Sixteenth Annual Colorado Rare Plant Symposium
September 27th, 2019
CSU Western Colorado Campus
Grand Junction, Colorado

Rare Plant Symposium

Moderator: Susan Panjabi (CNHP)

Review of Southwest Colorado G2 plant species: status, recent observations, current conservation efforts and priority conservation needs

Session facilitated by Jill Handwerk (CNHP)

Reminder: G1/S1 = 1-5 occurrences; G2/S2 = 6-20 occurrences; G3/S3 = 20-80 occurrences.

Astragalus anisus **(G2G3 S2S3; BLM):**

Robin Bingham: Lots of moisture, in good condition, lots of plants

Jessica Smith: CNAP volunteers Stephen and Jeanne Wenger saw on South Beaver ACEC, common, doing well

Astragalus cronquistii **(G2 S2; BLM)**:

Biologist for Ute Mtn. Tribe, Hannah Ertl: will possibly have more information for next year

Astragalus debequaeus **(G2 S2; BLM):**

Jeanne Wenger: volunteer Natural Areas: Escalante Canyon Natural Area, had seen it there some years ago – short lived perennial, seems to move around the landscape 3-5 years (border Mesa/Montrose).

Carol Dawson and Phillip Krening, BLM: BLM monitoring of *Astragalus debequaeus* dates back to 2005 at two locations in Atwell Gulch. Currently the study system includes five study sites distributed across the species range. Long-term trend data is not yet available for the species range-wide, though two of the three longest running trend sites have exhibited significant declines over the timeframe monitored.

At the time monitoring was completed in the spring of 2019 it was clear that many large, reproductive individuals had been impacted by the drought conditions that persisted through 2018, with the remains of large desiccated individuals obvious throughout the study populations. Overall, population trends in

2019 appeared to be stable to increasing as a result of widespread seedling recruitment across the study system. Demographic analysis has shown that plants are short-lived – likely completing their life cycle in three to five years. Additionally, seedling survivorship is very low indicating that a return to drier-than-normal conditions through the remainder of the 2019 growing season may result in significant population declines in 2020.

***Astragalus iodopetalus* (G2 S1; FS):**

No new information.

***Astragalus naturitensis* (G3? S2S3; BLM)**:

Carol Dawson and Phillip Krening, BLM: BLM has a single *Astragalus naturitensis* study site located near the town of Nucla. Long-term trend data for this species and site are not yet available. Initial assumptions include that this species is likely early seral and somewhat short-lived. Occurrences are often found in areas that have been the focus of vegetation treatments and/or receive moderate levels of disturbance.

***Astragalus piscator* (G2G3 S1; BLM)**:

Savanna Smith, CNAP: Expanded mapped area at Gateway

***Astragalus rafaelensis* (G2G3 S2S3; BLM)**:

Jeanne Wenger: Common around Rough Canyon, Mesa County, doing well

***Camissonia eastwoodiae* (G2 S1; BLM)**:

No new information.

***Erigeron kachinensis* (G3? S1; BLM)**:

Savanna Smith, CNAP: Verified at Gateway.

***Eriogonum clavellatum* (G2 S1; BLM)**:

No new information.

***Eriogonum coloradense* (G2 S2; BLM)**:

No new information.

Lepidium crenatum* (G2 S2)*:

Jeanne Wenger: Saw at Escalante Canyon, at least 5 years ago, photo with butterfly pollinator.

***Lomatium concinnum* (G2G3 S2S3; BLM)**:

No new information.

***Lupinus crassus* (G2 S2; BLM)**:

No new information.

Mentzelia paradoxensis* (G2 S2)*:

No new information.

Oreocarya osterhoutii (Cryptantha osterhoutii) **(G2G3 S2; BLM)*:***

No new information.

Penstemon mensarum **(G2 S2):**

Rebecca Hufft, DBG: Targeted for seed collection, populations looked good, collected from two populations, will be sending information to CNHP.

Physaria pruinosa (Lesquerella pruinosa) **(G2 S2; FS/BLM):**

No new information.

Physaria vicina (Lesquerella vicina) **(G2 S2; BLM):**

Peggy Lyon, CNHP: Ouray population had nothing in 2018; this year had lots of little rosettes.

Puccinellia parishii **(G2G3 S1)**

No new information.

Salix arizonica **(G2G3 S1; FS)**

No new information.

Thelypodiopsis juniperorum **(G2 S2):**

Peggy Lyon, CNHP: Black Canyon site, wasn't seen this year.

Townsendia glabella **(G2 S2):**

Savanna Smith, CNAP: Large numbers of plants on the Pagosa Skyrocket Natural Area (CPW land). Observed all throughout dark shale slopes.

<u>Review of Southwest G1 Plant Species of Colorado - Jill Handwerk (CNHP)</u>

Aletes latilobus (Lomatium latilobum) **(G1G2 S1; BLM)**:

No new information.

Aliciella sedifolia (Gilia sedifolia) **(G1 S1; FS)*:***

Peggy Lyon, CNHP: New site found this year, John Bregar has information, and CNHP should ask him about it.

Connie Colter: John Bregar has info and habitat shots; More than 200 plants, mostly very small and past blooming although it was early, Dolly Varden site – extension of 2017 sighting by John Bregar.

Astragalus deterior **(G1G2 S1S2)*:***

No new information.

Astragalus desperatus var. neeseae* (G5T1 S1: BLM)*:

Savanna Smith, CNAP: Large population observed along ridge at Gateway.

Erigeron abajoensis* (G1G2 S1)*:

No new information.

Gutierrezia elegans* (G1 S1; BLM/FS)*:

No new information.

Hackelia gracilenta* (G1G2 S1S2)*:

No new information.

Ipomopsis ramosa* (G1 S1)*:

No new information.

***Lygodesmia doloresensis* (G1G2 S1S2; BLM)**:

Nikki Grant-Hoffman, BLM: Found a good bit of this on BLM and will submit EOs for CNHP; it had a good year.

Oreocarya revealii (Cryptantha gypsophila)* (G1G2 S1S2: BLM)*:

Carol Dawson and Phillip Krening, BLM: BLM has a limited dataset from two *Oreocarya revealii* trend monitoring sites in Big Gypsum Valley. One study site exhibited a significant decline between 2014 and 2018 – likely the result of extreme drought conditions that affected the southwest corner of the state through the 2018 growing season. More study sites, and more years of data are necessary in order to clarify the natural range of variability populations may experience from year to year and to detect range-wide population trends.

Packera mancosana* (G1 S1; FS)*:

Jill Handwerk, CNHP: Observed this year, but looked dry.

Ross McCauley: There has been a question on species status. His work has determined it is genetically distinct. It is currently under *P. wernerifolia*, but Ross has let Ackerfield know his results

Physaria pulvinata* (G1 S1; BLM/FS)*:

Robin Bingham: What habitat modification for Gunnison sage grouse (on slide) has been done which may affect this species?

Raquel Wertsbaugh, CNAP: P-J encroachment work, could bring heavy machinery through; but CNHP has been doing monitoring on the populations.

Physaria rollinsii* (G1G2 S1S2)*:

Jessica Smith, CNHP: Steve and Jeanne Wenger have observed this in 2019 on South Beaver, and CNAP will share information and points

Physaria scrotiformis* (G1 S1; FS)*:

No new information.

Review of T&E Plant Species of Colorado - Jill Handwerk (CNHP)

***Astragalus humillimus* (G1 S1; Endangered)**:

No new information.

Astragalus microcymbus* (G1 S1, Candidate/BLM)*:

Allison Vendramel, USFWS: Western State is still doing surveys but nothing new so far. This listing package is sitting in our HQ office in DC going through surname process with an anticipated publish date of December 2019.

Robin Bingham, Western State: In 2019, we started a project (looked at 7 populations?); populations had 500 – up to 1000 individuals at the sites; Good year, young plants, plants flowered; they collected some seed and hope to do a seed bank study. Tom Grant has encouraged us to donate seed to state germplasm repository.

Rebecca Hufft, DBG: Continuing 24 years of demographic study. Germination studies to understand longevity of seeds; collected tissue for genetic work; good year for species; revisited one private land population, between Cebolla Creek and South Beaver Creek, and it looked good.

Astragalus osterhoutii* (G1 S1; Endangered)*:

Carol Dawson and Phillip Krening, BLM: BLM trend monitoring of *Astragalus osterhoutii* dates back to 2005. Monitoring sites are located at populations at Horse Gulch, Wolford Mountain Dam, Kremmling ACEC, and Troublesome Creek. Range-wide trend between 2011 and 2019 is stable despite a significant declining trend at Troublesome Creek over the same timeframe.

Monitoring has confirmed that once plants are established, they can be very long-lived (> 15 years). Plants are also slow to reach reproductive stage with many individuals not reproducing in as many as 11 consecutive years of data collection. This suggests that if the large, reproductive individuals in a population are lost, or if levels of reproduction remain low, population trend may experience a decline - as has been observed at Troublesome Creek.

Astragalus schmolliae* (G1 S1; Candidate)*:

Allison Vendramel, USFWS: Genetics work being done by Fort Lewis College funded by MVNP and partly by USFWS. This package is sitting in our HQ office in DC going through surname process with an anticipated publish date of January 2020.

Ross McCauley: Working with Mesa Verde NP, comprehensive genetic survey of this species across Mesa Verde; was all over MVNP in 2019; paper should be out next Spring.

Allison Vendramel, USFWS: SSA (Species Status Assessment) for this species as well.

David Anderson: Burn in 2002, following that there was lots of seedling recruitment; but now the trend has reversed.

Hannah Ertl, Ute Mtn. Ute: 25 transects monitored this summer; 3,400 individuals counted on tribal lands on Chapin Mesa; may have identified a new site.

Jill Handwerk; CNHP has been monitoring at Mesa Verde NP since 2001. Results strongly suggest the positive effects of fire that were originally seen after the 2002 Long Mesa Fire are waning or have reversed. It appears that the species initially benefitted from the large-scale burn, resulting in a high recruitment rate. However, by 2015-2019 the recruitment and reproductive output in the burned area was far below that in the unburned woodland, suggesting that while this species is adapted to survive fires, it is essentially a woodland species. In 2019, the Chapin Mesa population within the burned areas had less than 40% of the expected density compared to the unburned transects which were slightly above expected density. Seedlings were all but absent in burned areas and abundant in unburned transects (over 6000 seedlings). The only 2015-2017 seedlings to survive the 2018 extreme drought were those that emerged in 2015, that is, the 2016 and 2017 seedlings did not survive the extreme drought.

Gay Austin: Should add wildfire as threat.

Ross McCauley: 2018 was a dry year, almost no plants.

Astragalus tortipes* (G1 S1)*:

Hannah Ertl, Ute Mtn Ute: I'll report back next year.

Corispermum navicula* (G1? S1; BLM)*:

Jenny Neale, DBG: Established as not in Oklahoma.

Susan Panjabi: Think this should be a G1, not G1? .

Raquel Wertsbaugh: Currently unsure if the *Corispermum* sp. on state land is a hybrid or *C. navicula*, but there is a new management plan out on that property with strong protections for this species.

Draba weberi* (G1 S1; FS)*:

Jill Handwerk: 12 month finding due in 2022. Steve Olson expanded the original site a little with Dee Malone.

Mit McGlaughlin, UNC: My lab is initiating genetic work on this species…taxonomy and what's going on between the four drainages. I think probably a lot more places to survey particularly around Blue Lake. There were a lot of them. And lot of slopes above Blue Lake looked like perfect habitat.

Jill Handwerk: USFWS and private landowner working on conservation agreement.

***Eriogonum brandegeei* (G1G2 S1S2; FS/BLM)**

Jill Handwek: Long term monitoring by DBG, BLM, CNAP; genetics being started by Mit McGlaughlin; CNHP conducted Droney Gulch monitoring for CNAP in August, and it looked really good this year.

Rebecca Hufft, DBG: Monitoring every other year because they believe it is stable and reduce monitoring impacts, so didn't go in 2019.

Carol Dawson and Phillip Krening, BLM: Monitoring of *Eriogonum brandegeei* took place at all three established long-term monitoring sites in October of 2018 and have not yet been visited in 2019. A fourth study site was established at a population in the Big Bend OHV area near Salida to add to the representation of the study overall and provide an assessment of motorized recreation's impacts on plant population trends and dynamics. Overall population trends have remained very stable over the duration of the study. Rates of survival are high and recruitment low, contributing to the observed stable trends.

Savanna Smith, CNAP: Out in Fremont County early in season and saw lots of vegetative growth.

Susan Panjabi: asked why drought is affecting *E. pelinophilum* and not *E. brandegeei*?

Phil Krening: Higher elevation, much more moisture for *E. brandegeei.*

Jenny Neale, DBG: In past they have seen some mortality from drought but did bounce back. They have very long tap roots.

Eriogonum pelinophilum* (G2 S2; Endangered)*:

Carol Dawson and Phillip Krening, BLM: BLM has maintained six demographic monitoring sites (one on state land) since 2012. Monitoring sites are distributed across the species range, with several sites placed to investigate the impacts of livestock grazing. Population trend has remained relatively stable between 2013 and 2017. Extreme drought, beginning in 2017 and continuing for several consecutive years, in the Uncompahgre Valley has resulted in nearly 50% mortality among mature plants. A significant portion of the remaining individuals sustained partial or considerable die-back. Plants are known to exhibit dormancy for at least an entire growing season.

An updated Uncompahgre Field Office RMP is currently in review. The plan, as currently drafted, would retire all livestock use within the South Fairview ACEC – the largest population of *Eriogonum pelinophilum*.

Eutrema penlandii* (G2 S2; Threatened)*:

Carol Dawson and Phillip Krening, BLM: BLM, Forest Service, Fish and Wildlife Service, Mosquito Range Heritage Initiative (MRHI), continued the interagency monitoring effort of *Eutrema penlandii* in August 2019. The study sites are located in populations at Cameron Amphitheater, Hoosier Ridge, Mosquito Pass, Weston Pass, and Mt. Sherman.

Individual population trends fluctuate dramatically from year to year, suggesting that plants are likely short-lived perennials resulting in rapid population turnover. Focused demographic study plots established in 2018 aim to answer the question of how long individual plants live on average and how long it takes for plants to achieve reproductive maturity. Population estimates based on our five long-term sampling locations have estimated between 11,747 and 17,801 plants with an average of 15,040 plants between 2016 and 2019.

Savanna Smith, CNAP: Also went to SLB property, and surveyed patches which hadn't been surveyed as frequently; found good numbers. Couple hundred individuals.

Ipomopsis polyantha* (G1 S1; Endangered)*:

Allison Vendramel, USFWS: SSA being reviewed.

Jill Handwerk: CNHP honors student Emily Fitzjohn, collected data on 60 transects this summer on the CPW property; she counted 16,000 individual plants using distance sampling method, with analysis forthcoming with this winter.

Jessica Smith: CNAP monitored this summer. Drought hit population hard. Estimated 1.3 million plants on property. Saw a lot of young recruits. In just three places on property seedlings were still there later in the summer.

Rob Schorr, CNHP: Emily Fitzjohn a sophomore at CSU who took on the task of estimating the abundance of the Pagosa skyrocket using distance sampling techniques. She used existing shapefiles of the Low, Medium, and High-density segments of the populations to draw random transect starting points. Then, when she started sampling in mid-June, she selected a random compass bearing that all transects would follow. Transects were either 10 m, 25 m, or 50 m long depending on whether they were from High, Medium, or Low density class, respectively. She walked each transect locating skyrockets and measuring the perpendicular distance to the transect. She recorded additional ancillary data, such as whether it was a basal rosette or stem, rosette width, plant height, whether the plant had been grazed, and if there was a pollinator on the plant. This data can be helpful for estimating the detectability function and may allow us to estimate "rosettes" separately from "flowering plants." She also characterized the ground cover by using a Daubenmire plot at the beginning and ending of each transect estimating cover of grass, forb, bare ground, moss/lichen, and litter cover. She completed 60 transects (20 in each density class) and counted 16,015 individual plants. She counted so many that we decided to reduce the length of transects down to 15 or 25 m depending on the number of plants being encountered. She is beginning the analysis using distance but 16,000+ plants is a huge dataset and make take some time. We believe that we will be able to use this to accurately estimate population size, variance, and project future sampling efforts.

Raquel Wertsbaugh, CNAP: Installed a soil moisture probe on property. Good to compare the population estimates with the intern's thesis.

Mimulus gemmiparus* (G1 S1; FS)*:

Raquel Wertsbaugh, CNAP: Starting in 2011 worked with Mark Beardsley on Staunton State Park and expanded that work in 2016 to different USFS sites as well. In 2020 we plan for more monitoring; monitored 2019 at Staunton State Park, and plants looked smaller, populations not as robust as some years.

Mit McGlaughlin, UNC: Will initiate genetics work, sampling in 2020; this species doesn't seem to reproduce sexually in the wild – want to know how many genetic individuals in wild, which is important to understand response to climate change.

Oenothera coloradensis* (G3T2 S1; formerly Threatened)*:

Crystal Strouse, City of Fort Collins: Post listing monitoring agreement in place for next 5 years in Larimer and Weld County; University of Wyoming student working on seed set and longevity of seed.

Pediocactus knowltonii* (G1 SNA; Endangered)*:

Jill Handwerk, CNHP: Not found in CO, yet.

Ross: McCauley, Fort Lewis College: Working with New Mexico plant group – see it less than ~50 m from La Plata County, Colorado – access the site through Colorado, site is protected by TNC in New Mexico – NM has monitoring data from past 30 years, and it seems to be in decline. Group in San Juan College, NM – was going to do tissue samples, but fell through; Ross may pick up the work.

Jill Handwerk, CNHP. Years past was hit hard by cactus collectors.

Penstemon debilis* (G1 S1; Threatened)*:

Carol Dawson and Phillip Krening, BLM: BLM maintained a long-term *Penstemon debilis* monitoring site at the Anvil Points population from 2004 through 2017 when the access road was closed to the communication site at the historical mine. Population trend at the study site fluctuated over the 14 year of the study but overall remained stable over the timeframe studied. More study sites are necessary to make inferences to population trends range wide.

Jill Handwerk, CNHP: CNHP has been monitoring on natural area, population seems stable; got permission thanks to Raquel, and did a pilot study with a drone; SSA in progress (ready next spring), and USFWS will work on draft recovery plan.

David Anderson: Elevation range incorrect in previous slide?

Carla DeYoung, BLM: Elevation correct (lower elevation is where washed down into Smith Gulch).

***Penstemon grahamii* (G2 S1; BLM)**:

Jill Handwerk, CNHP: Public comment period out for another listing decision for this and White River penstemon; there is a proposed railroad in Unita Basin to get oil and gas out of area which may threaten the population.

Penstemon penlandii* (G1 S1;** Endangered**)*:

Allison Vendramel: 2022, SSA should come out

Penstemon scariosus* var. *albifluvis* (G4T1 S1/BLM)*:

Jill Handwerk, CNHP: Up for same listing decision as *P. grahamii*; public comments open until 10/5.

Phacelia formosula* (G1 S1; Endangered)*:

Jenny Neale, DBG: Larimer County population is not genetically distinct; believe they are all one species.

Carol Dawson and Phillip Krening, BLM: BLM has maintained five long-term trend monitoring sites for *Phacelia formosula* in North Park since 2010. Monitoring sites are located at populations across the species currently accepted range including at the Arapaho National Wildlife Refuge and California Gulch

populations. Monitoring has shown that individual population trends can fluctuate dramatically from year to year – as is typical of a biennial species. Notably, we documented a range-wide population crash in 2016, resulting in all five populations in our study system being reduced nearly to zero. Following that event average population frequency has rebounded to in line with 2010 levels, when monitoring was established.

This population crash has demonstrated that extreme climate conditions at critical periods during the life cycle may make populations vulnerable to extirpation. Soil moisture data loggers were established at monitoring locations in 2017 to shed light on what conditions contribute to reproductive failure or mortality among newly recruited plants – likely the primary factor driving a crash in population as a result of too few new individuals to replace the parent population. The fact that we've observed the recovery of populations at our monitoring locations suggests the existence of a soil seedbank, though it is likely limited due to the sandy nature of the substrate to which the plants are closely tied. It is possible that if conditions prohibit reproduction or the recruitment of new individuals for several consecutive growing seasons that populations could be lost entirely.

***Phacelia submutica* (G2 S2, Threatened)**:

Jeanne Wenger: Saw it this year (at Pyramid Rock), but weeds had a jump on it which made it hard to see.

Anna Lincoln, BLM: Found plants in areas which they had mapped as suitable habitat, but hadn't been seen before – so it had a good year; Alicia Langdon went out late, and found a place with thousands of plants, Anna thought maybe it germinated late; started a drone project to look at soils and maybe determine potential habitat that way (avoid travel on fragile soils).

Gay Austin: Maybe under threats you should add noxious weeds.

Mit McGlaughlin, UNC: We have done work on this species, will be published eventually; very distinctive genetically; closer related to *Phacelia salina* in Wyoming rather than *scopulina.*

Susan Panjabi: Should we consider change to G1 based on threats.

Physaria congesta* (G1 S1; Threatened)*:

Allison Vendramel: SSA and recovery plans are publicly available.

Carol Dawson and Phillip Krening, BLM: BLM has maintained two long-term demographic trend monitoring sites for *Physaria congesta* at the Duck Creek ACEC and 1145 Road populations since 2012. To add to the representation of the study two additional study sites were established in the species' core area of distribution in 2019 – one in the Dudley Bluffs ACEC and the other in the Ryan Gulch ACEC. We don't yet have robust range-wide trend dataset for this species.

***Physaria obcordata* (G1G2 S1S2; Threatened)**:

Carol Dawson and Phillip Krening, BLM: BLM monitoring of *Physaria obcordata* was completed in July of 2019. This marked the ninth year of data collection at the Yellow Fence population, the fifth year at Ryan Gulch, and the second year at both the Calamity Ridge and Pipeline study sites. Long term range-wide trends are not yet available for this species though trends appeared to be up in 2019 following drought conditions during the previous year. This uptick in trend was especially apparent at Calamity

Ridge where widespread recruitment occurred. The Yellow Fence population has exhibited a significant decline over the duration of the monitoring at the site. In general plants appear to be shorter lived than *Physaria congesta* plants.

Peggy Lyon: Study on the effects of dust, what were the conclusions?

Carol Dawson: Study could not find any evidence that dust caused harmful effects.

Sclerocactus glaucus* (G2G3 S2S3; Threatened)*:

Jill Handwerk: A new population was found at Cameo on State Lands; BLM and DBG monitor regularly.

Carol Dawson and Phillip Krening, BLM: BLM completed monitoring of Colorado hookless cactus (*Sclerocactus glaucus*) in early May of 2019. This marked the ninth year of data collection at the Escalante Canyon, Devil's Thumb, and Cactus Park study sites; the eighth year at Starr Nelson; the sixth year at Wells Gulch; and third year of data collection at Whitewater. A new study site was established within the Pyramid Rock ACEC in 2019 in order to expand the study's representation of occupied sites in the northern genetically distinct portion of the species range. The Pyramid Rock study site is unique from the other populations where monitoring has been previously established and exemplifies a key population important to the conservation of the species overall.

Range-wide we observed a slight increasing trend between 2018 and 2019 despite the Devil's Thumb and Starr Nelson sites exhibiting significant decreases. Overall, levels of reproduction were lower in 2019 than they were in 2018.

Interestingly, we observed widespread insect herbivory for the first time since monitoring was established. Frequency of insect damaged plants ranged from < 1% at Escalante Canyon to 78% at Starr Nelson. Severity of herbivory ranged from a few shallow depressions to individuals with large hollowed areas forming deep chambers in the stem. Mortality attributable to insect herbivory was also documented – appearing as the complete loss of vascular tissue with nothing left of the plant but a shell of spines remaining in place. Several species of cactus borers are known and could be the cause of predation; longhorn beetles (*Moneilema semipunctatum*) have been documented as a threat to other rare *Sclerocactus,* though information on their frequency of occurrence in Colorado hookless cactus populations is sparse and has not been previously documented through this monitoring study. More recently, concerns have emerged over the spread of the non-native cactus moth (*Cactoblastis cactorum*) through North America as a hypothetical threat to native cacti of the Southwest should their spread make it as far. To date, there have been no known instances of cactus moth infestation in Colorado. No remaining insects were found during data collection in order to confirm their identity.

Mit McGlaughlin, UNC: The Grand Valley and Gunnison groups do not show a really strong difference genetically; Northern DeBeque group quite different, almost to the level of species level differences. Still sampling and still working on nailing down the line between *S. glaucus* and *S. parviflorus*; spine characteristic is not diagnostic – best to tell them apart geographically (17 Road in the Valley).

Rebecca Hufft, DBG: Continuing monitoring, great year for it.

***Sclerocactus mesae-verdae* (G2 S2; Threatened):**

Jill Handwerk: Demographic studies (Janet Coles, Karin Decker) ended around 2011, and was published; were issues with cactus weevils.

***Spiranthes diluvialis* (G2G3 S2; Threatened):**

Jill Handwerk: Range expanded in last 15 years; 2 years ago, found in Eagle River, but lost sites some due to development along Front Range.

Lynn Riedel, Boulder OMSP: Even with permanently protected property, tough to hold on to occurrences; may have 10,000 – 15,000 plants overall, but challenges with flood mitigation plans threatening some populations and management – getting right disturbance regime – is a big challenge; and challenging to survey; would say we are slipping in Boulder on protected lands.

Crystal Strouse, City of Fort Collins: Surveyed 2 times this year; haven't seen a bolting plant in years; hard to manage population; prescribed fire – get rid of overgrowth, but now more water in area, affecting bolting.

Susan Panjabi: I think it was a lot more common but feel like this one is now in decline.

Irene Weber, Jeffco: 2 populations with 40 plants on their properties; seen them double every year for past 3 years; relocated populations not see since 2010.

Anthony M., Jeffco: Had high flows this year, may have created disturbance which it needed.

Irene Weber: 2 populations have totally different habitats – one shaded with cottonwoods, one not – mossy rock area.

Lynn Riedel: Dinosaur National Monument: Surveys there (Tamara Naumann) in Lodore Canyon; now Emily Spencer, resource manager will be picking up the monitoring – difficulty is Flaming Gorge Dam releases balancing fish and orchid management.

Allison Vendramel: Utah is lead for SSA, review due in 2022.

Carla DeYoung, BLM: Populations along Roaring Fork: a lot are on private land protected by conservation easements; 1,000s of plants along here, with several hundred on BLM land.

Review of Floristic Quality Assessment ranks to date - Pam Smith (CNHP):

An overview of the 2019 Floristic Quality Assessment (FQA) update being coordinated by the Colorado Natural Heritage Program (CNHP) at Colorado State University was provided followed by an FQA ranking session. The current list of Coefficients of Conservation (C-values) were assigned originally in a 2007 report for the State of Colorado by CNHP. They were prepared for the Colorado Department of Natural Resources Division of Wildlife, Wetlands Program and the U.S. Environmental Protection Agency, Region 8 (Rocchio 2007). For that report, a panel of 14 of Colorado's botanical experts were convened and assigned Coefficient of Conservation values (or C-values) to approximately 80% of the Colorado flora. For the 2019 update, 30+ Colorado botanists and ecologists agreed to participate by evaluating the remaining 20% of the list (743 taxa) and to provide comments on any of the previously assigned C-values

that may need to be changed. During the workshop many interested CoNPS members participated in discussions on how people use the C-values and thoughts on how to assign these values to plants. People began providing values during the discussion and a number of people took the lists with them and submitted more comments after the meeting providing enough information to update over 300 values as a result of the workshop. Many taxa had multiple values submitted which are then averaged to provide a stronger C-value. The final report and an online calculator will be available on the CNHP workshop by the end of 2020.

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