the cotton grass that it looks so similar to at first glance. The entire population was documented at that time, and the entire wetland assessed as part of a separate, but closely related Wetland Inventory and Assessment Project funded through the Ecology program on the Olympic NF. As part of the wetland assessment, additional data was collected in a 100 m^2 plot inside the *C. pauciflora* population, including a comprehensive species list with cover estimates for each (Table 1). Prior to these surveys, the *C. pauciflora* population was first documented in 1986, and then was revisited by Bill Watson, a Forest Service botanist, on September 26, 1995. The initial 1986 visit described "500 – 1000 plants over an area of 25 x 40 meters", while notes from the 1995 visit says "This species appears to be quite numerous and widely dispersed throughout the bog habitat. A cursory examination of the area suggests (that) a population…of several thousand ramets may be present."

One of the ONF ***Carex circinata*** populations is located on the summit of Colonel Bob, a 4400 ft peak northeast of Lake Quinault in the Colonel Bob Wilderness. The last time this population was documented was on July 11, 1991, and was described as being located "in the summit rocks on the north to northwest aspect. Do not need climbing gear to access the population." An attempt was made to visit this population mid-August, 2011, but the population was inaccessible at that time due to snow. Due to the difficulty and time involved with visiting this population, and the uncertain weather that continued through the summer of 2011, another attempt was not made to visit the occurrence this year. Every effort will be made to visit and document this rare sedge in 2012. We were also unable to re-locate the Three Peaks population of *C. circinata*, which has been documented to occur in a large complex of several small meadows between the 2270 road and the 2270500 spur. The occurrence information in the WNHP GIS dataset shows a 1000 ft radius circle to describe the location of this population, and not all of the appropriate habitat within this circle was searched during the course of these surveys due to time limitations. Also, the phenology of the vegetation was somewhat early at the time of our visit, so it is possible that it was too early in the growing season to identify this sedge. Every effort will be made to revisit this site in 2012, since the last time this population was documented was by WNHP almost 10 years ago, and it has never been documented by Forest Service personnel.

A second, equally important objective of this project was to survey for new populations of the species listed above, since appropriate habitat, although scattered and isolated, does exist on the Forest. The primary focus of the surveys was bogs, fens, and wet meadows since all of these species are known to occur in such habitats. Surveys were conducted at these types of wetlands throughout the Forest, with wetlands closer to the known populations being a higher priority (Map 1). Wetlands to survey were identified and prioritized by examining aerial photos and the NWI and Wetland layers in GIS, and by having conversations with people who have worked on the Forest for a long time and are could provide "on the ground" information about some of the wetlands identified. After the surveys were completed, areas suggested for future surveys were identified. Decisions regarding where these future surveys should take place were based on knowledge gained from completing this project, and on conversations with people familiar with the Forest and the species we are targeting.

Results and Discussion

The known populations of *Carex anthoxanthea* and *Carex pauciflora* were visited and assessed during these surveys. The two known populations of *Carex circinata*, however, were not relocated during these surveys, although it is very unlikely that this is because they have been extirpated from the documented sites. Rather, unusual weather and a very late snow pack prevented us from reaching these locations this year; they will be a high priority for survey next year. Two new populations of *Carex anthoxanthea* were found in the Three Peak Botanical Area. Including the wetlands the known and newly documented populations were found in, a total of 19 wetlands (approximately 100 acres) were surveyed for these rare sedges throughout the Forest (Map 1 and Table 2).

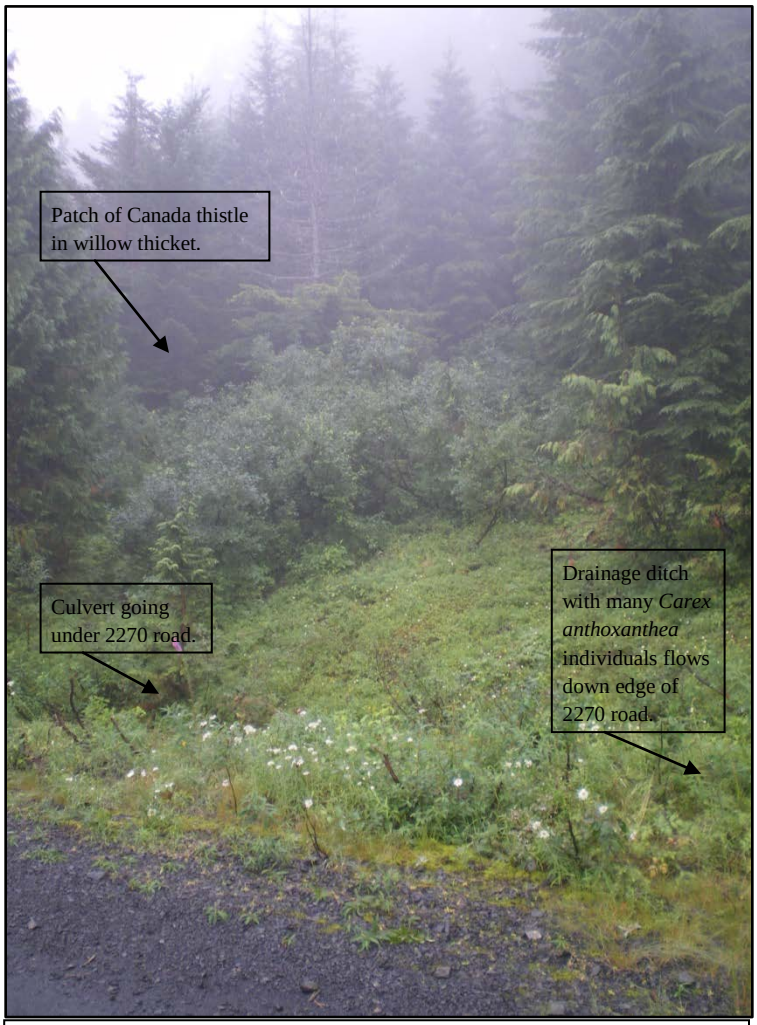


Figure 5: Potential threats to 2270 road population of *Carex anthoxanthea* include weed invasion, road maintenance activities, and potential hydrologic alterations. Photo shows seep area of population; the rock face seep is outside the right frame of the photo.

The known population of *Carex anthoxanthea* growing along the 2270 road was found to be in relatively good health, but several issues exist that are potential threats to this population. However, the population does appear to be larger than described in accounts from previous visits, which only mention plants growing on a wet rock face of a seepy road cut. The population documented by our surveys also includes plants found in a seep adjacent to a small, heavily vegetated drainage approximately 100 feet up the road from the rock face portion of the population, and in the drainage ditch on the upslope side of the road. Including all of these areas (rock face, wet seep, and drainage ditch), the population covers approximately 0.1 acres, with 2 – 3% of this area being occupied by *C. anthoxanthea*. The plants observed growing in the seep and in the drainage ditch were much more robust, and producing more fruit than those growing on the rock face, which looked spindly and brown (Figure 1). Associated species for the entire population include *Arnica amplexicaulis, Sanguisorba canadensis, Parnassia palustris var. neogaea, Parnassia fimbriata, Adiantum aleuticum, Alnus rubra, Thuja plicata, Chamaecyparis nootkatensis* and *Salix scouleriana*.

There are several potential threats to this population of *C. anthoxanthea*, the most significant of which is road maintenance that could alter or destroy the habitat that this plant is currently growing in (Figure 5). Of particular concern, the small drainage that supports the seep portion of the population is within just a

few feet of the 2270 road and a large culvert. If this culvert needs to be replaced (which eventually it will), the majority of the seep area will probably be destroyed. Related to this, ditch maintenance could also kill individual plants, as numerous individuals were seen growing in such areas between the seep and the rock face. Another more imminent threat to this population is a small infestation of Canada thistle (*Cirsium arvense*) that is growing along the drainage in a thicket of willow just upslope from the seep that supports a large portion of the *C. anthoxanthea* population. This infestation occupies approximately 0.1 acres (recorded as 500 m^2 in field notebook) at about 10% cover, and is within a few feet of the *C. anthoxanthea* growing in the seep area next to the road. Herbicide treatments for this location will be scheduled for the 2012 season and in the years to follow to ensure that this infestation does not expand further into the *C. anthoxanthea* habitat. Another potential threat is any future project work which might alter the hydrology of this small population. This would include work along the 2270 road, but also the 2270440 spur, which is upslope from this population. If this road is reopened, and culverts removed or installed, this could affect the "downstream" hydrology that is currently supporting this rare sedge.

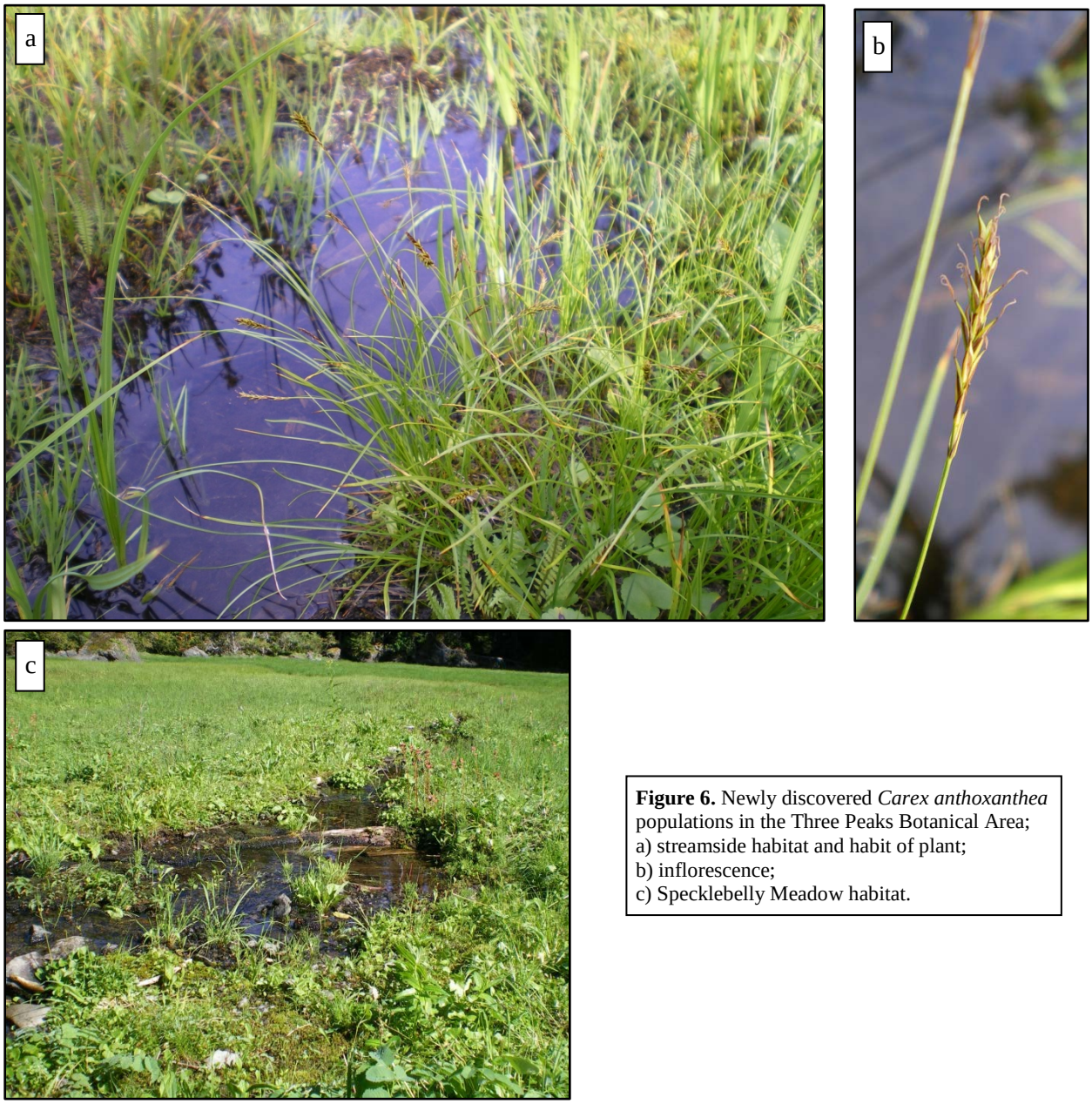


Figure 6. Newly discovered *Carex anthoxanthea* populations in the Three Peaks Botanical Area;
a) streamside habitat and habit of plant;
b) inflorescence;
c) Specklebelly Meadow habitat.

Two new *C. anthoxanthea* populations were discovered during the course of these surveys, which brings the total number of known populations in Washington to three. A collection from one of these populations was sent to Barbara Wilson of the *Carex* working group, who confirmed its identity as *C. anthoxanthea*. This collection will be archived at the Oregon State University herbarium. Both of the new populations are within the Three Peaks Botanical area, and are associated with the wetlands near the 2270460 spur (Map 2). They are physically close enough together, and similar enough in habitat and species composition that they could probably be considered a single population, but it does not appear that the two wetlands they occur in (called Cottongrass Meadow and Specklebelly Meadow, although neither of these are "official" names) are hydrologically connected. Because of this, and in order to more clearly document the location of where these plants were found, they will be documented separately. Both of these locations are large, very wet meadow/fen complexes which had pooled surface water and flowing channels at the time of our surveys on September 20, 2011. A majority of the *C. anthoxanthea* observed at both locations were growing along the edges of small (less than 3 feet wide, and less than 1 foot deep) perennial channels (Figure 6); *Parnassia palustris* var. *neogaea*, another sensitive species, was also common at both locations. Other associates include *Carex luzulina, Carex laeviculmis, Caltha biflora* var. *biflora, Hypericum anagalloides, Juncus ensifolius, Sanguisorba canadensis, Polygonum bistortoides,* and *Leptarrhena pyrolifolia.* Because the Three Peaks Botanical Area is rich with wetlands very similar to those that we found supporting *C. anthoxanthea*, similar wetlands should be searched specifically for this sedge, as it seems very likely that more populations exist in the area.

The Cranberry Bog population of *Carex pauciflora* was found to be in good health, and somewhere between the descriptions given on previous visits (in 1986 and 1995) in both number and distribution of these plants. *C. pauciflora* was observed to be restricted to the northeast corner of Cranberry Bog, and was most numerous in openings where low-growing *Ledum groenlandicum* had moderate to high cover in the *Sphagnum* mats that dominate the entire north end of the Bog. In other *Sphagnum* dominated parts of the Bog where *L. groenlandicum* is either 1) more than a half meter tall, or 2) without *L. groenlandicum* altogether, *C. pauciflora* is very sparse to absent. The area observed that supported *C. pauciflora* was approximately 25,000 ft^2 (about 0.6 acres), and the average cover of this sedge within this area was about 5%. The data collected at the plot inside this population describes the typical composition of the vegetation (Table 1), which was relatively uniform throughout the area where *C. pauciflora* was growing. No weeds were observed at the north end of Cranberry Bog in areas where *Sphagnum* is dominant, but the weeds at the south end of the Bog are slowly creeping northward around the edges of the wetland towards the *C. pauciflora* population. Reed canary grass, Canada thistle, and herb Robert are the biggest threat, and will almost certainly invade the north end of the Bog where *C. pauciflora* occurs if diligent efforts to eradicate these weeds are not maintained for years to come. There is currently an active restoration project underway, which includes weed eradication and planting natives at the south end of the Bog (Bartlett, 2011).

Table 1. Species list for 100 m^2 plot completed at Cranberry Bog.

Scientific name	Common Name	Cover
Ledum groenlandicum	Labrador tea	55
Kalmia microphylla	Bog laurel	<1
Eriophorum chamissonis	Cotton grass	3
Drosera rotundifolia	Sundew	6
Carex pauciflora	Few-flowered sedge	2
Sphagnum spp.	Sphagnum moss	95
Oxycoccus oxycoccus	Bog cranberry	8
Tsuga mertensiana	Mountain hemlock	4

No new populations of *Carex pauciflora* were discovered during these surveys, but very little *Sphagnum* dominated bog habitat was surveyed, primarily because it appears to be a very rare community type on the Forest. There is, however, a large wetland about 2 miles west of Cranberry Bog (between the 2870050 and 2870030 spurs) that has appears to have good potential to support this type of bog habitat, and therefore good potential to support *C. pauciflora*. It was not examined during these surveys because it is currently under private ownership, but the Olympic NF has expressed some interest in acquiring this parcel of land since it supports what appears to be high quality habitat, and is embedded in federally owned land. If this land is acquired by the Forest in the future (or if the current land owner is agreeable prior to that), this wetland should be an extremely high priority for survey.

Carex stylosa remains undocumented, but suspected on the Olympic National Forest. However, during the course of researching background information for this report, a hardcopy of an old e-mail chain was recently found in the back of a file cabinet that addressed a probable population of this species on the Olympic National Forest (Map 3). This conversation was between Shelly Benson (Hood Canal Botanist, who has since moved on), Robin Shoal (Ecologist and Native Plant Program Manager), and Laura Potash (Botany Program Manager & South Zone Botanist, Mt. Baker – Snoqualmie NF) and described a population along the Big Quilcene trail (#833.1) just east of Marmot Pass. Specifically, in July, 2006 Laura Potash wrote in her field notebook :

> "Possible *Carex stylosa* growing in wet meadow full of dandelions above Camp Mystery camping area. On edge of trail. Elevation 5469 ft, lat-long N 47 49.047 W 123 07.636. Appears somewhat clumpy, 3 clumps of ~30 stems each. >120 within 2m of trail. May be more but not enough time to look. Associates: *Carex spectabilis, Polygonum bistortoides, Valeriana sitchensis, Erythronium, Delphinium, Lupinus latifolius, Polemonium,* and about 40 other species. Aspect 98 deg, slope 10%."

In a recent e-mail exchange, Laura Potash said she did not collect a voucher specimen at the time she noticed this population because the phenology was too early for it to be useful material to try to key, but she felt fairly certain that it was *C. stylosa*. She also indicated that there were abundant weeds in the area, including dandelion, white Dutch clover, and perhaps creeping buttercup. Although none of the species mentioned are those targeted for control on the Olympic NF, because it's in Wilderness and the weeds are potentially associated with a sensitive plant species, a restoration plan for the Camp Mystery area might be in order. This area will be visited and assessed during the 2012 field season to document the *Carex stylosa* population, and determine what efforts need to be made to improve the habitat this rare sedge occurs in.

Conclusions

In addition to the populations we were unable to document this year, much work remains on surveying and documenting relict sedge populations on the ONF, as more certainly exist. In addition to the species this effort focused on (species that met the criteria of being both relict species *and* FS sensitive), several other taxa of sedges *not* listed as sensitive, but still retreating northward should also be noted when found during future surveys. This is because these species may be more vulnerable to decline than others to climate change that is projected for the region, and in the future may become part of the next suite of sensitive species. These include *C. buxbaumii, C. livida,* and *C. saxitalis*. Of these species, one population of *C. livida* was found in Juniper Meadow (Table 2) and coincidentally, a 100 m^2 Wetland Assessment plot was completed in this population, which was the dominant species within the plot.

Map 1. Overview of locations surveyed and/or having populations of relict sedges.

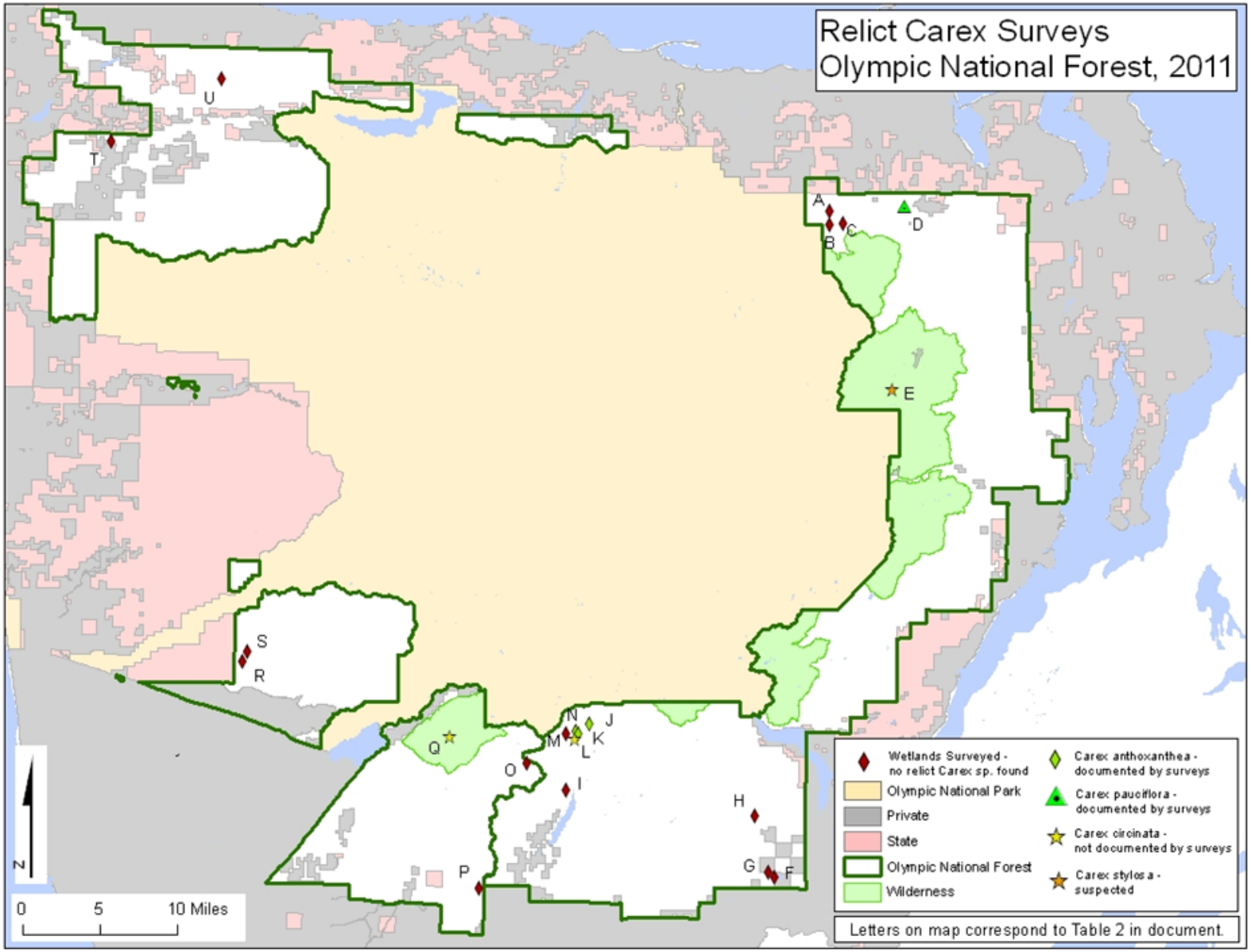
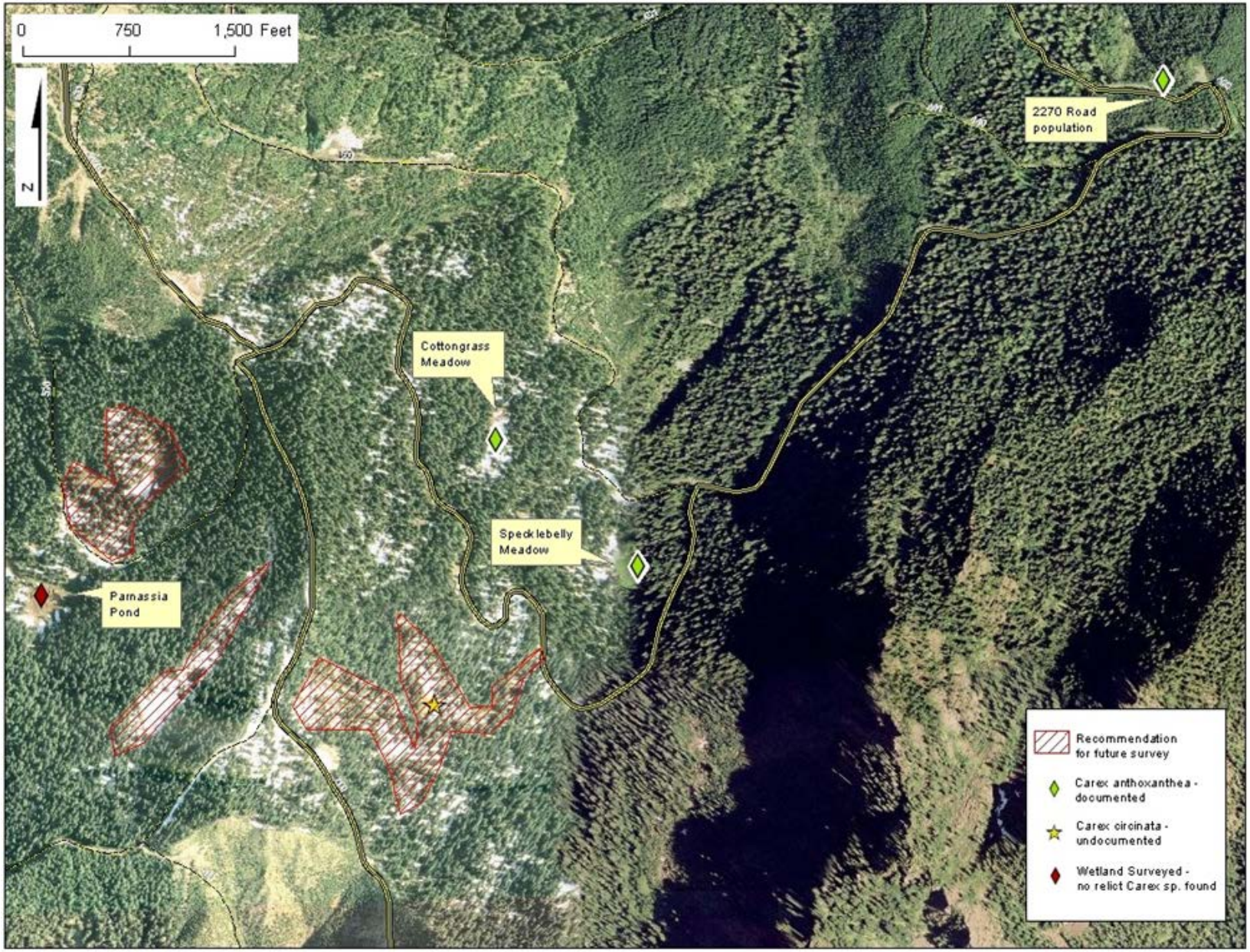
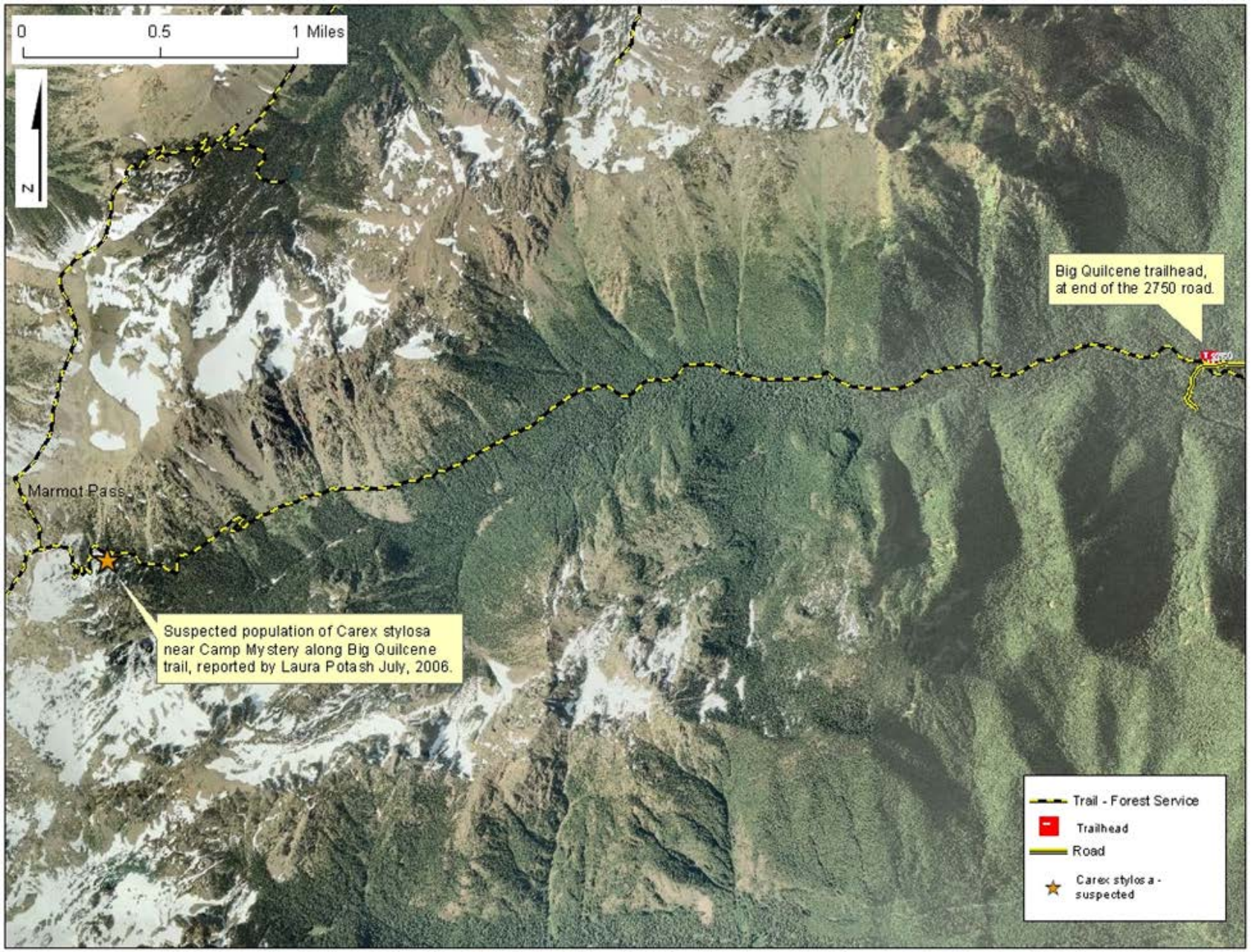


Table 2. Locations surveyed, and/or having populations of relict sedges. UTM are NAD 83, Zone 10.

Letter on Map	Survey Status	Name of Location	UTM northing	UTM easting	Narrative of location
A	Wetland surveyed - no relict *Carex* sp. found.	Pats Prairie Botanical Area	5314551	483601	South and east of the 2877 road, in the Dungeness River watershed.
B	Wetland surveyed - no relict *Carex* sp. found.	Juniper Meadow	5313154	483710	North of MP 1.5 of the 2878070 spur, in the Dungeness River watershed.
C	Wetland surveyed - no relict *Carex* sp. found.	Warbler Wetland	5313309	485293	North of MP 0.4 of the 2878070 spur, in the Dungeness River watershed.
D	***Carex pauciflora*** - documented by surveys	Cranberry Bog Botanical Area	5314652	491479	East of the junction of the 058 and 059 spurs of the 2870 road, in the Dungeness River watershed.
E	***Carex stylosa*** - suspected	Camp Mystery	5296060	490475	East of Marmot Pass along the Big Quilcene trail, in the Buckhorn Wilderness.
F	Wetland surveyed - no relict *Carex* sp. found.	Crescent Meadow	5244319	477671	Just east of MP 1.1 of the 2340 road in the Skokomish watershed (near Lake West).
G	Wetland surveyed - no relict *Carex* sp. found.	Horsetail Pond	5244464	477363	42 spur in the Skokomish watershed.
H	Wetland surveyed - no relict *Carex* sp. found.	Brown Creek Beaver Pond	5251284	475708	Large wetland adjacent to Brown Creek Campground, in the Skokomish watershed.
I	Wetland surveyed - no relict *Carex* sp. found.	Upper Wynoochee wetland	5253515	455974	At junction of the 2294 and 2294400 spur, in the Wynoochee watershed.
J	***Carex anthoxanthea*** - documented by surveys	2270 road population	5260759	458513	Along the 2270 road, between 400 and 420 spurs.
K	***Carex anthoxanthea*** - documented by surveys	Specklebelly Meadow	5259727	457408	On west side of 2270460 spur in the Three Peaks Botanical Area.
L	***Carex circinata*** - not documented by surveys	Three Peaks meadows	5259422	456999	Between the 2270 and the 2270500 spur in the Three Peaks Botanical Area.
M	Wetland surveyed - no relict *Carex* sp. found.	Parnassia pond	5259602	456175	Just south of the 2270510 spur, in the Three Peaks Botanical Area.
N	***Carex anthoxanthea*** - documented by surveys	Cottongrass Meadow	5260065	457145	On west side of 2270460 spur in the Three Peaks Botanical Area.
O	Wetland surveyed - no relict *Carex* sp. found.	East Fork Humptulips Headwaters	5256637	451922	East and North of the 2204190 road, in the Humptulips watershed.
P	Wetland surveyed - no relict *Carex* sp. found.	Pothole Meadow	5243611	446927	South of the 22 road, near the 2281 junction.
Q	***Carex circinata*** - not documented by surveys	Colonel Bob	5259772	443830	In Colonel Bob Wilderness, east of Lake Quinault.
R	Wetland surveyed - no relict *Carex* sp. found.	Bobcat Meadow	5267518	422287	On the north side of the 2140 road, in the Queets River watershed.
S	Wetland surveyed - no relict *Carex* sp. found.	Matheny Beaver Pond	5268364	422758	On the north side of the 2140200 road, in the Queets River watershed.
T	Wetland surveyed - no relict *Carex* sp. found.	Clavicle Meadow	5321687	408517	South of the 2923070 road, in the Sol Duc River watershed.
U	Wetland surveyed - no relict *Carex* sp. found.	Dragonfly Swamp	5328270	419906	At the junction of the 30 road and the 3000200 spur, in the Sol Duc River watershed.


0
750
1,500 Feet
N
2270 Road population
Cottongrass Meadow
Specklebelly Meadow
Parnassia Pond
Recommendation for future survey
Carex anthoxanthea - documented
Carex circinata - undocumented
Wetland Surveyed - no relict Carex sp. found


0
0.5
1 Miles
N
Big Quilcene trailhead, at end of the 2750 road.
Marmot Pass
Suspected population of Carex stylosa near Camp Mystery along Big Quilcene trail, reported by Laura Potash July, 2006.
Trail - Forest Service
Trailhead
Road
Carex stylosa - suspected

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