



THE HUNTINGTON
Library, Art Collections, and Botanical Gardens

***Quercus ajoensis* Collection Report**
APGA-USFS Tree Gene Conservation Partnership

October 12, 2018

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Project Summary

The Huntington and Arizona Sonora Desert Museum collaborated to scout localities where *Quercus ajoensis* had been observed in the past, including the Ajo, Kofa, White Tank, Javalina, Sand Tank and Pinal mountains of Arizona between 12 April 2018 and 13 August 2018. *Quercus ajoensis* was targeted for this work because of its Vulnerable Red List status, limited geographic range, and documented hybridization with *Quercus turbinella*.

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Objectives and Outcomes

1) Scout localities of herbarium records for presence of *Quercus ajoensis* or hybrids involving *Quercus ajoensis*.

The first objective was accomplished primarily during April and May 2018, almost exclusively by Arizona-Sonora Desert Museum, with staff from The Huntington joining for the final two days. Once permits were obtained to access the Goldwater Range, staff of both institutions scouted there on 30 July 2018. When we learned of a third canyon in the Ajo Mountains with *Quercus ajoensis*, staff of both institutions went to scout and collect on 13 August 2018.

2) Collect acorns, if available.

This work was slated for the week of 13 – 17 August 2018, based on phenology suggested by George Ferguson, co-author of Field Key to Southern Arizona Oaks. However, acorns dropped almost a full month before that. Peter Holm of Organ Pipe Cactus National Monument graciously collected acorns from four maternal lines on our behalf. Arizona-Sonora Desert Museum sowed those acorns with approximately 75% germination.

Distribution of seedlings to The Huntington, Boyce Thompson Arboretum and Starhill Forest Arboretum is planned for early October 2018.

3) **Collect material for micropropagation, if seed unavailable.**

Micropropagation material was collected after seed had dropped in Estes Canyon on 13 August 2018.

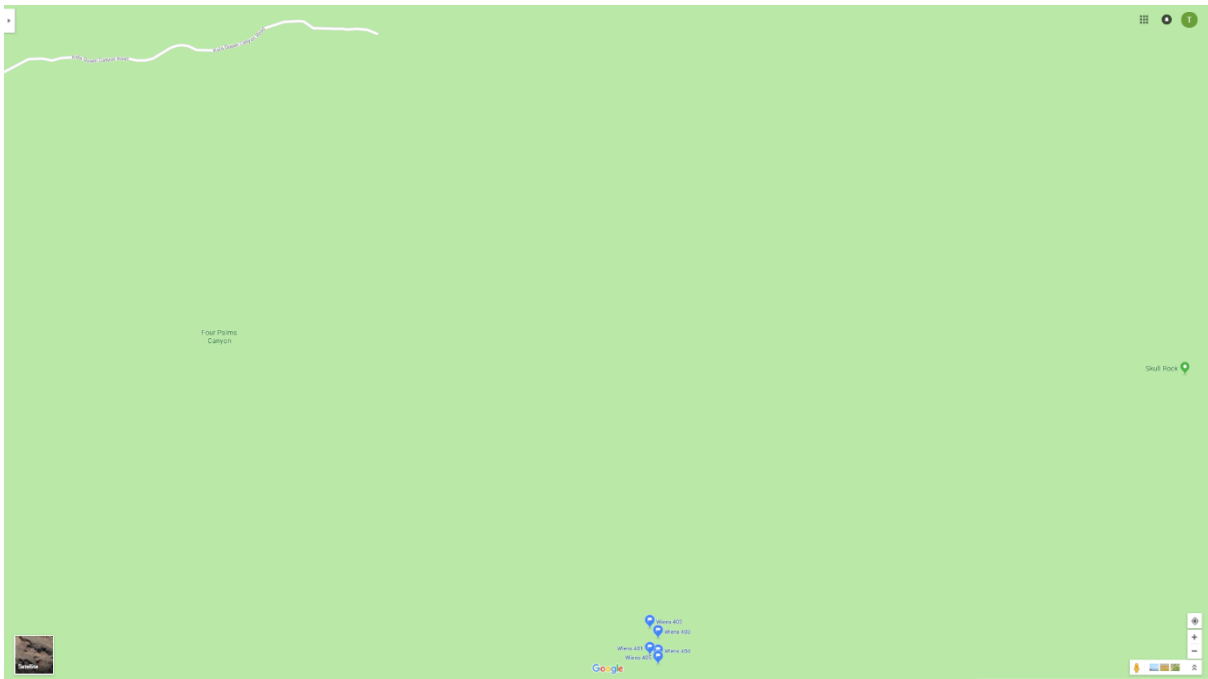


Variation in leaf morphology captured in two canyons in the Ajo Mountains. Photo: John Wiens

Daily Field Log

12 April 2018

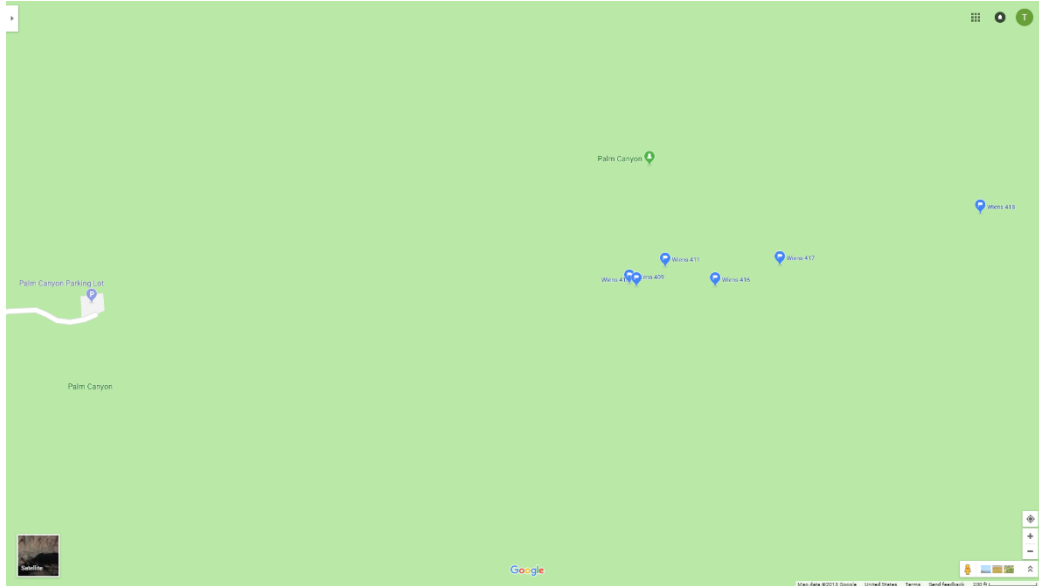
The field team of Mark Fleming, John Wiens and Erik Rakestraw hiked Four Palms Canyon in the Kofa Mountains, accessing from Kofa Queen Canyon Road to the north. Five *Quercus ajoensis* x *Q. turbinella* hybrids were found and vouchered.



Map of collecting sites for 12 April 2018

13 April 2018

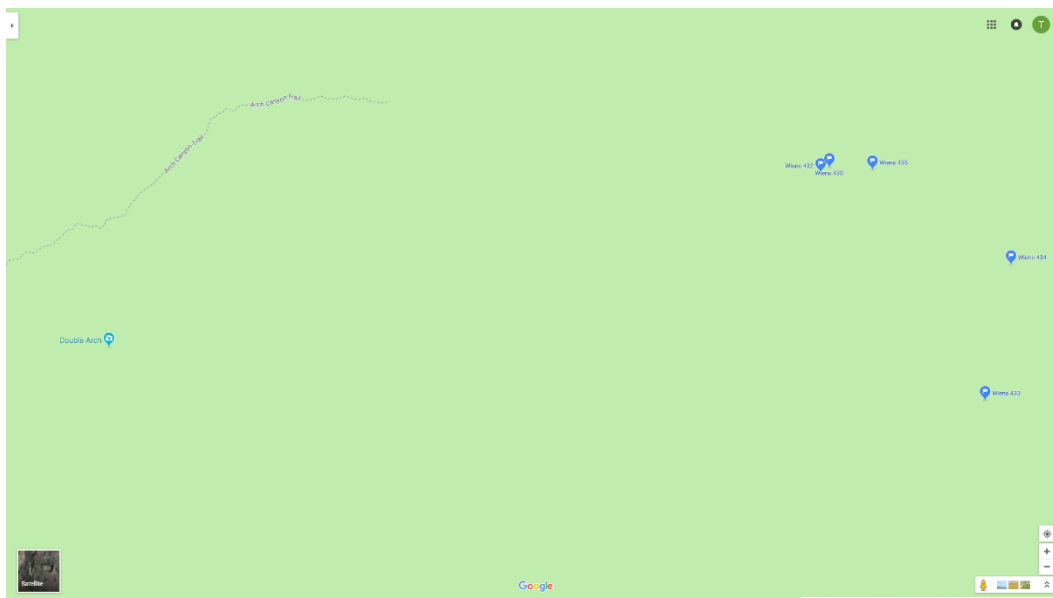
The field team of Mark Fleming, John Wiens and Erik Rakestraw found and vouchered six *Quercus ajoensis* x *turbinella* hybrids in Palm Canyon in the Kofa Mountains.



Map of collecting sites for 13 April 2018

1 May 2018

The field team of John Wiens, Julie Wiens and Matt Jevnikar scouted both forks of Arch Canyon in the Ajo Mountains. No oaks were found in the north fork. Nine *Quercus ajoensis* were seen in the south fork, voucher specimens made for five of them.



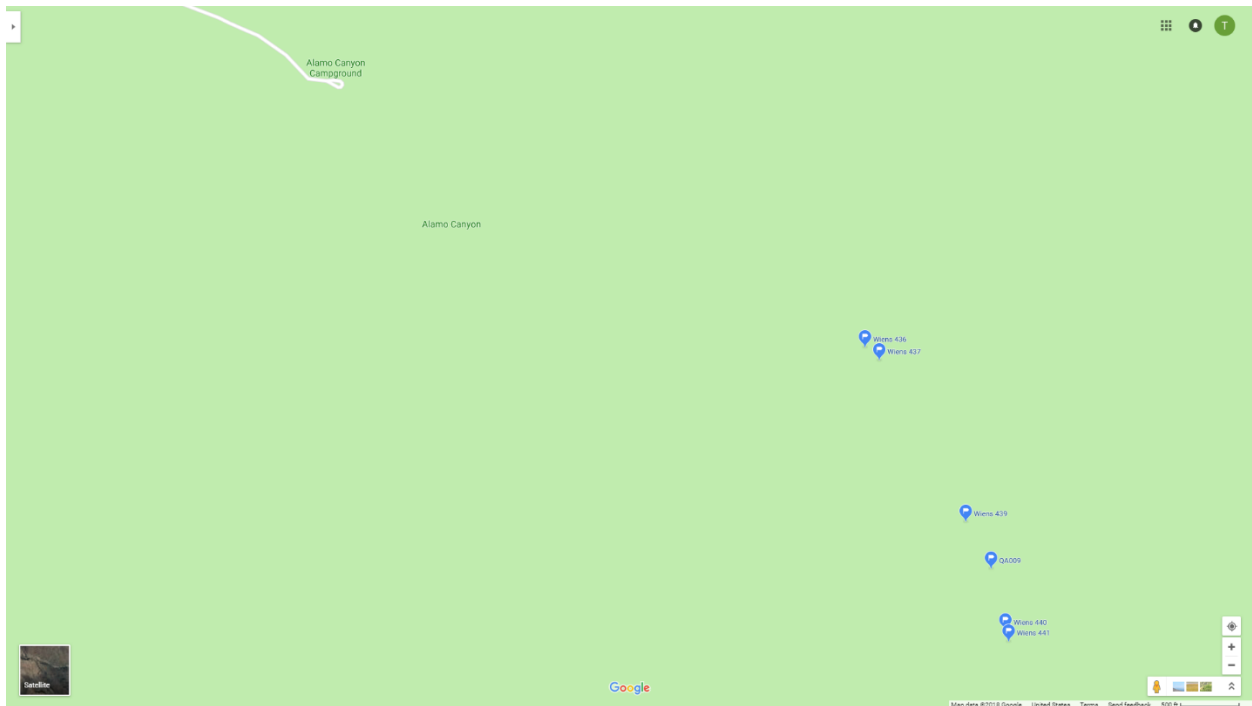
Map of collecting sites for 1 May 2018

2 May 2018

The field team of John Wiens, Julie Wiens and Matt Jevnikar saw approximately 40 oaks in Alamo Canyon in the Ajo Mountains. They made voucher specimens from six of them.



Close up of Wiens et al 441. Photo: John Wiens



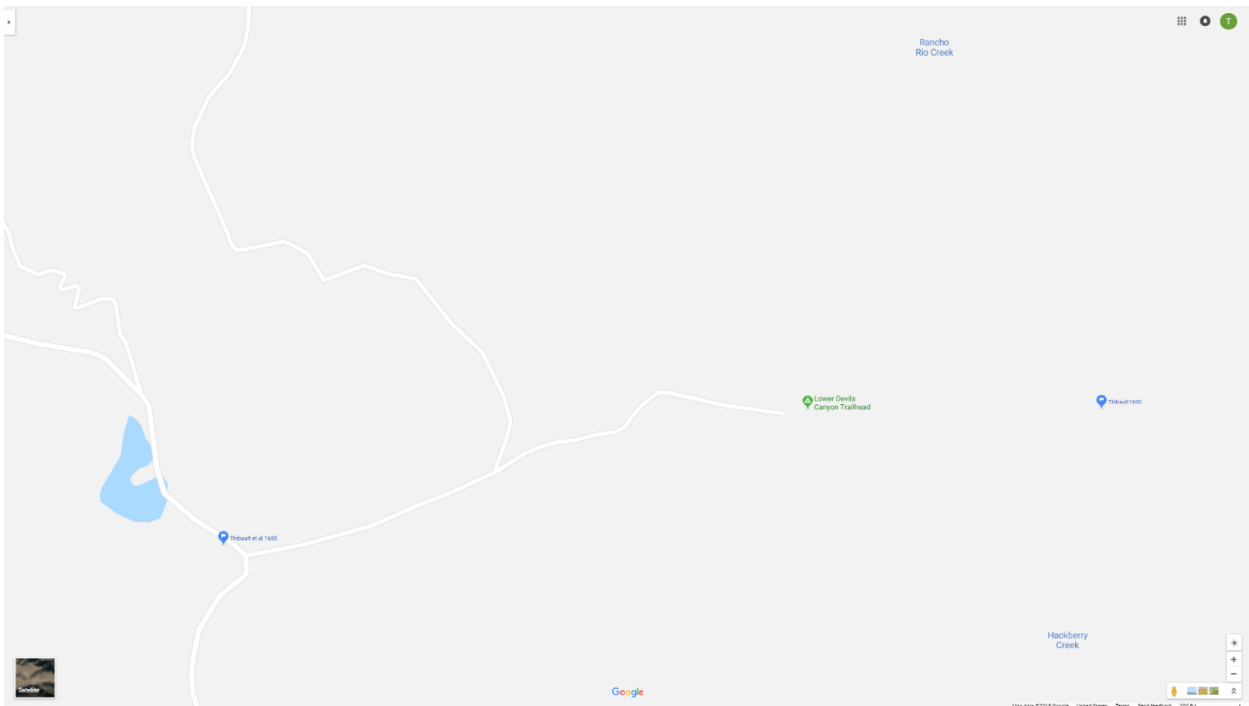
Map of collecting sites for 2 May 2018

22 May 2018



The field team of Tim Thibault, John Wiens, Jason Wiley and Massimo Boscolo visited two sites in the Pinal Mountains. *Quercus ajoensis* was not found at either site. However, oaks at both sites showed signs of introgression, and one from each site was vouchered as *Quercus ajoensis* x *Q. turbinella*.

Top of the 350-foot descent into Devil's Canyon.
Photo: Massimo Boscolo.



Map of collecting sites for 22 May 2018

23 May 2018

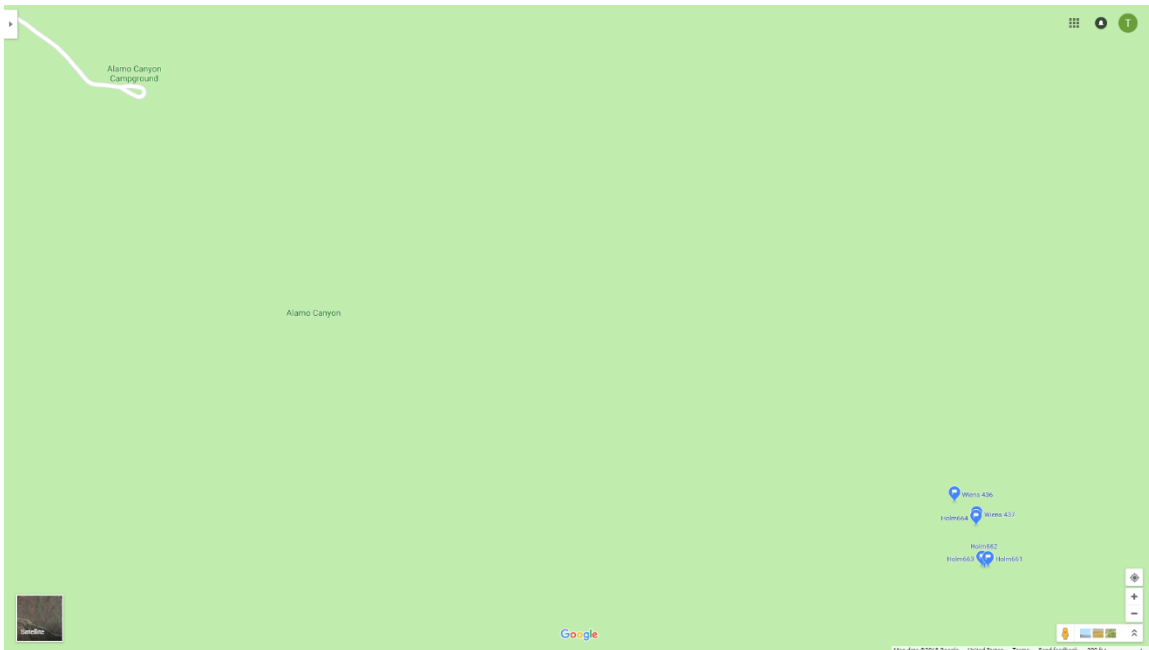
The field team of Tim Thibault, John Wiens, Jason Wiley and Massimo Boscolo hiked Ford Canyon Trail in the White Tank Mountains. Despite a 2016 herbarium collection, no oaks were found.



Rattlesnake narrowly missed Thibault along Ford Canyon Trail.
Photo: John Wiens

19 July 2018

During routine field work in Alamo Canyon, Peter Holm of Organ Pipe Cactus National Monument noticed that *Quercus ajoensis* had already dropped its acorns. He collected approximately 50 acorns from the ground below each of four maternal lines. Note the proximity of Holm's collection to those of Wiens et al from 2 May in the map below.



Map of collecting sites for 19 July 2018

25 July 2018

Thibault drove to Organ Pipe Cactus National Monument to pick up germinating acorns of *Quercus ajoensis* collected by Peter Holm.

30 July 2018

The field team of Tim Thibault, John Wiens and Erik Rakestraw visited the Javalina and Sand Tank mountain ranges in the Barry M. Goldwater Air Force Range. No oaks were found in either range.



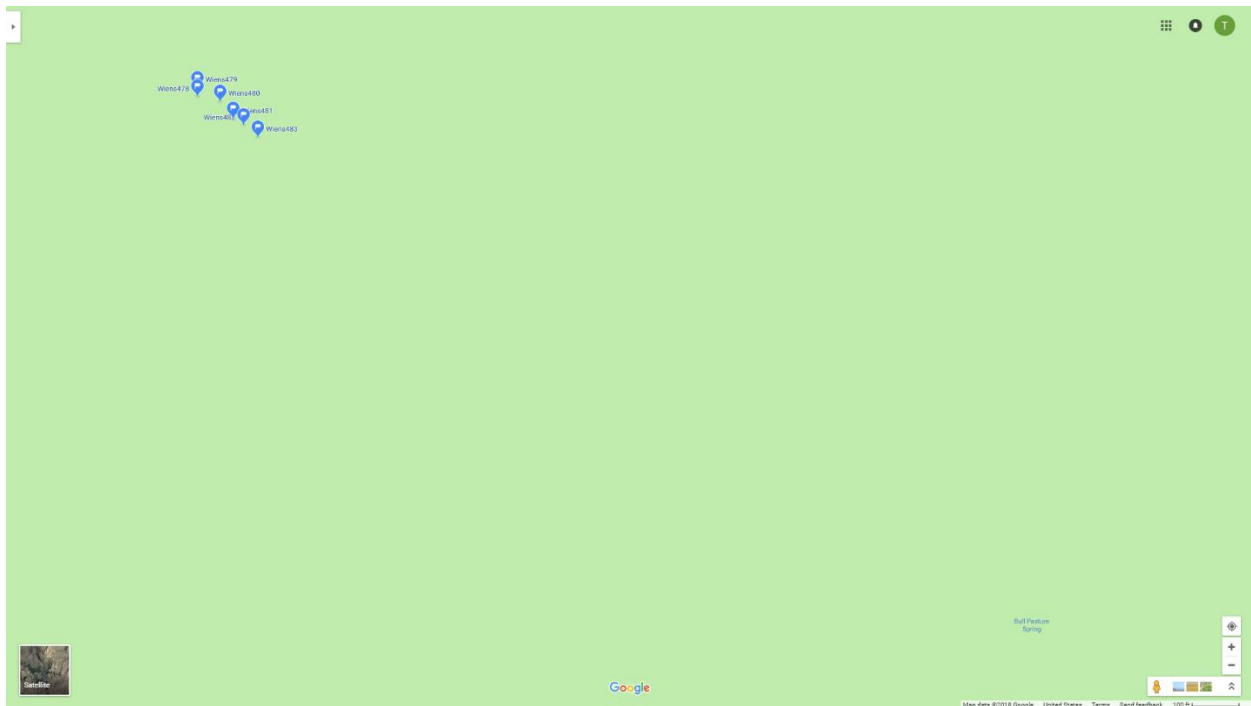
Down saguaro blocks road into Javalina Mountains. Photo: Tim Thibault

13 August 2018



The field team of John Wiens, Tim Thibault and Massimo Boscolo hiked Estes Canyon in the Ajo Mountains. Micropropagation material was collected and voucher specimens taken from six *Quercus ajoensis*.

John Wiens (left) and Massimo Boscolo (right) verify identity of *Quercus ajoensis*.
Photo: Tim Thibault.



Map of collecting sites for 13 August 2018

Conclusions and Future Opportunities

It appears that the US range of *Quercus ajoensis* is contracting to just three canyons in the Ajo Mountains. Despite finds from the year 2000 by accomplished collectors Richard Felger and Peter Holm, *Quercus ajoensis* was not located in the Javalina and Sand Tank mountains respectively. A 2016 collection in the White Tank Mountains similarly could not be duplicated. In the Kofa and Pinal mountains, only hybrids or introgressants could be found.

Fortunately, the remaining US populations are relatively well protected on public lands. However, the recent wildfires and other disasters highlight the vulnerability of being constrained to a small geographic area and underscore the value of collecting and distributing material for *ex situ* conservation. Unfortunately, oaks are masting species. With the improved understanding of phenology of the species and collaboration with land managers developed through this grant, our capacity to capture acorns during the next masting event is greatly improved.

There is a need for a similar search on the Mexican side of the border. An online search of herbarium records lists five localities on the Baja Peninsula, with only two collections this century. While Felger has made collections of *Quercus ajoensis* in Arizona, the species is not listed in *Trees of Sonora, Mexico* by Felger et al., making the Baja localities potentially disjunct by over 100 miles.

Collaborators and Contributions

Peter Holm, Organ Pipe Cactus National Monument, collected acorns and provided locality data for oaks within the national monument and the Sand Tank Mountains.

Cathy Babcock, Boyce Thompson Arboretum, serving as *ex situ* site.

Guy Sternberg, Starhill Forest Arboretum, serving as *ex situ* site.

Label Data for *Quercus ajoensis* or Hybrid Specimens or Observations

All data for specimens deposited at The Huntington Botanical Gardens Herbarium (HNT) is posted on SEINet at www.swbiodiversity.org.

Quercus ajoensis C.H. Mull. x *Q. turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Four Palm Canyon. 2,638 ft. 33°22.008'N, 114°05.302'W. In association with *Simmondsia chinensis*, *Senegalia greggii*, *Larrera tridentata*, *Penstemon pseudospectabilis*, *Galium stellatum*, *Lycium berlandieri*, *Agave deserti*, *Bromus rubens*, *Bebbia juncea*, *Encelia farinosa*, *Commicarpus scandens*, *Phoradendron californicum*, *Ferocactus cylindraceus*. Lowest oak; small and somewhat stressed. Leaves green, not bluish. John F. Wiens, Mark Fleming and Erik Rakestraw 401. 12 Apr 2018.

Quercus ajoensis C.H. Mull. x *Q. turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Four Palm Canyon. 2,666 ft. 33°22.056'N, 114°05.301'W. About 40 m upstream from Wiens 401. In association with *Simmondsia chinensis*, *Ericameria laricifolia*, *Penstemon pseudospectabilis*, *Bebbia juncea*, *Senegalia greggii*, *Krameria bicolor*, *Encelia farinosa*, *Condalia globosa*, *Phoradendron californicum*, *Scutellaria mexicana*, *Commicarpus scandens*, *Ephedra nevadensis*, *Ayenia compacta*. Leaves more bluish than Wiens 401. John F. Wiens, Mark Fleming and Erik Rakestraw 402. 12 Apr 2018.

Quercus ajoensis C.H. Mull. x *Q. turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Four Palm Canyon. 2,685 ft. 33°22.038'N, 114°05.289'W. In association with *Simmondsia chinensis*, *Senegalia greggii*, *Lycium berlandieri*, *Bernardia incana*, *Bromus rubens*, *Lepidum lasiocarpum*. Leaves similar in color to Wiens 401. John F. Wiens, Mark Fleming and Erik Rakestraw 403. 12 Apr 2018.

Quercus ajoensis C.H. Mull. x *Q. turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Four Palm Canyon. 2,845 ft. 33°22.003'N, 114°05.286'W. In association with *Senegalia greggii*, *Simmondsia chinensis*, *Lycium berlandieri*, *Bromus rubens*, *Bernardia incana*, *Galium stellatum*, *Sphaeralcea ambigua*, *Canotia holacantha*. Leaves notable for having 3 teeth on each edge, as compared to 4-7 on Wiens 401, 402 and 404. John F. Wiens, Mark Fleming and Erik Rakestraw 404. 12 Apr 2018.

Quercus ajoensis C.H. Mull. x *Q. turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Four Palm Canyon. 2,858 ft. 33°21.991'N, 114°05.285'W. In association with *Simmondsia chinensis*, *Lycium berlandieri*, *Prosopis velutina*, *Senegalia greggii*, *Mirabilis laevis*, *Sphaeralcea ambigua*, *Muhlenbergia porteri*, *Larrea tridentata*, *Nolina bigelovii*. Leaves very blue-green with lanose hairs beneath. Many 3-4 points on each edge of leaves. John F. Wiens, Mark Fleming and Erik Rakestraw 405. 12 Apr 2018.

Quercus ajoensis C.H. Mull. x *Quercus turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Palm Canyon. 2,204 ft. 33°21.642'N, 114°05.927'W. Lowest oak. In association with *Senegalia greggii*, *Koeberlinia spinosa*, other *Quercus* sp., *Hyptis emoryi*, *Justicia californica*, *Bromus rubens*, *Simmondsia chinensis*, *Ditaxis* sp., *Parkinsonia microphylla*,

Olneya tesota, *Parietaria hespera*, *Abutilon abutiloides*, *Abutilon incanum*. Leaves green, not bluish. John F. Wiens, Mark Fleming and Erik Rakestraw 409. 13 Apr 2018.

Quercus ajoensis C.H. Mull. x *Q. turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Palm Canyon. 2,376 ft. 33°21.640'N, 114°05.923'W. Next to Wiens 409. In association with *Senegalia greggii*, *Koeberlinia spinosa*, other *Quercus* sp., *Hyptis emoryi*, *Justicia californica*, *Bromus rubens*, *Simmondsia chinensis*, *Ditaxis* sp., *Parkinsonia microphylla*, *Olneya tesota*, *Parietaria hespera*, *Abutilon abutiloides*, *Abutilon incanum*. Leaves bluish. The only flowering oak found. John F. Wiens, Mark Fleming and Erik Rakestraw 410. 13 Apr 2018.

Quercus ajoensis C.H. Mull. x *Quercus turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Palm Canyon. 2,418 ft. 33°21.654'N, 114°05.896'W. In association with *Senegalia greggii*, *Hyptis emoryi*, *Mirabilis laevis*, *Justicia californica*, *Bahiopsis parishii*, *Nolina bigelovii*, *Trixis californica*, other *Quercus* sp. John F. Wiens, Mark Fleming and Erik Rakestraw 411. 13 Apr 2018.

Quercus ajoensis C.H. Mull. x *Quercus turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Palm Canyon. 2,460 ft. 33°21.640'N, 114°05.856'W. In association with *Senegalia greggii*, *Condalia globosa*, *Rhus aromatica*, *Hyptis emoryi*, *Parietaria hespera*, *Sphaeralcea ambigua*, *Lycium fremontii*, *Bromus rubens*, *Brickellia coulteri*, *Bernardia incana*, *Phaseolus filiformis*, other *Quercus* sp. Large bluish leaves with tiny stellate hairs on under surface. John F. Wiens, Mark Fleming and Erik Rakestraw 416. 13 Apr 2018.

Quercus ajoensis C.H. Mull. x *Quercus turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Palm Canyon. 2,509 ft. 33°21.655'N, 114°05.800'W. In association with *Senegalia greggii*, *Justicia californica*, *Hyptis emoryi*, *Ephedra nevadensis*, *Brickellia coulteri*, *Bahiopsis parishii*, *Simmondsia chinensis*, *Descurainia pinnata*, *Bernardia incana*, *Janusia gracilis*, *Parietaria hespera*, other *Quercus* sp. John F. Wiens, Mark Fleming and Erik Rakestraw 417. 13 Apr 2018.

Quercus ajoensis C.H. Mull. x *Quercus turbinella* Greene. USA: Arizona: Yuma: Kofa Mountains: Palm Canyon. 2,854 ft. 33°21.691'N, 114°05.636'W. In association with *Simmondsia chinensis*, *Carlowrightia arizonica*, *Senegalia greggii*, *Nolina bigelovii*, *Justicia californica*, *Galium stellatum*, *Hyptis emoryi*, *Crossosoma bigelovii*, *Rhus aromatica*, *Prenanthes exigua*, *Bernardia incana*, *Penstemon pseudospectabilis*, *Hibiscus coulteri*, *Nicotiana obtusifolia*, *Sphaeralcea ambigua*, *Brickellia coulteri*, *Aristida purpurea* var. *nealleyi*, *Bromus rubens*, *Atriplex polycarpa*, *Parkinsonia microphylla*, *Scutellaria mexicana*. John F. Wiens, Mark Fleming and Erik Rakestraw 418. 13 Apr 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Arch Canyon. 2,762 ft. 32°02.436'N, 112°42.111'W. In association with *Vauquelinia*, *Simmondsia*, *Sebastiana*, *Lycium berlandieri*, *Acalypha*, *Senegalia*, *Bothriochloa*, *Ambrosia ambrosioides*, *Prosopius*, *Celtis*

pallida, *Phoradendron*, *Coursetia*, *Koanophyllon*, *Forestiera*, *Abutilon incanum*. Height: 5 m. Width: 10 m. In full flower. Leaves glaucous & glabrous on both sides, 3-5 spines on each margin of leaves. Mature twigs reddish-brown to gray & lanose. John F. Wiens, Julie Wiens and Matt Jevnikar 430. 1 May 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Arch Canyon. 3,038 ft. 32°02.433'N, 112°42.114'W. In association with *Vauquelinia*, *Simmondsia*, *Sebastiana*, *Tragia*, *Herissantia*, *Anisacanthus*, *Dodonaea*, *Koanophyllon*, *Ambrosia ambrosioides*, *Acourtia*, *Celtis pallida*, *Senegalia*, *Myriopteris*, *Pentagramma*, *Acalypha*, *Brickellia coulteri*, *Pellaea*, *Mimosa*, *Aristida*, *Eriogonum wrightii*, *Muehlenbergia porteri*, *Abutilon incanum*, *Phoradendron*, *Bahiopsis*, *Lycium berlandieri*, *Rhus*, *Keckiella*, *Galactia*, *Galium*, other *Quercus* sp. Height: 4 m. Width: 3 m. In early flower bud. Leaves glaucous & glabrous on both sides, 4-8 spines on each margin of leaves. John F. Wiens, Julie Wiens and Matt Jevnikar 432. 1 May 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Arch Canyon. 3,034 ft. 32°02.299'N, 112°42.001'W. In association with *Vauquelinia*, *Simmondsia*, *Sebastiana*, *Tragia*, *Herissantia*, *Anisacanthus*, *Dodonaea*, *Koanophyllon*, *Ambrosia ambrosioides*, *Acourtia*, *Celtis pallida*, *Senegalia*, *Myriopteris*, *Pentagramma*, *Acalypha*, *Brickellia coulteri*, *Pellaea*, *Mimosa*, *Aristida*, *Eriogonum wrightii*, *Muehlenbergia porteri*, *Abutilon incanum*, *Phoradendron*, *Bahiopsis*, *Lycium berlandieri*, *Rhus*, *Keckiella*, *Galactia*, *Galium*, other *Quercus* sp. Height: 5 m. Width: 8 m. In very early flower bud. Leaves glaucous & glabrous on both sides, 4-6 spines on each margin of leaves. John F. Wiens, Julie Wiens and Matt Jevnikar 433. 1 May 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Arch Canyon. 2,890 ft. 32°02.379'N, 112°41.982'W. In association with *Vauquelinia*, *Dodonaea*, *Ambrosia ambrosioides*, *Rhamnus*, *Agave*, *Acalypha*, *Brickellia coulteri*, *Sebastiana*, other *Quercus* sp. Height: 7 m. Width: 13. Leaves glaucous & glabrous on both sides, 4-8 spines on each margin of leaves. John F. Wiens, Julie Wiens and Matt Jevnikar 434. 1 May 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Arch Canyon. 2797 ft. 32°02.435'N, 112°42.078'W. In association with *Vauquelinia*, *Simmondsia*, *Senegalia*, *Ambrosia ambrosioides*, *Celtis pallida*, *Acalypha*, *Rhamnus*, *Coursetia*, *Prosopis*, *Justicia californica*. Height: 7m. Width: 4m. In flower. Leaves tiny, glaucous & glabrous on both sides. 2-3 spines on each margin of leaves. John F. Wiens, Julie Wiens and Matt Jevnikar 435. 1 May 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Alamo Canyon. 2,325 ft. 32°03.934'N, 112°42.805'W. Lowest oak noted. *Senegalia*, *Prosopis*, *Ambrosia ambrosioides*, *Dodonaea*, *Simmondsia*, *Acmispon*, *Gutierrezia*, *Acalypha*, *Abutilon incanum*, *Cynodon*, *Baccharis sarothroides*, *Epilobium*, *Arida*, *Ericameria laricifolia*, *Digitaria*, *Artemisia*, *Euphorbia florida*, *Eriogonum fasciculatum*, *Bothriochloa*, *Cirsium*, *Celtis pallida*, *Ziziphus*,

Gymnosperma, *Acourtia*, *Ambrosia cordifolia*, *Wislizenia*, *Caulanthus*, *Descurainia*, *Carlowrightia*, *Bromus*, & other *Quercus* sp. Height: 3.5m. Width: 4m. Tiny leaves; glaucous & glabrous on both sides. 3-4 spines on each margin of leaves. John F. Wiens, Julie Wiens and Matt Jevnikar 436. 2 May 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Alamo Canyon. 2,384 ft. 32°03.916'N, 112°42.777'W. Approx. 40m upstream of Wiens 436, with 3 other *Quercus* between. Several seedling *Quercus* beneath canopy. There are 20 more mature oaks between this and 100m upstream, including one plant with 2-3 spines on each margin of leaves. In association with *Senegalia*, *Prosopis*, *Ambrosia ambrosioides*, *Baccharis sarothroides*, *Celtis reticulata*, *Verbena*, *Dodonaea*, *Euphorbia arizonica*, *Brickellia californica*, *Acalypha*, *Forestiera*, *Phacelia ramosissima*, *Epilobium*, *Acourtia*, *Nicotiana*, *Bromus*, & other *Quercus* sp. Height: 7m. Width: 10m. Large leaves; glaucous & glabrous on both sides. 4-8 spines on each margin of leaves. Fresh stem growth strongly anthocyanous. In late stages of flowering/early fruit. John F. Wiens, Julie Wiens and Matt Jevnikar 437. 2 May 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Alamo Canyon. 2,433 ft. 32°03.688'N, 112°42.634'W. This is just upstream of the "T" in the canyon. Growing with 2 other oaks; all appear stressed (majority of leaves dried and hanging on plant). In association with *Senegalia*, *Prosopis*, *Ambrosia ambrosioides*, *Sebastiana*, *Anisacanthus*, *Sarcostemma*, *Bothriochloa*, *Juniperus*, *Chenopodium*, *Ambrosia cordifolia*, *Dodonaea*, *Simmondsia*, *Acalypha*, *Eriogonum wrightii*, *Celtis pallida*, *Coursetia*, *Abutilon incanum*, *Gymnosperma*, *Phoradendron*, *Bromus*, *Muhlenbergia microsperma*, & other *Quercus* sp. Height: 4.5m. Width: 6m. Leaves glaucous & glabrous on both sides. 5-8 spines on each margin of leaves. John F. Wiens, Julie Wiens and Matt Jevnikar 439. 2 May 2018.

Quercus ajoensis C.H. Mull. 2458 ft. 32°03.622'N 112°42.596'W 2458' elev. Waypoint only; within cluster of a dozen large, healthy *Quercus*. Most in flower. Leaves of most smaller, but with long spines on margins. #QA009.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Alamo Canyon. 2,421 ft. 32°03.535'N, 112°42.567'W. Within a small grove of oaks; some stressed and some not; few in flower bud. In association with *Senegalia*, *Prosopis*, *Ambrosia ambrosioides*, *Ambrosia cordifolia*, *Abutilon incanum*, *Bouteloua curtipendula*, *Anisacanthus*, *Dodonaea*, *Celtis pallida*, *Tragia*, *Simmondsia*, & other *Quercus* sp. Height: 7m. Width: 8m. Leaves tiny, glaucous & glabrous on both sides. 4-6 spines on each margin of leaves. John F. Wiens, Julie Wiens and Matt Jevnikar 440. 2 May 2018.

Quercus ajoensis C.H. Mull. USA: Arizona: Pima: Ajo Mountains: Alamo Canyon. 2,498 ft. 32°03.520'N, 112°42.565'W. Highest oak reached; canyon wash obstructed by large boulders. In association with *Vauquelinia*, *Simmondsia*, *Ambrosia ambrosioides*, *Ambrosia cordifolia*,

Abutilon incanum, *Rhus aromatica*, *Rhamnus*, *Koanophyllon*, *Acalypha*, *Aristida ternipes*, *Abutilon abutiloides*, *Dodonaea*, *Celtis reticulata*, & 4 other *Quercus*. Height: 7.5m. Width: 8m. Partially deciduous. In flower. Leaves very glaucous & glabrous on both sides. 3-6 long spines on each margin of leaves. John F. Wiens 441. 2 May 2018. John F. Wiens, Julie Wiens and Matt Jevnikar 441. Highest oak reached; canyon wash obstructed by large boulders.

Quercus ajoensis C.H. Mull. x *Q. turbinella* Greene. USA: Arizona: Pinal: 2.7 miles (by air) S of Highway 60 at Oak Flats Road near windmill. 3,830 ft. 33°16.483'N, 111°2.404'W. Base of slope at edge of road, in association with *Salix*, *Morus*, *Cercocarpus*, *Dodonaea*, *Prosopis*, *Berberis*, *Lonicera*, *Ericameria laricifolia*, *Juniperus*, *Baccharis sarothroides*, *Mimosa aculeaticapa*, *Celtis reticulata*. Common 4 m tall tree, leaves adaxial blue-green, abaxial yellow-green with sparse stellate hairs on both surfaces. Tim Thibault, John F. Wiens, Massimo Boscolo and Jason Wiley 1655. 22 May 2018.

Quercus ajoensis C.H. Mull. x *Q. turbinella* Greene. USA: Arizona: Pinal: Devil's Canyon, 2.8 miles (by air) SE of Highway 60. 3,614 ft. 33°16.588'N, 111°01.644'W. W-facing slope in association with *Quercus arizonica*, *Simmondsia*, *Senegalia greggii*, *Phoradendron* spp., *Rhus aromatica*, *Juniperus deppeana*, *Agave chrysantha*, *Ericameria laricifolia*, *Prosopis velutina*, *Carnegiea*. Abundant shrub to 2 m., foliage gray-green above, yellow-green beneath, acorn caps gray-brown, twigs reddish-yellow. Tim Thibault, John F. Wiens, Massimo Boscolo and Jason Wiley 1660. 22 May 2018.

Quercus ajoensis C.H. Mull. United States: Arizona: Pima: Ajo Mountains: Estes Canyon. 2590 ft. 32.01899°N, 112.69761°W. With *Rhamnus ilicifolia*, *Dodonaea*, *Abutilon* spp., *Senegalia*, *Vauquelinia*, *Simmondsia*, *Forestiera*, *Anisacanthus*. Tree 4m tall X 3m wide. Bark gray; fissured in strips. Leaves blue-green with 5-8 teeth on each edge. John F. Wiens, Tim Thibault and Massimo Boscolo 478. 13 Aug 2018.

Quercus ajoensis C.H. Mull. United States: Arizona: Pima: Ajo Mountains: Estes Canyon. 2593 ft. 32.01904°N, 112.69761°W. With *Rhamnus ilicifolia*, *Dodonaea*, *Abutilon* spp., *Senegalia*, *Vauquelinia*, *Simmondsia*, *Forestiera*, *Anisacanthus*. Tree 6m tall X 7m wide. Bark gray; fissured in strips. Leaves blue-green & glabrous with 6-7 teeth on each edge. John F. Wiens, Tim Thibault and Massimo Boscolo 479. 13 Aug 2018.

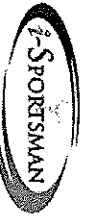
Quercus ajoensis C.H. Mull. United States: Arizona: Pima: Ajo Mountains: Estes Canyon. 2633 ft. 32.01896°N, 112.69745°W. With *Rhamnus ilicifolia*, *Dodonaea*, *Abutilon* spp., *Senegalia*, *Vauquelinia*, *Simmondsia*, *Forestiera*, *Anisacanthus*. Tree 5m tall X 6m wide. Bark gray; fissured in strips. Leaves blue-green & glabrous with 3-4 teeth on each edge. John F. Wiens, Tim Thibault and Massimo Boscolo 480. 13 Aug 2018.

Quercus ajoensis C.H. Mull. United States: Arizona: Pima: Ajo Mountains: Estes Canyon. 2593 ft. 32.01886°N, 112.69736°W. With *Rhamnus ilicifolia*, *Dodonaea*, *Abutilon* spp., *Senegalia*,

Vauquelinia, *Simmondsia*, *Forestiera*, *Anisacanthus*. Tree 6m tall X 7m wide. Bark gray; fissured in strips. Leaves blue-green & glabrous with 3-8 teeth on each edge. John F. Wiens, Tim Thibault and Massimo Boscolo 481. 13 Aug 2018.

Quercus ajoensis C.H. Mull. United States: Arizona: Pima: Ajo Mountains: Estes Canyon. 2599 ft. 32.01882°N, 112.69729°W. With *Rhamnus ilicifolia*, *Dodonaea*, *Abutilon* spp., *Senegalia*, *Vauquelinia*, *Simmondsia*, *Forestiera*, *Anisacanthus*. Tree 4m tall X 6m wide. Bark gray; fissured in strips. Leaves blue-green & nearly glabrous with 3-4 teeth on each edge. John F. Wiens, Tim Thibault and Massimo Boscolo 482. 13 Aug 2018.

Quercus ajoensis C.H. Mull. United States: Arizona: Pima: Ajo Mountains: Estes Canyon. 2605 ft. 32.01875°N, 112.69719°W. With *Rhamnus ilicifolia*, *Dodonaea*, *Abutilon* spp., *Senegalia*, *Vauquelinia*, *Simmondsia*, *Forestiera*, *Anisacanthus*. Tree 3m tall X 7m wide. Bark gray; fissured in strips. Leaves blue-green & nearly glabrous with 5-8 teeth on each edge. John F. Wiens, Tim Thibault and Massimo Boscolo 483. 13 Aug 2018.



Luke AFB iSportsman Service

NAME: Thibault, Tim NUMBER: 284206
ADDRESS: The Huntington 1151 Oxford Road, San Marino CA
PHONE: (626) 405-3511 STATUS:
FROM: July 25, 2018 TO: June 30, 2019
0 0000284206 6

ACCOUNT VALIDATIONS
Safety Video Validation START DATE: Jul 25, 2018 END DATE: 30 Jun 2019

PERMITS
General Permit - All Areas START DATE: Jul 25, 2018 END DATE: 30 Jun 2019
BMGR-E Area B Gates Code #: 3515



Research and Monitoring
Special Use Permit
(For Official Use Only)

Permit #: 22570-18-13

Permit Term:

From:
3/14/2018

To:
12/31/20
18

1) Principal Investigator Name/Affiliation: Mark Fleming, Arizona Sonora Desert Museum

2) Permit Activity Type: Research: APGA-USFS Tree Gene Conservation Partnership: Two Arizona Oaks at Risk

3) Permit Status: Approved *If approved, provide special conditions (if any) in the text box below.*
 Denied *If denied, provide justification in the text box below.*

Scouting and seed collection as described in the permit applications from specimens is approved for up to 35 seeds per plant (tree). Seeds may be collected from up to 50 specimens of each species (*Quercus ajoensis* and *Quercus toumeyii*), with the following stipulations: No more than 20% of seeds of any individual plant annual seedset may be collected.

4) Are there additional special conditions attached to the permit? Yes No N/A

5) Are other licenses/permits required, and have they been verified? Yes No N/A

6) Are Insurance and/or Certification(s) required, and have they been verified? Yes No N/A

7) Is an Assurance of Animal Care or Institutional Animal Approval form needed? Yes No N/A

If yes, is the form attached? Yes No

8) Has a Minimum Requirements Decision Assessment been conducted? Yes No N/A

If yes, is assessment attached? Yes No

9) Record of Payments: Full Partial Exempt

10) Is a surety bond or security deposit required? Yes No N/A

This permit is issued by the U.S. Fish and Wildlife Service and accepted by the applicant signed below, subject to the terms, covenants, obligations, and reservations, expressed or implied therein, and to the notice, conditions, and requirements included or attached. A copy of this permit should be kept on-hand so that it may be shown at any time to any refuge staff

11) Permit approved/issued by: (Signature and title)

12) Permit accepted by: (Signature of permittee)

Date: _____

Date: _____

General Conditions and Requirements

1) Responsibility of Permittee: The permittee, by operating on the premises, shall be considered to have accepted these premises with all facilities, fixtures, or improvements in their existing condition as of the date of this permit. At the end of the period specified or upon earlier termination, the permittee shall give up the premises in as good order and condition as when received except for reasonable wear, tear, or damage occurring without fault or negligence. The permittee will fully repay the Service for any and all damage directly or indirectly resulting from negligence or failure on his/her part, and/or the part of anyone of his/her associates, to use reasonable care.

2) Operating Rules and Laws: The permittee shall keep the premises in a neat and orderly condition at all times, and shall comply with all municipal county, and State laws applicable to the operations under the permit as well as all Federal laws, rules, and regulations governing national wildlife refuges and the area described in this permit. The permittee shall comply with all instructions applicable to this permit issued by the refuge official in charge. The permittee shall take all reasonable precautions to prevent the escape of fires and to suppress fires and shall render all reasonable assistance in the suppression of refuge fires.

3) Use Limitations: The permittee's use of the described premises is limited to the purposes herein specified and does not, unless provided for in this permit, allow him/her to restrict other authorized entry onto his/her area; and allows the U.S. Fish and Wildlife Service to carry on whatever activities are necessary for: (1) protection and maintenance of the premises and adjacent lands administered by the U.S. Fish and Wildlife Service; and (2) the management of wildlife and fish using the premises and other U.S. Fish and Wildlife Service lands.

4) Transfer of Privileges: This permit is not transferable, and no privileges herein mentioned may be sublet or made available to any person or interest not mentioned in this permit. No interest hereunder may accrue through lien or be transferred to a third party without the approval of the Regional Director of the U.S. Fish and Wildlife Service and the permit shall not be used for speculative purposes.

5) Compliance: The U.S. Fish and Wildlife Service's failure to require strict compliance with any of this permit's terms, conditions, and requirements shall not constitute a waiver or be considered as a giving up of the U.S. Fish and Wildlife Service's right to thereafter enforce any of the permit's terms or conditions.

6) Conditions of Permit not Fulfilled: If the permittee fails to fulfill any of the conditions and requirements set forth herein, the U.S. Fish and Wildlife Service shall retain all money paid under this permit to be used to satisfy as much of the permittee's obligation as possible.

7) Payments: All payment shall be made on or before the due date to the local representative of the U.S. Fish and Wildlife Service by a postal money order or check made payable to the U.S. Fish and Wildlife Service.

8) Termination Policy: At the termination of this permit the permittee shall immediately give up possession to the U.S. Fish and Wildlife Service representative, reserving, however, the rights specified in paragraph 11 below. If he/she fails to do so, he/she will pay the U.S. Fish and Wildlife Service, as liquidated damages, an amount double the rate specified in this permit for the entire time possession is withheld. Upon yielding possession, the permittee will still be allowed to reenter as needed to remove his/her property as stated in paragraph 11 below. The acceptance of any fee for the liquidated damages or any other act of administration relating to the continued tenancy is not to be considered as an affirmation of the permittee's action nor shall it operate as a waiver of the U.S. Fish and Wildlife Service's right to terminate or cancel the permit for the breach of any specified condition or requirement.

9) Revocation Policy: The Regional Director of the U.S. Fish and Wildlife Service may revoke this permit without notice for noncompliance with the terms hereof, or for violation of general and/or specific laws or regulations governing national wildlife refuges, or for nonuse. It is at all times subject to discretionary revocation by the Director of the Service. Upon such revocation the U.S. Fish and Wildlife Service, by and through any authorized representative, may take possession of said premises for its own and sole use, and/or may enter and possess the premises as the agent of the permittee and for his/her account.

10) Damages: The U.S. Fish and Wildlife Service shall not be responsible for: any loss or damage to property including but not limited to crops, animals, and machinery; injury to the permittee or his/her relatives or to the officers, agents, employees, or any other(s) who are on the premises from instructions; the sufferance from wildlife or employees or representatives of the U.S. Fish and Wildlife Service carrying out their official responsibilities. The permittee agrees to hold the U.S. Fish and Wildlife Service harmless from any and all claims for damages or losses that may arise to be incident to the flooding of the premises resulting from any associated government river and harbor, flood control, reclamation, or Tennessee Valley Authority activity.

11) Removal of Permittee's Property: Upon the expiration or termination of this permit, if all rental charges and/or damage claims due to the U.S. Fish and Wildlife Service have been paid, the permittee may, within a reasonable period as stated in the permit or as determined by the U.S. Fish and Wildlife Service official in charge, but not to exceed 60 days, remove all structures, machinery, and/or equipment, etc., from the premises for which he/she is responsible. Within this period the permittee also must remove any other of his/her property including his/her acknowledged share of products or crops grown, cut, harvested, stored, or stacked on the premises. Upon failure to remove any of the above items within the aforesaid period, they shall become the property of the U.S. Fish and Wildlife Service.

KOFA NATIONAL WILDLIFE REFUGE
SPECIAL CONDITIONS FOR
SPECIAL USE PERMIT 22570-18-13

Authorized Activities

All activities of the Permittee and other personnel are subject to all federal laws, rules, and regulations, including those governing wildlife and National Wildlife Refuges. This permit does not relieve the Permittee of responsibility to comply with all other federal, state and local laws and regulations. Activities under this permit may be conducted only after any other permits and/or authorizations necessary to conduct the activities have been obtained.

This permit is valid through 31 December 2018. For work in subsequent years, a permit renewal must be requested. A report summarizing the work completed is required to receive a renewal for the following calendar year. Please submit report and renewal request one to two months prior to beginning fieldwork, unless otherwise agreed upon.

The taking of any animal, vegetable, or mineral matter, except as authorized in this Permit, is prohibited on all Refuge lands and waters.

The trimming, cutting, or mowing of vegetation, and the making of trails is prohibited unless authorized by the Refuge Manager.

Specimens

All samples collected in the Refuge are property of the U.S Fish and Wildlife Service. All specimens will receive a voucher number to be typed or written legibly in permanent ink, and affixed to each sample prior to storage. Further analysis on such samples will require an approved proposal by the Refuge and a signed loan agreement for use of the samples for future research. As owners of the samples collected, the U.S. Fish and Wildlife Service retains first refusal rights to all inventions or research results made through the direct use of the materials.

Closed Areas

The SUP does not the Permittee access to closed areas on the refuge.

Wildlife Disturbance

If Sonoran pronghorn are detected during road travel ahead of or to the side of vehicles during travel, please slow down to 5-10 mph to prevent vehicle collision. If Sonoran Pronghorn are seen they should not be approached and if necessary the individuals conducting work should retreat far enough to avoid any disturbance to the Sonoran Pronghorn or alteration of their behavior, such as retreat or increased watchfulness.

If desert bighorn sheep are seen they should not be approached and if necessary the individuals conducting surveys should retreat far enough to avoid any disturbance to the desert bighorn sheep or alteration of their behavior, such as retreat or increased watchfulness

GIS Reporting

GPS coordinates will be used within all reports to describe the positions of all data and samples acquired in the Refuge. The Permittee and/or Other Personnel will take GPS coordinates for all sampling locations, transect locations, observation locations, etc. The Permittee and/or Other Personnel will also provide the GPS coordinate system and units used.

Data.

All data acquired on Kofa NWR is property of the U.S. Fish and Wildlife Service. This data may not be used for any purpose not specifically outlined in this permit and may not be shared with the public or third parties without written permission.

Permittees must obtain permission from the Refuge or Complex Manager prior to using photographs or film obtained under this Permit in any commercial production or publication.

A copy of all data collected on the Refuge will be provided to the Refuge along with the final report, or if requested along with annual reports.

Reports

The Permittee will furnish the Refuge Manager with an electronic report of the work accomplished (pdf or MS Word preferred) as outlined below. A trip report is due 30 days after field season completion and a comprehensive annual report is due by the end of the second week of January of the calendar year that follows the year that the permit was in effect or before a new permit is issued, whichever comes first.

Trip Report: The trip report should be a summary of all work undertaken including at a minimum, but not limited to: dates of arrival and departure from the Refuge, names of all persons involved, details of all specimens collected, handled, marked, collared, interesting sightings, and any other pertinent information, GIS locations of all samples collected, transects, etc., and an electronic copy of all data collected. For the purposed of permit 22570-18-12 trip date(s), an email detailing areas surveyed and sightings of eagles or nests and locations thereof is sufficient as trip report.

Annual Report: The comprehensive annual report should be a summary of all work undertaken including at a minimum, but not limited to: dates of all arrivals and departures from the Refuge, names of all persons involved, field methods, details of all specimens collected, handled, marked, collared and any other pertinent information, GIS locations of all samples collected, transects, results, analysis and discussion of work to date, copy of all data collected, and a proposed schedule of publication or production of final work and an electronic copy of all data collected. Also include trapping effort and non-target species encountered. The report should include a concise summary or abstract for use in Refuge reports.

Productions, and Publications

An electronic copy of any article, publication, or product created as a result of the information gained or work completed under this Permit, including materials generated at any time in the future following expiration of this Permit must be sent to the Refuge Manager and Complex Manager.

The U.S. Fish and Wildlife Service and the individual National Wildlife Refuge must be credited in any publication, presentation, production, or product as follows:

Kofa National Wildlife Refuge
U.S. Fish and Wildlife Service
Department of the Interior

Trash

The Permittee is responsible for removing all trash and refuse resulting from his/her activities. No trash or pollutants of any kind will be dumped on Refuge lands or in Refuge waters.

Permittee Provided Equipment/Supplies

All equipment or supplies brought into the Refuge by the Permittee, or structures of any kind built on the Refuge by the Permittee, are the responsibility of the Permittee and must be approved by the Refuge Manager. Any Permittee provided structures, equipment, or supplies that require maintenance, or are determined to be unserviceable or a safety hazard to humans or wildlife is the responsibility of the Permittee and must be repaired or removed from the Refuge by the Permittee as soon as possible. No Permittee provided structures, equipment, or supplies may be left in the Refuge without making prior arrangements with the Refuge Manager. The specific location of any research equipment placed on the refuge, such as trail cameras or traps, must be reported to the Refuge Manager or biologist with GPS coordinates as soon as possible, but no later than three days after the field visit during which the equipment was placed. Any equipment placed on the refuge must be clearly labeled with the name of the owning organization and a contact including a phone number or email address. All flagging or stakes must be removed at the end of the study season unless special arrangements are made with the Refuge Manager. All flagging must be marked with the researchers' name and date.

Care of Facilities

The Permittee shall protect, maintain, and keep in good working order the facilities and equipment occupied, used or rented under this SUP. Please report anything nonfunctional and in need of repair to the Refuge Manager.

Roads

Public designated roads on the refuge may be accessed at any time. Administrative roads may be used on a case by case basis upon clearance with refuge staff; most administrative roads are locked and access will need to be arranged. Closed roads may not be used at any time.

Water Catchments

To minimize disturbance to wildlife, camping is restricted to a minimum of one-quarter mile from any water source. All vehicles must remain within 100 feet of the designated road.

Invasive Species Prevention

Introductions of organisms have caused significant damage to the native plant and animal communities in many areas, including National Wildlife Refuges. The Service is responsible for the management and protection of the Refuges. For prevention of spreading invasive species, the Permittee and associated personnel are required to wash their boat when taking from one water body to another and to remove seeds and other plant material from shoes and tires before traversing through another area. Bilge pumps, live wells, and all other possible contaminated reservoirs within the boat must be emptied and flushed with clean water prior to transport to different water bodies. All aquatic gear such as nets and traps should be cleaned and inspected before and after use on the Refuges to prevent spread of invasive species. Vehicles that have traveled off of paved roads in other areas should also be washed prior to entering the refuge.

HazMat & Chemicals

All chemicals and hazardous materials must be pre-approved by the Refuge Manager for SUP approval. An MSDS on each chemical must be provided.

All chemicals and hazardous materials must be stored, used, and disposed of according to applicable laws and Refuge-approved protocols.

Permittee and their Personnel must be properly trained in use of all chemicals and hazardous materials used. Proof of appropriate training may be required by the Refuge Manager. Areas treated with chemicals must be properly posted in accordance with EPA Worker Protection Standards.

Immediately after the project is complete the Permittee must make arrangements to remove all chemicals and hazardous materials from the Refuge. Any costs associated with use, storage, transport, training, disposal, or HazMat response for these materials will be the sole responsibility of the Permittee.

Waste Disposal

Biologic tissues and other wastes created from collections, bait, dissections, etc., must be disposed of properly so as to not create a nuisance, pollution, or source for disease.

Bioprospecting

Bioprospecting (the process of searching for and extracting potential pharmaceutical compounds from organisms) in any form is not permitted.

Historical Artifacts

The historic properties of the Refuges are strictly protected (National Historic Preservation Act of 1966, as amended [16 USC 470] and Archeological Resources Protection Act). These include the remnants of the mining structures, old homestead sites, geoglyphs, petroglyphs, archaeological deposits and cultural sites. The artifacts related to the early occupation of the area are important for interpreting the history of these areas and should be maintained and protected *in situ*. Disturbance or collection of any archaeological materials is strictly prohibited (Antiquities Act of 1906; the Archeological Resources Protection Act).

Safety

Permittees must report vehicle accidents and human injuries to the refuge office within 24 hours to complete the necessary documentation. If possible, do not move vehicles from the scene of an accident until an investigation takes place.

Road hazards, damaged fencing, injured animals, or anything unusual must be reported to the refuge office. As part of our efforts to preserve and restore native habitats on the SW Arizona NWRC, we also request that any new colonies of invasive plants and non-native animal sightings be reported.



Research and Monitoring Special Use Permit Application

Refuge Name:

Address:

Attn: (Refuge Official)

E-Mail:

Phone #:

For Official Use Only

Approved Permit #:

Station #:

Permit Term: from to

Note: We do not require all information for each Research project. See instructions at the end of the notice and contact the refuge to determine applicability of a particular item. Attach additional sheets if the text spaces provided are inadequate.

- 1a) Identify the type of Permit you are applying for: New Renewal Modification Other
- 1b) Have you applied, or do you intend to apply, to any other refuges for this same activity? Yes No
- 1c) If yes, which refuges?

Applicant Information

2) Principal investigator: 3) Is curriculum vitae or resume attached? Yes No

4a) Affiliation/Sponsoring Organization:

4b) Relationship to affiliation/sponsoring organization (professor, staff, student, etc.):

5) Physical Address:
City/State/Zip:

6) Mailing Address: (if different than above)
City/State/Zip:

7) Phone #: 8) Fax #: 9) E-mail:

10) List known assistants/subcontractors/subpermittees: (Only required if the assistants/subcontractors/subpermittees will be operating on the refuge without the permittee being present.)

Name	Address	Phone #
John Wiens	c/o Arizona Sonora Desert Museum 2021 N Kinney Rd. Tucson, AZ 85743	520 883-3010
Erik Rakestraw	c/o Arizona Sonora Desert Museum 2021 N Kinney Rd. Tucson, AZ 85743	520 883-3010
Tim Thibault, Curator	c/o The Huntington 1151 Oxford Road San Marino, CA 91108	626 405-3511
Raquel Folgado, Ph.D.	c/o The Huntington 1151 Oxford Road San Marino, CA 91108	626 405-3523

Project Information

11) Title of project: **APGA-USFS Tree Gene Conservation Partnership: Two Arizona Oaks at Risk**

12) Is a full research proposal attached? Yes No

Note: Depending on the research and monitoring project for which you are requesting a permit, we may ask you for the following project information (13 -25) if it is not included in your research proposal, or if you have not provided a full research proposal with this application. Please contact the specific refuge where the activity is being conducted to determine what information is required.

Attach additional sheets to the application if the text spaces provided are inadequate.

13) Describe project by specifically identifying timing, frequency, and how the project is expected to proceed:

The American Public Gardens Association is partnering with the United States Forestry Service's Forest Health Protection to establish living gene banks of US tree species at risk, by collecting plant material (seed, cuttings, as appropriate) from across its native range to capture broad genetic diversity then distributing propagules to public gardens for safeguarding in ex situ collections. The current partnership runs through 2018, and includes funds to support monitoring/scouting and collecting trips, propagation and distribution of propagules.

Goal: Collect and safeguard representative sampling of a targeted taxon across its range in ex situ collections at a minimum of 3 public gardens. Efforts will focus on at-risk non-orthodox seeded taxa native to US forests which cannot be conserved through traditional seedbanking methods.

14) Specifically identify location(s) and/or attach a map for the project: (GPS location(s) preferred)

One known location 0.25 mi up Palm canyon in Kofa Mountains, 19 mi S of Quartzsite on Highway 95, 7 mi E off Highway 33.33 -113.95278 but we will look for more depending on research

15) Identify species or habitats being studied:

Quercus ajoensis and Quercus toumeyii

16) Purpose/hypothesis:

Ex-situ conservation at botanic gardens is considered as a major insurance policy for the safeguard of rare and threatened plant species

17) Expected benefits of research/monitoring:

Seed held in a cryopreservation seedbank, some grown by tissue culture if verified as pure, and a small group grown from seed for educational display.

18) Briefly describe project history and context of research/monitoring project:

The project is the result of a grant proposal initiated by Huntington Gardens with assistance from Arizona Sonora Desert Museum.

19) Briefly describe project's relationship to other research/monitoring projects either known of or conducted by the applicant:

Four other gardens were awarded grants in 2017

20) Identify the types of specimen collections to be taken (see specimen collection clause in the instruction section #20) or data to be collected during the proposed project:

seed and vegetative tissue

21) List other cooperators and institutions involved in the project:

--

22) Generally identify the anticipated timeline for analysis, write-up and publication:

March through December 2018, publication in 2019

23) For research involving animals, attach an Assurance of Animal Care Form or an approval from an Institutional Animal Care and Use Committee? Is a form or approval attached? Yes No N/A

License/Insurance/Certifications/Permits

Note: Contact the specific refuge office where the research project is going to be conducted to determine if any type of license, insurance, certification(s), or permit(s) will be required. We may process this Special Use Permit while the applicant obtains them. Attach additional sheets to the application if the text spaces provided are inadequate.

24a) List and attach copies of any licenses you have for equipment operation (i.e., aviation or commercial boats), pesticide applications, transporters) or others if required:

License Type	Number	Expiration Date (if applicable)

24b) List and attach copies of any insurance you have (i.e general liability, flight/grounding, contaminants, medical evacuation, or others if required:

Insurance Type	Carrier	Expiration Date (if applicable)

24c) List and attach copies of any certifications you have, such as rat free, hull inspections, CPR/First Aid, or others if required:

Certificate Type	Expiration Date (if applicable)

24d) List and attach copies of any other Federal, State, or Tribal permits if required:

Permit Type	Permit Number	Expiration Date (if applicable)

Logistics and Transportation Attach additional sheets if the text spaces provided are inadequate.

25a) Does project require personnel to stay overnight on the refuge? Yes No

25b) If yes, how many? And list known personnel involved in overnight stay below:

List Names	List Names	List Names	List Names

26) Specifically describe all major instrumentation/equipment/gear (i.e. use of drones) and materials used, if applicable or required:

no instrumentation or equipment

27a) Provide details and schedule for the installation of instrumentation:

27b) Provide details and schedule for the removal of instrumentation:

27c) If instrumentation is permanent, describe need:

27d) If instrumentation requires a maintenance schedule, describe needs and schedule:

27e) Provide a data collection schedule:

28) Provide logistical arrangements for offsite transportation of samples:

29a) Provide detailed information on the logistics for onsite, intersite, and/or ship-to-shore transportation to or on the refuge, if required:

29b) Provide descriptions, license plate and/or identification numbers of vehicles used for onsite transportation, if required:

Vehicle Type	Plate/I.D./Registration #	Vehicle Type	Plate/I.D./Registration #

29c) Provide descriptions, license plate and/or identification numbers of vehicles used for intersite transportation, if required:

Vehicle Type	Plate/I.D./Registration #	Vehicle Type	Plate/I.D./Registration #

29d) Provide descriptions, license plate and/or identification numbers of vehicles used for ship-to-shore transportation, if required:

Vehicle Type	Plate/I.D./Registration #	Vehicle Type	Plate/I.D./Registration #

30a) Is fuel cache needed? Yes No N/A

30b) Provide specific location(s) of fuel caches: (GPS coordinates preferred)

31) Attach Safety Plan if required. Is Safety Plan attached? Yes No N/A

Work and Living Accommodations

32) Specifically describe onsite work and/or living accommodations, including spike camps:

daytime access only, leaving the site for overnights

33) Specifically describe on or offsite hazardous material storage or other on or offsite material storage space: (Including on and offsite fuel caches.)

none

Sign, date, and print this form and return it to the refuge for processing. By signing this application, I agree my operations will conform to the information I have provided in this application, and I understand that any deviations or changes to this information must receive prior written approval.

34) Signature of Applicant: Mark Hermin Date of Application: 2/7/18



Permit Profile ORPI-2018-SCI-0007

[Renew](#) [View Application](#)

Finalized

Permit Details

Park: Organ Pipe Cactus**Study#:** ORPI-00149**Permit#:** ORPI-2018-SCI-0007**Start Date:** Jun 01, 2018**Expiration Date:** Aug 31, 2022**Coop Agreement#:****Optional Park Code:****Name of principal investigator:****Name:** Mr Mark Fleming **Phone:** 520 883-3069 **Email:** mrfleming@desertmuseum.org**Name of Institution represented:**

Arizona Sonora Desert Museum

Additional investigators or key field assistants:

Name	Phone	Email
Dr. Raquel Folgado	626 405-3523	rfolgado@huntington.org
Tim Thibault	626 405-3523	tthibault@huntington.org

Study Title:

APGA-USFS Tree Gene Conservation Partnership: Two Arizona Oaks at Risk

Purpose of study:

The American Public Gardens Association is partnering with the United States Forestry Service's Forest Health Protection to establish living gene banks of US tree species at risk, by collecting plant material (seed, cuttings, as appropriate) from across its native range to capture broad genetic diversity then distributing propagules to public gardens for safeguarding in ex-situ collections. The current partnership runs through 2018, and includes funds to support monitoring/scouting and collecting trips, propagation and distribution of propagules

Subject/Discipline:

Vascular Plants

Locations authorized:

We will be exploring areas where oaks grow within the Organ Pipe National Monument. We will rely on SEINet website, local experts and general descriptions of the area to seek out *Quercus toumeyii* and *Quercus ajoensis*. We expect to find oaks grow on north facing slopes as is usual in arid lands.

Transportation method to research site(s):

By foot from roads and parking lots

Collection of the following specimens or materials, quantities, and any limitations on collecting:Up to 50 cuttings from oaks (*Quercus* species).

Up to one gallon of acorns each of five years. No more than 20% of the acorns produced by a given tree in one year.

Name of repository for specimens or sample materials if applicable:

NPS General Conditions for Scientific Research and Collecting Permit (available at the RPRS HELP page) apply to this permit. The following specific conditions or restrictions, and any attached conditions, also apply to this permit:

The following conditions apply to all research permits at Organ Pipe Cactus National Monument:

1. All permitted researchers are required to contact the monument's Research Coordinator at least 5 days prior to visiting the monument. Please provide information on: your anticipated visit dates; description of vehicle(s) including license plate number and state; area of the monument in which you will be working. The Research Coordinator will be provided with a copy of the approved permit. The lead field researcher is required to have a copy on their person while in the field and one to be placed on the dashboard of each participating vehicle for identification purposes.
2. After any visit is completed, notify the Research Coordinator that all members of your party are safely out of the field.
3. The permittee is responsible for ensuring that all persons working on the project adhere to permit conditions and applicable NPS regulations.
4. This permit may not be transferred or assigned. While working in the monument, field assistants are to be supervised by the person(s) named in the permit. The principal investigator shall notify the monument's Research Coordinator when adding or replacing members of the field crew. The supervisor of each party working in a different location shall carry a copy of the permit.
5. The permittee must obtain all other state, federal, and NPS permit(s) required to conduct the specified project. Copies may be requested by the Research Coordinator.
6. An Application for Scientific Research and Collecting Permit (Appendix A) is required to collect specimens that are to be permanently retained, regardless of where they are kept. Such specimens must be accessioned and cataloged into the National Park Service's catalog system, and bear National Park Service accession and catalog numbers. Contact the Research Coordinator for further information.
7. The Permittee is required to obtain permits for backcountry camping and any other applicable permits in the same manner as other monument visitors.
8. This permit may be terminated for breach of any condition or at the discretion of the superintendent.
9. The National Park Service cannot guarantee the safety of any researcher. The permittee knowingly assumes all risks, and accepts full responsibility for the safety and security of themselves and their equipment, when conducting research in any part of Organ Pipe Cactus National Monument. Please read the safety briefing at the bottom of this section and contact the Research Coordinator or Visitor Center for current conditions.
10. The permittee should not anticipate assistance from the NPS unless specific arrangements are made and documented in either an additional stipulation attached to this permit or in other separate written agreements.
11. Some roads and areas of the monument may be closed temporarily due to weather, maintenance, or law enforcement activities. Contact the Research Coordinator for an update.
12. Travel within the monument is restricted to only those methods that are available to the general public unless otherwise specified in additional stipulations associated with this permit.
13. Approval for any activity is contingent on the monument being open and staffed for required operations. No entry into restricted areas is allowed unless authorized in additional monument-specific stipulations attached to this permit.
14. No use of mechanized equipment in designated, proposed, or potential wilderness is allowed unless authorized by the monument in additional specific stipulations associated with this permit. The applicant may be required to draft a Minimum Requirements Analysis as required under the Wilderness Act if mechanized equipment is required.
15. Disturbance from fieldwork should be minimized. Field work should be done out of sight of trails, roads, and developed areas within the monument, unless specifically authorized on the permit. Research activities should be done as unobtrusively and discreetly as possible. Foot trails created as a result of field activities should be eliminated within sight of roads and trails. This may be done by raking the trail, or brushing across the trail with a branch or other object to obscure the path. No site markers or equipment will be left in the field after the permittee has left the monument unless authorized in additional monument-specific stipulations attached to this permit. If you have questions, please contact the Research Coordinator or Resource Management office.
16. If a visitor should approach during fieldwork, cease collections until visitor is out of view or explain that you have a research activity permit and describe the project.
17. This permit expires on the date listed. Nothing in this permit shall be construed as granting any exclusive research privileges or automatic right to continue, extend, or renew this or any other line of research under new permit(s).
18. The permittee is required to submit an Investigator's Annual Report and copies of final reports or published materials resulting from this permitted activity. Instructions explaining how and when to submit an annual report will be provided by NPS staff.

Researchers are requested to meet the Superintendent in his office located in the Visitor Center. Researchers are invited to give a public presentation about their work to park staff and visitors. Arrangements can be made through the park Permit Coordinator.

The presentation of a research permit, where applicable, will allow a waiver of entrance fees.

Safety

The southern boundary of Organ Pipe Cactus National Monument borders Mexico for 30 miles. Illegal border activities occur in Organ Pipe including the smuggling of drugs and humans. You are very unlikely to encounter illegal activity. Smugglers and migrants want to evade detection and therefore try to avoid contact with other people.

In rare instances when smugglers or migrants do approach a visitor it is usually because they are lost, need water or medical assistance. Do not provide water or food as they may continue and become distressed in an area where there is no help available. If you see or encounter them please alert Park Rangers (Visitor Center front desk 520-387-6849 ext7302), Border Patrol (520-387-7002), or call 911 if possible. They are trained and equipped to provide medical assistance. You are advised to avoid contact with anyone who might be involved in illegal activity. If you encounter individuals who are carrying odd bundles and black water bottles you should minimize contact. Continue to drive and call for help. Do not invite strangers into your vehicle.

When parked, lock your vehicle and keep valuables, water, and food out of sight. Hiking trails can be rugged with loose rock or steep drop-offs. It is generally a good idea to hike with others and to inform someone of where you are going and when you will return. You can reduce your likelihood of encountering illegal activity by hiking designated trails and hiking during the day.

You are in a desert and should carry supplies of water and light snacks while taking a scenic drive or hiking one of the trails. Even without physical activity, you can lose more than a quart of water per day. If you are hiking, the rate of water loss can increase to more than a quart per hour.

Do not enter flooded washes. Know the forecast before heading out – especially during the summer monsoon season. Washes can flow even if rain does not fall at that location.

Cactus and many other plants use thorns as a means of defense or to propagate and spread by hitching a ride on you; so you should always be aware of your surroundings and avoid contact with plants that can grab, scratch, or poke you. The Monument is home to many animals, including birds and reptiles. Some of these animals can be dangerous if cornered or handled. The handling of these animals can put both you and the animals at risk for injury. A few animals are poisonous. Do not put your hands or feet into areas that you cannot see.

Field Methods:

In 2018, Tim Thibault and Brian Dorsey of The Huntington, Mark Fleming of Arizona-Sonora Desert Museum and Heather Huggins will scout the Kofa Wildlife Refuge and Organ Pipe Cactus National Monument and collect seed if available, and permits can be acquired. They will also scout populations in the White Tank, Javalina, and Pinal Mountains to evaluate for evidence of hybridization with *Q. turbinella*, collect vegetative buds of individuals true to *Q. ajoensis*. Alicia Baugh and Raquel Folgado will work with cuttings and acorns. Baugh will germinate the acorns that are healthy and mature, while Folgado will establish clones in tissue culture and she will use embryo rescue techniques to propagate the damaged and the immature acorns. The goal is collecting data and herbarium specimens to evaluate hybridization between *Q. ajoensis* and *Q. turbinella*, and capture representative individuals from *Q. ajoensis*.

Seed is the most effective conservation method for plant species (Guerrant, 2004), but the acorns lose viability when dried. Therefore propagation is needed to maintain ex situ collections since the long-term storage in seed bank facilities is not possible. When hybridization occurs, collecting seeds is not a good strategy to preserve the pureness of the species. We seek to capture and establish an ex-situ collection of the genetic composition of the population. When acorns cannot be collected, propagation of clones may help to capture the genetic diversity. This will further enable potential reestablishment of degraded plant populations in the wild or even reintroduction where the species is considered to have entirely disappeared.

Specimen Collection

Handling or Collecting Specimens Yes

Proposed Disposition of Specimens or Materials

Permanently retained in National Park Service collection, maintained in one or more non-NPS repositories identified in attached Appendix A (complete and submit an Appendix A for each proposed repository)

Objects Collected

Some cuttings may be used as permanent herbarium specimens.

The remaining cuttings and acorns will be used to propagate live individuals for conservation and research.

Appendix A: Proposed Repository for Collected Specimens or Materials

Repository Name:

Repository Institution: Arizona Sonora Desert Museum

Address 2021 E Kinney Rd, Tucson, AZ 85743

Officials Name: Mark Fleming

Officials Title:

Phone: 520-883-3069

Fax #: 520-883-2500

Email: mfleming@desertmuseum.org

Website: www.desertmuseum.org/

Proposed Disposition of Specimens or Materials

Permanently retained in National Park Service collection, maintained in one or more non-NPS repositories identified in attached Appendix A (complete and submit an Appendix A for each proposed repository)

Objects Collected

Some cuttings may be retained as permanent herbarium specimens.

Remaining cuttings and acorns will be used for conservation and research.

Appendix A: Proposed Repository for Collected Specimens or Materials

Repository Name:

Repository Institution: The Huntington

Address 1151 Oxford Road, San Marino, CA 91108

Officials Name: Tim Thibault

Officials Title:

Phone: 626-405-3523

Fax #: 626-405-3501

Email: tthibault@huntington.org

Website: www.huntington.org/

Attached Documents (3)



United States
Department of
Agriculture

Forest
Service

Southwestern Region
Regional Office

333 Broadway SE
Albuquerque, NM 87102
FAX (505) 842-3800
V/TTY (505) 842-3292

File Code: 2450

Date: October 31, 2017

Mr. Tim Thibault
Henry E. Huntington Library
1151 Oxford Road
San Marino, CA. 91108

Dear Mr. Thibault:

The USDA Forest Service has approved your request to collect botanical specimens on USFS lands in the Southwestern Region in accordance with the free-use regulations as written in 36 CFR 223.5-10.

Timely action is required on your part to complete the process. Enclosed are two (2) copies of the permit with my signature as Forest Officer. You will need to sign both copies where indicated as the Permittee and return one (1) copy to me. I have included an addressed return envelope for your convenience.

The additional enclosures are for your records. As indicated on the permit, the permit and the additional information must be with you in the field at all times.

Your permit does not authorize the collection of any federally listed or regionally sensitive species. However, if you do encounter a federally listed species in the field, we ask that you inform the Regional Botanist (contact information below), as well as the local Forest Service Supervisor's Office or Ranger District Office of the species and its location. This information will assist ongoing efforts to compile records of our sensitive species populations.

If you have any questions regarding the terms and conditions or other aspects of this permit, please do not hesitate to contact me at (505) 842-3423 or ahargrave@fs.fed.us. Technical questions related to your collection activities should be directed to Kathryn Kennedy, our Regional Botanist at (505) 842-3263 or kathrynlkennedy@fs.fed.us.

I hope you have both a safe and productive collection season.

Sincerely,

ASHTON HARGRAVE
Forest Officer

Enclosures: FS-2400-8 #RO-301, Small population addendum, Wilderness addendum, Federal threatened-endangered plant list, USFS R3 Regional Forester's sensitive species: plants
cc:



Region: Southwestern
 National Forest: All
 Ranger District: All

**FOREST PRODUCTS FREE USE PERMIT
 PERSONAL USE ONLY (Not for Resale)**
 (Ref. FSM 2460 and FSH 2409.18)

Permit FS-2400-8 (11/2003)
 OMB No. 0596-0085
 Expires 01/31/2014

U.S. DEPARTMENT OF AGRICULTURE – FOREST SERVICE

Permittee's Name and Complete Address:			Permit No.	Preparation Date	
Name:	Tim Thibault		RO-301		
Address:	Henry E Huntington Library		Effective Date	Termination Date	Load Ticket Numbers
	1151 Oxford Road		10/31/2017	11/1/2018	From: NA Thru: NA
City/State:	San Marino, CA		Product Plan		From: NA Thru: NA
Zip Code:	91108		Number: NA	Name: NA	
Permittee Identification		Type	Permit Area Description:		
		Drivers License	All national forests and national grass lands in the Southwestern Region (Arizona, New Mexico, Oklahoma and Texas) excluding Primitive Areas, Wilderness, Research Natural Areas, Botanical Areas, Scenic Areas, Forest Service Campgrounds or Picnic Areas. <u>Permittee is authorized to collect in the Gila and White Mountain Wilderness areas.</u>		
Vehicle(s) Information					
Year:	1999	Year:			
Make:	Honda	Make:			
Model:	Civic	Model:			
Color:	Black	Color:			
License:	4SMA111	License:			
State:	CA	State:			

Remarks:

Permittee shall contact the local Ranger District where collection is planned prior to beginning work for you safety and information on closed areas, special forest orders, etc.

Permittee shall acknowledge the cooperation of the USDA Forest Service in any publications, whenever possible

Permittee agrees to deposit the required voucher specimen in a recognized herbarium in either New Mexico or Arizona.

The Small Population Addendum (rev.8/2017) is included with this permit. The addendum defines additional terms and conditons for botanical collections from small populations. Permittee must carry the addendum at all times when collecting, and must be shown upon request to a Forest Service officer.

Permittee has been issued the Federal Threatened-Endangered Plant List of Arizona and New Mexico National Forests (undated) and the USFS R3 Regional Forester's Sensitive Species: Plants (2013). Permittee must carry both lists at all times when collecting, and must be shown upon request to a Forest Service officer.

Permittee is authorized to collect N/A (amt) of N/A (spp) from the above lists subject to all terms and conditions of the permit and small population addendum.

Name of Other Authorized Collector(s): Sean Lahmeyer, Brian Dorsey, Heather Huggins, Jim Folsom, Raquel Folgado, John Trager, Alicia Ruvalcaba, Karen Zimmerman, Dan Berry, Kelly Shunn.

For questions regarding the intent and use of collections authorized under this permit: Kathryn Kennedy (505) 842-3263
 Issuing Forest Officer: Ashton Hargrave (505) 842-3423

PRODUCT DESIGNATION					
Product	Species	Unit of Measure (UOM)	Quantity	Rate per Products (UOM)	Total Value (Free)
35 - Seed	General collection of all species subject to the remarks and conditions of the permit	Pound (lb)	Two pounds per species per collection site or 10% of the available material, whichever is <u>less</u>	\$2/lb	\$10
55 - Plants		Each (ea)		\$1/ea	\$20
Total Permit Value \$					\$30

PRODUCT QUANTITY REMOVAL RECORD											
Date	Time	Quantity Removed	Date	Time	Quantity Removed	Date	Time	Quantity Removed	Date	Time	Quantity Removed

SIGNATURES			
	<u>2 Nov 2017</u>		<u>10/28/17</u>
PERMITTEE	Date	FOREST OFFICER	Date

Under the Paperwork Reduction Act of 1995, an agency shall not conduct or sponsor, and no persons are required to respond to, a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0085. Public reporting burden for this collection of information is estimated to average 5 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

**SMALL POPULATION ADDENDUM
PERMIT NUMBER RO-301**

Thank you for your cooperation in observing best practices for protection of wild population viability and helping ensure materials are used, documented, and disposed of in a manner that meets highest priority needs of sensitive species.

Additional Terms and Conditions for Botanical Collection Permits from Small Populations

1. The Permittee must obtain permission from the Regional Botanist (contact information below) to study and/or collect from newly discovered listed species, SCC, or FSS species populations prior to beginning such work.
2. If populations less than 25 individuals are encountered no voucher specimens should be collected, nor manipulative studies conducted. The populations should be documented photographically, preferably digitally, and include information about locality, GPS coordinates, date and photographer. Such documentation shall be submitted to designated herbaria in lieu of a voucher specimen and to the Regional Botanist.
3. For populations of 100 individuals or less, herbarium specimen collections shall be limited to collection of diagnostic plant parts and not the removal of whole plants. Further documentation using photographs of the vouchered plant would be helpful to include with the specimens obtained.
4. The permittee shall provide the Forest Service with one copy of each publication or report resulting from collections in small populations.
5. The permittee shall acknowledge the cooperation of the USDA Forest Service in any publications, whenever possible.
6. Equipment used to obtain plant parts and manipulate flowers shall be cleaned between plant populations to avoid the transference of disease organisms.
7. The Permittee shall seek written permission from the Forest Service to convey any materials collected from small populations to a third party prior to conveyance.
8. The Permittee shall keep materials collected from small populations separated by population source and within populations by maternal lines if possible. Separate collections of fruit/seed from each individual plant into separate paper coin envelopes or similar appropriately-sized sturdy paper envelopes. The Permittee shall keep seed produced in ex-situ studies labeled as such and separate from wild-collected population samples. Do not dispose of unused seed. Priority for any excess wild collected seed, or seed or other materials produced in the study will be for secure gene/seed banking, DNA samples, or tissue banking to meet future research and recovery needs. Contact the Regional Botanist for assistance.

Important Contact Information

Kathryn Kennedy
Regional Botanist
333 Broadway Boulevard SE
Albuquerque, NM. 87102
kathrynlkennedy@fs.fed.us
(505) 842-3263

WILDERNESS ADDENDUM
PERMIT NUMBER RO-301

Requirements for Collection of Botanical Specimens in Wildernesses:

1. Collections may occur in the following wildernesses:
New Mexico National Forest
 - a. **Gila National Forest:** Gila
 - b. **Lincoln National Forest:** White Mountain
2. Limit of three people at one time in the sampling group, unless otherwise approved by District Ranger or Forest Supervisor. Transportation will be by foot or horseback. No motorized equipment or mechanical transport is allowed.
3. In addition to contacting the appropriate Ranger District as indicated in the Remarks section of the permit, (FS 2400-8), the following people shall be notified at least **48** hours prior to collection on the listed Forest, with the following information – when and where collections will occur, how many people in the group, and duration of trip:
New Mexico National Forest
 - a. Gila National Forest: Christa Osborn, (575) 388-8421
 - b. Lincoln National Forest: Rafael Castanon, (575) 434-7373
4. Provide a summary of when and where collections actually occurred to contacts listed in #3 above within one month after collections were made.
5. Collection teams shall follow Leave No Trace Practices. For information on Leave No Trace see <http://www.lnt.org/programs/lnt7/index.html>.
6. Some wildernesses have special regulations which must be followed.
7. Plants will not be recollected from the same area in wilderness without prior approval from the Regional Botanist, Kathryn Kennedy, (505) 842-3263, email: kathrynlkennedy@fs.fed.us

USFS R3 REGIONAL FORESTER'S SENSITIVE SPECIES: PLANTS - 2013

Common Name	Scientific Name	Forest(s)
TUFTED SAND VERBENA	<i>Abronia bigelovii</i>	CAR, SFE
PIMA INDIAN MALLOW	<i>Abutilon parishii</i>	COR, TON
WRIGHT'S DOGWEED	<i>Adenophyllum wrightii</i> var. <i>wrightii</i>	GIL
TONTO BASIN AGAVE	<i>Agave delamateri</i>	COC, PRE, TON
HOHOKAM AGAVE	<i>Agave murpheyi</i>	TON
SANTA CRUZ STRIPED AGAVE	<i>Agave parviflora</i> ssp. <i>parviflora</i>	COR
PHILLIPS' AGAVE	<i>Agave phillipsiana</i>	COC, PRE
TRELEASE AGAVE	<i>Agave schottii</i> var. <i>treleasei</i>	COR
SACRED MOUNTAIN AGAVE	<i>Agave verdensis</i>	COC
PAGE SPRINGS AGAVE	<i>Agave yavapaiensis</i>	COC
GOODDING'S ONION	<i>Allium gooddingii</i>	A-S, COR, GIL, LIN
SAIYA	<i>Amoreuxia gonzalezii</i>	COR
LARGE-FLOWERED BLUE STAR	<i>Amsonia grandiflora</i>	COR
MOGOLLON DEATH CAMAS	<i>Anticlea mogollonensis</i> (= <i>Zigadenus m.</i>)	GIL
CHAPLINE'S COLUMBINE	<i>Aquilegia chaplinei</i> (= <i>A. chrysantha</i> var. <i>chaplinei</i>)	LIN
CHIRICAHUA ROCK CRESS	<i>Arabis tricornuta</i>	COR
MT. DELLENBAUGH SANDWORT	<i>Arenaria aberrans</i>	COC, KAI, PRE, TON
LEMMON MILKWEED	<i>Asclepias lemmonii</i>	COR
GREENE MILKWEED	<i>Asclepias uncialis</i> ssp. <i>uncialis</i>	A-S, CIB, COR, GIL, PRE, SFE
ZUNI MILKVETCH	<i>Astragalus accumbens</i>	CIB
GUMBO MILKVETCH	<i>Astragalus ampullarius</i>	KAI
TALL MILKVETCH	<i>Astragalus altus</i>	LIN
MAGUIRE'S (COPPERMINE) MILKVETCH	<i>Astragalus cobrensis</i> var. <i>maguirei</i>	COR
MARBLE CANYON MILKVETCH	<i>Astragalus cremnophylax</i> var. <i>hevronii</i>	KAI
CLIFF MILKVETCH	<i>Astragalus cremnophylax</i> var. <i>myriorrhaphis</i>	KAI
VILLOUS GROUNDCOVER MILKVETCH	<i>Astragalus humistratus</i> var. <i>crispulus</i>	A-S, CIB, GIL
HUACHUCA MILKVETCH	<i>Astragalus hypoxylus</i>	COR
KERR'S MILKVETCH	<i>Astragalus kerrii</i>	LIN
CHACO MILKVETCH	<i>Astragalus micromerius</i>	CIB, SFE
PAGOSA MILKVETCH	<i>Astragalus missouriensis</i> var. <i>humistratus</i>	CAR
RIPLEY MILKVETCH	<i>Astragalus ripleyi</i>	CAR
RUSBY'S MILKVETCH	<i>Astragalus rusbyi</i>	COC, KAI
ONE-FLOWERED MILKVETCH	<i>Astragalus wittmannii</i>	CIB
AYENIA	<i>Ayenia jaliscana</i> (= <i>A. truncata</i>)	COR
SIERRA BLANCA KITTENTAILS	<i>Besseyia oblongifolia</i>	LIN
CRENULATE MOONWORT	<i>Botrychium crenulatum</i>	COC
BUSH-VIOLET	<i>Browallia eludens</i>	COR
PECOS MARIPOSA LILY	<i>Calochortus gunnisonii</i> var. <i>perpulcher</i>	SFE
CHILTEPIN	<i>Capsicum annuum</i> var. <i>glabriusculum</i>	COR
CHIHUAHUAN SEDGE	<i>Carex chihuahuensis</i>	COR, TON
COCHISE SEDGE	<i>Carex ultra</i> (= <i>C. spissa</i> var. <i>ultra</i>)	COC, COR, PRE, TON

Common Name	Scientific Name	Forest(s)
SHOOTINGSTAR GERANIUM	<i>Geranium dodecatheoides</i>	LIN
BARTRAM STONECROP	<i>Graptopetalum bartramii</i>	COR
FLAGSTAFF PENNYROYAL	<i>Hedeoma diffusum</i>	COC, KAI, PRE
ARIZONA SNEEZEWEED	<i>Helenium arizonicum</i>	A-S, COC
ARIZONA SUNFLOWER	<i>Helianthus arizonensis</i>	A-S, COC
RUTTER'S FALSE GOLDENASTER	<i>Heterotheca rutteri</i>	COR
EASTWOOD ALUM ROOT	<i>Heuchera eastwoodiae</i>	A-S, COC, PRE, TON
ARIZONA ALUM ROOT	<i>Heuchera glomerulata</i>	A-S, COR, TON
SANDIA ALUM ROOT	<i>Heuchera pulchella</i>	CIB
CAPITAN PEAK ALUMROOT	<i>Heuchera woodsiaephila</i>	LIN
COLEMAN'S CRESTED CORALROOT	<i>Hexalectris colemanii</i>	COR
CHISOS MT. CRESTED CORALROOT	<i>Hexalectris revoluta</i>	LIN
WOOTON'S ALUMROOT	<i>Heuchera wootonii</i>	LIN
ARIZONA CORALROOT	<i>Hexalectris spicata</i> var. <i>arizonica</i>	COR, GIL, LIN
TEXAS PURPLE-SPIKE	<i>Hexalectris warnockii</i>	COR
MOGOLLON HAWKWEED	<i>Hieracium brevipilum</i> (= <i>H. fendleri</i> var. <i>mogollense</i>)	A-S, GIL
RUSBY HAWKWEED	<i>Hieracium abscissum</i> (= <i>H. rusbyi</i>)	COR, GIL
NEW MEXICO BITTERWEED	<i>Hymenoxys ambigens</i> var. <i>neomexicana</i>	COR
TALL BITTERWEED	<i>Hymenoxys brachyactis</i>	CIB
SIERRA BLANCA CLIFF DAISY	<i>Ionactis elegans</i> (= <i>Chaetopappa e.</i>)	LIN
KAIBAB BLADDERPOD	<i>Lesquerella kaibabensis</i>	KAI
LEMON LILY	<i>Lilium parryi</i>	COR
WOOD LILY	<i>Lilium philadelphicum</i>	LIN, SFE
CHIRICAHUA MUDWORT	<i>Limosella pubiflora</i>	COR
ALAMOS DEER VETCH	<i>Lotus alamosanus</i>	COR
HORSESHOE DEER VETCH	<i>Lotus mearnsii</i> var. <i>equisolensis</i>	TON
HUACHUCA MOUNTAINS LUPINE	<i>Lupinus huachucanus</i>	COR
BROADLEAF LUPINE	<i>Lupinus latifolius</i> ssp. <i>leucanthus</i>	PRE
LEMMON'S LUPINE	<i>Lupinus lemmonii</i>	COR
MAPLELEAF FALSE SNAPDRAGON	<i>Mabrya acerifolia</i> (= <i>Maurandya a.</i>)	TON
SUPINE BEAN	<i>Macroptilium supinum</i>	COR
ARIZONA MANIHOT	<i>Manihot davisiae</i>	COR
CHAMA BLAZING STAR	<i>Mentzelia conspicua</i>	CAR, SFE
SPRINGER'S BLAZING STAR	<i>Mentzelia springeri</i>	SFE
WIGGINS MILKWEED VINE	<i>Metastelma mexicanum</i> (= <i>Cynanchum wigginsii</i>)	COR
LADIES'-TRESSES	<i>Microthelys rubrocallosa</i> (= <i>Schiedeella r.</i> , <i>Spiranthes r.</i>)	LIN
SOUTHWESTERN MUHLY	<i>Muhlenbergia palmeri</i> (= <i>M. dubioides</i>)	COR
SYCAMORE CANYON MUHLY	<i>Muhlenbergia elongata</i> (= <i>M. xerophila</i>)	COR
HEARTLEAF GROUNDSEL	<i>Packera cardamine</i> (= <i>Senecio cardamine</i>)	A-S, GIL
TOUMEY GROUNDSEL	<i>Packera neomexicana</i> var. <i>toumeyi</i> (= <i>Senecio n.</i> var. <i>t.</i>)	COR, TON
SPELLENBERG'S GROUNDSEL	<i>Packera spellenbergii</i> (= <i>Senecio s.</i>)	CIB
VIRLET PASPALUM	<i>Paspalum virletii</i>	COR
ARIZONA PASSIONFLOWER	<i>Passiflora arizonica</i>	COR

Common Name	Scientific Name	Forest(s)
GALIURO SAGE	<i>Salvia amissa</i>	COR, TON
MEARNS SAGE	<i>Salvia dorrii</i> ssp. <i>mearnsii</i>	COC, PRE
CHIRICAHUA MOUNTAIN BROOKWEED	<i>Samolus vagans</i>	COR
MIMBRES FIGWORT	<i>Scrophularia macrantha</i>	GIL
NEW MEXICAN STONECROP	<i>Sedum integrifolium</i> ssp. <i>neomexicana</i>	LIN
HUACHUCA GROUNDSEL	<i>Senecio multidentatus</i> var. <i>huachucanus</i> (=s. <i>huachucanus</i>)	COR
NODDING BLUE-EYED GRASS	<i>Sisyrinchium cernuum</i>	COR
GUADALUPE MOUNTAINS GOLDENROD	<i>Solidago wrightii</i> var. <i>guadalupensis</i>	LIN
GUADALUPE MESCAL BEAN	<i>Sophora gypsophila</i> var. <i>guadalupensis</i>	LIN
PORSILD'S STARWORT	<i>Stellaria porsildii</i>	COR, GIL
LEMMON'S STEVIA	<i>Stevia lemmonii</i>	COR
GUADALUPE JEWELFLOWER	<i>Streptanthus sparsiflorus</i>	LIN
PINOS ALTOS FLAME FLOWER	<i>Talinum humile</i>	COR, GIL
TEPIC FLAME FLOWER	<i>Talinum marginatum</i>	COR
ARAVAIPA WOODFERN	<i>Thelypteris puberula</i> var. <i>sonorensis</i>	COR, TON
SONORAN NOSEBURN	<i>Tragia laciniata</i>	COR
MOGOLLON CLOVER	<i>Trifolium longipes</i> ssp. <i>neurophyllum</i> (=T. <i>neurophyllum</i>)	A-S, GIL
TUMAMOC GLOBEBERRY	<i>Tumamoca macdougallii</i>	COR
SHADE VIOLET	<i>Viola umbraticola</i>	COR
DEFINITIONS		
1	Species is proposed for federal listing, and will be removed from the RFSS list if/once the final rule is published implementing the Federal protections provided by the ESA.	
A-S	Apache-Sitgreaves National Forests	
CAR	Carson National Forest	
CIB	Cibola National Forest	
COC	Coconino National Forest	
COR	Coronado National Forest	
GIL	Gila National Forest	
KAI	Kaibab National Forest	
KRB	Kiowa/Rita Blanca National Grasslands	
LIN	Lincoln National Forest	
PRE	Prescott National Forest	
SFE	Santa Fe National Forest	

Federal Threatened-Endangered Plant List
Arizona and New Mexico National Forests

<u>Scientific Name</u>	<u>Common Name</u>	<u>State</u>	<u>Forest</u>
<i>Argemone pleiacantha</i> ssp. <i>pinnatisecta</i>	Sacramento prickly poppy	New Mexico	Lincoln
<i>Cirsium vinaceum</i>	Sacramento Mountains thistle	New Mexico	Lincoln
<i>Echinocereus fendleri</i> var. <i>kuenzleri</i>	Kuenzler's hedgehog cactus	New Mexico	Lincoln
<i>Erigeron rhizomatous</i>	Zuni fleabane	New Mexico	Cibola
<i>Hedeoma todsenii</i>	Todsen's pennyroyal	New Mexico	Lincoln
<i>Ipomopsis sanciti-spiritus</i>	Holy Ghost ipomopsis	New Mexico	Santa Fe
<i>Coryphantha scheeri</i> var. <i>robustispina</i>	Pima pineapple cactus	Arizona	Coronado
<i>Echinocereus triglochidiatus</i> var. <i>arizonicus</i>	Arizona hedgehog cactus	Arizona	Tonto
<i>Lilaeopsis schaffneriana</i> ssp. <i>recurva</i>	Huachuca water umbel	Arizona	Coronado
<i>Purshia subintegra</i>	Arizona cliffrose	Arizona	Coconino, Tonto
<i>Senecio franciscanus</i>	San Francisco Peaks groundsel	Arizona	Coconino
<i>Spiranthes delitescens</i>	Canelo Hills ladies'-tresses	Arizona	Coronado