ADDITIONS TO THE FLORA OF GRAND CANYON NATIONAL PARK RESULTING FROM NATIONAL VEGETATION MAPPING PROGRAM FIELDWORK

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ABSTRACT

Recent collections from United States Geologic Survey - National Park Service National Vegetation Mapping Program fieldwork in Grand Canyon National Park have documented 25 new records for the park, including 21 new species and four new subspecific taxa. The new records represent 16 families and 24 genera. All 25 taxa are native to the United States; no new non-native taxa were documented. Two taxa, *Perityle intricata* and *Epilobium nevadense*, are new records for Arizona. Additional collections have documented 12 range extensions or rediscoveries of noteworthy taxa.

INTRODUCTION

Grand Canyon National Park (GCNP), of northern Arizona, hosts roughly half of the 3,500 or more vascular plant species found in the state (Stein 2002). Extremes of elevation and topography, a diverse geology, and influences from surrounding biogeographic provinces all contribute to this diversity. An 8,000-foot elevation gradient in the park supports five of the seven major life zones in North America, including the Lower Sonoran, Upper Sonoran, Transition, Canadian, and Hudsonian (Brown 1994). Three of the four major North American Deserts (Sonoran, Mohave, and Great Basin) converge near the Grand Canyon. The park is located within the Colorado Plateau floristic subprovince, but also lies in close proximity to the Mohavian, Great Basin, and Apachian floristic subprovinces (McLaughlin 2007). These rich and varied influences combined with the complex and diverse local environments found in Grand Canyon, appear to make the area a hotspot of plant diversity.

Plant collecting has occurred in GCNP for well over one-hundred years; however a formal floristic inventory of the park has never been funded despite the area's propensity for high plant diversity. Phillips et al. (1987) made a concerted effort to synthesize an up-to-date annotated checklist for GCNP, and various additions to this checklist have been published since that time (Ayers et al. 1995, Brian 2001, Brian et al. 1999). While a current annotated checklist of the flora of GCNP does not yet exist, every year new collections continue to document new species from the park. While not its primary focus, an effort was made to further the goal of compiling a thorough species list for GCNP as part of the United States Geologic Survey - National Park Service (USGS-NPS) National Vegetation Mapping Program (NVMP).

Additions to the Flora of Grand Canyon National Park. *CANOTIA* 7: 41–53, 2011.

The NVMP is a cooperative effort between the USGS and the NPS Inventory & Monitoring Program. The objective of the program is to classify, describe, and map vegetation communities in more than 270 national park units, including GCNP. Two major final products will result from these ongoing efforts; a digital map of the vegetation communities within each park, and a technical classification and description of these communities. These data, along with a database of plants from each park, will provide NPS natural resource managers with the requisite knowledge of the vegetation needed to make informed management decisions. These data will provide baseline vegetation information for the parks, and will thus be used to guide other scientific inquiries, to provide a gauge for potential climate change, and to direct stewardship efforts of NPS-managed lands.

The NVMP employs the United States National Vegetation Classification, a hierarchical system that organizes natural vegetation based upon coarser-scale physiognomic features, as well as finer-scale floristic distinctions. At the bottom of this hierarchy lies the vegetation *association*, a level which can only be ascertained through an accurate taxonomic inventory of the plant species found within each park. While many common species are readily known by fieldworkers, less common, unusual, or newly adventive species must be collected and identified. Thus, having trained botanists assisting with NVMP efforts has two chief benefits: 1) species are more likely to be accurately identified in the field, or properly collected, identified, and vouchered by herbarium specimens when possible; and, 2) as a by-product of fieldwork and the great distances traversed in the process, trained botanists will better document the floristic diversity within each park (Ahrends et al. 2011). To this end, approximately 1425 herbarium collections were made during NVMP fieldwork in GCNP and Grand Canyon-Parashant National Monument (GCPNM).

METHODS

All collections were made by members of the field crew between March, 2007 and October, 2008 as part of the USGS-NPS NVMP in GCNP and GCPNM. Species identifications were made using standard floras including: the *Intermountain Flora* (Cronquist et al. 1972+), the *Flora of North America* (Flora of North America Editorial Committee 1993+), treatments from the *Manual of Vascular Plants of Arizona* as published in the *Journal of the Arizona-Nevada Academy of Science* and *Canotia* (Vascular Plants of Arizona Editorial Committee 1992+), *a Utah Flora* (Welsh et al. 2003), and *Seed Plants of Northern Arizona* (McDougal 1973). When listed, Colorado River Mile (CRM) references follow Stevens (1983). Nomenclature, nativity, and common names follow the PLANTS database (USDA 2009). All specimens are deposited in the Grand Canyon National Park Herbarium (GRCA); duplicates, when available, are housed in the Deaver Herbarium (ASC) at Northern Arizona University.

The determination of whether a collection was new to Grand Canyon was based upon a review of the published species lists for GCNP (Ayers et al. 1995, Brian 2001, Brian et al. 1999, and Phillips et al. 1987), as well as a thorough query of the ASU, ARIZ, ASC, and GRCA herbaria databases using the Southwest

Environmental Information Network's (2009) on-line query tools (http://swbiodiversity.org/seinet/index.php). Digital searches were conducted in three steps: 1) a search of the ASU, ARIZ, ASC, and NAVA databases using a *locality* value of "grand canyon", 2) a complete search of the GRCA database, and 3) a geographic search of the ASU, ARIZ, ASC, NAVA, and GRCA databases for collections made within the boundaries of GCNP. Taxa that were not listed in earlier literature, and were absent from the three-part database search, were deemed to be new records for GCNP. In some instances, for a specimen that seemed to represent a new record, additional research showed that earlier collections existed, or that it had been misidentified.

RESULTS AND DISCUSSION

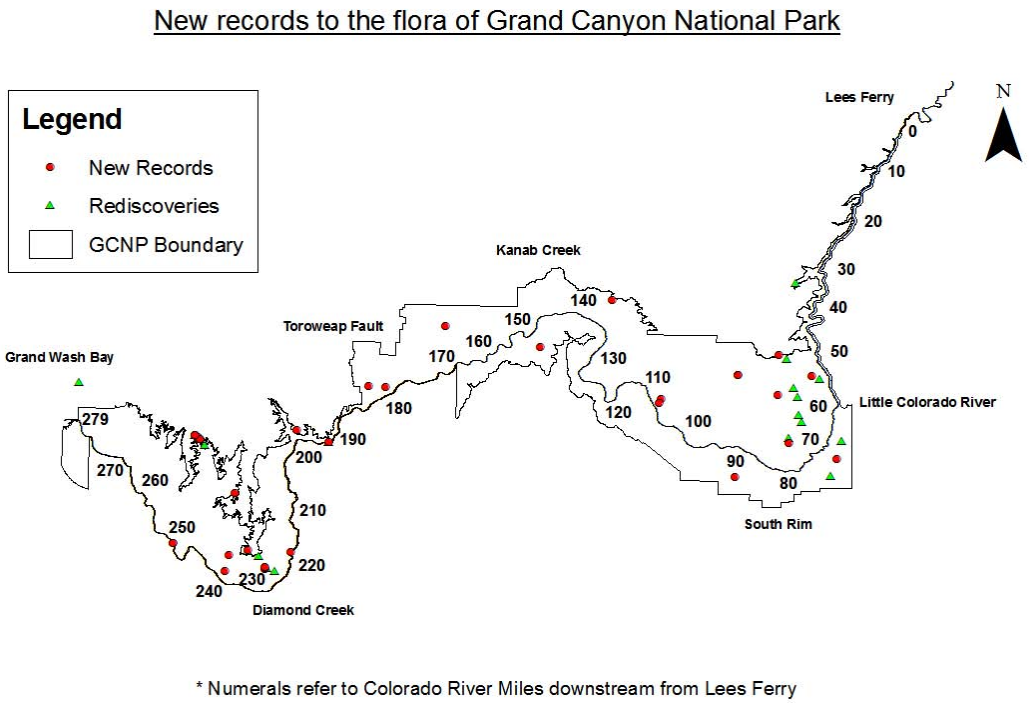
Approximately 1425 herbarium collections were made during NVMP fieldwork in GCNP and GCPNM during 2007 and 2008. Twenty-five new records for GCNP proper, including two new state records, were documented (see Appendix). These records represent 16 families and 24 genera. All 25 taxa are native to the United States; no new non-native taxa were documented. Additional collections record eight range extensions and four rediscoveries of rarely collected or noteworthy taxa. *Perityle intricata* and *Epilobium nevadense*, both documented from the western Grand Canyon, are new records for Arizona.

New records were not restricted to a single remote or inaccessible portion of the park, but were made throughout the entire Grand Canyon (fig. 1). Two new records were made from the South Rim, three from the North Rim, and 20 from the Inner Canyon (table 1). Of the Inner Canyon collections, one was from Marble Canyon (CRM 1 - CRM 61), five were from the corridor area (between the Little Colorado River and the Toroweap Fault, CRM 61- CRM 179), and 14 new records were made from the western Grand Canyon (west of the Toroweap Fault at CRM 179). From an east to west perspective, the first new record was documented from near Saddle Mountain, adjacent to Nankoweap Canyon at CRM 52, and the last new record was documented from Surprise Canyon at CRM 248. These collections suggest that the western Grand Canyon likely hosts the majority of potential new records, but that all of GCNP may harbor undocumented plant species.

These collections highlight a number of interesting patterns that attest to the extreme floristic diversity and uniqueness of GCNP. The fact that fairly common species, those which are widespread in both Arizona and in the Southwest, were first documented during this project (e.g., *Rorippa sinuata*, *Linum australe*) speaks to the great immensity and remoteness of the park. Of the 25 new records documented, over 25% commonly inhabit the southwestern United States and have been collected near the Grand Canyon. Based upon distribution data, these species must have undoubtedly been present in the Grand Canyon, but until this project they had not been formally documented within the park boundaries. Roughly one-hundred years of plant collecting in GCNP has not documented all of the area's plant life, and certainly additional species await discovery.

The Grand Canyon, with its myriad habitats and large elevational range, provides refuge for a variety of species growing at the extreme limits of their

distributions. New collections from this project illuminate two interesting biogeographical patterns. Roughly 30% of the new records have affinities to the Great Basin floristic sub-province to the northwest. In general these species barely enter extreme northwestern Arizona, and the western Grand Canyon seems to provide appropriate habitats for these species at the limit of their ranges. Many of the most noteworthy collections from this project, including two new state records, document Great Basin and northern Mohavian species reaching the southeastern extent of their distributions in Grand Canyon (i.e., *Perityle intricata*, *Epilobium nevadense*, *Lupinus flavoculatus*). On the other hand, over 20% of the new records had strong floristic affinities to the Apachian floristic sub-province to the southeast. Species such as *Polygala macradenia* and *Panicum hallii* seem to reach the northwestern limits of their ranges in the Grand Canyon. Less than five percent of the new records had clear affinities to any other adjacent floristic sub-province; however various desert-loving species such as *Senna bauhinioides* and *Carlowrightia arizonica* reach their northern limits in GCNP. These data suggest that the Grand Canyon may act as a southeastern extension of the Great Basin floristic sub-province, a northwestern extension of the Apachian floristic sub-province, and to some extent a northward extension of the Sonoran floristic sub-province (McLaughlin 2007). Collectively, these vouchers attest to how the Grand Canyon provides appropriate habitats for species from disparate floristic regions with various biogeographical affinities.



Grand Canyon Flora Figure 1. New records to the flora of Grand Canyon National Park.

Table 1. Geographic locations of new records from Grand Canyon National Park.

Collection #	Scientific Name	GCNP Location
KC 1664	*Chrysothamnus viscidiflours* ssp. *puberulus*	Inner Canyon (Corridor)
GR 6838	*Cuscuta denticulata*	Inner Canyon (Corridor)
GR 6832	*Lycium cooperi*	Inner Canyon (Corridor)
TD 24	*Peteria thompsoniae*	Inner Canyon (Corridor)
GR 6867, GR 6999, GR 8261	*Hymenopappus filifolius* var. *cinereus*	Inner Canyon (Corridor) / Western Grand Canyon
TD 20	*Salvia columbariae*	Inner Canyon (Marble Canyon)
BR 10875, BR 10876	*Carex utriculata*	North Rim
KC 1514	*Rorippa sinuata*	North Rim
GR 7111	*Valeriana arizonica*	North Rim
KC 1423	*Lotus plebeius*	South Rim
BR 10843, GR 8101	*Linum australe*	South Rim / Western Grand Canyon
GR 8245, GR 8364	*Amaranthus torreyi*	western Grand Canyon
GR 8242	*Asclepias engelmanniana*	western Grand Canyon
KC 1696	*Carlowrightia arizonica*	western Grand Canyon
GR 6959, GR 6984	*Chaenactis carphoclinia*	western Grand Canyon
GR 8110, GR 8232	*Epilobium nevadense*	western Grand Canyon
GR 8324	*Ericameria nauseosa* ssp. *consimilis* var. *mohavensis*	western Grand Canyon
GR 8145	*Eriogonum pharnaceoides*	western Grand Canyon
GR 8096	*Eriogonum umbellatum* var. *juniporinum*	western Grand Canyon
KC 1655, ST s.n.	*Lupinus flavoculatus*	western Grand Canyon
GR 8327	*Panicum hallii*	western Grand Canyon
KC 1703	*Perityle intricata*	western Grand Canyon
GR 6967, GR 8318	*Polygala macradenia*	western Grand Canyon
GR 6891	*Psathyrotes ramosissima*	western Grand Canyon
GR 6925	*Senna bauhinioides*	western Grand Canyon

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APPENDIX

Each species entry includes scientific name, common name, a discussion of geographic range and collection locations within GCNP, and voucher information. The appendix is divided into three subcategories: state records, park records, and range extensions and rediscoveries.

STATE RECORDS

MAGNOLIOPHYTA (FLOWERING PLANTS) - MAGNOLIOPSIDA (DICOTS)

Asteraceae

Perityle intricata (Brandegee) Shinners - Narrowleaf Laphamia. This species is known from Nye, Lincoln, and Clark Counties, Nevada; and also from San Bernardino County, California. A collection from Gneiss Canyon (CRM 236) occurs 100 km east/southeast from nearest known population from north of Las Vegas in the Desert National Wildlife Refuge and documents the species growing at the southeastern limit of its range. (*K. Christie 1703*).

Onagraceae

Epilobium nevadense Munz - Nevada Willowherb. This species is known from the Great Basin of central Nevada to southwestern Utah. It has been documented in neighboring Clark County, Nevada (50 km to the west); and from Washington County, Utah (100 km to the north); collections from Twin Springs Canyon (near CRM 248) document a southeastern extension of the species' range. (*G. Rink 8110, 8232*).

PARK RECORDS

MAGNOLIOPHYTA (FLOWERING PLANTS) - MAGNOLIOPSIDA (DICOTS)

Acanthaceae

Carlowrightia arizonica A. Gray - Arizona Wrightwort. *C. arizonica* was previously documented once in Mohave County from the Artillery Mountains near Alamo Lake, but is more commonly known from the Sonoran Desert of southwestern Arizona. A collection from Gneiss Canyon (CRM 236) is the second voucher from Mohave County, and represents a range extension of 160 km north from the nearest known population. (*K. Christie 1696*).

Amaranthaceae

Amaranthus torreyi (A. Gray) Benth. ex S. Watson - Torrey's Amaranthus. This species is known from California and Arizona; in Arizona it is most common in the central and southern portions of the state. Collections from Twin Springs Canyon (near CRM 248) and the Shivwits Plateau near Kelly Point (near CRM 220) are the northwestern-most records from Arizona. The species has been documented from the Hualapai Mountains (105 km to the south), and from the Paria Plateau (170 km to the east/northeast), but otherwise it had not been documented in northwestern Arizona. (*G. Rink 8245, 8364*).

Asclepiadaceae

Asclepias engelmanniana Woodson - Engelmann's Milkweed. This species is known from the southwestern United States and the Great Plains. In Arizona it is most common in the central and southern portions of the state. A collection from Twin Springs Canyon (near CRM 248) is the northwestern-most collection in Arizona, and documents *A. engelmanniana* at the western limit of its range. It was previously known from the Hualapai Mountains, (105 km to the south) and from the Williams area (150 km) to the southeast. (*G. Rink 8242*).

Asteraceae

Chaenactis carphoclinia A. Gray - Pebble Pincushion. This species is more common to the Sonoran and Mohave Deserts of southern Arizona and California. A collection from Trail Canyon (CRM 219) documents the species growing at the northeastern extent of its range, and documents a range extension of 75 km east from the nearest known population from Grand Wash Bay. (*G. Rink 6959, 6984*).

Chrysothamnus viscidiflorus (Hook.) Nutt. ssp. *puberulus* (D. C. Eaton) H. M. Hall & Clem. - Yellow Rabbitbrush. This subspecies is known from the western United States and regionally is most prevalent in the Great Basin. A collection from the Bill Hall trail near Monument Point is the first to document this taxon within GCNP. (*K. Christie 1664*).

Ericameria nauseosa (Pall. ex Pursh) G. L. Nesom & Baird ssp. *consimilis* (Greene) G. L. Nesom & Baird var. *mohavensis* (Greene) G. L. Nesom & Baird - Rubber Rabbitbrush. This Mohavian variety occurs in California, Nevada, and southwestern Utah. A collection from the Sanup Plateau northwest of Diamond Peak documents the taxon growing at the extreme southeastern limit of its distribution. (*G. Rink 8324*).

Hymenopappus filifolius Hook. var. *cinereus* (Rydb.) I. M. Johnst. - Fineleaf Hymenopappus. This variety is fairly common in the Four Corners region (where Arizona, New Mexico, Colorado and Utah meet); however collections from Mount Akaba, Freya Castle, and the rim of Twin Springs Canyon are the first formal documentation of the taxon from GCNP. (*G. Rink 6867, 6999, 8261*).

Psathyrotes ramosissima (Torr.) A. Gray - Velvet Turtleback. This species occurs in the Mohave Desert of western Arizona and southeastern California. A collection from Boulder Wash (CRM 193) documents the species growing at the northeastern periphery of its range, and occurs 70 km east of the nearest known population from Pearce Ferry. (*G. Rink 6891*).

Brassicaceae

Rorippa sinuata (Nutt.) Hitchc. - Spreading Yellowcress. This species is fairly widespread in North America, and occurs regionally within the Four Corners; however a collection from the Walhalla Plateau on the North Rim is the first record from GCNP. (*K. Christie 1514*).

Cuscutaceae

Cuscuta denticulata Engelm. - Desert Dodder. Scattered collections of this species exist from across the southwestern United States and in Arizona it has mostly been collected in La Paz, and southern Mohave Counties. A collection from Monadnock Amphitheater (CRM 105) is the first from GCNP; it documents an intermediate locality between collections to the south in southern Mohave County, and a collection to the north from near Kanab, Utah. (*G. Rink 6838*).

Fabaceae

Lotus plebeius (Brandegee) Barneby - New Mexico Bird's-Foot Trefoil. This species occurs occasionally throughout Arizona. Two collections exist from near Mount Trumbull; and a dubious, older record exists from the Kaibab National Forest, perhaps near the park boundary. A collection from the Palisades of the Desert on the South Rim is the first documented collection from the park. The species may be expected in pinyon-juniper woodlands, rimrock communities, and high elevation grasslands in Grand Canyon. (*K. Christie 1423*).

Lupinus flavoculatus A. Heller - Yelloweyes. This species occurs predominantly in the Mohave Desert and Great Basin of Nevada and California, and uncommonly in southwestern Utah. It was previously collected once in 2001 from near the Wolf Hole Mountains, in northwestern Mohave County. Two collections from Toroweap Valley (CRM 179) represent the second and third records of *L. flavoculatus* in Arizona, and document a 100 km southeast range extension for the species. (*K. Christie 1655, S. Till s.n.*).

Peteria thompsoniae S. Watson - Thompson's Peteria. This species occurs in the California, Nevada, Utah, and sporadically on the Arizona Strip. A collection from Tuckup Canyon (CRM 164) documents the species growing at the southeastern limit of its range. (*T. DeKoker 24*).

Senna bauhinioides (A. Gray) Irwin & Barneby - Twinleaf Senna. This species has Chihuahuan affinities, and is known from Texas, New Mexico, and Arizona. It is commonly collected in southeastern and central Arizona, but is extremely uncommon north of Yavapai County. A collection from Lone Mountain (near CRM 197) is the northwestern-most collection of *S. bauhinioides* in Arizona, and documents a northwestern range extension of 170 km from the nearest known population outside of Cameron (which itself is somewhat of an outlier). (*G. Rink 6925*).

Lamiaceae

Salvia columbariae Benth. - Chia. This species is common to the Sonoran and Mohave Deserts of Arizona at lower elevations. Scattered collections exist from southern Utah, yet the species rarely occurs north of Flagstaff, AZ. A collection from near Nankoweap Butte (CRM 52) documents the species occurring near the northern extent of its range. W. Hodgson, S. Till, and D.

Hill first saw two distinct populations of *S. columbariae* in Kwagunt Canyon in 2007; however the plants were not flowering, and no collections were made. This collection documents their findings. (*T. DeKoker 20*).

Linaceae

Linum australe A. Heller - Southern Flax. This species is seemingly widespread in the southwestern United States and throughout Arizona. One previous record exists from the near Mount Trumbull, yet the species had never been documented from GCNP proper. Collections from the South Rim and the western Grand Canyon near Twin Springs Canyon (CRM 248) document *L. australe* in the park. (*B. Reif 10843, G. Rink 8101*).

Polygalaceae

Polygala macradenia A. Gray - Glandleaf Milkwort. This plant is known from Texas, New Mexico, and Arizona; in Arizona it is more common in the southern portion of the state. Along with several collections from Hualapai lands, collections from Surprise Canyon (CRM 248) and the Sanup Plateau (CRM 220) document *P. macradenia* at the northwestern limit of its range. (*G. Rink 6967, 8318*).

Eriogonum pharnaceoides Torr. - Wirestem Buckwheat. This species is known from New Mexico, Arizona, extreme southwestern Utah, and extreme southeastern Nevada. A few collections exist from near Mount Trumbull, yet the taxon had not been previously documented in the park. A record from Horse Spring Canyon (near CRM 248), in the western Grand Canyon, documents this species growing near the northwestern limit of its distribution. (*G. Rink 8145*).

Eriogonum umbellatum Torr. var. *juniporinum* Reveal - Juniper Buckwheat. This species seems to occur sporadically throughout the Mohave Desert and the Great Basin in isolated desert mountain ranges. A collection from the rim of Twin Springs Canyon documents the taxon growing at southeastern limit of its distribution. (*G. Rink 8096*).

Solanaceae

Lycium cooperi A. Gray - Peach Thorn. This species is known from California, Nevada, southwestern Utah, and northwestern Arizona. A collection from Monadnock Amphitheater (CRM 105) documents the species growing at the eastern extent of its range, and records a 145 km eastern range extension from known populations in Mohave County. (*G. Rink 6832*).

Valerianaceae

Valeriana arizonica A. Gray - Arizona Valerian. This species occurs in the southwestern United States and Texas. It is known from adjacent Forest Service lands near Saddle Mountain, but had not been previously documented within GCNP. A collection from near Saddle Mountain on the North Rim documents the species growing just inside the park boundary. It can be expected to occur uncommonly at higher elevations on the North Rim. (*G. Rink 7111*).

MAGNOLIOPHYTA (FLOWERING PLANTS) - LILIOPSIDA (MONOCOTS)

Cyperaceae

Carex utriculata Boott - Northwest Territory Sedge. This species is widespread in North America; and in Arizona it occurs most commonly in the White Mountains. A few collections exist from moist, high-elevation meadows on the Kaibab Plateau; however two collections from Hades Lake on the North Rim provide the first documentation of *C. utriculata* within the park. (*B. Reif 10875, 10876*).

Poaceae

Panicum hallii Vasey - Hall's Panicgrass. This species occurs from Arizona east to Louisiana, and north into Utah. It has been collected in southern and central Arizona, but other than a single collection from Whitmore Canyon, it has never been collected north of Flagstaff. A collection from the Sanup Plateau northwest of Diamond Peak (CRM 220), documents *P. hallii* growing at the northwestern limit of its range. (*G. Rink 8327*).

RANGE EXTENSIONS AND REDISCOVERIES

PINOPHYTA – GNETOPSIDA (GNETOPHYES)

Ephedraceae

Ephedra trifurca Torr. ex S. Watson - Longleaf Jointfir. This species is known from Texas, New Mexico, Arizona, and California. In Arizona it is typically known from the southern portion of the state. A voucher from near Snap Canyon in GCPNM is the second collection from Mohave County, and represents a northwest range extension of 100 km from known populations in Yavapai County. This species has not yet been documented from GCNP proper. (*B. Reif 10916*).

MAGNOLIOPHYTA - MAGNOLIOPSIDA (DICOTS)

Asteraceae

Brickellia eupatorioides (L.) Shinners var. *chlorolepis* (Woot. & Standl.) B. L. Turner - False Boneset. This species occurs from Texas west to Arizona and Utah, and north to Wyoming. It is extremely uncommon in the Grand Canyon, and has only been collected once before from the South Rim. A voucher collection from Twin Springs Canyon seems to be one of the northwestern-most collections in Arizona and documents the taxon growing at the western limit of its range, 40 km west of a known population near Mount Trumbull. (*G. Rink 8247*).

Brickellia floribunda A. Gray - Chihuahuan Brickellbush. This species occurs in Arizona and New Mexico and has Chihuahuan affinities. It has typically been collected from southeastern Arizona and also from the Verde Valley. The plant is extremely uncommon in the Grand Canyon and has only been collected several times before. A collection from Twin Springs Canyon documents the taxon growing at the northwestern limit of its range. This collection also documents a range extension of 80 km north, from a known population in Hackberry, Mohave County; and 140 km west from a collection from Clear Creek, GCNP. (*G. Rink 8208*).

Ericameria arizonica R. P. Roberts, Urbatsch, & J. L. Anderson - Arizona Goldenbush. This species was first described in 2005 and seems to be endemic to GCNP. It occurs occasionally on rock faces and in cracks and crevices, in rocky, limestone soils, typically at 2100 meters. The authors of the species suggest that it is of conservation concern. Two vouchers from Twin Springs Canyon document the taxon in the western Grand Canyon, 130 km west of known populations from the South Rim developed area between Hermit Creek and the South Kaibab Trail. (*G. Rink 8234, 8292*).

Brassicaceae

Caulanthus crassicaulis (Torr.) S. Watson - Thickstem Wild Cabbage**.** This species is known from the Intermountain West and California. A collection from Lava Canyon near Juno Temple is the first from Grand Canyon in over 60 years and documents the species growing at the southeastern extent of its range; 70 km southeast of the closest documented population on the Arizona Strip. The species does not seem to occur south of the Grand Canyon. (*G. Rink 7026*).

Physaria chambersii Rollins - Chambers' Twinpod. This species is mostly known from Utah, Nevada, and California. Along with a single previous collection from Red Canyon, collections from Unkar, Lava, and Nankoweap Canyons record the species growing at the southeastern limit of its range in GCNP, and document a 70 km southeastern range extension from known populations on the Arizona Strip. (*G. Rink 6790, 7029, 7064*).

Lamiaceae

Scutellaria potosina Brandegee var. *kaibabensis* S. Rhodes & T. Ayers var. nov. in press - Mexican Skullcap. Two collections, one from near Saddle Mountain and one from South Canyon, can be attributed to this variety, which is endemic to the eastern edge of the Kaibab Plateau and occurs 160 km northeast of the closest known population of *S. potosina*. *S. potosina* is primarily an Apachian and Chihuahuan species, and these vouchers document the species growing at the northern extent of its range. This taxon has been collected once before from South Canyon, and several times from Forest Service land adjacent to North Canyon. W. Hodgson has documented several populations outside of the park in the vicinity of Saddle Mountain on the Kaibab Plateau. It is uncommon in the park, but likely occurs sporadically in and around Marble Canyon. It should be looked for in that area. (*K. Christie 1418, G. Rink 7091*).

Polemoniaceae

Linanthus filiformis (Parry ex A. Gray) J. M. Porter & L. A. Johnson - Yellow Gilia. This species occurs in California, Nevada, Utah, and enters into the northwestern corner of Arizona. It has been collected several times before from GCNP, mostly from the Toroweap Valley and Vulcans Throne. Collections from Boulder Wash (CRM 193) and Kwagunt Creek document *L. filiformis* growing at the southeastern limit of its range. The Kwagunt Creek voucher documents a 60 km range extension to the east from a collection made near Tobar Terrace (CRM 121.5). (*G. Rink 6749b, 6884*).

Phlox amabilis Brand - Arizona Phlox. This species is endemic to Arizona, where it occurs mostly in southern Coconino, Mohave, Navajo, and Yavapai Counties. It is considered to be a Forest Service *sensitive species* and has only been collected once before from GCNP, 100 years ago. A collection from the South Rim near Desert View campground provides important habitat and locality information for this Arizona endemic, and documents the species growing near the northern limit of its range. (*K. Christie 1435*).

Polygonaceae

Eriogonum jonesii S. Watson - Jones' Buckwheat. This Arizona endemic has been collected in scattered locations in the state, mostly between Flagstaff and Winslow. It had been collected once from the Sanup Plateau in GCNP, 30 years ago. Collections from Twin Springs Canyon, the Sanup Plateau northwest of Diamond Peak, the Shivwits Plateau east of Kelly Point, and from Palisades of the Desert near Espejo Point provide valuable habitat and distribution data for the species; documenting it from both the western and eastern reaches of the Grand Canyon. (*B. Reif 10862*, *G. Rink 8112*, *8301*, *8329*, *8369*, *8419*).

Rosaceae

Rubus neomexicanus A. Gray - New Mexico Raspberry. This species is known from southeastern Arizona, as well as from the Four Corners, but has only been collected once from GCNP. A collection from Kwagunt Canyon, southwest of Banta Point, is the first in 70 years. *R. neomexicanus* should be looked for in moist, shaded canyons and similar protected habitats. (*G. Rink 7044*).

Scrophulariaceae

Penstemon ophianthus Pennell - Coiled Anther Penstemon. This species occurs in the southwestern United States and is known from GCNP from a single South Rim collection made in 1965. Another collection from adjacent Forest Service land near Tusayan was made in 1973. A collection from Twin Springs Canyon documents the species occurring at the western extent of its range and seems to be the western-most collection in Arizona, 120 km west of the Tusayan collection. (*G. Rink 8271*).