

Rare Plant Technical Council, ABQ BioPark Monday, November 13th, 2023

Opening remarks from Erika Rowe, State Botanist, and new chair of the Rare Plant Technical Council:

Overview of meeting agenda, which includes many updates from agencies and partners. Then move into a brief discussion of where we've been with the Rare Plant Strategy [Partnership] and whether there should be more subgroups to tackle the workload. The day to conclude with a discussion on the rare plant list and unfinished business from 2021 meeting.

Updates from ABQ BioPark – Clay Meredith

- Can work w bio park to have non-FIOA data
- Biopark can fill funding with fast turnaround for small projects
- This year's collections focused on four species at three sites targeting gypsophiles: White Ridge Bike Trails (Ojito Wilderness) and Ball Ranch ACEC. Occur on outcrops of the Todilto formation while the southern site, Mesa de la Cienega, is on the Yeso Formation. Four species were targeted, all of which are present in the Ojito Wilderness.
- Todilto Blazingstar (*Mentzelia todiltoensis*); the most widespread of the species collected.
 - In some areas, it's relatively common.
 - appears to prefer disturbed areas and can be common along roadsides.
 - Tolerance for gypsum seems to vary, suggesting this species is weakly gypsophilic and it is unlikely to be dependent upon gypsum soils.
- Studies in Spain and Mexico have determined that a large proportion of seemingly gypsophilic species can be propagated in soils lacking gypsum. It seems that rather than being dependent on gypsum, these species have simply evolved to tolerate gypsum and benefit from a lack of competition. This has enormous implications for the conservation of these species as it opens the possibility for greater levels of ex situ conservation, seed banking, and restoration of disturbed gypsum habitats.
- *Townsendia gypsophila* is a narrow endemic of Sandoval County extending from near San Ysidro north almost to Cuba. The species occurs primarily on Zia and Jemez Pueblos, though some substantial populations exist on the BLM's Ojito Wilderness. This diminutive plant rarely exceeds 6 inches in diameter. Surveys were conducted in 2016 by Daniela Roth to document the species' population throughout much of its range. The species is intolerant of disturbance and is threatened by gypsum mining at a large mine near Ojito, off trail mountain biking at the White Ridge Bike Trails, disturbance caused by oil and gas drilling, and fugitive dust from roads servicing oil and gas infrastructure. At Ojito, the primary threat is disturbance of soil crusts due to mountain biking.
- This year salvaged Aztec gilia (*Aliciella formosa*) which is to be impacted by highway construction near Aztec.
 - had ~ 50% survival rate which was better than expected. The survivors have put on new growth and look quite healthy. Previous efforts at transplanting this

species were not successful, and we're hoping that the experience from this salvage project, combined with future efforts to outplant this species into public collections will inform future efforts at salvage of the species.

- New effort to remediate habitat for the Sacramento Mountains Checkerspot Butterfly with partners (USFS, USFWS, IAE and others).
 - Most important for this discussion is the capacity for fundraising.
 - became apparent that temporary fencing was needed to protect *P. neomexicana* plants necessary for the survival of SMCB larvae,
 - put out a fundraising call and raised \$9,000 over the course of 2 weeks to purchase fencing supplies. I'm happy to work with any of you on similar efforts for rare plant conservation. We can tailor our fundraising strategy to meet the needs of the species in question and assist with logistics where possible.
- *Muilla lordsburgana* Salvage: 35 bulbs salvaged prior to new transmission line disturbance in SW NM.
- Next year:
 - *Cirsium wrightii* seed collections
 - Development of additional long-term projects
 - Better utilization of volunteer network

Shannon D. Fehlberg, Associate Research Scientist, Plant Conservation Geneticist Desert Botanical Garden Phoenix, Arizona

Examining patterns of genetic diversity in rare cacti of the desert southwest to inform conservation

Echinocereus research:

- Echinocereus is of the most rapidly diverging genera!
- *E. fendleri* var. *kuenzleri*, Federally and NM State protected species, listed as endangered in 1979 and reclassified as threatened in 2018.
- For *Echinocereus fendleri* study 261 total individuals representing 52 populations (from ingroup and outgroup) from 8 taxa were sampled with DNA extractions
- Measurements for key morphological traits used for distinguishing varieties were recorded for each sample at the time of collection for example: stem width base, number ribs, inter areole, central spine present, central spine present, central spine length, number radial spines, radial spine thickness
- Analyses of these data indicate a well-supported, monophyletic *E. fendleri* clade, with strong geographic structuring
- Three subclades are apparent within the *E. fendleri* var. *fendleri*/*kuenzleri* clade- **a northern clade comprising *E. fendleri* var. *fendleri***, a central clade comprising *E. fendleri* var. *fendleri* and *E. fendleri* var. *kuenzleri* from Lincoln Co., NM, and a southeastern clade comprising only *E. fendleri* var. *kuenzleri*.

- Northern-most populations Santa Fe, Albuquerque, Socorro and have intermediate number of radial spines + radial spines of intermediate thickness, intermediate number of ribs, usually with central spines
- All southeast individuals from populations of *E. fendleri* var *kuenzleri* at **Mule Canyon and Texas Hill. Morphology – very few/thick radial spines, lacking central spines, few ribs.**
- results suggest **two independent transitions to the extreme ‘kuenzleri’ morphology of very few, thick radial spines.**
- Alternative explanation is **geneflow between populations** of *E. fendleri fendleri* and *E. fendleri kuenzleri* **where they co-occur in Lincoln county.** No evidence for this in the cp phylogeny. Widely distributed chloroplast haplotypes across all samples and localities that do not correspond to taxonomically recognized entities.
- There is a lack of clear, discrete characters that consistently separate this taxa.
- **Conclusion: The federally endangered *E. fendleri* var. *kuenzleri* as currently recognized is not a single evolutionary lineage.**
- **Based on current sampling, *E. fendleri* var. *fendleri* and *E. fendleri* var. *rectispinus* are also not independent evolutionary lineages.**
 - **The best current evidence is that *E. fendleri* is one widespread, morphologically variable lineage.**
 - **Within this *E. fendleri*, there are two evolutionary lineages corresponding to the *E. fendleri* var. *kuenzleri* morphology.**
 - Additional sampling of *E. fendleri* var. *kuenzleri* and *E. fendleri* var. *fendleri* will be completed in the near future.
- Also working on
 - *Echinocereus fitchii*
 - *Echinocereus arizonicus* subsp. *arizonicus*
 - *Echinomastus erectocentrus* var. *acunensis*

Steve Blackwell, Conservation Collections Manager, Desert Botanical Garden, Phoenix; Conserving and Augmenting Sclerocactus in the SW

- *Sclerocactus mesa-verdae*
 - Visted 4 known sites
 - 944 seeds from 4 populations collected
- *Sclerocactus cloverae*
 - 7,498 seeds from 4 populations collected
 - Worked with SWCA consultants to salvage 216 plants from Lybrook NM. Testing different substrates to test performance.
 - Hand pollination tests in spring of 2023
 - Soil analysis
- *Amsonia tharpaii*
 - Seed collections for CPC seed longevity study

- 1100 seeds banked from Yeso Hills
- Donated plants to ABQ BioPark
- Sclerocactus cloverae subsp. brackii
- Germination tests and micropropagation
 - Low initial germination in both S. cloverae and S. mesae-verdae
 - Extracting seedling from seed coat helps
 - Test: After-ripening, hormones, light, acid scarification
- Upcoming: more site visits and scouting of new populations
- Additional seed collections
- Continuing seed germination and tissue culture trials

Mark Porter California Botanic Garden

Resolving long standing plant species taxonomic, conservation, and management problems using genomic data

- *Coryphantha sneedii* complex
 - 413 individuals sampled from 33 ingroup populations and 8 outgroup pop
 - *Escobaria sneedii sneedii* is not monophyletic
 - <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8799629/>
 - C. sneedii composed of four geographically and phylogenetically defined lineages: Franklin-Organ-San Andreas Mtns. Lineage, Guadalupe-Sacramento Mtns. Lineage, *C. orcuttii*, and *C. albicolumnaria*.
 - All of the U.S. varieties characterized by Zimmermann (1985) show significant genetic divergences and should be taxonomically recognized (contra Zimmerman and Parfitt 2003)
 - There may be evidence of hybridization between *C. sneedii* var. *guadalupensis* and *C. vivipara* (currently under investigation)
- *C. robustispina*
 - Varieties: ***C. robustispina* subsp. *robustispina* (AZ), subsp. *uncinata*, subsp. *scheeri***
 - All three varieties are distinct clades
 - In analyses outcomes, in all cases, divergences between taxa are greater than divergences within taxa
 -
- Also currently in progress genetic work:
 - *Cylindropuntia* x *viridiflora*
 - *Eriogonum gypsophilum*
 - *Eriogonum lachnogynum*

Maria Mullins and Sam Reiss (BLM State office)

- New habitat models, some developed with USGS, are a priority
 - MVC a priority, and Sclerocactus cloverae and Aliciella formosa completed

- Zuni fleabane almost completed, did ground truthing efforts this past summer
- Ongoing demographic monitoring for 10 species
- Pollinator monitoring with Olivia Carril, also looking at the impact of habitat modification
- Hiring four new botanists (las Cruces, Farmington, Carlsbad, Taos) – almost completed with offers
- Data sharing agreements with Natural Heritage

UNM Herbarium – Harpo Faust, Collections Manager, Museum of Southwestern Biology

- Use the collections!
- Contact Harpo about a Chihuahuan desert collection foray
- Talk to Harpo re: Brokeoffs or Guadalupe Mountains Foray for 2024
- Largest herbarium in the state, and have room to grow and are acquiring more cabinets
- Study looking at collection density at different levels, easternmost counties lacking in specimen collections... NM not where we should be. Another article will be published soon. **Least collected area = Chihuahuan desert.**
- Hosting collection forays and public identification nights – join in !
- Have capacity for storing leaf tissue silica – genomics division – library working on protocol and methods

FWS updates – Katie Sandbom

- Wrights marsh thistle - now listed w critical habitat, recovery outline completed
- Kuenzleri - recovery plan amended (downlisted to threatened)
- Sac mtns thistle, sac prick poppy, Hedeoma townsendii, - 5 year review done, no changes
- Castilleja ornata finished 12 mo finding, working on listing

USFS updates - Kathryn Kennedy

- Lots of funding but has to relate to fire
- Four out of the five NF in NM lack a botanist (Lincoln NF the only one with an Assistant Botanist – Adam McCullough)
- Maybe botanist in Carson NF soon
- USFS transitioning to using SCCs (Species of Conservation Concern)
- Let know what plants should be SCC- email Kathryn and the specific forest
- Species viability plans review needed
- Forest Service released a Survey123 collection app and can take training on how to use it.
- Non-native weevils on *Cirsium vinaceum* populations in the Lincoln is very concerning. The weevil was released to control musk thistle, but now boring into flowering heads of *C. vinaceum*, which leads to aborted seed production
- Seed banking with Cntr Plant Conservation (CPC), e.g., have started banking of *Allium gooddingii*, *Salix arizonica*

- Doing a GAP Analysis – early December, then prioritizing list for seed collections
- Habitat suitability modeling – south Sacramento – 23 species
- Legacy Data Management Project – making sure all records are shared with NHHM

Jim McGrath, USFS, Update:

- Jim McGrath, Forest Service Botanist, Gila NF, sedges@swcp.com
Natural History of the Gila Symposium X
February 28 - March 1, 2024
<https://sites.google.com/view/gilasymposium/home>
- Please participate (or attend) and consider giving a plant or botany related talk (only 20 minutes long), doesn't have to be on Gila specific plants/topics.

Native Plant Society/Santa Fe Botanical Garden (Sylvan Kaufman)

- Native Plant Society – grants available up to \$2000
- Santa Fe Botanical Garden – brand new science and conservation program

Richard Norwood NMNH - Data Management

- Obtaining data request via website (nhnm.unm.edu/data/request_data)
 - Best way to request is through the NHHM website
- **Platform options for submitting data to NH**
 - iNaturalist project, please considering joining (Nat. Heritage New Mexico Observations). This is for all plants in NM.
 - Marty Purdy (Assistant State Botanist for EMNRD) has also created a rare plant project on iNaturalist, but focused on NM State Endangered plants only so that if you join, observers can share their locations with EMNRD staff
 - currently creating a template for FieldMaps or Survey123 to make collecting field data easier and standardized
 - Making it easier to find and submit data
 - Feedback on the above or website requests?

Rare Plant Conservation Strategy – Erika Rowe

- First gave an update on the new amendment for state endangered rare plant take permitting. It's been a slow, quiet roll out and mostly been permits submitted by consulting companies for their clients on BLM lands. Erika and EMNRD leadership met with BLM leadership earlier in the summer to get their support and implement this policy in BLM Field Offices and in NEPA process, and BLM supervisors must remind operators that state endangered plants need state take permits. BLM is supportive of initiative. It may take time to have word spread that this is now a new policy, especially on private lands. The process has also brought to light that I will rely on BLM staff to

help with avoidance first before comes to my desk. I have the ability to approve (with conditions) or deny. I also can't enforce a survey to occur prior to disturbance to identify if there are rare plants.

- Rare Plant Conservation Strategy document was meant to bring together agencies and organizations to form a "Partnership" but how to adopt formally? MOU? Shared stewardship? How to keep momentum? Written by Daniela Roth (former state botanist) in collaboration with BLM and others.
- Strategy is to provide guidance to regulatory agencies and land managers to protect NM's rare plant species through:
 - Increased protection
 - Data on status and distribution
 - Providing management guidelines
 - Increased coordination and collaboration
 - Promoting education and stewardship
 - Facilitating conservation and recovery actions
 - Serve as reference for priority actions to maintain/improve status of rare plants
- **7 goals for break out groups:**
 - Inventory, monitor, and research Strategy Species to inform management and regulatory decisions
 - ~~Protect~~, manage, and restore Strategy Species and their habitats
 - Improve data management, accuracy, storage, & dissemination
 - Develop ex-situ conservation and recovery strategies
 - Improve **PROTECTION**, laws, regulations, and policies
 - Improve collaboration, education, and outreach
 - Improve funding, infrastructure, and rare plant programs
- **Issues that undermine the actions and goals in the Strategy**
 - Lack of baseline info
 - Lack of botanical capacity
 - Lack of funding
 - Inadequate regulatory mechanisms
- **Products from the Strategy (Este Muldavin, NHHM):**
 - Plant Conservation Scorecard (method for scoring rarity and conservation – adapted from Colorado Natural Heritage)
 - Consistency and comparable across state lines
 - Focuses on Biodiversity = Size + Quality + Landscape Integrity, Protection, primary threat
 - Also NatureServe ranking calculator that determines Global and State Ranks
 - Important Plant Areas (boundaries are being refined to make more usable – Este Muldavin NHHM)
 - Strategy Species list (rare list of species found on the NM Rare Plants website)

- <https://www.plantlife.org.uk/> (Este Muldavin)
- **Goals of breakout groups is to find actionable items in the goals and whether there should be a working group around that topic(s), e.g., data sharing, education/outreach, research recommendations, rare plant list review etc, for example:**
 - Objective 1: who should be leading the work?
 - Objective 2: who works on prioritizing projects?
 - Ob 3: Who should be developing protocols?

Institute for Applied Ecology – Melanie Gisler, Institute for Applied Ecology (IAE), updates on what they are contributing toward Strategy goals:

- **Goal 1:**
 - Rare Plant Surveys- 2023 Black Range
 - NM Rare Plants Crew
 - Arizona willow survey Santa Fe and Carson Forests
- **Goal 4:**
 - Rare plant propagule banking
 - Recommendations for ESA Section 7 Consultations Involving NM Plants
 - Conservation Strategy for Aztec Gilia (*Aliciella formosa*) and Clover's Cactus (*Sclerocactus cloverae*)
- **Goal 6:**
 - Blue Hole Cienega Curriculum
- **Goal 7:**
 - Botany Leads in FFO, LCDO, and CFO and botany support NM BLM State Office

Introduction and History on Taxa Review & Ranking (Bob Sivinski and Erika Rowe)

- Agency lists vs rare plant strategy list vs strategy species list? How are they different?
- What qualifies as rare for being included on Strategy List?
 - Peripherals (edge of their range in NM) – Bob doesn't feel these merit being rare
 - Endemics (some yes)
 - Disjuncts (species that occur in widely separated geographic areas) – Bob also outlined how previous meetings have argued to keep these off the list – clearly not consensus and need to revisit this topic during future list review
- State Endangered – how do species get this status? State Endangered listing can be irrelevant of being peripheral or disjunct, but NM rare plant list should not include peripherals/disjuncts (bob), especially if they are secure throughout the rest of their range and are G3-G4

- Next steps, writing justifications is work once agreement that a species qualifies for the list, then putting on the rare plant website, workload issues, volunteers not following through
- Bob: feels that we should be focusing on the “truly rare” despite disjuncts and peripherals being S1 ranked species here. if they are common throughout their range elsewhere, but just happened to be a peripheral in NM, then they aren’t *rare*.
- In summary: widespread disagreement on what is “rare” and still need to revisit this topic especially given climate change and changing priorities, or lack of limited knowledge for other species like *Botrychium* spp. – who’s to say these are peripherals?? Maybe there just hasn’t been enough survey work. But Bob says it’s also a work load issue to do literature reviews, etc and post to website and distracts from priorities.
- Erika and others posed the question why putting a species on a “watch” list would in any way distract from priorities and rather it might bring more attention to these species. No funding is being diverted to do survey work so why does it matter?
- Reviewed briefly the 2023 proposed species, but Bob felt that none of the new species “qualified” as “rare” because they are common outside of NM, except for *Cirsium culebraense* and *Oreocarya worthingtonii*. However, he also acknowledged that he can’t comment specifically on *Botrychium* species that were also nominated.
- Also revisited tasks not completed from the last 2021 Technical council meeting. Many species not dealt with and still unresolved.

Wrap up:

- Erika will send out virtual meeting invite soon to focus (revisit) on reviewing species listing and rarity topic for sometime in January.
- What should the “council” meetings be in the future, and how often to meet?
 - Some suggested 2x per year, once in spring and again in late fall
 - Depends on topics, so maybe just 1x per year
 - Get Native Plant Society involved?
 - Working groups meet more often for e.g., rare species listing
 - Erika will synthesize break out group suggestions for working groups and send out calls for help for leads
 - Will need to think about how and if to formalize the council and what does that look like