

### Section 6 Report Review

Attachment to letter dated 1 October 2002

Project: Status Update on Tobusch Fishhook Cactus

Final or interim report? Final (revised)

Job #: WER 22 (67)

Reviewer's Station: Austin

Lead station was contacted and concurs with the following comments:

☐ Yes ☐ No ☒ Not applicable (reviewer is from lead station)

<u>Interim Report</u>	<u>Final Report</u>
<input type="checkbox"/> is acceptable as is	<input checked="" type="checkbox"/> is acceptable as is
<input type="checkbox"/> is acceptable as is, but the comments below need to be addressed in the next report	<input type="checkbox"/> is acceptable, but needs minor revision (see comments below)
<input type="checkbox"/> needs revision (see comments below)	<input type="checkbox"/> needs major revision (see comments below)

Comments:

# **FINAL REPORT**

As Required By

THE ENDANGERED SPECIES PROGRAM

TEXAS

Grant No. E-1-11

Endangered and Threatened Species Conservation

**Project WER22(67): Status Update of Tobusch Fishhook Cactus  
(*Ancistrocactus tobuschii*)**

Prepared by: Jackie M. Poole and Gena K. Janssen



John Herron  
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April 30, 2002

## FINAL REPORT

State: Texas

Grant Number: E-1-11

Program Title: Endangered and Threatened Species Conservation

Period Covered: September, 1997 through August, 1999

Project Number : WER 22 (67)

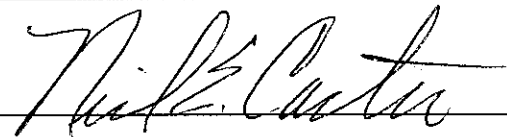
Project Title: Status Update of Tobusch Fishhook Cactus  
(*Ancistrocactus tobuschii*)

### Project Objectives:

1. To determine the distribution, demography, preferred habitat, and health of Tobusch fishhook cactus.
2. To establish a positive relationship with landowners.
3. To facilitate public education concerning this species.

Prepared by: Jackie M. Poole and Gena K. Janssen

Date: April 19, 2002

Approved by: 

Date: May 31, 2002

Neil E. Carter  
Federal Aid Coordinator

## STATUS UPDATE ON TOBUSCH FISHHOOK CACTUS

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**INTRODUCTION:** Tobusch fishhook cactus occurs in Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde Counties, and is endemic to the southwestern part of the Edwards Plateau (Figure 1). The species occurs either as single individuals or in small scattered populations. However a few large concentrations exist. The cactus grows on thin, rocky soils underlain by fractured limestone, sometimes in association with spikemoss, usually in openings within live oak-juniper woodlands. Occasionally it is found within pinyon pine-oak woodlands, cenizo shrublands, or little bluestem grasslands. It usually occurs on level to gently sloping hills, ridgetops, or floodplain terraces of no particular aspect. Climate, in particular droughts and floods, along with fire have shaped the habitat of Tobusch fishhook cactus.

The species is a small, low-growing cylindrical cactus with one hooked central spine. In the early spring clusters of yellow flowers are produced at the top of the stem. Potential pollinators include butterflies, beetles, and bees (both native and introduced). Fruits ripen by late spring, and are swarmed by small ants that disperse the seeds. Germination is low in cultivation (1-65%), and apparently low in nature as few seedlings are observed. Growth rate averages several millimeters per year although abnormally wet years or drought can dramatically alter the rate. Plants reach reproductive age at about 2 cm. Average number of flowers per plant is between two and three, with larger plants producing more flowers. The largest plants known are over 10 cm in cross-section. Although age cannot easily be deduced from growth due to climatic fluctuations, plants are thought to live to 10 years or more.

Several populations of Tobusch fishhook cactus have been monitored for almost a decade. All populations within state parks and wildlife management areas are being monitored annually. Such intensive monitoring has revealed various life history components such as pollination syndrome, phenology, dispersal mechanisms, individual and population growth rate, life expectancy, causes of mortality (including massive destruction from insect predation), herbivory, and population structure. A current research project using monitoring in conjunction with experimental treatments is hoped to determine the effects of various common land management practices on the cactus.

In the past Tobusch fishhook cactus has been confused with a closely related species, *Ancistrocactus brevihamatus*. The ranges of the two species overlap in Val Verde and Kinney counties. The most reliable way to distinguish the species is flower color (yellow in Tobusch fishhook cactus; various shades of pink in *A.*

*brevihamatus*). However spine number and diameter are somewhat helpful as is habitat. Several taxonomists such as A. D. Zimmerman, B. Parfitt, and A. M. Powell consider Tobusch fishhook cactus to be a variety of *A. brevihamatus*, while others including E. F. Anderson, N. P. Taylor, and D. R. Hunt think that both species should be placed in the genus *Sclerocactus*.

Although threats from collection were significant in the past, collection is not currently perceived to be a grave threat. Herbivory is an occasional, usually highly localized, problem, but not of much overall importance. Trampling, whether by domestic livestock or other animals as well as humans, is inconsequential. Insect predation has become a major concern in at least one population, reducing it from the largest known to one of the smallest in a matter of a few years. Habitat alteration and destruction are still considered a prime threat, although the imminence and the overall effects are not totally clear.

When the original status report for Tobusch fishhook cactus (*Ancistrocactus tobuschii*) was written, the species was thought to occur primarily on gravel bars or limestone ledges along floodplains or stream terraces in two counties on the Edwards Plateau of central Texas (Weniger 1979). Thus it was subject to threat from the inevitable flooding that shapes the Edwards Plateau. In fact it was such a flood in August 1978 that destroyed two of four known populations of Tobusch fishhook cactus, and led to the listing (USFWS 1979). Although a few more populations had been found by the time of the recovery plan (USFWS 1987), the species was still considered to be quite rare. However by the early 1990s many new locations had been discovered, and the species was known from eight counties. Most sites were no longer in the floodplain, but found from lower slopes to ridge tops. Also several of the new sites were on state parks and wildlife management areas. In addition, the perceived impediment to various land use practices due to endangered species' presence led to a clamor to delist Tobusch fishhook cactus. Before such action was taken, it was determined that an updated status report should be conducted.

**METHODS:** Because Tobusch fishhook cactus inhabits several different soil types and geologic formations as well as a number of distinct plant communities, it was not efficient to identify survey sites from aerial photography, soil surveys, or geologic maps. An unfortunate but practical way to select sites in a private land state such as Texas is to deal only with landowners that will permit access to their lands. Working from historical and known locations with the help of local Texas Parks and Wildlife (TPW) wildlife biologists and park staff, Natural Resources Conservation Services (NRCS) personnel, The Nature Conservancy (TNC), and others, numerous landowners were identified that could potentially have Tobusch fishhook cactus on their property. Also public lands such as highway rights-of-way, parks, and wildlife management areas were surveyed if the habitat seemed suitable. Because the area of potential habitat was so large (eight counties with known sites plus several counties to the north that appeared to have suitable habitat), a workshop was held to train personnel from various agencies, consulting firms, and conservation groups in the identification of Tobusch fishhook cactus and its habitat.

Once a site was identified and the landowner contacted, a site visit was made with landowner permission. Usually this consisted of driving at a very slow rate of speed (less than 5 mph) along all ranch roads, looking for Tobusch fishhook cactus and potential habitat. Random meander surveys were made in sites of potential habitat and/or those with Tobusch fishhook cactus. Occasionally landowners had already found sites. Once at an occupied site, information on habitat (soils, geology, plant community, slope, aspect, associated species, etc.) and demography (reproductive status, number of individuals, mortalities, etc.) were recorded. Due to time constraints thorough surveys of a population's extent were not conducted. The focus of the study was presence/absence to determine the frequency of Tobusch fishhook cactus throughout its range.

In order to more precisely determine the population trends in Tobusch fishhook cactus throughout its range, monitoring plots were established in each county of the distribution. The sites were primarily placed on publicly owned land; however due to the lack of occupied public land in some counties, two plots were placed on private lands. Three of the plots had been previously monitored (Emmett 1995; Poole and Janssen 1994). Most of the other plots were established in 1996, and were run continuously through 1999. However new plots were also added for new plants or populations found within the same land ownership. Monitoring protocols consisted of marking the plot with a rebar stake, mapping or GPSing its location, and then measuring a distance and bearing from the stake to each tagged individual. Monitoring plots are conceptually circular, but vary in size primarily due to vegetation. None have a radius of more than 100 m. Data was recorded during both flowering and fruiting season. In addition to counting the number of flowers and fruits, stem cross-section was taken during the flowering visit (or during the fruiting season if a new plant was found). Stem cross-section was done using digital calipers, measuring from tubercle tip to tubercle tip in two directions, usually perpendicular to each other. In some cases where this was not possible (for example, plants lodged in rock crevices), only one measurement was taken, and this was recorded on the data sheets. Additional notes were taken on plant condition, including stem color, overall vigor, causes of mortality, date of discovery, floral visitors, herbivory, and other miscellaneous comments. When plants could not be relocated, they were logged as missing. If they could not be refound in three years, they were assumed to be dead. As new plants of any size were found within the plot, they were added to the monitoring data sheets.

**RESULTS:** A workshop was held on February 20, 1996 at the South Llano River State Park/Walter Buck Wildlife Management Area outside Junction in Kimble County. Over forty people were in attendance, and represented the following groups (numbers in parentheses indicate number of individuals from each group): TPW (17), Texas Department of Transportation (8), NRCS (6), Texas Agricultural Extension Service (3), National Park Service (2), TNC (2), USFWS (1), Texas Forest Service (1), Southwest Texas State University (1), and Texas Department of Agriculture (1). A packet was given to all attendees that included a distribution map, an information sheet on Tobusch fishhook cactus, a summary of

the endangered plant laws, a line drawing of Tobusch fishhook cactus with important features and terms indicated, photographs of both Tobusch fishhook cactus and the closely related and very similar *Ancistrocactus brevihamatus*, line drawings of the spines of both species, an article on Tobusch fishhook cactus from the Texas Organization for Endangered Species newsletter, a table comparing the morphology of the two species, and an informal survey sheet to report new locations. During the morning of the workshop, Tobusch fishhook cactus identification and habitat were covered. Several live plants of both Tobusch fishhook cactus and *A. brevihamatus* were available for observation. In the afternoon, the participants helped survey a site on the Buck Wildlife Management Area. Although few plants were found at that site, known populations on the Buck WMA were visited to familiarize the attendees with the plant in its habitat. Although only five informal surveys were returned and these resulted in no new locations or landowners that would allow access, two of the workshop participants located populations on properties under their ownership or management. Both of these sites became monitoring plots. Another benefit from the workshop was the identification of key contacts within the species' range. These biologists were invaluable in identifying potential habitat and willing landowners. Over 50 landowners were contacted, and 36 permitted surveys. A few (5) would not allow the information to be entered into the TPW Biological Conservation Database, but 14 new populations were entered into the database with signed landowner permission.

The status report cited Tobusch fishhook cactus as occurring only in Bandera and Kerr Counties (Weniger 1979). By the time the recovery plan was published, the populations in Kerr and northern Bandera Counties could not be relocated, but new or additional sites had been found in Bandera, Kimble, Real, and Uvalde Counties (USFWS 1987). As of August 1999, populations were known from Bandera, Edwards, Kerr, Kimble, Kinney, Real, Uvalde, and Val Verde Counties. Over 100 sites have been mapped within the TPW Biological Conservation database. Of these 80 were surveyed during the course of this study. Twenty-two sites were not visited, primarily due to access problems. These sites may still have extant populations, as all had been seen sometime between 1970 and 1991 (except the population at the type locality reported as extirpated by Weniger and not relocated by Keeney) (Weniger 1979; USFWS 1987). At seven sites where Tobusch fishhook cactus had been reported, no plants could be found after hours of searching. However the habitat was still intact, and could be recolonized in the future. The same is true of seven sites where tracked individuals of Tobusch fishhook cactus died or were removed (with USFWS concurrence). One site reported in the literature (Wauer 1973) as being in Big Bend National Park was a misidentification of a new species of *Ancistrocactus* closely related to *A. tobuschii*. Four sites on the western edge of Tobusch fishhook cactus' range turned out to be misidentifications of *Ancistrocactus brevihamatus*. One site in this same area had two individuals that appeared to be hybrids between *A. tobuschii* and *A. brevihamatus*, but the only other *Ancistrocactus* found was *brevihamatus*. One site was so vague as to be unrelocatable, although the location may fall within the range of other known populations. Using the TNC

convention of combining populations within 0.5 mile into one site, 21 mapped locations within the database were combined into five.

During this project, a total of 56 properties were visited. Nineteen were public land sites (highway rights-of-way, state parks and wildlife management areas). The rest were private. Over half (29) had Tobusch fishhook cactus. Several of the properties had multiple populations. As of August 1999 53 populations containing approximately 2000 plants had been verified during the course of the study. Over half of these populations (29) are probably not viable as they contained only one to ten plants. Although more intensive searches of these sites could possibly turn up more plants, usually the plants in such small populations eventually die, leaving no trace that the area was ever occupied. Only four populations, all being monitored, have more than 100 plants. The largest has just over 500 plants. While this may seem viable, the largest known population (over 1100 individuals in 1994) is now comprised of only 24 plants, primarily due to insect herbivory. The other 20 populations have between 11 and 100 individuals. In order to deter vandalism or collection and to maintain landowner privacy, populations are shown only by presence/absence at a 7.5' USGS topographic quadrant scale (Figure 2).

Ten monitoring sites were established within all counties of the known range of Tobusch fishhook cactus. All but two sites are on public land. Most sites contain multiple monitoring plots. A total of 1363 plants were being monitored as of 1999. Plots contain from one individual to several hundred. Appendix I provides the results of the monitoring as site by site annual summaries. Appendix II contains the individual plant data for all years by site.

Four years' worth of data is usually not enough to detect any trends. Confounding the situation was the discovery of new, previously unseen plants in the plots. These were usually not seedlings, but plants of some size, often reproductive. Tobusch fishhook cactus seedlings are extremely small (0.3 mm or less) and almost impossible to detect. Thus it was difficult to determine the annual recruitment to the plots. Also plants sometimes disappeared, only to reappear during the next monitoring session. Small Tobusch fishhook cacti are capable of pulling into the soil, gravel, litter, or spikemoss during dry periods. When conditions are more favorable, they re-emerge. New plants, refound missing plants, and the contributions from new plots within monitoring sites were recorded separately. However all were added into the yearly total of live plants. Missing plants were recorded as were dead plants. Causes of mortality were determined although this was often difficult as plants were often just hollow shells or clusters of spines on the soil surface. However several insects (*Gerstaeckaria* sp. nov., *Moneilema armata*, and an unidentified fly larvae) were found within the stems of many cacti. Although Emmett (1995) identified the *Gerstaeckaria* as *nobilis*, collections sent to a weevil taxonomist were identified as a new species. Soil disturbance (armadillo, feral hog, and other animal rooting), herbivory, trampling (either by researchers or other animals), and fungal infections also killed plants occasionally. A few plants, either dead or dying, were removed, with the proper permits, for a study on the *Gerstaeckaria* weevils. However most

causes of mortality were unknown (see Appendix I).

Despite the brevity of the monitoring component of the project, a few trends were evident. The Devil's River State Natural Area and the Devil's Sinkhole State Natural Area sites have experienced high mortality (>50%), and the populations are declining, that is the amount of mortality exceeds the number of new plants found in the plots. However the addition of new plots does superficially increase the total live count, but does not represent recruitment for the site. The other sites have 20% mortality or less, and during most years, the number of new plants exceeds mortality losses. Some sites such as Lost Maples State Natural Area and the private preserve in Kerr County have less than 10% mortality (see Appendix I).

**DISCUSSION:** Compared to the habitat description of Weniger (1979), much has been uncovered concerning the habitat of Tobusch fishhook cactus. Originally the cactus was thought to occupy gravel bars and limestone ledges along floodplains or stream terraces (Weniger 1979). Such sites now are considered a minor habitat type. The listing brought the previously unknown species to the attention of consultants, habitat managers, and biologists. With more intensive surveying, many additional populations were found, particularly in upland areas (Bryan 1989, Carr 1992, Chevalier 1993, Clayton 1991, Lockwood 1995, Poole 1987, Poole 1989, Poole 1995). Edaphically the habitat consists of discontinuous patches of very shallow, moderately alkaline, rocky loams or clays (primarily of the Tarrant, Ector, or Eckrant series) over massive, fractured limestone bedrock (usually the Edwards formation or an equivalent formation). Typically the sites are on level to slightly sloping hills or ridge tops of no particular aspect. Occasionally plants will be found on steeper slopes, but on level to gently sloping microsites. The sites are usually open, in full sunlight, with a thin herbaceous cover of grasses and other herbaceous species, but within a matrix of woodland or savannah. This surrounding community is primarily the live oak-juniper woodland community, although pinyon pine-oak is found in the western part of the range, and the species is occasionally found in little bluestem grasslands or ceniza shrublands. The plants regularly grow in a thin layer of soil, gravel, rock crack, or spikemoss. An intensive study of the habitat of Tobusch fishhook cactus was conducted on the Buck Wildlife Management Area in Kimble County (Sutton et al. 1997). However associated species vary across the range sufficiently to render the study of limited use except in the Kimble County area.

Tobusch fishhook cactus habitat is naturally maintained by the harsh conditions in its microenvironment and periodic disturbances. The very shallow soils over limestone bedrock are extremely drought-prone, giving small stem-succulents a competitive advantage. In floodplain habitats, the periodic disturbance of flooding keeps the sites open and free of taller vegetation. In upland areas, long-term stochastic events such as fire discourage woody species and maintain a patchy, open habitat. Drought affects the plants primarily by reducing reproductive output. During periods of limited precipitation, the average number of flowers produced per plant decreases (Lockwood 1995). Drought also affects fruit production as well. Only anecdotal information is available concerning the effect

of floods on Tobusch fishhook cactus. The population at the type location was reported to have been destroyed in the catastrophic 1978 flood. However other populations have maintained themselves within infrequently flooded sites (for example the population at Lost Maples State Natural Area). The effect of fire on Tobusch fishhook cactus is still not entirely clear. Other small cactus species are reported to be susceptible to fire (Benson 1982; Bunting et al. 1980). Several fires, primarily controlled burns, have occurred within populations of Tobusch fishhook cacti (Bryan 1989; Roy Heideman, pers. comm. 1996; Bill Armstrong, pers. comm. 1997). While it appeared that individual plants suffered little mortality (probably less than 5%), no baseline data was available to corroborate the observation. Additionally at Lost Maples it was noted that many flowers were burned or desiccated by the fire and aborted. Even the infrequent loss or lessening of reproductive output is significant in a species with seemingly low fecundity and establishment. Preliminary experimental work at the Buck Wildlife Management Area on the effects of common range management practices (burning, grazing, juniper cutting) on Tobusch fishhook cactus suggests that these practices have little effect on the species (Baccus 1999). However small sample size and the lack of a separate burn treatment may limit the application of the conclusions from this study.

Tobusch fishhook cactus has a slow rate of growth, relatively long generation times, limited distance dispersal, and a non-substantial soil seed bank (Emmett 1995). Under normal field conditions Tobusch fishhook cactus can grow at a rate of about one to several millimeters per year (Emmett 1995). However years of heavy rainfall cause increases of one centimeter or more, often in a relatively short time period. Cacti store water in their stems, and often swell dramatically after intense rainfall events. Likewise in times of drought, plants may shrink in size. Long-term monitoring data on stem cross-section needs to be correlated with precipitation records to determine a more refined growth rate for the species. Longevity estimates derived from previous growth rate estimates should thus be taken cautiously. Observations of individual plants indicate that plants can live 10 years or longer. In general plants become reproductive at about 2 cm. The largest recorded plants are over 10 cm in cross-section. Larger plants produce more flowers, but most populations have few individuals over 5 cm with most individuals being between 1 and 5 cm. While most mortality probably occurs during seedling establishment, per capita mortality is high among larger individuals. An average of two to three flowers are produced per plant, and flowers can remain viable for up to one week, opening and closing each day. In large populations (>100 plants) about one-half to two-thirds of the plants are usually reproductive in average years. Flowering begins as early as late January in the southernmost part of the range, and as late as mid-March in the northernmost part. Usually within a given geographic locale, flowering lasts about two to three weeks. Although pollinators have not been identified, honey bees (*Apis mellifera*), several species of halictid bees (*Dialictus comulus*, *D. pruinosiformis*, *Lasioglossum morrilli*, *Osmia subfaciata*, and *Agapostemon* sp.), sulphur butterflies (*Eurema nicippe*), and spotted cucumber beetles (*Diabrotica undecimpunctata*) have been observed as floral visitors (Emmett 1995; Lockwood 1995). Tobusch fishhook cactus is an obligate outcrosser. Fruits ripen

within about 8 to 10 weeks of anthesis. Fruit set is between 50 and 70%, with 30-60 seeds produced per fruit (Emmett 1995). The fruits split open when ripe, and are swarmed by small ants (*Forelius foetidus*) that transport seeds and pulp to their nest (Emmett 1995). These ants may be responsible for as much as 85% of seed dispersal (Emmett 1995). Most of the remainder of the seeds are dispersed by rain or gravity, with a very small percentage moved by birds or small mammals. Tobusch fishhook cactus does not maintain a substantial persistent soil seed bank, and thus is dependent on annual seed production (Emmett 1995). Seed germination experiments have produced mixed results, with germination percentages ranging from 1-65% (Emmett 1995). While uncommon, vegetative reproduction does occur, usually when the apical meristem is damaged. Annual mortality rate varies among sites, and has been recorded from 0 to almost 70%. Any mortality rate greater than the number of new plants found within a monitoring site should be cause for concern. Although some plants appear healthy (stems green, firm, and plump; average flower and fruit production for plant size; new straw-colored spine growth), only a pile of spines will be left by the next year. More often however plants turn various shades of red and/or yellow, become soft, and produce fewer or no reproductive structures. Often the spines are gray although this is also part of the normal aging process. Plants also turn purplish or maroonish although this seems to be related more to cold weather or drought stress, and is usually overcome. Most of the causes of mortality are unknown. Sometimes the stems are hard, dry, and corky inside. Other times the stems are completely hollow with no evidence of insect infestation. There have been a few instances of death from trampling either by humans or by domestic livestock or other animals. Isolated incidents of herbivory have been devastating to small subsets of a population, but in general are not a major cause of mortality. Probably the most significant identified cause of mortality is from insects, specifically the weevil *Gerstaeckaria* sp. nov., the longhorn beetle *Moneilema armata*, and an unidentified fly larva. All lay their eggs within the stem or root of the cactus, and the developing larvae eat the stem tissue. As the weevils are smaller, there are often several per stem, leaving small galleries and exit holes behind in the decimated stem. Only one longhorn beetle larva per stem has been found to date, as the larva are about the same diameter as the stem. In the case of the fly larvae, the stem tissue dissolves into a red to orange, foul-smelling liquid. At Devil's Sinkhole State Natural Area, the weevils are thought to be the primary cause of the population's drastic decline from over 1100 individuals in 1994 to less than 25 in 1999. A new study has been initiated on the weevil to determine more about its life cycle, food and host preferences, and its overall effect on Tobusch fishhook cactus.

Although there is probably enough information to calculate a minimum viable population estimate for Tobusch fishhook cactus, none has been determined to date. However from field observations it appears that populations of 10 individuals or less are not viable. Unfortunately over half of the recently verified populations are of this size. Populations with close to 100 individuals or more seem to be stable, but the decimation of the Devil's Sinkhole population makes no current population seem safe.

In the 1990s many reports of Tobusch fishhook cactus started turning up, particularly in the western part of its range. Upon careful examination many of these specimens turned out to be a very closely related species, *Ancistrocactus brevihamatus*. Aside from the fact that the two species look very similar, *A. brevihamatus* was not recognized in the widely used Texas flora, The Manual of the Vascular Plants of Texas (Correll and Johnston 1970). Lyman Benson, the author of the cactus treatment in The Manual and author of The Cacti of the United States and Canada (Benson 1982), considered *A. brevihamatus* to be a synonym of the common south Texas species, *A. scheeri*. However the two species only bear a slight resemblance to one another. In his book Cacti of Texas and Neighboring States, Weniger (1984) recognized *A. brevihamatus*. The primary difference between *A. brevihamatus* and *A. tobuschii* is flower color. The flowers of *A. brevihamatus* are dusky rose to greenish or yellowish pink. The flowers of *A. tobuschii* however are bright, clear yellow or rarely a bright spring greenish yellow. There are other differences such as the number of radial spines (*A. brevihamatus* usually has 12 -22 and *A. tobuschii* usually 7-12), but there can be overlap in characteristic numbers even on the same plant of either species. Spine diameter may turn out to be a valid character as spines of *A. tobuschii* appear more delicate than those of *A. brevihamatus*. However a detailed spine characterization needs to be carried out in concert with flower color. Another somewhat less reliable distinguishing character is habitat. In general Tobusch fishhook cactus occurs in plant communities associated with the Edwards Plateau such as live oak-juniper woodland while *A. brevihamatus* is found in associations more typical of the South Texas Plains such as cenizo shrublands.

Collection has been a problem in the past. Shortly after the Recovery Plan was published and made available to the public, one of the populations cited in the plan lost most of the plants to collection. Although the exact location was not published, enough information was given for an avid collector to determine the location of the site. No other incidents are known to have occurred since then. The species is rarely seen in cultivation as it is somewhat difficult to grow and not one of the most showy and attractive species. It is available through a few, legally permitted growers.

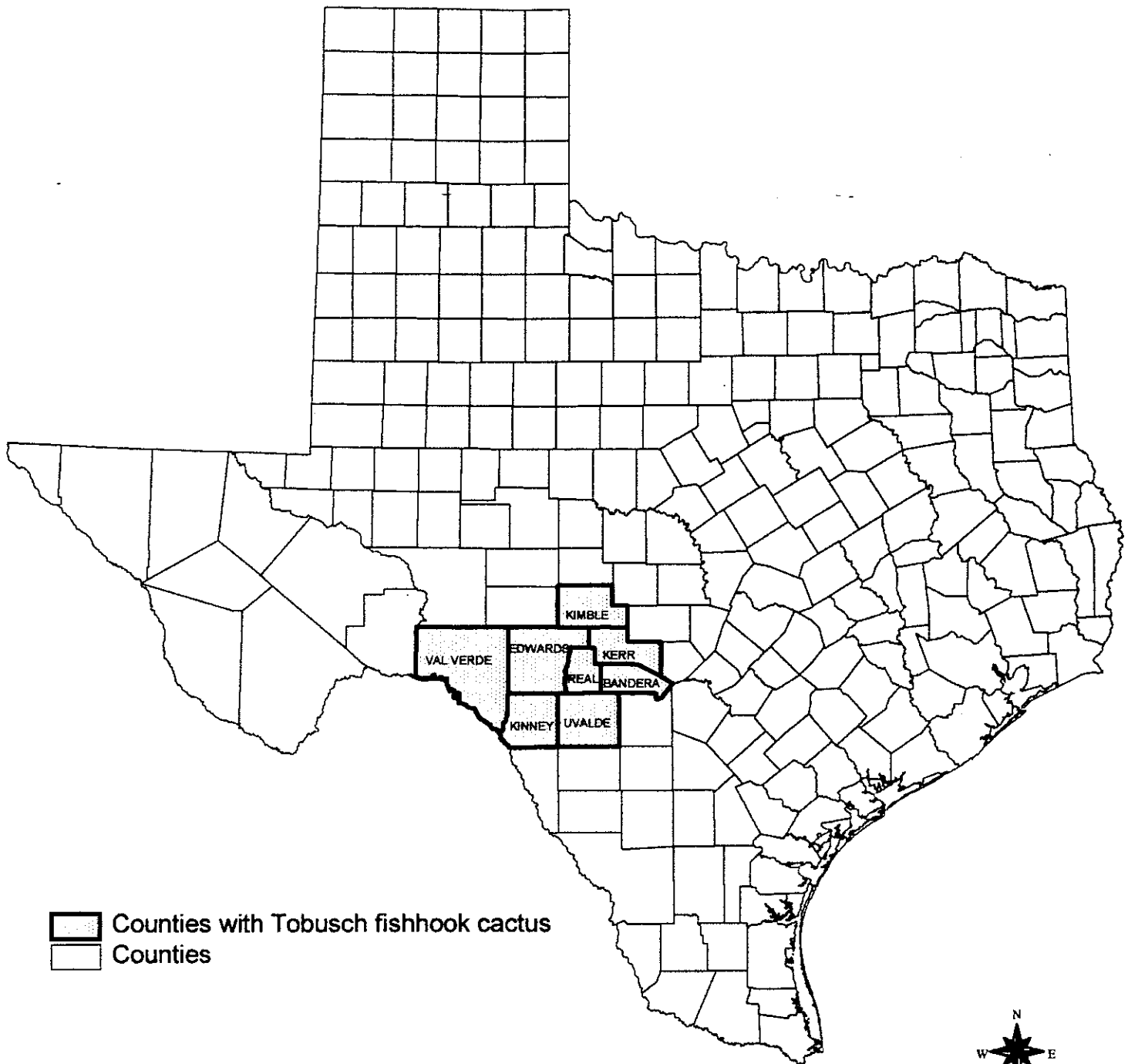
**CONCLUSION:** The range and number of populations of Tobusch fishhook cactus have greatly expanded since the listing and publication of the Recovery Plan. The habitat profile has likewise been augmented with additional topographic, edaphic, and plant community types. Many more people are aware of the existence of this species on the Edwards Plateau, and are knowledgeable as to its identity and where it grows. Much has been learned concerning the life history and demographics of the species as well as the threats to its continued survival. However many of the populations do not appear to be viable, and the long-term impacts of insect predation and controlled winter burns have not yet been determined. The continued survival of this species will be dependent on the clarification of these issues as well as others.



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**Figure 1.**  
**Distribution of**  
**Tobusch fishhook cactus**  
**in Texas**



 Counties with Tobusch fishhook cactus  
 Counties



11 April 2002




Projection: UTM, Texas Statewide Mapping System

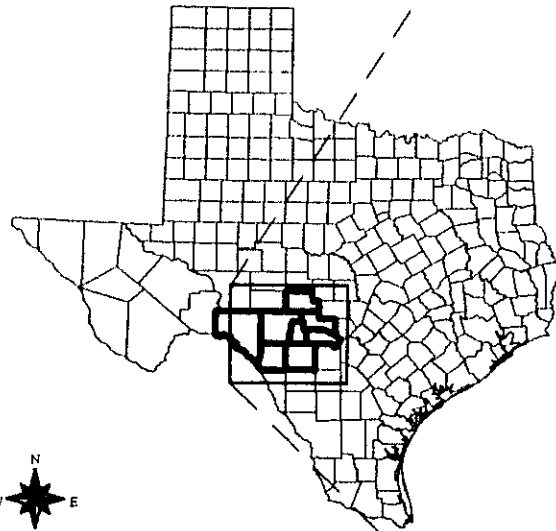


Map compiled by the Texas Parks and Wildlife Department,  
Wildlife Diversity Program. No claims are made to the  
accuracy of the data or suitability of the data for a particular use.

100 0 100 200 300 Miles

**Figure 2.**  
**Distribution of**  
**Tobusch fishhook cactus**  
**in Texas**

-  7.5' Topographic quads with Tobusch fishhook cactus
-  Counties with Tobusch fishhook cactus
-  Counties



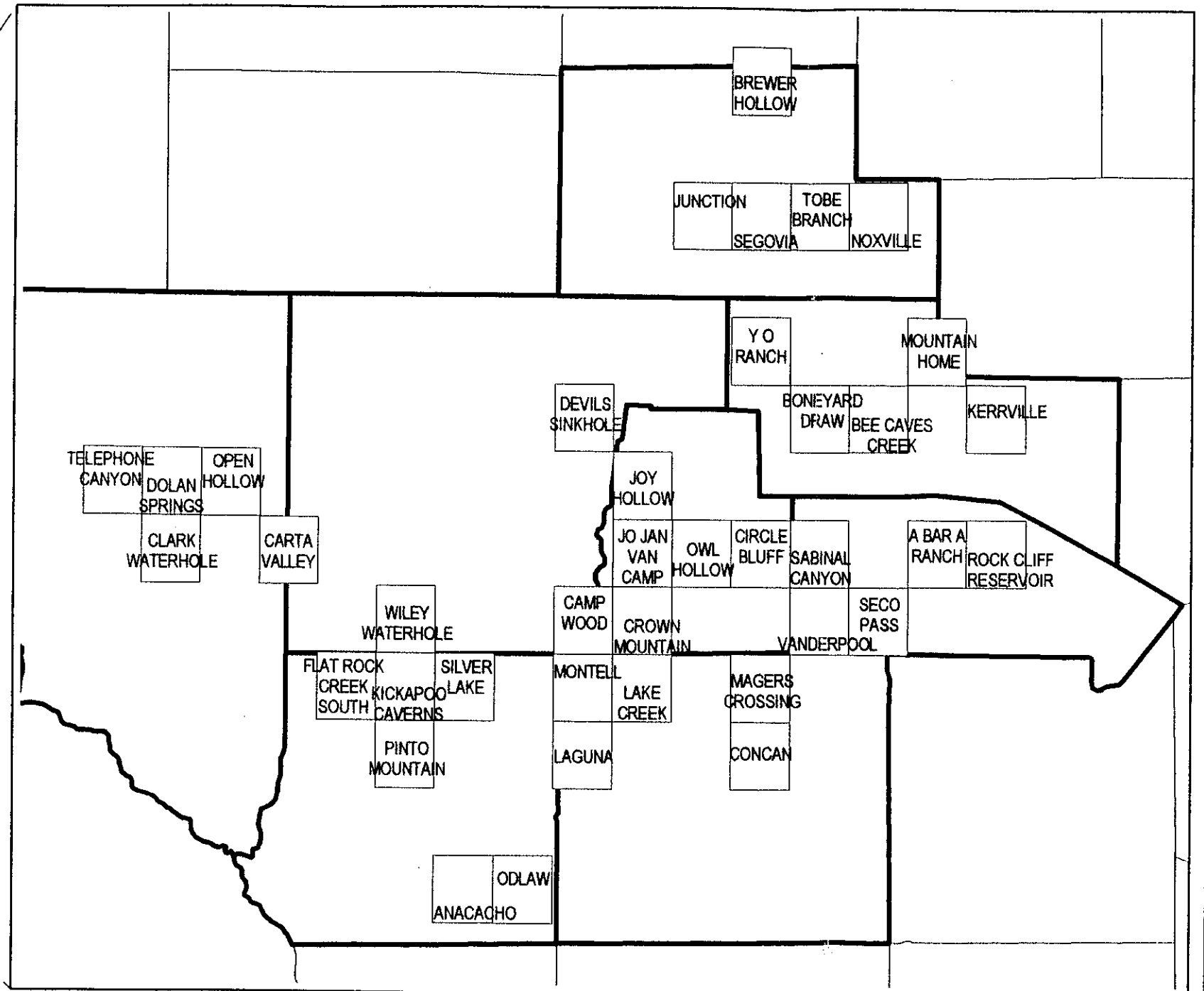
20 0 20 40 Miles

11 April 2002

Projection: UTM, Texas Statewide Mapping System



Map compiled by the Texas Parks and Wildlife Department,  
Wildlife Diversity Program. No claims are made to the  
accuracy of the data or suitability of the data for a particular use.



## APPENDIX I

Annual Monitoring Totals for Tobusch fishhook cactus by site

Devils River SNA, Val Verde County		1996	1997	1998	1999					
Total Live			16	8	6					
Total New			5	1	1					
Total New Stake			0	4	19					
Total Refound MIA			0	0	0					
<b>Total Live at end of year</b>		<b>8</b>	<b>21</b>	<b>13</b>	<b>26</b>					
Total MIA			7	5	1					
Total Dead			4	7	6					
COD* - weevils			0	5	3					
COD* - hollow			0	0	3					
COD* - soil disturbance			0	1	0					
COD* - unknown			4	2	0					
COD* - fly larvae			0	0	0					
COD* - Moneilma			0	0	0					
<b>Total mia, dead, not A. tobuschii</b>			<b>11</b>	<b>12</b>	<b>7</b>					
Garner State Park, Uvalde County		1996	1997	1998	1999					
Total Live		Plots established in		2	1					
Total New		1998			0					
<b>Total Live at end of year</b>				<b>2</b>	<b>1</b>					
Total MIA					0					
Total Dead					1					
COD* - weevils					1					
COD* - hollow					0					
COD* - soil disturbance					0					
COD* - unknown					0					
<b>Total mia, dead, not A. tobuschii</b>					<b>1</b>					
Private preserve, Kerr County		1996	1997	1998	1999					
Total Live			94	96	100					
Total New			10	12	11					
<b>Total Live at end of year</b>		<b>96</b>	<b>104</b>	<b>108</b>	<b>111</b>					
Total MIA			1	5	1					
Total Dead			1	3	7					
COD* - weevils			0	0	0					
COD* - hollow			0	0	0					
COD* - soil disturbance			0	0	0					

## Annual Monitoring Totals for Tobusch fishhook cactus by site

	COD* - collected for weevil study		0	0	0				
	COD* - fly larvae		1	1	0				
	COD* - unknown		0	2	7				
	<b>Total mia, dead, not A. tobuschii</b>		<b>1</b>	<b>8</b>	<b>8</b>				
<b>Private property, Real County</b>		<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>				
	Total Live	52	40	51	62				
	Total New		24	23	7				
	Total Refound MIA		0	0	0				
	<b>Total Live</b>	<b>52</b>	<b>64</b>	<b>74</b>	<b>69</b>				
	Total MIA		2	0	4				
	Total Dead		10	13	8				
	COD* - weevils		1	4	1				
	COD* - Moneilema		2	1	0				
	COD* - hollow		0	0	0				
	COD* - soil disturbance		0	0	2				
	COD* - collected for weevil study		0	0	0				
	COD* - unknown		2	8	5				
	COD* - trampling		1	0	0				
	COD* - fly larvae		4	0	0				
	<b>Total mia, dead, not A. tobuschii</b>		<b>12</b>	<b>13</b>	<b>12</b>				
<b>Devil's Sinkhole SNA</b>		<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>				
	Total Live	71	15	34	17				
	Total New		0	0	4				
	Total New Stake		76	0	2				
	Total Refound MIA		0	0	1				
	<b>Total Live at end of year</b>	<b>71</b>	<b>91</b>	<b>34</b>	<b>24</b>				
	Total MIA		10	10	3				
	Total Dead		31	48	14				
	COD* - weevils		5	16	4				
	COD* - hollow		0	3	2				
	COD* - soil disturbance		0	3	0				
	COD* - unknown		26	25	7				
	COD* - herbivory		0	1	1				
	<b>Total mia, dead, not A. tobuschii</b>		<b>31</b>	<b>58</b>	<b>17</b>				

Annual Monitoring Totals for Tobusch fishhook cactus by site

Pole Hollow, Kimble County		1995	1996	1997	1998	1999			
Total Live		10	8	12	24	26			
Total New			8	12	2	4			
<b>Total Live at end of year</b>		<b>10</b>	<b>16</b>	<b>24</b>	<b>26</b>	<b>30</b>			
Total MIA			0	1	0	0			
Total Dead			2	3	0	0			
COD* - weevils			0	0	0	0			
COD* - collected for weevil study			0	0	0	0			
COD* - Moneilema			0	0	0	0			
COD* - root rot			0	0	0	0			
COD* - hollow			0	0	0	0			
COD* - soil disturbance			0	0	0	0			
COD* - unknown			2	3	0	0			
<b>Total mia, dead, not A. tobuschii</b>			<b>2</b>	<b>4</b>	<b>0</b>	<b>0</b>			
Kerr WMA, Kerr County		1996	1997	1998	1999				
Total Live		Plot established in 1999.			29				
Total New Plot									
Total New									
<b>Total Live at end of year</b>					<b>29</b>				
Total MIA									
Total removed for weevil study									
Total Dead									
COD* - weevils									
COD* - hollow									
COD* - soil disturbance									
COD* - unknown									
<b>Total mia, dead, not A. tobuschii</b>									
Junction, Kimble County		1995	1996	1997	1998	1999			
Total Live		34	23	42	86	86			
Total New			31	45	9	37			
Total New Stake			5	25	0	0			
Total Refound MIA			0	0	0	1			
<b>Total Live at end of year</b>		<b>34</b>	<b>59</b>	<b>112</b>	<b>95</b>	<b>124</b>			
Not A. tobuschii			0	0	0	0			
Total MIA			1	0	4	2			

Annual Monitoring Totals for Tobusch fishhook cactus by site

Total Dead		10	17	22	7		
COD* - weevils		0	1	6	2		
COD* - Moneilema		0	0	0	0		
COD* - fungus		0	0	0	0		
COD* - root rot		0	0	0	0		
COD* - collected for weevil study		0	0	0	0		
COD* - herbivory		1	0	0	0		
COD* - hollow		0	0	0	0		
COD* - soil disturbance		0	0	0	0		
COD* - unknown		9	16	16	5		
<b>Total mia, dead, not A. tobuschii</b>		<b>11</b>	<b>17</b>	<b>26</b>	<b>9</b>		
<b>Lost Maples SNA, Bandera/Real Cos.</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>			
Total Live	357	389	476	479			
Total New		116	45	22			
Total Refound MIA		0	2	1			
<b>Total Live at end of year</b>	<b>357</b>	<b>505</b>	<b>523</b>	<b>502</b>			
Total MIA		8	11	21			
Total Dead		6	21	18			
Total Removed		0	0	5			
COD* - insect larvae		0	0	2			
COD* - hollow		0	0	0			
COD* - soil disturbance		0	0	0			
COD* - unknown		6	16	14			
COD* - herbivory		0	0	0			
COD* - fungus		0	5	1			
COD* - rot		0	0	0			
COD* - trampling		0	0	0			
COD* - fly larvae		0	0	0			
COD* - Moneilema		0	0	0			
<b>Total mia, dead, removed</b>		<b>14</b>	<b>32</b>	<b>44</b>			
<b>Kickapoo Caverns SP, Kinney/Edwards Cos.</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>
Total Live	115	104	84	87	147	205	200
Total New			12	14	85	25	148
Total New Plot				65	0	3	102
Total Refound MIA				5	1	0	4

## Annual Monitoring Totals for Tobusch fishhook cactus by site

<b>Total Live at end of year</b>	<b>115</b>	<b>104</b>	<b>96</b>	<b>171</b>	<b>233</b>	<b>233</b>	<b>454</b>	
Total MIA		0	17	3	8	11	8	
Total Dead		11	3	6	17	17	24	
COD* - weevils		4	0	3	7	5	16	
COD* - Moneilema		1	0	0	0	0	0	
COD* - researcher		0	1	0	0	0	0	
COD* - fly larvae		0	0	0	0	0	0	
COD* - soil disturbance		0	0	0	0	0	0	
COD* - unknown		6	2	3	10	10	8	
<b>Total mia, dead, removed</b>		<b>11</b>	<b>20</b>	<b>9</b>	<b>25</b>	<b>28</b>	<b>32</b>	
<b>Hwy 674 right-of-way, Kinney Co.</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>
Total Live	2	2	2	1	1	1	3	3
Total New		0	0	0	0	2	0	8
Total Refound MIA		0	0	0	0	0	0	0
<b>Total Live at end of year</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>3</b>	<b>11</b>
Total MIA		0	0	0	0	0	0	0
Total Dead		0	0	1	0	0	0	0
COD* - unknown				1	0	0	0	0
<b>Total mia, dead, removed</b>		<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
COD = cause of death								
MIA = missing								

## APPENDIX II

**Ancistrocactus tobuschii Data for  
Devil's River State Natural Area**

1 of 11

PL #	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Stake 1 is first utility pole on left side of road after turn, ~ 0.1 mi from crossroad to radio towers; GPS Anc tob 1, GPS at plants; all distances measured over shrubs																
1.00	1	42.80	21	2.20	1	2	4.40	4	3+1A	Dead	Dead	Dead				seedling at base 4/97; COD unknown, not hollow, tag removed, seedling also dead 2/98
1.01	1	43.70	20	3.10		0	3.60	0	0	3:30	0	Dead				discovered 5/96; dead, roots damaged by hole digging 5/98
1.02	1	45.50	20	4.80		3	5.90	4	5	6.20	3	2+1A	5.77	0	0	discovered 5/96; OK, spines gray, yellow tubercle tip 2/98; OK, a few tan & orange tubercle tips 2/99 & 4/99; green with a few tan and orange tubercle tips, good 2/00 & 4/00; green, good 2 & 4/01
1.03	1	42.90	20	2.60		0	3.60	3	3	3:10	0	0	2.63	0	Dead	discovered 5/96; poor, spines gray, body yellow 2/98; OK, body green 2/99; dead, hollow, larva & metamorphosized weevils collected, dead 4/99
1.04	1	44.00	21	2.30		0	2.80	0	0	2:20	0	Dead				discovered 5/96; tag uprooted, replaced 4/97; hollow, but no exit holes, weevils?, dead 4/98
1.05	1	43.70	21	2.30		0	3.30	0	0	2:90	0	0	Dead			discovered 5/96; poor, spines gray, body yellow 2/98; hollow, dead 2/99
1.06	1	43.70	21	2.70		0	3.60	2	3	2:80	0	0	Dead			discovered 5/96; poor, spines gray, body yellow 2/98; hollow, dead 2/99
1.07	1	44.10	22	3.30		2	3.50	3	4	3:10	0	Dead				discovered 5/96; dead, hollow with exit holes, death by weevils 5/98
1.08	1	43.50	20	0.40		0	mia			mia			mia			discovered 5/96; mia 2 & 4/97, 2 & 5/98, 2 & 4/99
1.09	1	43.50	20	2.50		0	3.20	1	1	1:90	0	Dead				discovered 5/96; hunkered down 2/98; hollow with exit holes, death by weevils 5/98
1.10	1	43.60	20	0.60		0	mia			mia			mia			discovered 5/96; mia 2 & 4/97, 2 & 5/98, 2 & 4/99
1.11	1	43.60	20	0.80		0	Dead									discovered 5/96; dead, COD unknown 2/97
1.12	1	43.60	20	0.50		0	mia			mia			mia			discovered 5/96; mia 2 & 4/97, 2 & 5/98, 2 & 4/99

## 2 of 11

**Stake 2** is pink-flagged rebar through gate in opening at 180 degrees from transformer post, beyond dead juniper & almost dead *Acacia roemeriana*;  
GPS *Ancistrocactus tobuschii* 2 at stake

**Ancistrocactus tobuschii Data for  
Devil's River State Natural Area**

3 of 11

PL #	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.00	2	43.05	260	5.50	1+2 fr	disp.	4.90	4	3+1A	5.20	3	1A	4.94	4	4	measured between persimmon & condalia, plant reddish 5/96; green 2/97; yellowish 5/98; green, good 2/99 & 4/99; yellowish-green, poor 2/00; yellow-green, OK 4/00 & 2/01; green, good 4/01
3.00	2	31.62	211	3.10	3 fr	2	Dead									stem hollow, no grubs, maybe weevils dead 2/97
3.01	2	31.62	212				0.50	0	0	0.70	0	0	mia			discovered 2/97; under rock; good 5/98; plant & tag mia 2/99, 4/99, 2/00 & 4/00; plant and tag refound, plant green, good 2 & 4/01
4.00	2	19.90	150	5.10	2+6 fr	5disp;										big, long, heavy spines; dead 5/96
4.01	2	19.98	150	0.40		0	0.60	0	0	mia			mia			discovered 5/96; tag uprooted 2/98 & 2/99; plant mia 98, 99, & 00
4.02	2	19.99	150	0.40		0	0.60	0	0	mia			mia			discovered 5/96; tag uprooted 2/98 & 2/99; plant mia 98, 99, & 00
4.03	2	19.99	150	0.40		0	0.60	0	0	mia			mia			discovered 5/96; tag uprooted 2/98 & 2/99; plant mia 98, 99, & 00
4.04	2	19.98	150	0.40		0	Dead									Discovered 5/96; COD unknown
4.05	2	20.05	150	0.50		0	mia			mia			mia			discovered 5/96; mia 97; tag uprooted 2/98 & 2/99
4.06	2	20.08	150	0.90		0	mia			mia			mia			discovered 5/96; may not be Ancistrocactus tobuschii; mia 97; tag uprooted 2/98 & 2/99
5.00	2	38.85	85	4.60	3+5 fr	1, rest disp.	5.40	6	7	5.50	5	5	Dead			orangish at base 2/98; dead, larva collected 2/99
6.00	from # 5	12.80	58	3.10	2	3	3.20	0	Dead							sick 2/97, squishy, dull green; COD unknown, no insect holes 4/97

## 4 of 11

[illegible]

### Ancistrocactus tobuschii Data for Devil's River State Natural Area

5 of 11

[illegible]

**Ancistrocactus tobuschii Data for  
Devil's River State Natural Area**

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PL #	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
1.00	7	26.12	310										2.49	1	1	tag mia, replaced, green with a few tan tubercle tips, pulling into soil, OK 2/00; green good 4/00, 2 & 4/01
1.10	7	26.06	310													discovered 2/00; green; good 2 & 4/00; tag mia, replaced, green, good 2 & 4/01
2.00	7	26.70	310										3.14	1	1	tan and poor; probably <i>Ancistrocactus brevihamatus</i> 4/99; olive green with a few tan tubercle tips, OK 2 & 4/00, 2/01; green, OK 4/01
3.00	7	26.87	311										3.44	3	2	looks tan and bad; probably <i>Ancistrocactus brevihamatus</i> 4/99; petals pinkish, stigma yellow, body olive green with a few tan tubercle tips, long spines, OK 2 & 4/00; tag mia, replaced, olive, OK 2/01; green with reddish tubercle tips, very squishy, poor 4/01
4.00	7	26.64	311										5.26	3fl+1fr	5	reddish green, OK 2 & 4/00; flowers yellow, body olive, OK 2/01; hollow with large chambers, larvae inside, collected for weevil study, 4/01
5.00	7	26.98	315										2.45	0	0	closest to stake; olive green, OK; tag chewed, replaced 2/00; green, good 4/00; tag mia, replaced, plant green, good 2/01; removed for weevil study, hollow 4/01

**Ancistrocactus tobuschii Data for  
Devil's River State Natural Area**

7 of 11

PL #	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
6.00	7	27.00	315										2.55	0	0	to right and behind of 5.00; reddish green, OK, tag chewed, replaced 2/00; green, good 4/00; tag mia, replaced, plant maroonish-green, OK 2/01; removed for weevil study, larvae inside 4/01
7.00	7	27.02	315										2.44	0	0	to right of 6.00; reddish green, OK, tag chewed, replaced 2/00; green, good 4/00; tag mia, replaced, plant green, good 2/01; green, OK 4/01
8.00	7	27.01	315										1.74	0	0	left and between 6.00 & 7.00; tag chewed, replaced, reddish green, OK, flower partially eaten 2/00; green, good 4/00; tag mia, replaced, plant green, good 2 & 4/01
9.00	7	23.45	341										5.23	3	3	found by Bea Harrison in prickly pear 2/99; dark reddish green, OK 2 & 4/00; COD insects (Moneilema ?), large gallery in body 2/01
9.01	7	23.41	341													between 9.00 and 11.00; one measurement only, poor 2/00; poor, looks dead 4/00; plant mia 2 & 4/01
10.00	7	23.48	341										1.06	0	0	behind and right of 9.00; one measurement only, OK 2/00; poor, maybe dead 4/00; plant mia 2 & 4/01

**Ancistrocactus tobuschii Data for  
Devil's River State Natural Area**

8 of 11

PL #	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
11.00	7	23.40	341										0.90	0	0	in front of 9.00; may be a small seedling behind 4/99 (see 9.01); OK 2/00; poor, maybe dead 4/00; plant mia 2 & 4/01
12.00	7	27.00	316										4.41		1fr+1A	good, may not be Ancistrocactus tobuschii, discovered 4/99; dark reddish green, long spines, flowers past, good 2/00; green, good 4/00; olive, OK 2 & 4/01
13.00	7	26.90	311										3.09		0	good, may not be Ancistrocactus tobuschii, discovered 4/99; maroon, OK 2 & 4/00; green, good 2/01
14.00	7	26.95	311										2.56		0	good, may not be Ancistrocactus tobuschii, discovered 4/99; maybe dead, but firmly rooted 2 & 4/00; just spines left; COD unknown 2/01
14.01	7	26.96	311													behind 14.00; discovered 2/00; green, good 2 & 4/00; plant and tag mia 2 & 4/01
15.00	7	27.00	311										2.30		0	good, may not be Ancistrocactus tobuschii, discovered 4/99; green, good 2 & 4/00; orange mush inside; flies 2/01
Dead plant beside 14.00, 14.01, and 15.00, COD unknown, probably parent of all three 2/00																
16.00	7	26.97	311										0.96		0	OK, may not be Ancistrocactus tobuschii, discovered 4/99; plant mia 2/00; relocated, under grass in front of 3.00, green, good 4/00; red, poor 2/01; hard, dry, solid, COD unknown 4/01

**Ancistrocactus tobuschii Data for  
Devil's River State Natural Area**

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PL #	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
17.00	7	27.07	311										0.54			OK, may not be Ancistrocactus tobuschii, discovered 4/99; OK 2/00; very loose and squishy, poor 4/00; green, OK 2 & 4/01
18.00	7	27.10	311													discovered 2/00; green, good 2 & 4/00; tag mia, replaced, plant green, good 2 & 4/01
19.00	7	16.40	332													discovered 4/00; olive green, OK 4/00; hole in vicinity of where plant was, plant mia 2 & 4/01
20.00	7	16.50	333													discovered 4/00; green, good 4/00; nibbled on one tubercle, olive with a few yellowish tubercles, OK 2 & 4/01
20.01	7	16.52	333													on west side of 20.00, not tagged, discovered 4/01; green, OK 4/01
21.00	7	~24.86	~318													discovered 2/01; green with a few tan tubercle tips, OK 2 & 4/01

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[illegible]

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PL #	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
1.00	9												4.91	8	4+1A	between tasajillo, small Opuntia lindheimeri and hog plums, flowers greenish-yellow, plant looks good 2 & 4/99; next to hog plum, old ant mound across road, flowers pinkish, stigma yellow orange, long spines, green, good 2/00; fruit already dispersed, 1 partial fruit with seeds left, green, good 4/00; pale green, OK 2 & 4/01
Stake 10 is 1 mi W of gate in fence, 0.6 mi W of Devil's River triangle																
1.00	10	6:50	146													flowers dusky yellow, long spines, body green, good 2/00; green with some yellow tubercle tips, OK 4/00; body solid, COD unknown 2/01
2.00	10	6:60	160													flowers slightly pinkish yellow, long spines, body reddish green, OK 2 & 4/00; COD weevils, galleries 2/01
Data was taken and recorded by Jackie Poole on 2/96, 5/96, 2/18/97, 4/28/97, 2/10/98, 5/4/98, 2/9-10/99, 4/19/99, 2/17/00, 4/24/00, 2/15/01, 4/24/01																

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
Stake 2 = GPS1 R022321A																					
2.20	2	5.47	205				4.40	6	6	3.80	3	3	3.50	2	nd	Dead					
2.22	2	6.30	212							1.60	0	0	2.20	0	0	mia			mia		
2.23	2	6.20	214							1.90	1	1	2.10	1	1	mia			Dead		
2.24	2	5.96	214							1.40	0	0	1.50	0	0	mia			mia		
2.25	2	5.95	215							1.60	0	0	1.80	0	0	1.30	0	0	1.50	0	0
2.26	2	5.95	215							1.30	0	0	1.40	0	0	Dead					
2.30	2	7.78	212				4.30	2	2	4.00	2	1									
2.31	2	7.78	212				0.40	0	0	0.60	0	0	0.90	0	0	mia			mia		
2.32	2	?	?													0.90	0	Dead			
2.40	2	11.16	218				3.50	2	0	4.00	3	1	4.50	2	1	2.70	0	Dead	Dead		
2.41	2	11.15	218				2.30	0	0	3.00	2	1	3.90	4	4	2.20	0	Dead	Dead		
2.60	2	11.15	218				3.80	2	0	3.60	1	1	4.50	3	3	2.90	0	0	Dead		
2.70	2	11.64	218				3.50	3	0	4.00	4	4	4.40	3	0	3.60	0	0	Dead		
2.80	2	4.40	246				4.60	4	0	3.80	1	1									
3.00	2	7.87	264	1.60	0	0	1.90	0	0	2.40	0	0	3.00	0	0	Dead					
3.10	2	10.18	266				2.60	2	0	2.60	3	0	3.00	1	0	Dead					
3.20	2	10.35	266				1.90	0	0	2.00	2	0	2.30	2	1	Dead					
3.30	2	10.35	266				1.40	0	0	1.60	1	0	1.50	0	0	mia	mia	mia	mia		
4.00	2	7.50	266	3.00	2	1	2.80	1	0	2.90	0	0	2.90	0	0	Dead					
5.10	2	8.92	276				1.90	0	0	1.50	0	0	1.70	0	0	1.90	1	0	1.30	0	Dead
5.20	2	8.52	275				1.60	0	0	1.60	1	1	2.10	0	0	Dead					
5.35	2	33.50	270													nd	nd	nd	Dead		
6.00	2	5.75	278	2.00	0	0	3.30	1	0	3.20	2	1	3.50	2	0	Dead					
9.00	2	8.31	280	2.60	2	2	2.70	0	0	2.40	0	0	2.00	0	0	2.00	0	0	Dead		

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
10.00	2	10.25	285	1.10	0	0	1.90	0	0	1.80	0	0	1.80	0	0	1.30	0	0	1.30	0	0
10.10	2	8.20	285	2.10	nd	1	1.80	1	1	1.90	1	1	2.10	0	0	mia			Dead		
10.30	2	5.66	285				0.90	0	0	0.90	0	0	1.20	0	0	mia	mia	mia	mia		
10.50	2	12.41	286				2.40	1	0	3.40	3	3	3.80	2	0	3.80	3	3	Dead		
11.00	2	2.40	299																1.20	0	0
17.20	2	11.55	348	1.00	0	0	1.60	0	0	1.10	0	0	1.40	0	0	1.80	0	0	Dead		
17.41	2	11.26	342							1.50	0	0	1.70	0	0	Dead					
17.48	2	10.12	10							1.10	0	0	1.20	0	0	1.50	0	0	mia		
18.20	2	12.02	350	0.70	nd	0	0.70	0	0	0.90	0	0	0.90	0	0	1.20	0	0	0.90	0	0
20.00	2	5.80	2	1.10	0	0	1.40	0	0	1.30	0	0	nd	0	0	mia	mia	mia	1.40	0	0
26.10		3.45	14	2.50	nd	0	3.20	1	1	2.60	1	1	3.20	1	0	Dead					
27.00	2	3.00	68	1.80	1	0	2.40	0	0	2.40	1	1	2.40	1	1	2.00	0	0	Dead		
27.10	2	3.10	78				1.20	0	0	1.40	0	0									
27.20	2	6.00	78				2.80	2	0	3.10	2	0	3.50	2	0	Dead					
28.20	2	3.00	85	0.90	nd	0	1.60	0	0	1.80	0	0	1.80	0	0				Dead		
28.30	2	5.20	90				3.00	3	0	2.80	2	1	2.70	2	2	Dead					
28.50	2	1.95	95				3.60	4	0	3.10	0	0	2.90	1	1	Dead					
28.51	2	1.95	95				3.50	3	0	2.70	0	0	2.80	1	1	Dead					
28.52	2	?	?							0.40	0	0	0.40	0	0	mia	mia	mia	mia		

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
1.70	0	0	1.30	0	0	0.99	0	0	green, hunkered down in <i>Selaginella</i> 5/96, 3 & 5/97, 2 & 5/98, 2/99; popped out, green, good 5/99 & 3/00; slightly reddish-green, OK 5/00; green, good 3 & 5/01
									found 4/91; sickly 8/92; eaten, may pup 4/94; apparently not 2/95; Dead 96
mia									near ant mound 3/92; not seen 8/92; mia 95; hole left where plant was 2/96; plant, tag, and flag mia 3/97
									uprooted 2/96
1.10	0	Dead							hunkered down in <i>Selaginella</i> 8/96 & 3/97; maybe dead 3/97; COD unknown, stem hollow, tag & flag removed 5/97
									pile of spines 2/96
									Dead 95
mia			mia						not seen 8/93; mia 96 & 97; plant, tag, and flag mia 5/98
Dead									first seen 4/91; under edge of rock; mia 8/96; one loose spine cluster in the vicinity; COD unknown, center of stem hollow, no insects, tag removed 3/97
mia			mia			mia			not seen 2/94; refound 4/94; tag buried under grass clump 2/96; flag present, but plant & tag mia 3/97; flag mia, but placed in vicinity 5/98
									first seen 4/91; Dead 95
									just spines left 2/96
									with larvae 2/95; Dead 95
									2 fl buds eaten 3/92; with larvae 2/95; Dead 95
									first seen 4/91; Dead 96
									Dead 95
									pup w/28.51; rock atop 4/93; sickly 8/93; needs tag 4/94; Dead 95
									pup w/28.5; rock atop 4/93; sickly 8/93; needs tag 4/94; Dead 95
mia									not seen 8/93; mia 95 & 96; plant, tag, and flag mia 3/97

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
28.60	2	5.47	87							1.40	0	0	1.70	0	0	mia	mia	mia	mia		
30.00	2	16.40	170	4.00	5	5	3.90	2	2	3.70	3	1	3.50	3	0	3.60	6	5	2.70	0	Dead
30.10	2	15.62	170				4.30	3	0	4.30	3	3	nd	nd	nd	3.00	2	0	Dead		
30.20	2	4.59	142												na	2.40	2	2	1.60	0	Dead
<b>Stake 3 = GPS2 R022321B</b>																					
32.20	3	3.15	263				5.10	3	0	4.70	2	2	4.30	1	0	3.90	3	2	2.50	0	Dead
32.21	3	4.35	262							3.80	1	1	3.10	0	0	3.30	2	2	2.50	0	Dead
32.22	3	4.35	262							3.30	1	1	2.70	0	0	2.60	2	2	1.70	0	Dead
32.23	3	4.35	262							2.90	0	0	2.70	0	0	2.80	0	0	2.10		Dead
32.32	3	4.92	258							1.00	0	0	0.80	0	0	0.80	0	0	1.00	0	0
32.40	3	5.39	255				5.10	5	0	4.80	1	1	4.50	3	3	Dead					
32.70	3	9.34	255				2.20	1	0	1.70	1	1	1.60	0	0	Dead					
33.32	3	?	?													1.00	0	0	mia		
33.40	3	7.37	259				1.30	0	0	nd	nd	nd	1.70	0	0	Dead					
33.50	3	7.37	259				0.70	0	0	0.80	0	0	0.90	0	0	mia		nd	Dead		
33.60	3	7.37	259				0.70	0	0	nd	nd	0	0.80	0	0	0.90	0	0	Dead		
33.70	3	7.37	259				0.50	0	0	nd	nd	nd	0.60	0	0	0.80	0	0	Dead		
34.00	3	8.65	266	2.00	1	0	2.40	1	0	2.40	1	1	2.00	0	0	Dead					

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
34.10	3	7.36	260	1.00	nd	0	1.10	0	0	1.00	0	0	nd	0	0	Dead					
36.20	3	7.20	260				1.40	0	0	1.00	0	0	nd	0	0	mia	mia	mia	mia		
37.10	3	7.57	262	1.40	nd	0	1.50	0	0	1.20	0	0	nd	0	nd	1.40	0	0	mia		
39.10	3	8.25	272	1.20	0	0	1.70	0	0	1.50	0	0	1.50	0	0	Dead					
39.20	3	?	?													1.40	0	0	Dead		
40.00	3	6.83	271	1.60	1	0	1.80	0	0	1.60	0	0	1.90	1	1	Dead					
42.00	3	7.57	275	3.40	3	0	1.50	0	0	1.10	0	0	nd	0	0	1.50	0	Dead	Dead		
42.10	3	7.57	275	3.40	3	0	1.30	0	0	1.10	0	0	nd	0	0	1.20	0	Dead	Dead		
43.00	3	5.29	277	3.00	3	0	2.00	0	0	1.60	0	0	nd	0	0	Dead					
44.01	3	?	?							0.90	0	0	0.80	0	0	mia	mia	mia	mia		
44.02	3	?	?							0.30	0	0	0.60	0	0	mia	mia	mia	mia		
44.03	3	?	?							0.30	0	0	0.50	0	0	Dead					
44.04	3	?	?							0.40	0	0	nd	0	0	Dead					
45.30	3	6.43	270							0.90	0	0	nd	0	0	Dead					
47.00	3	5.85	10	3.00	2	2	3.50	1	0	2.50	1	1	nd	nd	0	3.10	3	3	2.50	2	0
50.10	3	7.80	88	nd	0	0	0.80	0	0	0.80	0	0	0.90	0	0	1.30	0	0	mia		
50.20	3	7.80	88	nd	nd	0	0.70	0	0	0.70	0	0	0.80	0	0	1.70	0	0	mia		
51.00	3	6.83	85													2.90	3	3	Dead		
51.10	3	6.88	85													1.80	1	1	1.20	0	Dead

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
									found 4/91; not censused 2/94; refound 4/94; Dead 95
mia									not censused 2/94; refound, very sickly 4/94; mia 95; tag & flag mia also 2/96, 3/97, 5/97
mia			mia						found 4/91; not censused 2/94; refound 4/94; DM 95 - 1.4; mia 96 & 97; tag, plant, & flag mia 5/98
									needs new tag 4/94; Dead 95
									too far gone to discern cause of mortality, Dead 96
									Dead 95
									eaten 3/91; 2 pups forming 4/91; pup with 42.1; not censused 2/94; refound 4/94; only spines left 2/96
									pup with 42.00; not censused 2/94; refound 4/94; only spines left 2/96
									eaten 3/91, 1 pup forming 4/91; not censused 2/94; refound 4/94; Dead 95
mia									mia 95 & 96; plant, tag, and flag mia 3/97
mia									mia 95 & 96; plant, tag, and flag mia 3/97
									Dead 95
									not censused 2/94; refound 4/94; Dead 95
									not censused 2/94; refound 4/94; Dead 95
3.50	0	Dead							very dessicated 2/92; not censused 2/94; refound 4/94; very hunkered down in Selaginella 2/96; great, very green 5/96; good, coming out of Selaginella 3/97; top of stem popped off, weevil exit holes, tag & flag removed 5/97
mia			mia						found 4/91; mia 96 & 97; tag, plant, and flag mia 5/98
mia			mia						found 4/91; not seen 8/92; mia 96 & 97; tag, plant, and flag mia 5/98
									big hole in side 2/96
Dead									looks dead 2/96; COD unknown, only spines left, 5/96

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
55.00	3	6.72	110													1.00	0	0	0.70	0	Dead
55.10	3	6.61	110																0.70		0
58.00	3	6.34	135	2.80	2	0	2.20	0	0	2.00	0	0	1.40	0	0	1.60	0	0	Dead		
60.00	3	?	?													1.60	0	0	Dead		
63.00	3	8.25	154	2.40	0	0	2.50	0	0	1.80	0	0	2.00	0	nd	2.20	0	0	Dead		
<b>Stake 4 = GPS3 R022322A</b>																					
1.00	4	2.10	103																		
68.01	4	4.35	275							0.60	0	0	0.90	0	0	0.90	0	0	0.50	0	Dead
68.02	4	?	?													2.10	1	1A	Dead		
68.41	4	5.01	269							0.80	0	0	1.00	0	0	1.10	0	0	1.00	0	0
68.42	4	5.01	269							0.60	0	0	0.80	0	0	1.00	0	0	mia	mia	0
68.43	4	5.01	269							0.70	0	0	0.90	0	0	0.90	0	0	1.00	0	0
68.44	4	5.01	269							0.70	0	0	0.60	0	0	1.20	0	0	mia		
68.45	4	5.01	269							0.60	0	0	0.60	0	0	0.80	0	0	mia		
68.50	4	5.61	277				2.50	1	1	2.20	0	0	2.10	0	0	2.20	1	1	Dead		
69.20	4	5.26	282				0.70	0	0	0.70	0	0	0.90	0	0	1.00	0	0	1.20	0	0

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Dead									bad, spines gray, plant loose in ground, 2/96; gone, only a hole in ground left 5/96; presumed dead 3/97
0.70	0	mia	mia			mia			found in 5/96; mia 5/97, 2 & 5/98, 2 & 5/99 sickly 2/93; completely hollow 2/96 hollow 2/96 damaged 3/92; pup formed 2/93; not found 4/94; top popped off 2/96
									discovered 3/01; dark olive, OK 3/01; maroonish-green, good 5/01
									4 cm South of 68:00; hollowed out, insect, collected 5/96
									completely hollow 2/96
1.00	0	mia	mia			mia			1 m South of 68:4, 1 m Southeast of 68:5; only spines showing; hunkered down 2/96; spines detached, looks weird 3/97; a few loose spines, no plant 5/97; mia 98; tag & pl mia 2/99 & 5/99
0.90	0	0	1.30	0	0	1:38	0	0	see 68:41; feeds (?) pin 4/94; measured in one direction only; yellowish 2/98; green, good, new spine growth 5/98; green, good, soil loose 2/99; green, good 5/99; COD unknown, collected by Bill Calvert 3/00
mia			mia			mia			see 68:41; plant and tag mia 3/97, 2/98, 5/98, 2/99 & 5/99
1.70	0	0	Dead						see 68:41; in grass 3/97; hollow with weevil exit holes 2/98
mia			mia						see 68:41; tag mia also 2/96; found tag 3/97; plant and tag mia 5/97, 5/98
									fruit odd shape, light color 4/92; sickly; hole at base 2/96
1.60	0	0	1.40	0	Dead				wedged in between 3 rocks 2/96; good 5/96; measured in one direction only 2/98; hollow with weevil exit hole 5/98

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
71.00	4	3.15	292	3.00	2	2	3.60	0	0	2.80	2	2	3.00	0	0	3.30	3	3	Dead		
72.00	4	2.35	295	2.20	1	1	2.80	1	1	2.60	2	2	3.00	0	0	3.00	0	0	Dead		
72.10	4	?	?													2.30	0	0	Dead		
73.10	4	4.40	296	1.10	nd	0	1.20	0	0	1.40	0	0	2.10	0	0	2.50	1	0	Dead		
76.00	4	3.16	308	5.20	5	5	5.40	6	2	5.20	5	5	4.80	3	2	4.20	0	0	Dead		
76.10	4	12.53	312				4.10	1	0	nd	nd	2	3.50	0	0	1.60	2	3	2.80	0	Dead
77.50	4	3.11	320	1.00	nd	0	nd	nd	nd	1.30	0	0	1.20	0	0	1.40	0	0	Dead		
77.60	4	3.11	320	1.20	nd	0	nd	nd	nd	1.40	0	0	1.40	0	0	1.50	0	0	Dead		
80.00	4	2.68	334	1.40	0	0	1.90	0	0	2.20	0	0	2.20	0	0	2.30	0	0	Dead		
86.00	4	4.85	54	2.20	1	0	2.80	1	0	2.70	1	1	2.70	1	1	2.40	0	0	1.70	0	Dead
88.00	4	2.76	84	3.20	2	2	3.90	4	0	3.90	3	3	4.20	4	4	3.80	4	5	Dead		
88.10	4	3.15	85													3.90	5	4	Dead		
88.20	4	4.15	113													22.30	2	1A	Dead		
88.30	4	4.55	145													2.80	1	Dead	Dead		
89.10	4	1.82	103				0.80	0	0	nd	nd	nd	1.10	0	0	1.70	1	0	0.70	0	0
89.20	4	4.81	112				3.10	2	0	2.70	1	1	2.80	1	1	2.40	3	2	Dead		
89.22	4	2.96	117							1.70	0	0	1.90	0	0	2.20	2	1	Dead		
89.23	4	2.17	168							1.80	0	0	2.30	1	0	2.70	3	3	Dead		
89.24	4	1.90	168							2.90	0	0	3.50	1	1	3.30	1	0	Dead		
89.25	4	6.30	125										na			3.30	3	3	Dead		
89.30	4	4.81	112				2.80	0	0	2.40	0	0	2.40	0	0	2.70	4	0	Dead		
89.31	4	4.81	112										na			2.80	4	2	mia		
89.40	4	5.40	115							2.70	2	2	2.80	1	1	2.60	2	1	Dead		
89.41	4	5.40	115							2.60	1	1	2.40	0	0	1.50	1	0	Dying		Dead

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
									damaged ? 3/92; fruit half regular size 5/95; top popped off 2/96
									very sickly 8/93; hollow, top popped off but still attached (an exit hole?) 2/96
									6 " from 72.00; Dead 96
									found in 4/91; damaged 2/94; sickly 2/95; Dead 96
									hollow 2/96
									not measured 2/93; 2 or 3 orange tubercles with gray spines 2/96; some new spine growth, firmly rooted 5/96; COD unknown 8/96
									found 4/91; ? cm from 92; pup with 77.6; no tag nor flag, only spines left 2/96
									found 4/91; ? cm from 92; pup with 77.50; no tag nor flag 2/96; Dead 96
									just spines nested in grass 2/96
									1 seedling 2/94; looks dead but firmly rooted 2/96; dead, stem hollow, no insects 8/96
									hollow 2/96
									top popped off like a hatch 2/96
									hollow 2/96
Dead									hollow, only spines left 2/96
									14 seedlings by carcass 8/92; just spines left, COD unknown 3/97
									sickly 8/93; hole in root; root hollow 2/96
									needs tag 4/94; tag replace 2/95; hollow 2/96
									hole in stem, stem hollow 2/96
									hole in bottom, stem hollow 2/96
									hollow tube inside stem 2/96
									hole at stem base, stem hollow 2/96
mia			mia						no flag nor tag 2/96, 5/98; mia 96, 97, 98
									tag reads 89.21 - change tag; pup w/89.41, 89.42, & 89.43; Dead 96
									pup with 89.4, 89.42, & 89.43; only spines left 5/96

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
89.42	4	5.40	115							2.40	1	1	2.00	1	1	2.60	1	1	Dying		Dead
89.43	4	5.40	115							2.00	0	0	2.00	0	0	2.60	0	2	Dying		Dead
90.00	4	1.55	110	3.20	2	1	3.00	2	0	2.80	1	1	2.60	1	1	2.40	0	0	Dead		
90.10	4	-49.70	101																4.80	5	2+4A
92.00	4	26.51	45	1.60	0	0	1.80	0	0	1.70	1	1	1.70	0	0	Dead					
92.10	4	23.75	54													3.40	2	0	Dead		
93.00	4	27.64	46	4.00	4	4	4.30	4	0	4.20	3	3	4.30	2	2	Dead					
93.10	4	27.64	46	1.20	0	0	1.80	0	0	1.60	0	0	1.90	0	0	Dead					
Stake 4A is ~100m East of Stake 4, near ashe juniper stump with large flat limestone rock																					
1.00	4A	3.90	181																		
90.20	4A	3.90	181																		
Stake 6 = GPS4 R022320B; stake is at the edge of Condalia																					
96.00	6	5.55	346	3.60	nd	3	4.10	4	4	4.30	2	2	5.30	4	4	5.60	5	3	Dead		
96.10	6	6.15	222																3.10	5	2+2A
97.00	6	6.40	354	2.50	nd	3	2.70	2	0	3.00	2	2	3.50	2	2	3.20	2	Dead	Dead		
99.00	6	8.79	351	0.40	nd	0	0.80	0	0	0.90	0	0	1.60	0	0	2.30	1	0	Dead		
100.00	6	9.74	354	1.60	nd	0	1.70	0	0	1.90	0	0	2.00	0	0	2.90	4	1	Dead		
100.10	6	9.10	350													3.40	3	4	Dead		
101.10	6	7.63	354				1.00	0	0	1.30	0	0	1.90	0	0	3.00	3	3	Dead		
101.20	6	8.01	354				0.60	0	0	0.60	0	0	1.20	0	0	1.80	0	nd	Dead		
101.30	6	8.66	352				1.00	0	0	1.20	1	1	2.00	2	2	2.80	0	Dead	Dead		

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
									pup with 89.4, 89.41, & 89.43; looks dead but firmly rooted 5/96; dead, hollow 8/96
									pup with 89.4, 89.41, & 89.43; looks dead but firmly rooted 5/96; dead, hollow 8/96
									Dead 96
6.80	14	12+4A	Dead						weevil exit holes 2/98
									pup w/92.1; alive even after co-pup 92.1 grub-death 2/94, 4/94; Dead 95
									should be renumbered & retagged; hole in root & at stem base; Dead 96
									Dead 95
									Dead 95
						4.04			0 green, good, discovered 5/99; plant collected by Bill Calvert, weevil larva, seedling accidentally uprooted, replaced 3/00; seedling and tag mia 5/00
									weevil exit holes 2/98
									1 seedling 4/94; fruit only half developed; hollow, uprooted 2/96
4.30	6	3+3A	mia			mia			1 fruit moved ~1 cm from plant 5/96; totally orange 8/96; purplish green, healthy; scar beneath a tubercle 3/97; plant mia 3 & 5/00
									tubercles purplish 3/95; hollow 2/96
									hole at base 2/96
									sickly 2/94; 1 fruit eaten & larval hole 5/95; only spines left 2/96
									hollow 2/96
									hollow 2/96
									Dead 96
									smallest diameter, flower & fruit production!!!; Dead 96

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
									at 101.30; green, really hunkered 2/96; stem hollow, killed by grubs? 5/96
									Dead 96
									barely alive 5/95; Dead 96
									Dead 96
									rock atop 2/94; root hollow, no insects 2/96
mia			mia			mia			hunkered down in rock 2/96; either 101.36 or 101.37 is missing or they are beside each other & indistinguishable 5/96; only one small spine cluster in vicinity 3/97; tag loose 2/98, 5/98; mia 97, 98, 99
mia			mia			mia			hunkered down in rock 2/96; either 101.36 or 101.37 is missing or they are beside each other & indistinguishable 5/96; only one small spine cluster in vicinity 3/97
									Dead 96
									Dead 96
									not seen 8/93; Dead 96
									damaged? 3/92; fr 1/2 developed 5/95; Dead 96
									2 larvae collected, 2 seedlings at plant base 2/96; Dead 96
									eaten 3/92; pup formed 2/93; sickly 2/95; only one spine cluster left 2/96
									spines only 2/96
									sickly 8/93; Dead 96
									hollow, larvae gone? 2/96
mia			mia			mia			mia 8/96, 97, 98, 99
Dead									pup with 111.1; plant orange 8/96; COD unknown, just spines left 3/97
Dead									pup w/111.00; just spines left 3/97
1.90	0	0	2.10	0	Dead				in seedling ring by salmon pin with blue dot 3/97; measured in one direction only 2/98; stem w/4 chambers, 2 exit holes, 2 dried & dead larvae 5/98
1.00	0	0	0.80	0	0	1.01	0	0	in seedling ring by green pin with orange & blue dots 3/97; measured in one direction only 2/98; green, good 3 & 5/00, 3 & 5/01

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
						3.81	4	4	dull gray spines, body orangish & maroon, OK 5/99; COD unknown, collected by Bill Calvert 3/00
						3.07	3	3	green, good 5/99; a few tan tubercle tips, otherwise green and good 5/00; plant mia 3 & 5/01
									discovered 5/01; green, good, hunkered in Selaginella 5/01
									weevil collected 5/96
									discovered 3/01; green, good 3 & 5/01
									discovered 3/01; green, good 3 & 5/01
									1 fr 1/2 size of others, nipped at top 5/95; looks dead 2/96; killed by grubs 5/96
									not seen 8/93 or 2/94; refound 4/94; Dead 95
Dead									not seen 8/93; COD unknown, stem hollow, no insects 3/97
Dead									not seen 8/93; sickly 2/95; COD unknown, stem hollow, no insects 3/97
2.50	1	0	2.60	2	Dead				hollow with weevil exit holes 5/98
									discovered 3/01; green, good 3 & 5/01
									discovered 3/01; hunkered in Selaginella, green, good 3 & 5/01
									sickly 5/95; hollow 2/96
									found 4/92; very sick 2/95; tag & flag mia also 2/96; Dead 5/96?
2.30	0	0	Dead						hunkered down in Selaginella 2/96; coming out of Selaginella 3/97; just spines left, COD unknown 2/98
1.10	0	0	1.20	0	nd	1.14	0	0	discovered 3/97; measured in one direction only 2/98; plant & tag covered by rock 2/99; green, OK, hunkering 5/99, 3 & 5/00, 3/01; popping out, green, good 5/01

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
131.00	7	2.85	328	2.20	nd	1	3.00	2	0	3.00	2	2	3.10	1	1	4.00	3	3	3.60	4	2
132.00	7	1.90	340	4.50	nd	4	4.90	3	1	4.20	1	1	4.20	0	0	Dead					
132.10	7	1.90	340													6.50		0	Dead		
132.20	7	1.90	340													3.80	0	0	Dead		
133.00	7	9.30	23	3.30	nd	3	3.10	1	1	3.30	2	1	3.80	3	3	3.30	0	0	Dead		
133.10	7	9.30	23	2.80	nd	1	2.80	0	0	3.00	1	1	3.40	3	3	2.50	0	0	Dead		
135.00	7	2.75	31	4.60	nd	3	4.70	5	5	4.10	1	0	3.30	0	0	2.80	0	Dead	Dead		
137.00	7	3.15	45	1.70	nd	0	2.00	0	0	2.30	0	0	2.30	0	0	2.10	2	2	1.30	0	Dead
138.00	7	5.72	45	3.70	nd	2	4.40	1	0	4.00	2	2	3.60	0	0	3.30	0	Dead	Dead		
138.10	7	6.31	42				4.60		3	4.40	2	0	4.60	3	2	3.00	0	Dead	Dead		
138.11	7	6.33	28							2.30	0	0	2.50	0	0	2.20	0	Dead	Dead		
138.20	7	7.03	42				3.30		3	3.30	1	1	3.10	1	0	3.00	0	0	Dead		
138.30	7	8.77	30				2.40		2	2.90	2	2	3.00	2	2	3.30	0	0	mia		mia
138.40	7															3.10	0	0	Dead		
140.00	7	4.13	64	3.80	nd	2	3.60	1	1	3.30	1	1	3.00	0	0	3.00	0	Dead	mia		
140.10	7	3.80	66													1.40	0	0	1.10	0	mia
141.00	7	4.49	68	1.20	nd	0	2.20	1	0	2.40	1	1	nd	nd	nd	2.00	0	Dead	mia		
142.00	7	4.49	68	1.30	nd	0	2.30	0	0	2.30	1	1	2.40	0	0	1.90	0	Dead	mia		
143.00	7	4.49	68	1.20	nd	0	1.40	0	0	1.70	0	0	2.20	0	0	2.40	1	Dead	mia		
143.10	7	4.45	69	na			2.20	1	1	2.80	2	1	2.60	1	1	mia	mia	mia	mia		

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Dead									rock atop, removed 3/20/92; very sickly 8/93; 1 fruit ripped on top & ants swarming seeds 5/96; stem hollow with insect exit holes 3/97
									Dead 95
									Dead 96
									uprooted 2/96
									2 seedlings 3/92; pup with 133.1; seedling 5/95; completely hollow 2/96
									pup with 133.00; seedling 5/95; completely hollow 2/96
									sickly 8/92; very sickly 8/93 & 2/94; very, very sickly 2/95; hollow 2/96
									hunkered down 2/96; killed by grubs 5/96
									only spines left 2/96
									found 4/92; sickly 2/95; only spines left 2/96
									only spines left 2/96
									found 4/92; 2 unmapped seedlings 4/92; sick 2/93; seedlings tagged 4/94; larval exit holes 2/96
Dead									found 4/92; not seen 8/92; tag mia also 2/96; COD unknown, only spines left 3/97
									9.1 cm E of 138.11; hollow; larvae gone 2/96
									sick 8/92; very sick 8/93; Dead 95; tag mia also 2/96
mia			mia			mia			ca. 1" from 140.00; mia 8/96, 97, 98, 99
									mammal damage 8/93; pup from stump 4/94; no flag or tag 2/96; Dead 5/96?
									needs tag 4/94; no flag nor tag 2/96; Dead 5/96?
									needs tag 4/94; no flag nor tag 2/96; Dead 5/96?
mia									fruit yellow at maturity 4/94; mia 95; no flag nor tag 2/96; mia 97

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
									needs tag 4/94; spines gray at base, tubercles still green, plant loose in soil 2/96; killed by larvae 5/96
1.70	0	0	1.90	1	0	1.84	1	1	one tubercle brownish-purple 3/97; dull green 5/97; hunkered down in Selaginella, dull green, OK 2 & 5/99; green, good 3 & 5/00, 3 & 5/01
mia			mia			mia			mia 8/96; mia 97; tag mia 2/98; tag relocated 5/98; tag almost covered by Selaginella 2/99
Dead									basal spines gray, tubercles, green 2/96; new spine growth, ants swarming, no fruits 5/96; stem hollow with insect exit holes 3/97
									8 seedlings 3/92 & 2/94; 6 sick seedlings, parent grub-infested, 2/95; Dead 95
Dead									discovered 5/96; shrunk away from Selaginella 8/96; stem hollow with insect exit holes 3/97
									very light colored flowers 3/92; 2 fruit collected (68 & 61 seeds) 5/93; 93 seeds germinated 70% & 80%; only loose spines & hole left, spines scattered in a 1' radius 5/96
									found 4/92; Dead 95
						2.36	2	1	on old road , about midway down; orangish, OK 5/99; one spine cluster in vicinity, plant mia 3 & 5/00, 3 & 5/01
									discovered 3/00; green, good 3 & 5/00; reddish-green, OK 3/01; pale reddish-green, poor 5/01

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
<b>Stake 15 = GPS8 R022318B</b>																					
157.10	15	7.61	132				3.40	nd	2	2.70	0	0	3.20	0	0	Dead					
161.00	15	8.80	134	3.30	nd	2	3.60	nd	3	3.10	2	1	3.20	2	nd	3.20	0	nd	2.60	3	1+1fl
166.00	15	4.78	160	3.10	nd	1	3.00	2	2	3.00	0	0	3.10	2	0	1.70	0	Dead	Dead		
169.00	15	4.22	176	1.70	nd	0	2.10	nd	0	2.10	0	0	2.60	1	0	mia			Dead		
170.00	15	4.55	175	2.10	nd	0	2.30	nd	1	2.20	1	0	2.30	0	0	mia	mia	mia	mia		
171.00	15	6.66	172	1.60	nd	0	1.90	nd	0	1.90	0	0	2.10	1	0	mia	mia	mia	mia		
171.10	15	6.69	172																		
171.20	15	6.71	173																		
172.00	15	6.88	170	1.10	nd	0	1.70	nd	0	1.90	0	0	nd	0	0	mia			Dead		
174.00	15	6.88	176	3.00	nd	3	nd	0	0	1.60	0	0	2.20	0	0	Dead					
177.00	15	9.85	174	2.40	nd	0	nd	0	0	1.90	1	1	2.30	1	0	Dead					
178.00	15	9.27	174	0.60	nd	0	1.90	nd	0	1.80	0	nd	nd	nd	0	Dead					
178.10	15	9.27	174				0.70	nd	0	mia		nd	0.80	0	0	0.80	0	0	1.40	0	Dead
178.20	15	9.27	174				0.80	nd	0	1.10	0	0	1.80	0	0	Dead					
180.00	15	6.10	184	1.10	nd	0	1.60	nd	0	1.10	0	0	1.40	0	0	mia	mia	mia	mia		
180.10	15	6.10	184	1.00	nd	0	1.30	nd	0	1.00	0	nd	0.90	0	nd	mia	mia	mia	mia		
183.00	15	6.40	190	1.30	nd	0	1.50	nd	0	1.40	0	nd	1.40	0	nd	mia	mia	mia	mia		
185.00	15	11.45	186	1.20	nd	0	1.40	nd	0	1.80	0	nd	2.20	0	nd	Dead	Dead				
186.00	15	11.10	192	3.10	nd	4	2.80	nd	2	3.10	2	2	3.20	1	nd	2.80	2	1+1A	2.30	2	0
188.10	15	8.95	185							1.10	0	nd	1.60	0	nd	1.60	0	0	1.60	0	0

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
									found 4/92; appears damaged 4/92; pup forming 2/93; Dead 95
3.20	3	Dead							growing from under rock; orange & mushy inside, fruit not formed, tag & flag removed 5/97
									2 fruit with 23 & 17 seeds 4/92; sick 8/92; very sick 8/93; looks dead 5/95; only spines left 2/96
									Dead 96
mia									mia 95, 8/96, 97
mia									not seen 8/93; mia 95; tag missing; tag & flag missing also 2/96; mia 97
									possibly 171.00; discovered 3/01; hunkered, green, OK 2 & 5/01
									discovered 5/01; green, OK 5/01
									not censused 2/94; refound 4/94; Dead 96
									eaten, pup forming 3/92; Dead 95
									eaten, 2 pups forming 3/92; only 1 pup measured 2/93; Dead 95
									pup from stump 3/91; not censused 2/94; refound 4/94; Dead 95
									found 4/92; not seen in 1993; between 2 rocks 2/95; hollow; killed by larvae 5/96
									found 4/92; Dead 95
mia									pup with 180.1; mia 95, 8/96, 97
mia									pup w/180.00 (formerly 181.00); mia 95 & 96; tag mia 3/97
mia									pup with 183.1; 183.1 dead but 183.00 still alive 4/94; mia 95, 96, 97
									Dead 95
Dead									COD unknown, stem hollow inside & filled with granular substance 3/97
1.90	0	Dead							COD unknown, stem hollow 5/97

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
190.10	15	13.64	198				4.90	nd	3	4.50	2	2	4.30	1	nd	4.30	2	2	4.20	3	2+1fl
191.10	15	12.43	203				0.90	nd	0	0.90	0	nd	0.90	0	nd	1.70	0	0	2.30	0	0
191.20	15	~12.44	~204																1.60		0
194.00	15	12.48	206	4.80	nd	7	4.80	5	3	5.10	4	4	4.70	3	nd	4.90	7	7	4.00	8	8
194.01	15	12.48	206																		
194.02	15	12.48	206																		
194.03	15	12.48	206																		
194.04	15	12.48	206																		
194.10	15	12.66	204				2.40	nd	2	2.20	0	nd	2.60	1	nd	3.40	3	3	2.50	2	2
194.20	15	12.20	200																		
197.00	15	9.87	264	2.20	nd	1	1.90	nd	0	2.00	1	1	2.10	0	nd	2.10	0	1	1.90	1	disp.
197.01	15	~9.84	~264																1.00		0
197.02	15	10.05	265																		
197.03	15	10.07	265																		
197.04	15	9.96	267																		
197.05	15	10.00	266																		
197.10	15	6.45	265							2.00	0	0	nd	0	0	1.50	0	0	1.60	0	0
197.20	15	6.45	265													2.00	0	0	2.30	2	0
202.20	15	9.95	264				1.60	nd	nd	1.60	0	0	1.90	0	nd	1.90	0	0	1.70	2	disp.

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Dead									found 4/92; 3 seedlings 4/92; 2 seedlings 2/95; seedlings mia 2/96; COD unknown, stem hollow, filled with yellow granular matter 3/97
2.30	0	Dead							found 4/92; not seen 8/93; COD unknown, stem tissue solid but granular 5/97
Dead?	0	Dead							found 5/96; looks dead, but check again 3/97; COD unknown, only loose spines left 5/97
Dead									1 seedling at base by tag 5/96; COD unknown, only spines left 3/97
0.80	0	mia	mia			mia			discovered 3/97; mia 5/97, 98; one tag for all, uprooted & chewed, nail mia 2/99
0.40	0	mia	mia			mia			discovered 3/97; mia 5/97, 98, 99
0.40	0	mia	mia			mia			discovered 3/97; uprooted with parent, replanted 3/97; mia 5/97, 98, 99
0.40	0	mia	mia			mia			discovered 3/97; green pup off similar size stem 3/97; mia 5/97, 98, 99
Dead									found 4/92; COD unknown, small hole, perhaps weevil exit hole 3/97
									discovered 3/01; green, good 3 & 5/01
Dead									eaten, pup forming 3/92; sick 8/92 & 8/93; very sick 2/95; much better 2/96; COD unknown, only spines left 3/97
1.20	0	0	Dead						found 5/96; base of grass clump 3/97; just spines left, COD unknown 2/98
1.30	0	0	mia			mia			discovered 3/97; tag & nail loose 2/99; plant mia 3 & 5/00, 3 & 5/01
3.60	4	2+1A	Dead						discovered 3/97; hollow, just spines left, weevils? 2/98
									discovered 5/01; green, good 5/01
									discovered 5/01; green, OK 5/01
3.00	0	0	Dead						partly eaten 2/94; 2 pups forming 4/94; a few spines left, COD unknown 2/98
2.20	0	0	2.10	1	nd	Dead			small larva inside, larva killed by calipers 2/99
2.20	1	0	mia			mia			found 4/92; plant mia 98, 99, and 2000

**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
202.30	15	13.34	265													2.50	2	2	2.10	0	0
203.01	15									0.70	0	nd	0.80	0	nd	1.10	0	0	0.80	0	0
203.10	15	13.83	276				4.10	nd	4	3.70	3	3	4.60	3	nd	5.60	9	6	4.80	5	4+4A
203.11	15	14.05	282													2.50	2	2	1.90	1	1A
203.12	15	14.74	280													1.80	0	0	1.60	1	1
203.20	15	13.37	274				3.70	nd	3	2.80	0	nd	3.40	3	3	3.00	0	0	3.20	4	3+1A
203.21	15	13.37	274															0	1.20	0	0
203.211	15	13.37	274																		
203.22	15	13.37	274																1.40		0
203.30	15	13.23	274				1.00	nd	0	1.00	0	nd	1.00	0	nd	mia		0	1.50	0	0
203.40	15	13.00	297				2.60	nd	nd	2.70	0	0	2.70	0	nd	2.60	0	0	2.20	2	mia
203.41	15	13.51	297																0.50		1
204.00	15	13.51	297	4.50	nd	6	4.50	7	5	4.60	6	6	3.90	2	nd	4.20	5	1A	Dead		

**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Dead									in rock; COD unknown, stem hollow, no insects 3/97
mia			mia			mia			55 cm W of 203.00; base of grass clump; mia 8/96, tag & flag also mia; mia 97, 98, 99
Dead									found 4/92; COD unknown, stem solid 3/97
mia			mia			mia			very loose in soil, green, 1 seedling underneath 2/96; Dead 8/96, hole in stem, no insects, seedling still alive; seedling mia 3 & 5/97, 98, 99
Dead									in solution pocket in rock; COD unknown, drought?, stem solid 3/97
Dead									found 4/92; 5 seedlings 4/92; seedling by tag 5/95; numbered as 203.21 2/96; COD unknown, stem hollow, no insects 3/97
Dead									discovered 5/95; COD unknown, stem hollow, no insects 3/97
1.30		0	Dead						seedling or pup of 203.21, discovered 5/97; just spines left, COD unknown 2/98
1.30	0	Dead							discovered 5/96; stem hollow; with weevil holes 3/97
2.10	1	0	1.90	0	0	1.20	0	Dead	found 4/92; not seen 8/92; refound 5/95; looks poor, yellow green 2/99; COD unknown, collected by WHC 5/99
Dead									found 4/92; recently dead plant nearby (actually closer to 205 & 204.1), not hollow, no insects 5/96; relocated 8/96; COD unknown, stem hollow, no insects 3/97
									found 5/96; Dead; tag removed, cause of death unknown 8/96
									3 self fruit, 50/0/1 seeds (17 average) 4/92; also collected unmanipulated fruit with 37 seeds 4/92; damaged & sick 8/92; 2 yellow & black-spotted beetles feeding on tepals 2/20/93; very sick 8/93; stem hollow, weevils gone 2/96

**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
204.10	15	13.66	297																0.80		0
204.20	15	13.67	297														0.6				
205.00	15	13.67	296	2.90		4	2.90		4	2.60	1	1	3.30	0	nd	2.60	2	2	2.30	4	1
205.10	15	11.92	312				2.30	nd	1	2.50	2	nd	3.00	2	nd	3.40	4	4	2.80	2	2
206.00	15	11.20	319													3.00	3	1+1S	1.50	0	Dead
206.10	15	12.02	321																2.10	2	1
206.20	15	9.94	328																		
206.30	15	10.38	328																		
206.31	15	10.40	328																		
207.00	15	13.22	332																		
208.00	15	12.17	335																		
Stake 0A = nothing, no live plants																					
213.00	0A	2.32	112	1.50	nd	0	1.90	0	nd	1.90	0	nd	2.30	1	1	2.50	1	0	1.50	0	Dead
219.00	0A	1.86	62	2.70	nd	0	2.80	2	nd	2.00	0	nd	2.40	2	1	Dead		0			
222.00	0A	5.20	53	2.40	nd	0	2.30	1	1	2.40	0	nd	2.00	0	nd	1.80	0	nd	1.50	0	Dead

**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
0.90	0	Dead							smaller seedling (204.20) below 8/96; in grass clump, very loosely rooted 3/97; stem hollow, weevil larvae collected 5/97
0.50	0	0	0.70	0	0	0.61	mia	0	discovered 3/97; measured in one direction only 2/98; pl mia 2/99; hunkered, green, good 5/99 & 3/00; very hunkered, green, OK 5/00; plant mia 3 & 5/01
Dead									COD unknown, stem hollow, no insects 3/97
Dead									found 4/92; very sick 8/93; COD unknown, stem filled with granular material 3/97
									looks dead but firmly rooted 2/96; dead, killed by weevils 8/96
Dead									COD unknown, stem filled with granular material 3/97
	0		2.10		Dead				discovered 2/98; hollow with weevil exit hole 5/98
						0.66		0	right beside orange pin with blue dot, in seed ring, discovered 5/99; one measurement only, hunkered, green, OK 3 & 5/00; very hunkered, green, OK 3/01; popping out green, OK 5/01
						0.81		0	~1cm from orange pin w/ blue dot in seed ring, discovered 5/99; one measurement only, hunkered, green, OK 3 & 5/00; green, OK 3/01; green, good 5/01
									discovered 5/01; green, good 5/01
									discovered 5/01; popping out of crustose lichen, green, good 5/01
									found 4/91; hunkered down 2 & 5/96; looks dead 5/95; just spines left, dead 8/96
									found 4/91; Dead 95
									found 4/91; hunkered down 2 & 5/96; Dead 8/96, stem hollow in center, but no insects

**Ancistrocactus tobuschii Data for Devil's Sinkhole State Natural Area**

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PL#	STAKE	DIST	ANGLE	91DM	91FL	91FR	92DM	92FL	92FR	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR
<b>Stake 16 = GPS9 R022318A</b>																					
223.00	16	4.22	120																2.70		0
224.00	16	4.35	120																3.20		0
<b>Plot 17 stake is 0.3 mi from the road junction</b>																					
15 dead <i>Ancistrocactus tobuschii</i> were observed within this plot in 5/97, and one weevil was collected.																					
1.00	17	5.36	356																		
2.00	17	1.37	65																		
3.00	17	9.46	68																		
4.00	17	7.40	72																		
5.00	17	7.46	72																		
6.00	17	6.94	75																		
7.00	17	3.33	284																		
8.00	17	2.75	288																		
9.00	17	2.81	292																		

**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.80	0	0	nd	0	0	1.56	0	0	found 5/96; eaten or run over, only one tubercle left 2/98; new spine growth 5/98; hunkered down, green, good 2/99, 5/99 & 3/00; tubercle tips slightly purplish, otherwise green, OK 5/00; plant mia 3 & 5/01
4.40	5	3	5.40	6	4+1A	3.94	6	0	found 5/96; dull green 5/97; bright green 2/98; hunkered down 5/98 & 2/99, visited by 2 honeybees; top totally eaten off 5/99; plant mia 3 & 5/00, 3 & 5/01
0.90		0	1.10	0	0	Dead			measured in one direction only 2/98; dry & solid, COD unknown 2/99
2.60		0	Dead						between rocks; a little reddish 5/97; hollow, weevils? 2/98
2.60		1A	Dead						very squishy & loose, green 5/97; hollow, weevils? 2/98
6.0.9		0	2.00	0	0	0.80	0	Dead	two-headed plant in rock 5/97; measured as one 2/98; two separate plants, one dead (not hollow), other green, OK 2/99; no weevil evidence, COD unknown, WHC collected 5/99
1.00		0	1.30	0	Dead				in rock; measured in one direction only 2/98; hollow with exit holes 5/98
0.90		0	Dead						in rock; just spines, COD unknown 2/98
2.10		0	1.10	0	Dead				measured in one direction only 2/98; hard and solid, COD unknown 5/98
1.00		0	Dead						in rock; tag chewed and uprooted, plant hard and dry, COD unknown 2/98
2.60		0	Dead						in rock; tag chewed and uprooted, plant hard and dry, COD unknown 2/98

## Ancistrocactus tobuschii Data for Devil's Sinkhole State Natural Area

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**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
1.50		0	1.40	0	Dead				measured in one direction only, bad, tightly rooted 2/98; hollow with weevil exit hole 5/98
2.30		0	Dead						one larva collected 2/98
2.50		0	Dead						just spines, COD unknown 2/98
2.30		0	Dead						exit holes 2/98
									discovered 3/01; green, good 3 & 5/01
3.30		0	2.50	0	0	Dead			between rocks, loose spines, somehow damaged, green, with new growth 5/97; green, OK 5/98; hollow with weevil chambers 2/99
3.90		2+2A	Dead						tubercle tips red 5/97; COD unknown 2/98
0.90		0	Dead						root exposed, barely rooted 5/97; COD unknown 2/98
0.60		0	Dead						barely rooted, root out of ground 5/97; COD unknown 2/98
1.00		0	Dead						to the right of 6.04 and 6.05; COD unknown 2/98
0.60		0	Dead						between 6.03 and 6.05; COD unknown 2/98
0.60		0	Dead						to the left of 6.03 and 6.04; COD unknown 2/98
4.30		4+2A	4.80	4	3+1A	4.11	1	1	green, good 5/99, 3 & 5/00; chambers and galleries, COD weevils 3/01
2.30		3A	Dead						reddish 5/97; larva collected 2/98

## Ancistrocactus tobuschii Data for Devil's Sinkhole State Natural Area

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**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
1.20		0	mia			2.04	mia	0	green, good 5/99; almost totally buried, only spines out, covered by ant litter, green, OK 3/00; no litter, very hunkered, may be dead 5/00; plant mia 3 & 5/01
1.80		0	mia	mia	Dead				tag & plant mia 2/98; plant found, hollow, with weevil exit holes 5/98
									discovered 5/01; uprooted, replaced, green, OK 5/01
									discovered 5/01; green, good 5/01
2.10		0	2.70	0	0	2.70	1	1	Plants 4.00 & 5.00 may represent two heads of one plant; right of 5; green, good 5/99; covered by ant litter except spines, green, OK 3/00; litter gone, reddish-green, hunkered, OK 5/00; plant mia 3 & 5/01
2.10		0	2.80	0	0	2.78	1+2fr	2+1A	Plants 4.00 & 5.00 may represent two heads of one plant; left of 4; green, good 5/99; covered by ant litter, except spines, green, OK 3/00; litter gone, reddish-green, hunkered, OK 5/00; tag loose, replaced, plant mia 3 & 5/01
2.50		1	1.90	0	0	1.79	0	0	in grass clump; covered with dirt and duff 2/98; new spine growth 5/98; green, good 2 & 5/99; weevil larvae, collected by Bill Calvert
2.60		0	2.10	0	Dead				turning reddish, spines gray 2/98; hollow with weevil exit holes 5/98
1.30		0	1.40	0	0	1.89	mia	0	measured in one direction only 2/98; loose spines in area and lots of tossed around rocks 2/99; under rock; green, good 5/99; plant mia 3 & 5/00; relocated but dead, just spines, COD unknown 3/01
0.90		0	Dead						root exposed, barely rooted 5/97; COD unknown 2/98
2.60		0	Dead						center of stem eaten, two tubercles resprouting spines, plant reddish 5/97; COD unknown 2/98

**Ancistrocactus tobuschii Data for Devil's Sinkhole State Natural Area**

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**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
1.60		0	Dead						severely damaged, three tubercles resprouting spines 5/97; COD unknown 2/98
1.50		0	1.20	0	0	mia			center of stem eaten, one tubercle resprouting spines 5/97; measured in one direction only, may be a seedling; mia 99; plant mia 3 & 5/00, 3 & 5/01
2.10		0	Dead						center of stem eaten, two tubercles resprouting spines 5/97; COD unknown 98
2.50		0	1.90	0	Dead				edge of grass clump; spines gray 2/98; hollow with weevil exit holes 5/98
1.90		0	1.50	0	mia	mia			looks bad, covered with dirt 2/98; mia 5/98, 2/99, 5/99, 3/00 & 5/00, 3 & 5/01
3.90		1	2.60	0	Dead				bad, collapsed, mushy, loose spines 2/98; hollow with weevil exit holes 5/98
0.50		0	mia			mia			seedling of 16.00; plant & tag mia 2/99, 5/99, 3/00 & 5/00, 3 & 5/01
0.70		0	0.80	0	Dead				solid and dry, COD unknown 2/98
1.30		0	Dead						COD unknown 2/98
1.80		0	Dead						COD unknown 2/98
1.90		0	1.60	0	0	Dead			edge of rock; measured in one direction only 2/98; body dry & solid, COD unknown 2/99
1.00		0	1.50	0	0	mia	mia	Dead	measured in one direction only 2/98; just spines left, COD unknown 5/98
3.40		0	0.70	0	Dead				in rock, center of stem eaten; many loose spines 5/97; only a tubercle, measured in one direction only 2/98; only spines left, COD unknown 5/98
1.10		0	0.90	0	0	Dead			in rock, seedling of 22.00; measured in one direction only 2/98; just spines left, COD unknown 2/99
1.70		0	1.80	0	0	Dead			in grass clump; dry and hollow, probably weevils 2/99

**Ancistrocactus tobuschii Data for Devil's Sinkhole State Natural Area**

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**Ancistrocactus tobuschii Data for  
Devil's Sinkhole State Natural Area**

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97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
			1.30	0	0	1.29	0	0	discovered 2/98; bad, gray spines & body, squishy, firmly rooted 2/99; new spine growth, green, OK 5/99; dull light green, OK 3/00; green, OK 5/00, 2/01; armadillo rooting in area covered plant and tag with dirt, uncovered, green, OK 5/01  discovered 5/01; green, good 5/01
1.60		0	Dead						just spines, COD unknown 2/98
2.00		1A	2.40	0	0	1.99	0	Dead	plant maroonish 5/97; greenish, but looks bad 2/98; OK, new spine growth 5/98; bad, spines gray, body yellow 2/99; COD unknown, collected by WHC 5/99
1.20		0	mia			Dead			relocated, but dead, hollow, probably weevils 2/99
1.20		0	1.30	0	0	0.95	0	0	half a plant, only four tubercles 2/98; small, OK, new spine growth, green 5/98; almost buried 2/99; popping out, green, good 5/99; may be weevil gallery 3/00
3.30		1A	mia			Dead			under rock; just spines left, COD unknown 2/99
0.80		0	Dead						killed by a larva 2/98
0.90		0	1.30	0	0	mia			measured on one direction only 2/98; mia 99; spine cluster in area 3/00; plant mia 3 & 5/00, 3 & 5/01
0.60		0	1.00	0	0	0.71	0	0	seedling; measured in one direction only 2/98; bad, dull gray spines, yellow-green body 2/99; under rock, maroonish green, OK 5/99 & 3/00; green, OK 5/00 & 3/01; hunkered, poor 5/01
0.50		0	0.40	mia	0	0.61	0	0	seedling; mia in 2/98; refound 5/98; almost buried 2/99; popping out by tag, green, good 5/99; plant mia 3 & 5/00, 3 & 5/01
1.10		0	Dead						orangish 5/97; COD unknown 98
1.80		0	mia			mia		Dead	tag covered by flipped rock 2/99; COD unknown, collected by WHC 5/99

## Ancistrocactus tobuschii Data for Devil's Sinkhole State Natural Area

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**Ancistrocactus tobuschii Data for Devil's Sinkhole State Natural Area**

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**Ancistrocactus tobushii Data for  
Private Property, Real County**

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
<b>Reference point #1</b> is surrounded by 2 Texas persimmons and one Texas mountain laurel clump, 26 JMP paces at 74 degrees from a Texas mountain laurel and a silk tassel on the bluff edge; stake 1 = GPS2 R030919A																
1.00	1	7.07	183	3.10	1	0	3.30	3	3	2.70	0	0	2.66	0	0	misshapen 3/98; orange 5/98; collapsed on one side, OK 3/99; green, good 4/99; tag mia, replaced 2 & 5/00; green, good 2 & 4/01
1.10	1	6.30	181							5.90	7	7	6.16	4fr	4	discovered 3/98; good 3 & 4/99, 2/00; green, good 5/00, 2 & 4/01
1.20	1	6.95	182							3.00	1	0	2.49	1fr	0	discovered 3/98; good 3 & 4/99, 2/00; green, good 5/00, 2 & 4/01
2.00	1	7.04	181	1.90	0	0	1.70	0	0	2.00	0	0	1.93	0	0	good 3 & 4/99, 2/00; green, good 5/00, 2 & 4/01
2.10	1	6.87	182				1.40	0	0	1.50	0	0	1.24	0	0	discovered 2/97; kind of loose, good 3/99; green, good 2 & 5/00; hunkered, green, OK 2/01; popped out, green, good 4/01
2.20	1	6.79	181										1.20		0	reddish, OK, discovered 4/99; green, good 2 & 5/00; just spines left, COD unknown 2/01
3.00	1	7.38	181	4.40	3	3	5.30	1	1	4.60	5	5	4.80	3fr	1A	good 3 & 4/99; good, partially buried in old fire ant mound, tag mia, replaced; pale green, good 5/00; green, good 2 & 4/01

Ancistrocactus tobushii Data for  
Frank Robert's Ranch

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
3.01	1	7.17	181													discovered 4/01; green, good 4/01
3.10	1	7.32	180				2.40	0	0	2.30	0	0	2.04	0	0	discovered 2/97; good 3 & 4/99; partially buried in old fire ant mound, green, good 2 & 5/00; plant mia 2 & 4/01
3.20	1	7.56	180										1.01		0	discovered 4/99; green, good, under pebbles 4/99; green, good 2 & 5/00, 2 & 4/01
4.00	1	7.33	180	2.50	1 fr	1	3.00	2	2	3.10	1	1	2.97	3fr	0	1 fruit partially eaten 4/96; against rock, good, fire ants nearby 3/99 & 4/99; partially buried in old fire ant mound, green, good 2 & 5/00; mound gone, plant pale green, OK 2/01; green, good 4/01
5.00	1	8.02	189	3.40	2	0	3.80	2	3	3.80	4	4	4.09	3fr	3	rock fallen on top, removed, good 3 & 4/99; slightly reddish, OK 2/00; olive, OK 5/00; green with a few tan tubercle tips, OK 2/01; edge of fire ant mound, tag mia, replaced, plant green, good 4/01
5.01	1	7.88	189							1.60	0	0	1.05	0	0	discovered 3/98; good 3 & 4/99; green, good 2 & 5/00, 2/01; sticking out of edge of fire ant mound, green, good 4/01

Ancistrocactus tobushii Data for  
Frank Robert's Ranch

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
5.02	1	8.00	189										1.03		0	discovered 4/99; green, good 4/99, 2 & 5/00; plant mia 2 & 4/01
5.10	1	6.10	194				5.20		5	5.60	5	5	5.46	6fr	5+1A	one tubercle eaten, discovered 5/97; good 3 & 4/99; tag mia, replaced, green, good 2/00; orangish, OK 5/00; green, good 2 & 4/01
6.00	1	11.50	184	1.60	0	0	1.50	0	0	1.30	0	0	0.90	0	0	between two juniper clumps, hunkering, some loose spines, under grass 3/99; dull green, some loose spines, OK 4/99; tubercle sprout off spineless, gray base, gray-green, poor 2/00; root becoming exposed, gray-green, poor 5/00; gray-green, poor 2/01; root partly exposed, body tan with one reddish tubercle left, very poor 4/01
7.00	1	9.20	193	3.60	1	0	3.60	0	0	Dead						hollow, weevils?, dead 3/98
8.00	1	11.41	196	3.00	0	0	2.80	0	0	2.60	0	0	Dead			cow hoofprint beside 2/97; solid, dry, COD unknown 3/99
8.10	1	9.81	195							3.00	2	2	3.09	1fr	1	discovered 3/98; good 3 & 4/99; green, good 2/00; olive, OK 5/00; green good 2 & 4/01
8.11	1	9.84	195							1.30	1	0	1.81	0	0	discovered 3/98; good 3 & 4/99; green, good 2 & 5/00, 2 & 4/01

**Ancistrocactus tobushii Data for  
Frank Robert's Ranch**

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
8.20	1	10.71	196							4.10	3	3	4.21	4fr	4	discovered 3/98; good 3/99 & 4/99; green, good 2 & 5/00; green with a few tan tubercle tips, OK 2/01; maroonish, OK 4/01
8.21	1	10.72	196													discovered 4/01; green OK 4/01
8.30	1	11.23	197													buried in grass clump, discovered 2/00; green, good 2/00; reddish, OK 5/00; body green, tubercle tips maroon, OK 2 & 4/01
9.00	1	12.39	195	4.50	4	4	4.30	2	2	Dead						exit hole in top, probably weevils, dead 3/98
10.00	1	12.69	195	3.80	3	2	4.30	3	3+2A	Dead						just spines, hole where root was, COD unknown 3/98
10.01	1	12.58	195							0.80	0	0	1.63	0	0	discovered 3/98; good 3 & 4/99; green, good 2 & 5/00; very hunkered, almost spineless, green, OK 2/01; coming out, new spine growth, green, OK 4/01
11.00	1	12.61	195	1.80	0	0	1.80	0	0	Dead						spines almost eaten off 2/97; body flown away 3/98
12.00	1	12.92	195	0.70	0	0	0.70	0	0	Dead						root mostly out of ground, photographed 2/97; just one spine left, COD unknown 3/98
12.10	1	13.32	197				1.80	0	0	Dead?		Dead				discovered 2/97; looks dead, but check again 3/98; dried up, COD unknown 5/98
12.20	1	14.30	195				3.00		1	3.50	0	0	3.20	0	0	discovered 5/97; good 3 & 4/99; green, good 2 & 5/00; dead, large larval (Moneilema?) inside, collected 2/01

**Ancistrocactus tobushii Data for  
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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
12.30	1	12.80	197							1.00	0	0	1.30	0	0	discovered 3/98; dull green, OK 3/99 & 4/99; just spines left, COD unknown 2/00
12.40	1	9.44	199							1.40	0	0	1.35	0	0	reddish at base, discovered 3/98; orangish 5/98; dull green, OK 3/99 & 4/99; green, OK 2/00; covered by leaf, hunkered, green, OK 5/00; plant mia, loose spines in vicinity 2/01; mia 4/01
12.50	1	9.63	210	3.50		0	3.20	0	0	3.20	0	0	3.16	0	0	found 4/96; covered by a detached prickly pear pad 5/97; originally tagged as 48; good 3 & 4/99; slightly reddish, OK 2 & 5/00; olive, OK 2/01; green, yellowish at base, OK 4/01
12.60	1	8.94	204	3.00		0	3.60	2	1	3.40	1	1	3.03	1fr	0	found 4/96; trampled by cattle, 2 flowers badly damaged 2/97; good 5/97 & 3/98; orangish 5/98; originally tagged as 50; tag mia, replaced, dull green & yellow, OK 3/99; reddish 4/99; reddish, shrunken, poor 2/00; goldish, poor 5/00; green with orange tubercle tips, OK 2/01; green, OK 4/01
12.70	1	9.12	201							3.90	1	1	3.59	1fr	1	discovered 3/98; reddish, OK 4/99, 2 & 5/00; dead, COD weevils (galleries, chambers; exit holes) 2/01
12.71	1	9.08	200										0.34		0	right of 12.72, OK, discovered 4/99; green, OK 2 & 5/00; plant mia 2 & 4/01

Ancistrocactus tobushii Data for  
Frank Robert's Ranch

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
12.72	1	9.08	200										0.49		0	discovered 4/99; reddish, poor 2 & 5/00; plant mia 2 & 4/01
12.73	1	9.22	201													discovered 2/01; hunkered in moss, green, OK 2 & 4/01
12.80	1	6.24	202							9.40	8	7	Dead			largest plant so far!, discovered 3/98; somewhat hollow, granular, roach-like insect inside, pillbug near by, no larvae, COD unknown 3/99
13.00	1	7.99	236	4.00	1	0	nd	0	Dead							trampled 3/96; orangish 4/96; new growth from 1996, but severely trampled by cattle, photographed 2/97, only shell left; death by trampling 5/97
13.10	1	9.27	237				2.70	0	0	3.00	2	2	2.91	1fr	0	discovered 2/97; dull green, OK 3/99; reddish, OK 4/99, 2 & 5/00; green with a few tan tubercle tips, OK 2/01; dark green, OK 4/01
14.00	1	11.05	230	3.20	1	0	3.20	0	0	Dead						looks bad, grayish 5/97; stem solid, COD unknown 3/98
15.00	1	12.18	231	4.20	2	0	3.50	1	1	4.10	2	2	Dead			tag chewed, retagged 98; solid, granular, very small millipede-like creature inside, COD unknown 3/99
15.10	1	11.99	234				2.50		0	2.50	0	0	Dead			trampled by cattle, discovered 5/97; looks OK, grayish-green 98; solid, moist, COD unknown 3/99

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
15.20	1	12.48	232				3.00		0	3.50	0	0	3.47	0	0	discovered 5/97; buried in grass 98; good 3 & 4/99; green, good 2 & 5/00; almost spineless, yellowish-green, OK 2/01; new spine growth, some orange tubercle tips, OK 4/01
15.30	1	12.30	229							2.10		0	2.06	mia	0	discovered 5/98; plant & tag mia 3/99; green, good 4/99; plant and tag mia 2/00; COD unknown, tag removed, 5/00
15.31	1	12.29	229										0.57		0	green, good, not tagged, seedling of 15.30, discovered 4/99; plant mia 2 & 5/00, 2 & 4/01
15.40	1	12.40	233										2.27	0	0	good, loosely rooted 3 & 4/99; green, good 2 & 5/00, 2 & 4/01
16.00	1	14.50	230	4.70	3	0	nd	0	0	5.00	4	3+1A	4.53	3fr	3	severely trampled or eaten by cattle, photographed 2/97; coming back, green, healthy, new apical stem growth, 3 pups or seedlings (16.02-16.04) 5/97; good 3/98, 3 & 4/99, dark green 2/00; reddish, OK 5/00; green with reddish tubercle tips 2/01; dead, collected for weevil study 4/01
16.01	1	14.35	230				2.50	2	2	2.60	1	1	2.90	1fr	0	discovered 2/97; good 3 & 4/99; good, green 2 & 5/00; lots of loose spines, maroonish green, OK 2/01; partly covered with ant dirt, green, good 4/01

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
16.02	1	14.53	230				0.70		0	0.80	0	0	1.06	0	0	discovered 5/97; good 3 & 4/99; green, good 2 & 5/00, 2 & 4/01
16.03	1	14.52	230				1.10		0	1.20	0	0	1.15	0	0	discovered 5/97; good 3 & 4/99; green, good 2 & 5/00, 2 & 4/01
16.04	1	14.50	230				1.30		0	1.30	0	0	1.52	0	0	discovered 5/97; good 3 & 4/99; green, good 2 & 5/00; dead, just spines left, COD unknown 4/01
16.05	1	14.54	230				0.40		0	0.50	0	0	mia			discovered 5/97; between 16.02 and 16.03 and 16.00; mia 3/99; measured in one direction only, green, good 2/00; hunkered, OK 5/00; mia 2/01; just spines left 4/01
17.00	1	15.29	234	3.40	3	3	4.50	4	3	4.20	2	1	4.39	1fr	1A	at base of Texas persimmon; dull green, OK 3/99; green, good 4/99; reddish, OK 2/00; dull green, OK 5/00; covered by spider web and leaves, green, good 2/01; green, good 4/01
17.10	1	12.68	234				3.70		1	3.30	1	1A	Dead			in grass clump, discovered 5/97; somewhat hollow, but no larvae, COD unknown 3/99
17.101	1	15.29	234							0.80	0	mia	mia			discovered 3/98; mia 5/98; mia 99; tag and plant mia 2 & 5/00, 2 & 4/01
17.20	1	13.33	238				1.30		0	1.70	0	0	1.92	0	0	discovered 5/97; good 3 & 4/99; green, good 2 & 5/00, 2 & 4/01
18.00	1	15.02	238	3.30	1	3	Dead									COD unknown, red, mushy-granular inside, tag removed, dead 2/97

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
19.00	1	10.45	236	2.90	0	0	2.90	0	0	1.70	0	Dead				looks dead; gray, still rooted 3/98; dead, hard & solid, COD unknown 5/98
19.10	1	10.63	232				3.00	2	1	3.00	2	0	3.04	0	0	discovered 2/97; good, one orange tubercle 3 & 4/99, 2/00; green, good 5/00, next to dead plant, collected for weevil study 2/01
19.20	1	10.65	232				1.80	0	0	1.70	0	0	1.72	0	0	to the east of 19.1, may be a offshoot, discovered 2/97; good 3/99 & 4/99; epidermal abrasion, green, good 2 & 5/00; dead, large cavity in plant (Monilema?) 2/01
19.30	1	10.45	235				2.20	0	0	2.40	0	0	2.22	0	0	discovered 2/97; good 3/99; olive, OK 4/99; green, good 2/00; olive, OK 5/00; olive, poor 2 & 4/01
19.40	1	11.13	236							3.10	2	2A	2.23	0	0	discovered 3/98; dark dull green, OK 3/99; green, good 4/99; hunkered, green, a few purplish tubercles, OK 2/00; green, OK 5/00, 2 & 4/01
20.00	1	9.99	239	4.20	1+1 fr	0	4.30	2	3	4.30	2	1+1A	4.62	3fr	1, rest disp?	good 3/99 & 4/99; green, good 2 & 5/00; tag mia, replaced, plant dark green, good 2/01; maroonish, OK 4/01
21.00	1	11.74	241	2.80	0	0	2.60	mia	0	2.10	0	0	mia			dark orange, bad 4/96; plant & tag mia 2/97; refound 5/97; plant still looks very bad, although green, very shaded by little bluestem; green, shaded, OK 3/98; hunkered down in moss 5/98; plant & tag mia 3 & 4/99, 2 & 5/00, 2 & 4/01

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
22.00	1	9.63	241	2.90	1	0	2.70	1	1	2.60	0	0	3.20	0	0	good 3/99 & 4/99; green, good 2 & 5/00, 2 & 4/01
23.00	1	9.41	241	3.50	2 fr	1	3.80	3	1	3.60	3	3	3.80	1 fr	1	orangish 4/96; slightly orange on tubercle tips, OK 2 & 5/97; green & good, ~ 5 cm tall 3/98; good 3/99; some reddish tubercle tips, OK 4/99, 2 & 5/00; dead, body solid, no evidence of weevils or Monileima, COD unknown 2/01
24.00	1	9.60	241	2.70	0	0	3.00	1	0	2.90	1	1A	2.86	0	0	good 3/99 & 4/99; green, good 2 & 5/00; green, OK 2/01; green, good 4/01
24.10	1	9.50	240				3.00	0	0	2.90	1	1	2.56	0	0	discovered 2/97; good 3/99 & 4/99; green, good 2/00; tag mia, replaced, orangish-maroon and green, poor 2 & 4/01
25.00	1	9.65	241	3.00	1	0	3.40	2	1A	3.10	2	2A	2.85	1 fr	1	grayish looking 2/98; OK 3/99; hunkering 4/99; hunkering, reddish, OK 2 & 5/00; dead, hollow, COD unknown 2/01
26.00	1	9.99	241	2.50	0	0	mia			mia			mia			mia 3/97, 5/97, 3/98, 5/98 & 3/99
27.00	1	10.14	242	3.30	0	0	mia			mia			mia			mia 3/97, 5/97, 3/98, 5/98 & 3/99
28.00	1	10.20	242	1.70	0	0	2.10	0	0	2.10	0	0	mia			gone without a trace 3/99; tag and plant, mia 2 & 5/00, 2 & 4/01
29.00	1	10.48	241	3.00	1	1	2.70	0	0	2.40	0	0	Dead			hollow, COD weevils?, dead 3/99

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
30.00	1	9.18	241	3.70	1+1fr	1	4.10	2	3	4.00	3	3	4.30	3fr	1+1A	good 3/99 & 4/99; green, good 2 & 5/00; green, with some tan tubercle tips, OK, tag mia, replaced 2/01; a few reddish tubercle tips, OK 4/01
31.00	1	8.85	239	2.60	0	0	2.40	0	0	2.50	1	0	2.43	0	0	at edge of grass clump, accidentally stepped on by researcher 5/98; green, good 3/99 & 4/99; green, good, loose 2 & 5/00; small holes near apex, green, OK 2/01
32.00	1	9.19	246	2.70	0	0	Dead									orangish 4/96; COD unknown, only a few spines left 2/97
32.01	1	9.19	246				0.50	0	0	1.00	mia	0	0.89	mia	0	seedling of 32, discovered 2/97; popping up through moss, stem mostly pink & spineless, tag mia, retagged 5/98; green, good 4/99, 2 & 5/00; hunkered in moss, green, OK 2 & 4/01
33.00	1	9.34	242	3.90	1	1	3.90	2	1+1A	3.50	0	0	3.16	0	0	buried in grass, grayish-green 98; tag uprooted, good, green 3/99; good, green 4/99, 2 & 5/00, 2 & 4/01
33.10	1	9.32	243							1.00		0	1.04	mia	0	discovered 5/98; tag uprooted and several meters away 3/99; tag replaced almost on top of plant, plant green, good 4/99, 2 & 5/00; plant mia 2/01; green, good 4/01

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
33.20	1	9.37	243							1.20		0	1.50	0	0	discovered 5/98; good 3/99; olive, OK 4/99; green, good 2 & 5/00; hunkered in moss, green, OK 2 & 4/01
34.00	1	9.52	244	2.40	2	0	1.70	0	0	Dead						looks bad, slightly loose in ground 2/97; looks dead, but firmly rooted 5/97; only one spine cluster left, COD unknown 3/98
35.00	1	9.85	246	1.30	0	0	1.40	0	0	1.60	0	0	1.96	0	0	good 3/99 & 4/99; green, good 2 & 5/00, 2 & 4/01
35.10	1	10.04	246													discovered 2/01; reddish-green, OK 2 & 4/01
36.00	1	9.96	247	2.80	0	0	2.60	0	0	Dead						totally red 5/97; stem solid, COD unknown 3/98
36.10	1	9.96	250				1.70		0	1.70	0	0	1.62	0	0	slightly reddish, discovered 5/97; purplish 3/98; reddish, OK 3/99 & 4/99; green, OK 2/00; green, good 5/00, 2/01; dull green, OK 4/01
36.20	1	10.21	251				1.50		0	1.50	0	0	2.14	0	0	discovered 5/97; good 3/99 & 4/99; green, good 2 & 5/00, 2 & 4/01
37.00	1	7.73	251	2.80	2	2	Dead									COD unknown, stem hollow, no insects, tag removed 2/97
38.00	1	7.90	250	2.50	0	0	Dead									orangish 4/96; COD unknown; hollow around a central core, no insects, tag removed 2/97

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
39.00	1	8.09	252	2.80	1	1	3.60	2	3	3.40	1	1	3.48	2fr	2	green, good 3 & 4/99, 2 & 5/00; reddish, poor 2/01; dead, collected for weevil study 4/01
39.01	1	8.10	252													seedling of 39.00; discovered 4/01; green, OK 4/01
39.02	1	8.11	252													seedling of 39.00; discovered 4/01; green, OK 4/01
48.00	1	16.82	267				3.70		1	3.20	2	2	3.31	1fr	0	discovered 5/97; originally tagged as 53; good 3/99; maroonish, OK 4/99 & 2/00; ants swarming fruits, plant olive, OK 5/00; maroonish, OK 2/01; green with some maroonish tubercle tips 4/01
50.00	1	10.36	47							7.50	9	8	8.22	8fr	8	measured around mountain laurel; discovered by Frank Roberts 3/98; photographed 5/98; great 3 & 4/99; great, green 2 & 5/00, 2 & 4/01 (measurement 109.43 & 106.65 for diameter of 10.80 4/01)
49.00	1	9.45	202	1.10		0	1.30	0	0	Dead						found 4/96, yellowish; cattle hoofprint beside 2/97; hollow shell, COD unknown 3/98
51.00	1	9.41	201	3.50	na	1A	Dead									found 4/96; orangish; 51 and 52 were actually two heads on one stem/root; stem was hollow, and heads were filled with dark yellow mush, cattle hoofprints on top of plants, but plants probably died previously 2/97; tag removed 5/97
52.00	2	9.36	201	3.70	na	1A	Dead									found 4/96; see comments on 51

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
54.00	1	17.17	265				3.00		2	Dead						discovered 5/97; stem hollow, with weevil exit holes, dead 3/98
Number skip due to using numbers 40-47 at the second stake. This will be corrected through time.																
Reference point 2 is ~70 JMP paces at ~75 degrees from reference point 1, or ~50 JMP paces more or less NE from utility pole; stake 2 = GPS3 R030921A																
40.00	2	2.36	21	3.00	2	2	3.40	3	2+1A	3.40	1	Dead				purplish 3/98; weevils, dead 5/98
41.00	2	1.63	164	2.00	0	0	2.80	2	2	3.20	2	1	3.60	2fr	1	good 3/99 & 4/99; green, good 2 & 5/00; slightly maroonish-green, OK 2/01; new apical green growth, good 4/01
42.00	2	2.53	161	2.70	1	1	Dead									COD unknown, inside red and liquid, tag removed 2/97
43.00	2	2.45	175	2.80	0	0	Dead									stem hollow, insect exit holes, tag removed 2/97
43.10	2	26.26	185							3.30	0	0	Dead			uprooted by armadillo or squirrel, replanted 3/98; yellow, bad 5/98; death by uprooting 3/99
43.20	2	26.47	185							3.90	0	0	Dead			uprooted by armadillo or squirrel, replanted 3/98; yellow, poor 5/98; old dead piece of plant left, COD uprooting 3/99
43.30	2	26.20	185							nd	0	0	mia			small seedling without roots, replanted 3/98; still here but spineless 5/98; needs to be tagged; mia 3/99, 2 & 5/00, 2 & 4/01
44.00	2	2.59	196	2.70	1	1	3.00	0	0	3.10	1	1	3.27	1fr	1	good 3/99 & 4/99; green, good 2 & 5/00; nibbled on one side, green, OK 2/01; green, good 4/01
44.01	2	2.61	196													seedling of 44, not tagged, discovered 2/01; green, OK 2 & 4/01

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
44.10	2	24.10	218							3.60	4	4	3.68	4fr	3+1A	measured over agarita & mountain laurel; discovered 3/98; good 3 & 4/99, 2 & 5/00; nibbled on one side, green, OK 2/01; green, good 4/01
44.20	2	24.24	218							1.90		2	2.96	1fr	1	measured over agarita & mountain laurel; discovered 5/98; good 3/99 & 4/99 but almost covered by ant dirt, ants under nearby rock; tag mia, replaced, green, good 2 & 5/00; rock on top, removed, plant green, OK 2/01; green, good 4/01
45.00	2	4.32	219	4.00	3	0	5.20	6(7?)	5+1A	5.60	6	5	6.34	2+7fr	6+2A	good 3 & 4/99; green, good 2 & 5/00, 2 & 4/01
46.00	2	4.59	223	3.60	1+3fr	2	4.80	6	5+1A	4.70	6	7	5.14	6fr	3+disp +2A	good, accidentally stepped on 3/99; green, good 4/99, 2 & 5/00; green with some maroonish tubercle tips, good 2/01; green with some maroonish tubercle tips, OK 4/01
46.01	2	4.62	223													at 6 o'clock on 46/00, discovered 5/00; green, good 5/00; green, OK 2 & 4/01 (one measurement only 2/01)
46.02	2	4.50	223													discovered 4/01; green, OK 4/01

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PL#	STAKE	DIST.	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
46.03	2	4.62	223													discovered 4/01; under rock, green, good 4/01
47.00	2	4.50	245	4.50	0	0	Dead									orangish 4/96; COD unknown, husk of stem and root left, spines dried and gray, tag removed 2/97
48.00	2	3.72	251							2.40	0	0	2.33	0	0	discovered 3/98; good 3 & 4/99; green, good 2 & 5/00, 2 & 4/01
48.10	2	3.62	232													discovered 2/01; green, good 2 & 4/01
49.00	2	3.85	269							3.10	1	1	3.03	0	0	discovered 3/98; a few orangish tubercle tips, OK 3/99 & 4/99; green with reddish tubercle tips, OK 2/00; yellowish, OK 5/00; yellowish-green, with tan tubercle tips, OK 2/01; green with reddish tubercle tips, OK 4/01
50.00	2	24.40	225													measured around mountain laurel and persimmon, discovered 5/00; green, good 5/00, 4/01
51.00	2	~24.7	~225													measured over agarita, around mountain laurel and persimmon, discovered 2/01; green, good 2 & 4/01

### Ancistrocactus tobushii Data for Frank Robert's Ranch

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[illegible]

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PL#	STK#	DIST	ANGLE	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Stake 1 = GPS10 R030417A; rebar removed, replaced 2/01										
1.00	1	6.33	75	7.30	7	7	6.22	5fr	Dead	tag mia, replaced 5/98; spines dull gray, poor 3/99; dead, weevil damage, riddled with galleries 4/99; collected by WHC 5/5/99
2.00	1	12.75	264	4.90	6	6	4.52	6fr	7	good 3/99 & 4/99, only 2 m from road edge; green, good 2 & 5/00; slightly reddish-green, good 2/01; green, good 4/01
2.01	1	12.71	264							green, good 2 & 5/00, 2 & 4/01
3.00	1	4.64	6							spines gray, body reddish, OK-poor, 2/00; spines gray, body reddish, poor 5/00; tag uprooted, plant mia 2/01; tag mia, pieces of dead plant in vicinity, weevil chambers and galleries 4/01
Data collected by Jackie Poole 3/4/99, 4/21/99, 2/29/00, 5/1/00, 2/13/01, 4/27/01										

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[illegible]

**Ancistrocactus tobuschii Data for  
Hwy 674 Right-of-Way**

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97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
7	6.00	7	2+5A	5.28	5	5	1 seedling (~ 1 cm) at base 2/94; seedling (=2a) 4 cm to W 2/95; seedling mia 3/96; reddish, shrunken 2/99 and 4/99; very poor, reddish 2 & 4/00, 2/01; stem damaged, loose spines, dull green, poor 4/01
				1.09		0	discovered 4/99; mia 2/00; relocated 10cm West of 2.00 4/00; green, good 4/00, 2 & 4/01
				0.82		0	discovered 4/99; mia 2/00; relocated 12cm West/Northwest of 2.00 4/00; green, good 4/00, 2 & 4/01
				0.78		0	discovered 4/99; mia 2/00; relocated 10cm West/Northwest of 2.00 4/00; green, good 4/00, 2 & 4/01
				0.38		0	discovered 4/99; mia 2 & 4/00, 2 & 4/01
				0.28		0	discovered 4/99; mia 2 & 4/00, 2 & 4/01

## 3 of 6

[illegible]

**Ancistrocactus tobuschii Data for  
Hwy 674 Right-of-Way**

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97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
				0.50		0	discovered 4/99; mia 2 & 4/00, 2 & 4/01
				0.79		0	discovered 4/99; mia 2/00; relocated 6.5cm West/Northwest of 2.00 under rock 4/00; green, good 4/00; hunkered under rocks, green, OK 2/01
				0.28		0	discovered 4/99; mia 2 & 4/00, 2/01; relocated behind 2.07 4/01
0	3.40	5	2A, rest disp?	3.36	6	3	discovered 5/97; distance is around Acacia rigidula; flowers pinkish, stigma yellow, very shrunken 2/99; flowers pinkish yellow, stigma yellow green, body dark olive, OK 2/00; reddish, OK 4/00; flowers pinkish-yellow, stigma yellow, body maroonish-green, OK 2 & 4/01
0	3.50	3	1A, rest disp?	3.54	3+1fr	3	discovered 5/97; distance is over Acacia rigidula; flowers pinkish, stigma yellow, olive, shrunken 2/99; flowers dusky yellow-pink, stigma yellow, plant dark purplish-green, OK 2 & 4/00; flowers pinkish-yellow, stigma orange-yellow, plant orangish-green, Ok-poor 2/01; orange, poor 4/01

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[illegible]

### Ancistrocactus tobuschii Data for Hwy 674 Right-of-Way

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[illegible]

### Ancistrocactus tobuschii Data for Junction

[illegible]

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
<b>Reference Point 2</b> is a rebar stake in a clearing; ID#2 R032415C																		
1.00	2	~19.49	~352												3.65	3A	0	green, good, discovered 3 & 5/99; green, good 3 & 5/00; some apical meristem damage, meristem slightly shifted, plant green, good 3/01; pale green, good 5/01
1.10	2	~21.20	~352												5.54		0	olive, good, discovered 5/99; green, good 3 & 5/00; chambers, galleries and exit holes, COD weevils 3/01
1.20	2	~22.2	~352															discovered 3/01; green, good 3 & 5/01
2.00	2	7.90	216	med-lg	7	4:20	2+4fr	0	4:20	4fr	2+1A	4:60	5	4	4:62	6fr	4A	fruit eaten 5/96; all fruit partially eaten 5/97; green, good 3 & 5/99; dead, collected for weevil study 3/00; large exit hole and one large gallery, COD <i>Moneilma</i>
2.01	2	7.28	209												1.53	0	0	green, good 3/99; slightly maroonish 5/99; slightly hunkered, green, good 3 & 5/00; popped out, green, good 3 & 5/01
2.10	2	6.89	202															discovered 3/01; green, good 3 & 5/01
3.00	2	3.20	300	sm-med	3	Dead												only spines left 3/96; tag mia
3.10	2	1.47	312															discovered 3/01; green, good 3/01; olive, OK 5/01
4.00	2	3.45	7	small	2	Dead												only spines left 3/96; tag mia
5.00	2	3.48	7	small	0	2:30	0	Dead										root eaten, but tubercles still green; plant replaced 3/96; Dead 5/96

Ancistrocactus tobuschii Data for  
Junction

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PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
6.00	2	3.57	7	v. small	0	2.40	0	0										not Ancistrocactus tobuschii, probably Coryphantha sulcata, tag removed
7.00	2	3.91	11	v. small	0	2.40	0	0										not Ancistrocactus tobuschii, probably Coryphantha sulcata, tag removed
7.10	2	6.00	355						2.20	0	0	2.40	1	1	3.15	0	0	green, good 3/99; purplish, OK 5/99; olive, good 3/00; maroonish, OK 5/00; maroonish-green, good 3 & 5/01
7.20	2	6.13	357						2.70	2fr	2A	3.60	2	2	2.06	0	dead	some loose spines 3/97; looks good 5/97, 3/98; very hunkered, loose, squishy, maroon, poor, but lots of new spine growth 3/99; dead, GOD unknown 5/99
7.30	2	5.24	344															discovered 3/01; green, good 3 & 5/01
7.40	2	5.84	344															discovered 3/01; wedged between two rocks, center eaten, 2 tubercles with new spine growth, green, OK 3/01; forming 2 heads, green, good OK 5/01
8.00	2	12.00	330	small	1	2.90	2fr	0	1.80	0	0	2.40	2fr	2A	3.56	4fr	0	green, good 3/99; yellowish, OK, dispersed? 5/99; dull green, good 3 & 5/00; yellowish-purplish-green, good 3 & 5/01
8.10	2	12.91	329			3.40		0	1.60	0	0	2.40	0	0	3.11	3A	1	discovered 5/96, under evergreen sumacs; green, good 3 & 5/99; one flower partly eaten, plant green, good 3/00; green, good 5/00; hunkering, green with maroonish tubercle tips, OK 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

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PL#	STAKE	DIST.	ANGLE	95DM	95 Fl/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
8.20	2	~12.9	~315			2.70		3A	3.40	4fr	2A	3.70	3fr	2+1A	3.95	3A+3fr	2A, rest disp?	originally tagged as 43.00 from Stake 7; discovered 5/96; fruit mostly eaten 3/97; orangish 5/99; green, good 3 & 5/00; maroonish-green, OK 3 & 5/01
9.00	2	11.95	335	small	5	Dead												only spines left 3/96; tag mia
9.10	2	11.84	335			1.90		0	2.30	1	1	2.80	1+2fr	3	3.14	4fr	1A	discovered 5/96; green, good 3 & 5/99, 3 & 5/00; chambers, galleries, and exit holes, COD weevils 3/01
9.20	2	11.71	343			2.00		0	Dead									discovered 5/96; COD unknown, only spines left; tag removed 3/97
9.30	2	11.85	347			2.70		1	3.50	0	0	Dead						discovered 5/96; tag mia; just spines left; COD unknown 3/98
9.31	2	11.75	344												2.79	0	0	olive, OK, discovered 5/99; shaded by juniper, OK 3/00; green, good 5/00; almost covered by juniper litter, green, OK 3/01; new green apical growth, good 5/01
9.40	2	13.19	335						3.50	1	1	3.10	2	2	3.44	0	0	between evergreen sumac and female juniper; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
10.00	2	12.05	1	med	3	Dead												only spines left 3/96; tag mia
10.10	2	~16	~350						2.40		0	2.30	0	0	2.80	2A+1fr	1disp	measured over junipers; discovered 5/97; maroonish, OK 5/99, 3 & 5/00; just a few tubercles left, reddish, one with new spine growth, poor 3/01; new green apex formed, OK 5/01
10.20	2	~16.35	~351															discovered 3/01; green, good 3 & 5/01

Ancistrocactus tobuschii Data for  
Junction

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PL#	STAKE	DIST.	ANGLE	95DM	95 FI / FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
11.00	2	11.80	0	small	1	1.70	0	0	2.10	1	1A	Dead						spines falling off, but stem still green 3/96; new growth 5/96; loose spines beside, looks good 3/97; just spines left, COD unknown 3/98
11.10	2	~16.35	~17						4.90	7fr	5+1A	5.00	5	5	5.07	1A+3fr	1A, rest disp?	measured around oaks & juniper; between side by side juniper & kidneywood; ants swarming fruit 5/98; green, good 3 & 5/99; apical meristem shifted to NE side of plant, damaged?; green, good 3/00; dull green with a few yellow tubercle tips, OK 5/00; large larva inside, COD Monilema 3/01
11.20	2	~15.65	~20															discovered 3/01; green, good 3 & 5/01
12.00	2	11.73	0	small	0	1.80	0	0	2.30	2	2	2.30	0	0	dead			just loose spines, COD unknown 3/99
13.00	2	11.70	1	small	0	1.40	0	0	2.40	1	1	2.40	0	0	1.34	0	dead	very hunkered, loose, maybe dead 3/99; dead, collected by WHO 5/99; COD unknown
14.00	2	11.82	1	small	nd	0.90	0	0	1.60	0	0	1.90	0	0	Dead			just spines left, COD unknown 3/99
15.00	2	11.86	1	small	nd	0.60	0	0	Dead									of the cluster 15-17, 15 is closer to 14 and in front of and between 16 & 17; may be pups of a former, larger plant; COD unknown, just spines left 3/97
16.00	2	11.86	2	small	nd	0.80	0	0	mia			mia			Dead			of the cluster 15-17, 16 is behind 15, and to the right of 17; may be pups of a former, larger plant; loose spine clusters, COD unknown 3/99
17.00	2	11.86	2	small	nd	1.00	0	0	mia			mia			Dead			of the cluster 15-17, 17 is behind 15, and to the left of 16; may be pups of a former, larger plant; loose spine clusters, COD unknown 3/99
17.10	2	12.10	5						2.00	0	0	1.40	0	Dead				dry, hard, & solid, COD unknown 5/98

### Ancistrocactus tobuschii Data for Junction

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
18.00	2	8.18	40	nd	6	5.60	7fr	2	7.30	3+6fr	2+6A	7.70	9fr	2A+disp	8.10	8fr	7+1A	one fruit about 10 cm from plant, both fruit with small holes (ca. 1 cm) 5/96; tops of flowers & fruit eaten 3/97; green incredible! 3 & 5/99; green, good 3 & 5/00; galleries, chambers, exit holes; COD weevils 3/01
Reference Point 2A is ~52.9m at 21 degrees from Stake 3, around west side of juniper																		
1.00	2A	7.76	14															discovered 3/01; green with purplish tubercles, OK 3/01; green, good 5/01
2.00	2A	21.96	41															discovered 3/01; green, good 3 & 5/01
2.10	2A	22.38	41															discovered 5/01; green, good 5/01
3.00	2A	6.83	78															discovered 3/01; green, good 3 & 5/01
4.00	2A	8.75	88															discovered 3/01; green, good 3 & 5/01
5.00	2A	19.54	18															discovered 5/01; green, good 5/01
6.00	2A	20.21	18															discovered 5/01; green, good 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Reference Point 3 was a pointy rock painted pink, at southern edge of opening on top of hill; in 3/00 switched to rebar in rock and caliche pile 11.8m at 126 degrees from original reference point; ID #3 R032416A																		
1.00	3	27.30	11												4.11		3A	discovered 5/99; a few orange tubercles, OK 5/99, 3 & 5/00; just spine clusters left, COD unknown 3/01
2.00	3	27.18	11												2.22		0	discovered 5/99; green, good 5/99, 3 & 5/00, 2 & 5/01
3.00	3	26.83	11												4.31		0	discovered 5/99; olive, OK 5/99; dead, removed for weevil study 3/00; no evidence of weevils, COD unknown
3.01	3	26.84	11															discovered 3/00; hunkered, green, OK 3 & 5/00; plant mia 3 & 5/01
4.00	3	24.05	9												5.73		5A	discovered 5/99; a few loose spines, maroonish 5/99; dark green, good 3/00; green with purplish tubercle tips; good 5/00; interior soft and fluffy, COD fungus? 3/01
5.00	3	23.87	9												5.24		0	discovered 5/99; green, good 5/99, 3/00; green with slightly purplish tubercle tips, good 5/00; one large chamber, COD Monilemma 3/01
6.00	3	25.30	8												3.87		1A	measured over junipers, discovered 5/99; green, good 5/99, 3 & 5/00; center eaten, outer tubercles left, green, scarred over, poor 3/01; 3 new apices forming, green, OK 5/01
7.00	3	25.35	9															measured over junipers, discovered 3/00; green, good 3 & 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI / ER	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
8.00	3	14.42	20															8.00 is right of 9.00 & 10.00; discovered 3/00; green, good 3 & 5/00; center eaten, scarred over, tubercles reddish-green, poor 3/01; 3 new apices forming, green, OK 5/01
8.10	3	14.42	21															discovered 3/01; green, good 3 & 5/01
9.00	3	14.48	20															9.00 is left of 8.00 and behind 10.00; discovered 3/00; green, good 3 & 5/00; maroonish-green, OK 3/01; green with yellowish tubercles, OK 5/01
9.01	3	14.51	22															behind 9.00 at 7 o'clock; discovered 3/01; green, good 3/01; poor 5/01
10.00	3	14.42	20															10.00 is left of 8.00 and in front of 9.00; discovered 3/00; green, good 3/00; green with some orange tubercle tips, OK 5/00; green, with red tubercle tips, OK 3 & 5/01
11.00	3	13.74	28															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
12.00	3	~11.1	~292															discovered 3/00; green with a few orange tubercle tips, good 3/00; one fruit with hole, plant green with a few orange tubercle tips, OK 5/00; green, good 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

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PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
19.00	3	1.42	120	med	4	mia		Dead										spine cluster about 30 cm away; tag removed 5/96
19.10	3	13.40	143			2.70		0	3.50	0	0	3.70	3fr	2+1A	3.39	1A+1fr	1+1A	discovered 5/96; lannish, shrunken at base, very loose, but rooted 3/97; 3 fruit partially eaten, plant reddish with gray spines 3 & 5/98; reddish with gray spines, OK 3 & 5/99; dead, collected for weevil study 3/00; no evidence of weevils, COD unknown
19.20	3	13.44	141						1.50	0	0	Dead						Jabba the Hut syndrome 3 & 5/97; hard & dry, COD unknown 3/98
20.00	3	7.20	336	lg	6	5.70	2+3fr	3	6.30	1+2fr	1+2A	6.00	4	3+1A	6.30	0	0	tubercle tips orange, OK 3 & 5/99; becoming lop-sided, green with orange tubercle tips, good 3 & 5/00; two tubercles eaten, scarred over, maroonish-green, OK 3/01; green, good 5/01
20.01	3	7.23	336	v. sm	0	0.80	0	0	1.20	0	0	1.80	0	0	1.36	0	0	pup of 20.00, not tagged 3/97; measured in one direction only 3/98; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
20.02	3	6.26	352												2.51	0	0	misshapen, OK 3/99; green, good 5/99, 3 & 5/00, 3 & 5/01
20.03	3	6.08	350												1.97	0	0	green, good 3 & 5/99; slightly reddish-green, OK 3/00; green, good 5/00, 3 & 5/01
20.04	3	6.86	350															discovered 3/00; green, good 3 & 5/00, 3 & 5/01

Ancistrocactus tobuschii Data for  
Junction

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PL#	STAKE	DIST.	ANGLE	95DM	95 FI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
20.05	3	7.06	347															discovered 3/00; green, good 3 & 5/00; a few tubercles eaten, scarred over, green, OK 3/01; apex slightly shifted, green, good 5/01
20.60	3	7.30	343															measured over Acacia; discovered 3/00; green, good 3 & 5/00, 3 & 5/01
20.07	3	7.60	333															measured over Acacia and sumac; discovered 3/00; green, good 3 & 5/00; loose spines covering either tubercle tip or seedling, green, poor 3/01; green, good 5/01
20.50	3	29.05	100			2.40		0	Dead									discovered 5/96; measured over evergreen sumac; originally tagged as 54; only a few loose spines left, tag removed 3/97
21.00	3	13.20	347	med	4	4.90	4 fr	0	Dead									fruit may have already dispersed 5/96; COD unknown; only spines left, tag removed 3/97
23.00	3 (original)	12.09	340	medium	6	3.60	4	0	Dead									fruit may have already dispersed 5/96; COD unknown; only spines left, tag removed 3/97
24.00	3 (original)	12.00	345	med-lg	4	3.60	1+2fr	1	Dead									flower partially eaten 3/96; COD unknown; only a few loose spines left, tag removed 3/97
25.00	3	14.30	237	med-lg	3	4.70	3	3	5/20	4+2fr	2+2A	5.40	5	5	5/36	3fr	1+1A	fruit partially eaten 3/97; dull green, OK 3/99; yellowish, OK 5/99, 3/00; green with some yellow tubercle tips, good 5/00; plant uprooted; dead, COD uprooting, agent unknown 3/01

**Ancistrocactus tobuschii Data for  
Junction**

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PL#	STAKE	DIST.	ANGLE	95DM	95 FI /ER	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
25.10	3	10.64	240															discovered between rocks 3/00; green, good 3 & 5/00; purplish-green, good 3 & 5/01
25.20	3	13.58	~231															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
26.00	3 (original)	15.86	194	med	4	4.00	3	0	Dead									shaded; COD unknown; only loose scattered spines left; tag removed 3/97
26.10	3	9.20	176			3.90	4	2	5.20	7+1fr	7+1A	5.10	5	5	5.48	2fr	2A	discovered 3/96; holes in fruit 5/96; tubercle tips maroonish; plant OK 3/99; good 5/99; good, green 3 & 5/00; eaten below soil surface; COD herbivory 3/01
26.11	3	9.23	176			1.50	0	0	2.30	1	1	2.10	0	0	2.50	2	2A	discovered 3/96; seedling or pup of 26.10; green, good 3 & 5/99, 3 & 5/00; center eaten, scarred over, plant green, poor 3/01; two new apices forming, green, OK 5/01
26.12	3	9.21	175															discovered among rocks 3/00; one measurement only 3/00; tag mia, replaced 5/00; green, good 3 & 5/00, 3 & 5/01
26.13	3	9.18	176															discovered 5/00; green, good 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

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PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
26.20	3	9.26	176			1.60	0	0	2.00	2	1	2.30	0	0	2.35	1A	0	discovered 3/96; green, good, hunkering 3/99; green, good, popping out 5/99; hunkering, green, good 3/00; very hunkered, center depressed, loose spines, eaten?, green, OK 5/00; one tubercle left, poor 3 & 5/01
26.30	3 (original)	13.90	140			3.70	1+2fr	2	Dead									discovered 3/96, edge of small juniper; originally tagged as 40; COD unknown; only spines left; tag removed 3/97
26.40	3 (original)	16.81	194			2.70		1	Dead									discovered 5/96; originally tagged as 49; COD unknown; only a few loose spines left; tag removed 3/97
26.50	3	1.65	191						2.50	2fr	0	3.10	0	0	3.04	2A	0	green, good, hunkered 3/99; green, good, popping out 5/99; accidentally stepped on, green, good 3 & 5/00, 3 & 5/01
26.60	3	22.56	134						4.60	2+2fr	4	Dead						weevil chambers 3/98
26.70	3	12.85	134						3.00	0	0	3.50	2	2	3.95	1+1fr	2	dull green, OK 3/99; green 5/99; green, good 3 & 5/00, 3 & 5/01
26.71	3 (original)	14.77	126						1.60	0	0	Dead						Jabba the Hut syndrome 3 & 5/97; hard & dry; COD unknown 3/98
26.80	3 (original)	27.78	126						4.90	3fr	2	Dead						plant reddish 3/97; fruit badly eaten 5/97; COD unknown 3/98
26.90	3	19.89	127						1.10	0	0	1.50	0	0	1.68	0	0	Jabba the Hut syndrome 3 & 5/97; tagged as 29.3; retag; reddish 3/98; green, good 3/99; olive, OK 5/99; squishy, hunkered, green, OK 3/00; weevil inside, dead 5/00

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI / FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
40.10	3	~24.3	~71						4.20	2	1+1A	4.20	0	0	3.57	1+1A	1disp	originally measured from Reference Point 7; under shin oak; squishy, poor 3/99; green, OK 5/99; almost buried in oak leaf litter, green, good 3 & 5/00; coming out, green with gold tubercles at base, OK 3/01; green, good 5/01
42.00	3	22.34	~75			1.60		0	2.70	1	1	2.90	2	2	3.40	3A	3A	originally measured from Reference Point 7; discovered 5/96; green, good 5/99, 3 & 5/00, 3 & 5/01
42.10	3	17.26	57						2.60	3fr	3	2.30	0	0	2.60	0	0	originally shot from Reference Point 7; reddish; loose 3/97; pupping off side of apical meristem, green, OK 3/99; OK, green 5/99; no pup, green, good 3 & 5/00; just spines left, COD unknown 3/01
42.20	3	21.84	71															measured through juniper on west side; discovered 3/00; green, good 3 & 5/00; green with some tan tubercle tips, OK 3/01; green, good 5/01
42.30	3	22.12	71															measured through juniper on west side, discovered 3/01; green, good 3 & 5/01
42.40	3	20.01	77															discovered 5/01; green, good 5/01
42.50	3	20.30	78															discovered 5/01; green, good 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
42.60	3	20.41	78															discovered 5/01; olive, OK 5/01
43.10	3	20.76	62						3.20	5fr	1+4A	3.80	3fr+1A	3+1A	4.42	6A+1	1	originally measured from Reference Point 7; dark green, OK 3 & 5/99, 3/00; olive, OK 5/00; blue-green, good 3/01; maroonish, OK 5/01
44.00	3	27.78	28			2.40		0	3.00	0	0	3.60	0	0	3.50	2A	0	discovered 5/96; under juniper by Nolina; OK 3/99; green, good 5/99, 3 & 5/00; just spines left. COD unknown 3/01
45.00	3	28.10	28			1.90		0	2.30	0	0	2.40	0	0	2.29	0	0	discovered 5/96; under juniper by Nolina; green, good, getting buried 3/99; green, good, popping out 5/99, 3 & 5/00, 3 & 5/01
50.00	3	17.22	58			2.90		0	3.90	2+2fr	1+1A	4.50	3	3	4.67	1+2fr	1+1A	discovered 5/96; originally recorded as 50 in 3/96; switched to 20.10 in 3/97; switched back to 50.00 in 3/00; fruit eaten 3/97; green, good 3/99; few orangish tubercle tips, OK 5/99; getting partially buried in juniper litter; green, OK 3 & 5/00; large cavity, COD Moneilema 3/01
50.10	3	13.89	50															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
51.00	3	17.14	59			1.30		0	1.80	0	0	1.90	0	0	2.71	1fr	1	discovered 5/96; originally tagged as 51 in 3/96, then recorded as 20.20 in 3/97, switched back to 54.00 in 3/00; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
52.00	3	17.57	60			2.80		0	3.50	2	1+1A	3.60	2	2	4.45	3+1fr	2	discovered 5/96; originally tagged as 52 in 3/96, then recorded as 20.30 in 3/97, switched back to 52.00 in 3/00; petals partially eaten, green, good 3 & 5/99, 3/00; one fruit partially eaten, plant green, good 5/00; dark green, good 3/01; maroonish-green, OK 5/01
53.00	3	19.22	59			1.80		0	2.90	1+1fr	1+1A	3.70	1	1	3.74	2fr	0	discovered 5/96; originally tagged as 53 in 3/96, then recorded as 20.40 in 3/97, switched back to 53.00 in 3/00; green, good 3 & 5/99, 3 & 5/00; some damage to apical tubercles, plant green, OK 3/01; pale maroonish-green, good 5/01
54.00	3	20.43	48															measured over small juniper, discovered 3/01; green, good 3 & 5/01
55.00	3	19.86	87			1.30		0	1.90	0	0	2.10	0	1	2.88	2fr	1	in rock jam; discovered 5/96; originally tagged as 55 in 3/96, then recorded as 20.6 in 3/97, switched back to 55.00 in 3/00; measured in one direction only 3/98 & 3/99; a few orangish tubercles, OK 5/99; dull green, OK 3/00; orangish at base, otherwise green, OK 5/00; pale green, good 3/01; green, good 5/01
55.10	3	19.90	87									0.90	0	0	1.10	0	0	dead Ancistrocactus tobuschii beside, live plant measured in one direction only, discovered 3/98; originally tagged as 20.61, switched to 55.10 in 3/00; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
55.20	3	21.18	83												2.59	3A	0	originally tagged as 20.62; switched to 55.20 in 3/00; green, good, hunkering 3/99; olive, OK 5/99, 3 & 5/00; eaten to soil surface, COD herbivory 3/01
55.30	3	20.27	85												2.61	0	0	originally tagged as 20.63, switched to 55.30 in 3/00; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
55.40	3	20.84	78															discovered at edge of shin oak 3/00; green, good 3 & 5/00, 3 & 5/01
56.00	3	12.60	83			2.90		1+1A	3.10	2+2fr	2+2A	3.70	2	2	3.46	3fr	1	discovered 5/96; measured over evergreen sumac; originally tagged as 56 in ??, then recorded as 20.70 in ??, switched back to 56.00 in 3/00; a few orangish tubercle tips, OK 5/99, 3 & 5/00; green with a few tan tubercle tips, OK 3 & 5/01
56.01	3	12.61	83												0.52	0	0	originally tagged as 20.71, switched to 56.01 in 3/00; one measurement only 3/00; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
56.02	3	12.58	83															discovered at base of 56.00 (~11 o'clock), not tagged 3/00; green, OK 3/00; green, good 5/00, 5/01
56.03	3	12.63	83															close to 56 at 4:30 o'clock; discovered 5/01; not tagged, green, good 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /ER	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
57.00	3	15.23	85			3.00		1	2.80	3fr	3	2.80	0	0	2.67	0	0	fruit eaten, discovered 5/96; measured over evergreen sumac; originally tagged as 57 in ??, then recorded as 20.80 in ??, swithced back to 57.00 in 3/00; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
57.01	3	15.21	85												0.81	0	0	originally tagged as 20.81, switched to 57.01 in 3/00; green, good 3/99, 5/99, 3 & 5/00; green, OK 3 & 5/01
57.10	3	15.45	86															discovered 5/01; green, good 5/01
58.00	3	15.90	87			2.30		0	2.70	2fr	2	2.40	0	0	2.84	1fr	1disp	discovered 5/96; originally tagged as 58 in 3/96, then recorded as 20.90 in 3/97, swithced back to 58.00 in 3/00; green, good 3 & 5/99; hunkered, green, OK 3/00; popping out, green, OK 5/00, 5/01
58.10	3	15.63	101															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
59.00	3	15.49	101															discovered 3/01; green, good 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 EI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
60.00	3	15.44	101															discovered 5/01; green, good 5/01
61.00	3 (original)	22.63	122												4.22	4fr	2+1A	maroonish, OK 3 & 5/99; dead, weevil chambers 3/00
62.00	3	6.30	117						4.50	5fr	3	4.00	0	0	4.11	4fr	2	fruit partially eaten 5/97; dull green, OK 3/99; orangish, OK, tiny seedling (62.01) in front 5/99; green with orangish tubercle tips, OK 3 & 5/00; olive with some missing tubercles (scarred over) and tan tips, OK 3/01; maroonish-olive, OK 5/01
62.01	3	6.28	117															discovered 5/99; not tagged, OK 3 & 5/00; mia 3 & 5/01
62.02	3	6.26	117															discovered 3/00; not tagged, OK 3 & 5/00, 3/01; just spines left, COD unknown 5/01
62.10	3	7.81	113															discovered 3/00; green, good 3/00; dull green, OK 5/00; dark green, good 3/01; green, good 5/01
62.20	3	7.85	111															discovered 3/00; green, good 3 & 5/00, 3/01; dull green, OK 5/01
62.30	3	8.72	113															discovered 3/00; green, good 3 & 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
63.00	3 (original)	18.64	118						3.40	4fr	3+1A	3.80	2	1+1A	dead			2 weevils collected, tiny seedling replanted 3/99; seedling dead 5/99
64.00	3	8.50	107						2.10	1fr	1	2.60	2fr	2	2.83	3fr	3	dull green, OK 3 & 5/99; dead, weevil exit holes 3/00
64.01	3	8.17	104												1.03	0	0	green, good 3/99; hunkered, green, OK 5/99; hunkered, green, good 3/00; popping out, green, good 5/00; yellowish- green, good 3 & 5/01
64.10	3	8.62	100															discovered 3/00; green, OK 3 & 5/00; green, good 3 & 5/01
64.20	3	8.64	100															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
64.30	3	8.87	109															discovered 3/01; pale olive with reddish tubercles, OK 3 & 5/01
65.00	3 (original)	20.03	117						2.00	1fr	1A	2.40	1fr	1	2.69	2fr	2	dull green, OK 3 & 5/99; just spines left, COD unknown 3/00
66.00	3	4.71	93						0.90	0	0	1.20	0	0	1.23	0	0	Jabba the Hut syndrome, barely rooted 3/97; measured in one direction only, gray 3/98; dull green, OK 3 & 5/99; hunkered, green, good 3/00; popping out, green, good 5/00, 3 & 5/01
67.00	3	4.73	94						1.30	0	0	2.10	0	0	1.49	0	0	measured in one direction only 3/98; dull green, OK 3 & 5/99; hunkered, green, OK 3 & 5/00, 3/01; popped out, green, good 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
68.00	3 (original)	16.28	115						1.00	0	0	Dead						measured in one direction only; half buried horizontally, Jabba the Hut syndrome 3 & 5/97; hollow, weevils? 3/98
69.00	3	4.71	87						1.60	1fr	1	2.10	0	0	2.55	1fr+1A	0	green, good 3/99; OK, squishy 5/99; dead, just spines left, COD unknown 3/00
69.01	3	4.77	88									0.70		0	0.84	0	0	discovered 3/98; almost spineless, dull green, poor 3/99; some spines, green, OK 5/99; hunkered, green, OK 3/00; popping out, green, OK 5/00; plant mia 3 & 5/01
69.10	3	4.04	75												2.73	1fr	1disp	green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
69.20	3	3.80	63												4.05	0	0	dull green, OK 3/99; yellowish, OK 5/99, 3 & 5/00; light olive, OK 3/01; light green, good 5/01
69.30	3	4.59	80															discovered 3/01; green, good 3 & 5/01
70.00	3	17.86	110						3.50	3fr	3	Dead	Dead	Dead				hollow with yellow mush, weevils? 3/98
71.00	3 (original)	17.80	110						1.30	0	0	0.70	0	Dead				measured in one direction only; bad 3/98; hard & dry, COD unknown 5/98
72.00	3	6.26	73						2.90	2fr	2	3.60	2fr	2	3.68	3A	0	fruit partially eaten 3/97; tubercle tips orange & red, OK 3 & 5/99, 3/00; entire plant orange and red, OK 5/00; dry and fluffy inside, COD fungus? 3/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
72.10	3	7.67	63															discovered 3/00; green, good 3 & 5/00; olive with tan tubercle tips, OK 3 & 5/01
72.20	3	8.12	66															discovered 3/00; dull green, OK 3/00; orangish, OK 5/00; olive, OK 3 & 5/01
72.30	3	6.77	71															discovered 3/01; green, good 3 & 5/01
72.40	3	7.10	74															discovered 3/01; green, good 3 & 5/01
72.50	3	7.14	74															discovered 3/01; green, good 3 & 5/01
72.60	3	8.06	53															discovered 3/01; green, good 3 & 5/01
73.00	3	14.23	87						2.10	1fr	0	2.60	0	0	2.67	0	0	in cane big stem clump; green, good 3 & 5/99, 3/00 & 5/00, 5/01
74.00	3	17.30	81						4.90	1+5fr	6	4.20	0	0	4.30	0	0	green, good 3 & 5/99; dead, removed for weevil study 3/00; COD weevils
75.00	3 (original)	24.11	104						2.60		0	2.60	1	1	1.99	0	dead	discovered 5/97; dead, loose, shrunken spines gray 3/99; Dead?, collected by WHC 5/99; galleries, COD weevils
76.00	3	14.23	80									1.70		0	2.68	1fr	disp	discovered 5/98; green, good 3 & 5/99, 3/00; yellowish, OK 5/00; green with maroonish tubercle tips, OK 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
76.10	3	11.80	71															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
76.20	3	11.99	76															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
76.30	3	11.82	76															discovered 3/00; hunkered, dark green, OK 3/00; popping out, green, good 5/00, 3 & 5/01
76.40	3	10.55	67															discovered 3/00; reddish, OK 3 & 5/00; maroonish-green, good 5/01
76.50	3	14.35	75															discovered 3/01; apex on one side, stepped on in past?; green, OK 3 & 5/01
76.51	3	13.87	74															discovered 5/01; under rock; green, good 5/01
76.60	3	14.42	73															discovered 3/01; green, some tubercle damage, OK 3/01; green, good 5/01
76.70	3	10.69	73															discovered 3/01; green, good 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
76.80	3	14.86	73															discovered 3/01; green, good 3 & 5/01
76.90	3	15.40	76															discovered 5/01; green, OK 5/01
77.00	3	22.79	90															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
78.00	3	23.87	90															discovered 3/00; maroon and orange, poor 3/00; orangish-green, OK 5/00; dead, collected for weevil study 3/01
79.00	3	23.64	91															discovered 3/00; green, good 3 & 5/00; chambers, galleries, and exit holes, COD weevils 3/01
79.10	3	24.87	88															discovered 3/01; green, good 3 & 5/01
80.00	3	28.56	96															discovered 3/00; hunkered, olive, OK 3 & 5/00; tag loose replaced, blue-green with some orange tubercles, OK 3/01; maroonish, OK 5/01
81.00	3	28.40	93															measured under edge of juniper, discovered 3/00; tag loose, replaced 5/00; green, good 3 & 5/00; body with one large cavity, COD Monilemma 5/01
82.00	3	26.72	99															discovered 3/00; maroonish, OK 3 & 5/00; green good 3/01; maroon, OK 5/01

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST.	ANGLE	95DM	95 FI./FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
83.00	3	30.06	107															discovered 3/00; green with orange tubercle tips, OK 3 & 5/00; two flowers partly eaten, plant eaten on one side (scarred over), green with maroon tubercles, OK 3/01; maroonish-green, good 5/01
84.00	3	25.52	111															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
85.00	3	18.89	101															discovered 3/01; green, good 3 & 5/01
86.00	3	~73.63	~110															along old road, ~3m below juniper by big rock, discovered 3/01; lopsided, green, good 3 & 5/01
<b>Reference point 3a</b>																		
1.00	3A	14.84	193															discovered 3/00; green with a few orange tubercle tips, OK 3 & 5/00; chambers, galleries, and exit holes COD weevils 3/01
2.00	3A	14.59	193															discovered 3/00; reddish, OK 3/00; slightly purplish-green, OK 5/00; black inside, COD fungus 3/01
3.00	3A	4.35	48															discovered 3/01; green with some yellow tubercle tips, OK 3/01; yellowish, OK 5/01
4.00	3A	3.45	36															discovered 3/01; green, good 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
21.01	3A	3.46	44						2.20	1	1	3.50	3fr	1	4.57	5A	1A	evidently a seedling or pup of 21.00; green, good 3 & 5/99, 3/00; top eaten off of one fruit; plant green, good 5/00; eaten below soil surface, COD herbivory 3/01
21.10	3A	5.06	34			2.20	1	0	2.70	3	2	2.70	1	1	3.04	1fr	0	discovered 3/96; below prickly pear; green, good 3/99; hole in petal of flower; green, good 5/99; green, good 3 & 5/00, 3 & 5/01
21.11	3A	4.74	31									nd		0	1.38	0	0	discovered 5/98; green, good, hunkered in moss 3/99; green, good 5/99, 3 & 5/00, 3 & 5/01
21.12	3A	4.75	31									nd		0	1.18	0	0	discovered 5/98; green, good, hunkered in moss 3/99; green, good 5/99, 3 & 5/00, 3 & 5/01
21.20	3A	5.35	29			2.00	0	0	2.50	2	1+1A	3.10	1+1fr	1+1A	3.13	2A	0	discovered 3/96; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
21.21	3A	5.58	29															discovered 3/00; popping out of crustose lichen, green, good 3 & 5/00, 3 & 5/01
21.30	3A	1.86	119						3.90	5	4	4.60	3	3A	5.66	2+4fr	5A	stepped on 3/98; green, great 3 & 5/99, 3/00; fruit with hole in top, plant green, good 5/00; eaten below soil surface, COD herbivory 3/01

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST.	ANGLE	95DM	95 FI/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
21.31	3A	2.56	125									1.80	0	0	1.39	0	0	in prickly pear; discovered 3/98; loosely rooted, green, good 3/99; green, loosely rooted, OK 5/99; dull green, OK 3 & 5/00, 3 & 5/01
21.32	3A	1.85	56									1.10		0	2.02	1fr	1	discovered 5/98; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
21.33	3A	1.87	56									0.80		0	1.15	0	0	on its side, loosely rooted, discovered 5/98; turning orange on exposed side, OK 3 & 5/99; dead, hard, solid, dry, COD unknown 3/00
21.40	3A	2.48	227						3.80	1+5fr	1+3A	4.40	4	4	4.81	4A+1fr	1A	fruit partly eaten 5/97; maroonish with a few orangish tubercle tips, OK 3 & 5/99; dark green, good 3/00; hole in top of one fruit, green, good 5/00; top mostly eaten, a few red brown tubercles left, poor 3/01; COD herbivory 5/01
21.50	3A	3.35	243						3.50	1+1fr	1+1A	3.90	3fr	3	4.41	3A	0	little bluestem clump; green, good 3 & 5/99, 3 & 5/00; one flower mostly eaten, plant green with a few orange tubercle tips, OK 3/01; green, good 5/01
21.60	3A	3.45	243						4.30	2+2fr	1+2A	5.50	1+3fr	4	5.50	5fr	4A+1	flowers & fruit partially eaten 3/97; fruit partially eaten 5/97; fruit with ants but no seeds; fruit removed by WHC 5/99; green, great 3 & 5/99, 3 & 5/00; galleries, chambers, exit holes, COD weevils 3/01
21.70	3A	3.38	243						1.90	0	0	2.30	1	1	2.24	0	0	right of 21.8 and in front of 21.90; measured in one direction only 3/98; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
21.80	3A	3.37	243						1.50	0	0	1.40	0	0	1.50	0	0	measured in one direction only 3/98; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
21.90	3A	3.39	243						1.80	0	0	2.00	0	0	2.05	0	0	measured in one direction only 3/98; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
22.00	3A	2.80	50	sm-med	2	2.70	2	0	3.30	1+2fr	1+1A	3.90	3	3	4.49	6A+1fr	1A	fruit partially eaten 3/97; slightly maroonish, OK 5/99; yellowish, OK 3/00; tubercles yellowish on one side 5/00; center eaten, two tubercles with new spine growth, tubercles red-green, poor 3/01; two new green apices forming, good 5/01
22.10	3A	5.71	67						4.30	3	1+1A	4.60	1fr	1	4.78	4A	0	one flower partially eaten 3/97; 1 orange tubercle tip otherwise green, good 3 & 5/99, 3 & 5/00; eaten down below soil surface, COD herbivory 3/01
22.11	3A	5.30	64												2.66	0	0	green, good 3 & 5/99, 3 & 5/00; center eaten, a few green or red tubercles left, poor 3/01; two new green apices forming, good 5/01
Reference point 3B is 19.5m at 159 degrees from Stake 3																		
1.00	3B	3.03	204															discovered 3/01; dull green, good 3/01; green, good 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.00	3B	11.87	176															discovered 3/01; one flower partly eaten, plant blue-green, good 3 & 5/01
3.00	3B	12.71	177															discovered 3/01; all flowers partly eaten, plant green, good 3 & 5/01
4.00	3B	12.81	176															discovered 3/01; green, good 3 & 5/01
5.00	3B	13.43	168															discovered 3/01; all flowers partly eaten, plant blue-green, good 3/01; green, good 5/01
6.00	3B	18.83	169															discovered 3/01; green, good 3 & 5/01
7.00	3B	18.89	171															discovered 3/01; olive, OK 3 & 5/01
<b>Reference point 4</b> was a painted cross on a flat rock covered by flint 14.65m at ~340 degrees from rebar, west across drainage, follow flagging; rebar stake between Yucca clumps, ~46.8m at ~94 degrees from Stake 3																		
1.00	4	10.82	98															discovered 3/00; yellowish; OK 3/00; green with some yellow tubercle tips; good 5/00; one large chamber, CDD Moneilema 3/01
2.00	4	8.55	92															discovered 3/00; green, good 3 & 5/00; five flowers partly eaten, plant green, good 3 & 5/01

Ancistrocactus tobuschii Data for  
Junction

PL#	STAKE	DIST.	ANGLE	95DM	95 EI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.10	4	6.18	93															discovered 3/01; green, good 3 & 5/01
2.20	4	9.76	87															discovered 3/01; all flowers partly eaten, plant green, good 3 & 5/01
2.30	4	9.82	93															discovered 3/01; blue-green, good 3 & 5/01
2.40	4	10.65	85															discovered 5/01; green, good 5/01
3.00	4	9.31	107															under juniper, discovered 3/00; green, good 3 & 5/00, 3 & 5/01
4.00	4	8.05	109															discovered 3/00; green, good 3 & 5/00; tag mia replaced 3/01; green, good 3 & 5/01
4.10	4	8.45	107															discovered 5/01; green, good 5/01
4.20	4	8.56	105															discovered 5/01; green, good 5/01
5.00	4	8.45	123															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
5.10	4	~7.51	~123															discovered 5/01; green, good 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
5.20	4	1.90	119															discovered 5/01; purplish-green, good 5/01
6.00	4	12.20	127															discovered 3/00; green, good 3 & 5/00; some tubercle damage, plant green, OK 3 & 5/01
7.00	4	19.98	103															discovered 3/01; green with reddish tubercle tips, OK 3/01; dull green, OK 5/01
8.00	4	5.83	151															discovered 3/01; green, good 3 & 5/01
9.00	4	5.42	157															discovered 3/01; green, good 3 & 5/01
10.00	4	4.54	351															discovered 5/01; green, good 5/01
11.00	4	15.54	331															left of 12.00 and behind 15.00, discovered 5/01; green, OK 5/01
12.00	4	15.53	331															right of 11.00 and 15.00, discovered 5/01; green, OK 5/01
13.00	4	15.39	330															discovered 5/01; squishy, olive, OK 5/01

Ancistrocactus tobuschii Data for  
Junction

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PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
14.00	4	16.09	331															discovered 5/01; green, good 5/01
15.00	4	15.54	331															between 11.00 and 12.00, in front of 11 and left of 12; discovered 5/01; not tagged, green, OK 5/01
16.00	4	18.45	329															discovered 5/01; green, OK 5/01
17.00	4	17.64	328															discovered 5/01; green, good 5/01
18.00	4	18.86	325															discovered 5/01; green, good 5/01
19.00	4	18.92	326															discovered 5/01; green, good 5/01
27.00	4	13.78	345	sm-med	0	2.50	0	0	2.80	4fr	4	3.00	0	0	3.14	0	0	flower partially covered by animal droppings 3/96; covered by disintegrating animal droppings, good 3 & 5/99; maroonish, some loose spines, squishy, OK 3/00; olive, OK 5/00; maroonish-green, new apical spine growth, OK 3 & 5/01
27.01	4	13.80	345															upper right edge of tag 27.00, discovered 5/01 not tagged, green, OK 5/01

**Ancistrocactus tobuschii Data for  
Junction**

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PL#	STAKE	DIST.	ANGLE	95DM	95 FI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
28.00	4	13.80	345	small	0	1.80	0	0	2.40	3fr	3	2.90	0	0	2.80	0	0	flower partially covered by animal droppings 3/96; covered by disintegrating animal droppings, good 3 & 5/99; green, a few orange tubercle tips, OK 3/00; olive, OK 5/00; purplish-green with new apical spine growth, OK 3/01; orangish-green, OK 5/01
29.00	4	3.05	257	sm-med	1	mia			mia			mia						could not relocate, unsure of reference point 3 & 5/96; relocated reference point, but plant & tag still mia 3/97 & 5/97, 3 & 5/98
29.10	4	16.78	~332						0.60		0	0.90	0	0	mia			by old dead plant; discovered 5/97; not tagged; retagged 3/98; mia 99, 3 & 5/00, 3 & 5/01
29.20	4	16.78	~332						0.70		0	1.00	0	0	1.26	0	0	discovered 5/97; not tagged; retagged 3/98; green, good 3/99; olive, OK 5/99; green, good 3 & 5/00, 3/01; green with some red tubercle tips, good 5/01
<b>Reference point 5 is a painted cross covered by flint on a rock beyond Reference point 6; ID #5 R032421C</b>																		
1.00	5	0.82	172			0.70		0	1.20	0	0	1.60	0	0	2.02	0	0	discovered 5/96, probably a seedling of 31.00; originally tagged as 68 then as 31.01; large hole in center but stem still green 3/97; two new spine clusters at opposite sides 5/97; green, good 3 & 5/99, 3 & 5/00, 5/01
2.00	5	1.14	222												1.75	0	0	green, good 3 & 5/99, 3 & 5/00; just spines left; COD unknown 3/01
3.00	5	1.22	226												2.09	1A	0	maroonish, OK 3 & 5/99; hunkered, dark green, OK 3/00; hunkered, green, good 5/00; popped out, green, good 3/01; olive, OK 5/01

Ancistrocactus tobuschii Data for  
Junction

PL#	STAKE	DIST.	ANGLE	95DM	95 EI./FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
4.00	5	1.23	228												2.91	1A	0	maroonish, OK 3 & 5/99, 3 & 5/00, 3 & 5/01
5.00	5	2.07	96															discovered 3/00; goldish, OK 3/00; maroonish, OK 5/00; olive, OK 3 & 5/01
6.00	5	7.60	146															discovered 3/00; green, good 3/00; yellowish-green, good 5/00; green, good 3 & 5/01
7.00	5	1.35	109															discovered 3/01; green, OK 3 & 5/01
8.00	5	6.85	140															discovered 3/01; green, good 3 & 5/01
9.00	5	10.11	177															discovered 3/01; green, good 3 & 5/01
10.00	5	10.12	180															discovered 3/01; green, good 3 & 5/01
11.00	5	9.72	180															discovered 3/01; green, good 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
12.00	5	10.83	174															discovered 3/01; dark olive, good 3/01; green, good 3/01
30.00	5	0.70	140	small	0	1.90	0	0	Dead									sick 3/96; new growth, OK 5/96; COD unknown, only spines left, tag missing 3/97
31.00	5	0.80	170	sm-med	2	Dead												only loose spines left 3/96; tag gone 5/96
31.10	5	3.25	254			2.40	0	0	Dead									discovered 3/96; originally tagged as 43; COD unknown, scattered loose spines in vicinity 3/97
31.20	5	3.20	254			nd	nd	Dead?	Dead									discovered 3/96; severely eaten; main above ground plant gone, spines still attached to something 5/96; not tagged; COD unknown; plant gone 3/97
32.00	5	0.83	160	sm-md	0	Dead												only loose spines left 3/96; tag gone 5/96
32.10	5	1.27	291						3.20	3fr	2+1A	3.20	3fr	3	3.63	3A	0	reddish 3/98 & 3/99; reddish, OK 5/99; olive, OK 3 & 5/00; reddish, OK 3 & 5/01
33.00	5	7.54	324															discovered 3/01; flowers with pinkish tinge, stigmas yellow to pinkish-yellow, plant purple, OK 3 & 5/01
34.00	5	6.13	340															discovered 3/01; green, good 3 & 5/01
35.00	5	11.50	81															discovered 3/01; green, good 3 & 5/01

Ancistrocactus tobuschii Data for  
Junction

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /ER	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
36.00	5	11.54	77															discovered 3/01; green, good 3 & 5/01
37.00	5	1.41	29															discovered 3/01; reddish-green, OK 3 & 5/01
38.00	5	13.15	76															discovered 5/01; reddish-olive, OK accidentally stepped on 5/01
39.00	5	13.35	74															discovered 5/01; green, good 5/01
40.00	5	13.42	74															discovered 5/01; green with maroonish tubercles, good 5/01
41.00	5	13.56	76															discovered 5/01; green, good 5/01
Reference point 6 is a painted cross covered by flint on a flat rock																		
1.00	6	2.50	180												2.05	0	0	green, good 3 & 5/99, 3 & 5/00; purple, OK 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.00	6	2.18	197			1.80		0	1.90	1A	0	2.10	1fr	1	2.97	3A	0	discovered 5/96; originally tagged as 69, then 33.10, retagged as 2.00; green, good 3/99; olivish, OK 5/99, 3/00; purplish-green, good 5/00; tag loose, replaced, plant mia 3 & 5/01
3.00	6	5.70	174												3.08	1A	0	maroonish, OK 3 & 5/99, 3/00; orangish, OK 5/00; plant mia 3 & 5/01
3.01	6	4.45	170												2.20		0	discovered 5/99; maroonish, OK 5/99, 3/00; green, good 5/00; plant mia 3 & 5/01
4.00	6	4.85	174												1.39	0	0	green, good 3 & 5/99, 3 & 5/00; hunkered, green, OK 3/01; green, good 5/01
5.00	6	5.19	174												1.97	0	0	green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
6.00	6	5.45	205			1.30		0	2.20	1A	0	2.80	1fr	1	3.28	0	0	under rock, discovered 5/96; originally tagged as 70, then 33.20; retagged as 6.00; green, good 3 & 5/99, 3 & 5/00; hole surrounded by spine clusters, GOD unknown 3/01
7.00	6	9.69	180												2.34	1fr	0	green, good 3 & 5/99; hunkered, green, good 3/00; popping out green, good 5/00; plant mia 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FI /ER	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
7.10	6	9.55	207															discovered 5/01; green, good 5/01
8.00	6	13.34	185			2.50		0	2.90	1+1fr	1+2fr	3.30	2	2	3.62	2fr	1A	discovered 5/96; originally tagged as 71, then 33.30, retagged as 8.00; partially eaten but new spine growth 5/97; maroonish, OK 5/99; dull green, OK 3/00; green, good 5/00; almost totally eaten, pup forming on one side, green, OK 3/01; green, good 5/01
9.00	6	16.70	185												4.71	4A+2fr	4A+1	green, good 3 & 5/99; dead, collected for weevil study, no evidence of weevils, COD unknown 3/00
10.00	6	17.47	185												2.91	1+1A+2fr	2+2A	green, good 3/99; OK, almost buried in ant gravel, but coming out 5/99; buried, maroonish, OK 3/00; coming out, red, OK 5/00; plant mia 3 & 5/01
11.00	6	18.54	188												3.02		0	discovered 5/99; maroonish, OK 5/99; hunkered, maroonish, OK 3/00; green, OK 5/00; misshapen, most spine clusters missing, purplish-green, OK 3/01; new spine growth, purplish-green, OK 5/01
12.00	6	11.77	186												2.43		0	discovered 5/99; maroonish, OK 5/99, 3/00; yellowish, OK 5/00; just spines left, COD unknown 3/01
13.00	6	8.71	178												2.30		0	discovered 5/99; olive, dull gray spines, some new spine growth, OK 5/99; olive, OK 3 & 5/00; green, good 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

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PL#	STAKE	DIST.	ANGLE	95DM	95 FI / FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
14.00	6	8.12	190															discovered 3/00; olive, hunkered, OK 3/00; green, good 5/00; just spines left, COD unknown 3/01
15.00	6	10.34	195															discovered 3/00; green, hunkered, OK 3/00 & 5/00; tag loose, replaced, spine clusters in vicinity, plant mia 3 & 5/01
16.00	6	9.95	198															discovered 5/00; green, good 5/00; purple, OK 3/01; dark green, OK 5/01
17.00	6	17.47	192															discovered 3/01; bluish-green, OK 3/01; green, good 5/01
18.00	6	~25.60	~186															discovered 5/01; green, good 5/01
19.00	6	~25.55	~186															discovered 5/01; green, good 5/01
33.00	6	12.50	151	sm	5	3.50	4 fr	Dead										under Texas persimmon; only spines left 5/96, tag removed
33.01	6	12.50	151															discovered 5/01; green, good 5/01

**Ancistrocactus tobuschii Data for  
Junction**

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PL#	STAKE	DIST.	ANGLE	95DM	95 FI/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
33.40	6	~27.98	186			2.10		0	2.80	2fr	1+1A	3.00	0	0	3.41	2A	0	discovered 5/96; measured through junipers; originally tagged as 72; good, green 3 & 5/99, 3/00; many loose spines, sunken in center, olive, OK 5/00; eaten, spineless, tubercleless nub left, extremely poor 3/01; plant mia 5/01
33.50	6	~28	~186						4.00	4fr	1+3A	4.90	5fr+1A	5	4.15	0	dead	~75 cm NW of 33.4; several tubercles maroon, OK 3/99; spines dull gray, yellowish; collected by WHC 5/6/99; no evidence of weevils, COD unknown
33.60	6	8.35	200									1.70		0	2.71	1+1A	1 disp	discovered 5/98; maroon, OK 5/99; hunkered, olive, OK 3/00; green, OK 5/00; a few spines nearby, plant mia 3 & 5/01
34.00	6	3.70	56	sm	0	2.20	0	0	2.90	2fr	1A	3.00	2fr	2	3.61	2fr	disp?	dark green, good 3 & 5/99, 3 & 5/00; one large chamber, COD Monellema 3/01
35.00	6	7.35	350	sm-md	0	Dead		Dead?	Dead									measured over shrubs; only loose spines left 3/96; looks like a piece of the stem is left 5/96; COD unknown, plant & tag gone 3/97
36.00	6	0.52	6	nd	4	Dead												large hole in root & tag gone 5/96
37.00	6	3.20	68															discovered 3/01; green, good 3 & 5/01
Reference point 7 was a painted cross on a small rock north of a juniper which is west of Reference point 2, thru thicket; merged with Reference point 3 in 3/00																		
37.00	7	1.81	138			2.80		2	Dead									discovered 5/96; originally tagged as 59; COD unknown, just spines left 3/97
38.00	7	2.87	92			4.00		0	Dead									discovered 5/96; originally tagged as 60; COD unknown; only a few loose spines left; tag removed 3/97

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
39.00	7	3.06	92			3.80		0	Dead									discovered 5/96; originally tagged as 61; COD unknown; only a few loose spines left; tag removed 3/97
40.00	7	3.08	92			0.80		0	1.00	0	0	Dead						discovered 5/96; barely rooted; new spine growth; Jabba the Hut syndrome 3 & 5/97; just spines left; COD unknown 3/98
41.00	7	2.95	85			2.90		3	Dead									discovered 5/96; originally tagged as 63; COD weevils
Reference point 8 is uphill of reference point 1, 19.9m at 274 degrees (through junipers), rusty nail spike behind small juniper; ID#8 R032415B																		
46.00	8	1.25	32						1.80	0	0	2.00	0	0	2.43	0	0	green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
47.00	8	0.99	61						1.00	0	0	1.00	0	0	1.07	0	0	spines falling off, plant damaged 3/98; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
48.00	8	0.99	75						1.00	0	0	1.10	0	Dead				closer to reference point than 49; measured in one direction only 3/98; dried up; COD unknown 5/98
48.10	8	0.99	75												1.16	0	0	new plant or old nub of 48?, green, good 3 & 5/99; plant mia 3/00; relocated, under rock, green, OK 5/00; green, good 3 & 5/01
49.00	8	1.00	75						1.30	0	0	1.00	0	0	1.36	0	0	farther from reference point than 48; measured in one direction only 3/98; green, good 5/99, 3 & 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
50.00	8	1.14	75						2.00	0	0	Dead						of 50-53, the closet to the reference point; just spines left, COD unknown 3/98
51.00	8	1.16	75						1.30	0	0	Dead						behind 50.00; just spines left, COD unknown 3/98
52.00	8	1.18	75						1.80	0	0	Dead						behind 51.00 & to the right of 53.00; just spines left, COD unknown 3/98
53.00	8	1.18	76						1.40	0	0	Dead						behind 51.00 & 52.00, to the left of 52.00; just spines left, COD unknown 3/98
54.00	8	1.13	82						2.30	2fr	0	Dead						fruit eaten 3/97; COD unknown 3/98
55.00	8	1.27	82						1.20	0	0	1.20	0	0	1.39	0	0	one measurement only 3/00; apical meristem shifted to side, OK 3/99; dull green, OK 5/99; looks dead, but firmly rooted 3 & 5/00; dead, uprooted, ~15cm downhill, COD unknown 3/01
56.00	8	1.51	75						0.90	1	1	mia			dead			mia 3/98 & 5/98; plant relocated, dry, fluffy inside, COD unknown 3/99
57.00	8	1.51	83						1.60	0	0	1.70	0	0	1.72	0	0	green, good, hunkered 3 & 5/99; popping out, green, good 3 & 5/00, 3 & 5/01
58.00	8	0.72	125						3.00	1+1fr	1	Dead						at base of three-awn below small juniper; hollow, weevils? 3/98
59.00	8	2.16	155						3.40	4+1fr	3A	Dead						2 flowers partially eaten 3/97; hollow, weevils? 3/98
60.00	8	1.58	198						4.30	5	5	Dead						hollow, weevils? 3/98
61.00	8	1.53	199						2.10	2	2	Dead						solid, COD unknown 3/98
62.00	8	1.86	78						1.40		0	1.40	0	0	1.36	0	0	discovered 5/97; measured in one direction only 3/98; green, good 3 & 5/99, 3/00; green, OK 5/00; pale green, OK 3/01; COD, root rot 5/01
63.00	8	2.45	71						1.40		0	1.60	0	0	1.84	1fr	0	discovered 5/97; green, good 3 & 5/99; a loose spine cluster, green, good 3 & 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
Junction**

PL#	STAKE	DIST.	ANGLE	95DM	95 FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
64.00	8	2.27	67						1.40		0	0.90	0	0	mia			discovered 5/97; dead? 5/98; gone without a trace 3 & 5/99; 3 & 5/00; 3/7 5/01
Reference point 9 is before reference points 5 & 6, just as one turns into the large clearing, rebar in front of shin oaks;																		
	ID#9 R032421A																	
1.00	9	5.79	328															discovered 3/00; green, good 3 & 5/00; tag loose, replaced 3/01; loose spines in vicinity, plant mia 3 & 5/01
2.00	9	5.92	328															discovered 3/00; green, good 3 & 5/00; plant mia 3 & 5/01
3.00	9	12.61	34															discovered 3/00; green, good 3 & 5/00; body solid, COD unknown 3/01
4.00	9	11.17	37															discovered 3/00; green, good 3 & 5/00, 3 & 5/01
5.00	9	10.47	41															discovered 3/00; maroon, OK 3 & 5/00; scattered spine clusters, plant mia 3 & 5/01
6.00	9	12.71	21															discovered 3/00; olive, OK 3/00; green, good 5/00; purple, OK 3 & 5/01
7.00	9	11.94	18															discovered 3/00; green, good 3 & 5/00, 3/01; a few tannish tubercle tips, otherwise green, good 5/01

### Ancistrocactus tobuschii Data for Junction

[illegible]

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
South Owl Pasture							
51.00	2815	2.70	342	3.4	0		0: discovered 4/16/97; damaged on one side, good 3 & 5/99, 3 & 5/00; puplish, OK 2/01; green, good 4/01
52.00	2815	2.67	347	3.9	1+2fr	1	discovered 4/16/97; loose spines nearby, good 2/99; good 5/99; good, green 3/00; old fire scar becoming exposed at base, green, good 5/00; chunk eaten out of side, scarred over, OK 2/01; green, good 4/01
53.00	2815	1.77	5	mia			identity questionable, discovered 4/16/97; plant mia 99, 3 & 5/00, 2 & 4/01
54.00	2815	1.22	85	mia			discovered 4/16/97; big 98; plant mia 99, 3 & 5/00, 2 & 4/01
55.00	2815	0.67	85	mia			discovered 4/16/97; little 98; plant mia 99, 3 & 5/00, 2 & 4/01
56.00	2815	0.75	78	2.3	0	0	discovered 4/16/97; tiny 98; good 3 & 5/99; good, green 3 & 5/00, 2 & 4/01
57.00	2815	1.04	53	mia			identity questionable, discovered 4/16/97; plant mia 99, 3 & 5/00, 2 & 4/01
58.00	2815	0.61	55	mia			discovered 4/16/97; tiny 98; plant mia 3 & 5/00, 2 & 4/01
59.00	2815	0.69	70	1.1	0	0	green, good 3 & 5/99, 3 & 5/00, 2 & 4/01
60.00	2815	3.14	184				discovered 3/00; green, good 3 & 5/00; uprooted, body hollow, no exit holes, COD unknown 2/01
61.00	2815	3.19	184				discovered 3/00; green, good 3 & 5/00; uprooted, body hollow, no exit holes, COD unknown 2/01
62.00	2815	1.30	85				discovered 2/01; green, good 2 & 4/01
49.00	2821	0.32	180	3.8	2fr	2	discovered 4/23/97; good 3/99; maroonish, OK 5/99; dead just spines on top, root removed for weevil study 3/00

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
49.10	2821	~8.5	314				discovered by Bill Armstrong 3/00; reddish, OK 3 & 5/00; tag mia, replaced 2/01; plant maroonish-green, OK 2 & 5/01
49.11	2821	8.66	314				not tagged, at 3 o'clock on 49.10, discovered 5/01; green, good 5/01
49.12	2821	8.68	314				one measurement only, not tagged, at 5:30 o'clock on 49.10, discovered 5/01; green, good 5/01
49.13	2821	8.69	314				one measurement only, not tagged, at 6 o'clock on 49.10, discovered 5/01; green, good 5/01
49.14	2821	8.69	314				one measurement only, not tagged, at 6:30 o'clock on 49.10, discovered 5/01; green, good 5/01
49.15	2821	8.69	314				one measurement only, not tagged, at 7 o'clock on 49.10, discovered 5/01; green, good 5/01
49.16	2821	8.66	314				one measurement only, not tagged, at 9 o'clock on 49.10, discovered 5/01; green, good 5/01
49.17	2821	8.65	314				one measurement only, not tagged, at 10 o'clock on 49.10, left of 49.18, 49.20, discovered 5/01; green, good 5/01
49.18	2821	8.65	314				one measurement only, not tagged, at 10 o'clock on 49.10, right of 49.17 and behind 49.19, discovered 5/01; green, good 5/01

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
49.19	2821	8.64	314				one measurement only, not tagged, at 11 o'clock on 49.10, right and in front of 49.17 & 49.18, discovered 5/01; green, good 5/01
49.20	2821	8.62	314				one measurement only, not tagged, at 12 o'clock on 49.10, discovered 5/01; green, good 5/01
49.21	2821	8.61	314				discovered 5/01; green, good 5/01
49.22	2821	8.56	314				discovered 5/01; green, good 5/01
19.00	2931	0.30	0	dead			discovered 3/1/92; blooming 98; just spines left, COD unknown 99
20.00	2931	1.22	142	8.4	10 fr	9	discovered 3/1/92; great, green 3 & 5/99; 3 & 5/00; exit holes, COD weevils 2/01
3.00	2933	0.98	1450	dead			discovered 3/14/97; blooming 98; just spines left, COD unknown 99
4.00	2933	13.69	1980	dead			discovered 3/13/97; just spines left, COD unknown 99
12.00	2933	3.98	21	6	11 fr	7+4A	discovered 3/13/97; good, green 3 & 5/99, 3 & 5/00, 2 & 5/01
48.00	2933	11.48	282	4.6	8 fr	2+5A	Big Mama discovered 4/23/97; a little reddish, good 3/99; looks dead, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown 5/00
48.01	2933	11.48	282	4.1	6 fr	4+1A	looks dead, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown 5/00
48.02	2933	11.43	282	5.5	6 fr	2+1A	looks dead, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown 5/00
48.03	2933	11.44	282	3.6	3 fr	3A	looks dead, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown 5/00
48.04	2933	11.39	282	4.6	6 fr	4+2A	reddish, poor, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
48.05	2933	11.43	282	4.3	7 fr	5+2A	looks dead, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown 5/00
48.06	2933	11.41	282	2.5	0	0	reddish, poor, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown
48.07	2933	11.47	282	4.7	0	0	looks dead, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown 5/00
48.08	2933	11.51	282	4	4 fr	4	green, OK 3/00; collected with rest of clump for weevil study 3/00; dead, COD unknown
48.09	2933	11.52	282	4.3	5 fr	3+2A	reddish, OK, clump easily uprooted, most stems look dead or poor, collected for weevil study 3/00; dead, COD unknown
48.10	2933	11.53	282	1.8	1 fr	0	green, good 3/00; reddish, OK 5/00; apex off center, plant green, OK 2 & 5/01
48.11	2933	11.46	282	0.8	0	0	green, OK 3/00; collected with rest of clump for weevil study 3/00; dead, COD unknown
48.12	2933	11.61	282				discovered 3/00; green, good 3 & 5/00, 2/01; slightly reddish-green, OK 5/01
48.13	2933	11.63	282				discovered 3/00; green, good 3 & 5/00, 2 & 5/01
48.14	2933	11.54	282				discovered 3/00; green, good 3 & 5/00; just spines left, COD unknown 2/01
48.15	2933	11.40	282				discovered 3/00; OK, 3/00; orange, OK 5/00; plant mia 2 & 5/01
48.16	2933	11.37	282				discovered 3/00; green, good 3/00; hunkered, OK 5/00; plant and tag mia 2 & 5/01

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
48.17	2933	11.44	282				left of 48.18 and 48.19, discovered 3/00; reddish, OK 3 & 5/00; just spines left, COD unknown 2/01
48.18	2933	11.44	282				between 48.17 and 48.19, discovered 3/00; reddish, OK 3 & 5/00; just spines left, COD unknown 2/01
48.19	2933	11.44	282				right of 48.17 and 48.18, discovered 3/00; reddish, OK 3 & 5/00; just spines left, COD unknown 2/01
48.20	2933	11.67	282	2.1	1 fr+1A	1A	green, good, lopsided 5/99, 3 & 5/00; small hole in tubercle, plant green, OK 2/01; green, good 5/01
48.21	2933	11.42	282				discovered 3/00; one measurement only 3/00; green, OK, dislodged, replanted 3/00; mia 5/00; green, good 2 & 5/01
48.22	2933	11.49	282				left of 48.23, discovered 3/00; green, good 3 & 5/00, 2 & 5/01
48.23	2933	11.49	282				right of 48.22, discovered 3/00; green, good 3 & 5/00, 2 & 5/01
48.24	2933	11.51	282				not tagged, just behind 48.22 and 48.23 tag, discovered 5/00; green, good 5/00; plant mia 2/01; relocated 5/01, green, good 5/01
48.25	2933	11.54	282				discovered 2/01; green, good 2/01; tag loose, plant mia 5/01
48.26	2933	11.68	284				discovered 2/01; green with some red tubercle tips, OK 2/01; green, good 5/01
48.27	2933	11.69	284				discovered 2/01; green, good 2 & 5/01

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
48.30	2933	11.55	282	1.3		0	discovered under prickly pear 5/99; tag and plant mia 3 & 5/00, 2 & 5/01
61.00	2933	13.41	290	mia			discovered 5/28/97; perfect sp? 98; gone without a trace 99; plant mia 99, 3 & 5/00, 2 & 5/01
1.00	2934	0.61	0				dead 98
1.10	2934	15.00	129				discovered by Bill Armstrong 3/00; maroonish, OK 3/00; olive, OK 5/00; tag mia, replaced 2/01; purplish green, OK 2 & 5/01
18.00	2936	1.58	174	4.3	5 fr	5	discovered 3/17/97; blooming 98; good, green 3 & 5/99, 3 & 5/00, 2 & 5/01
Stake 2815 equals 2837 on map, not marked							
South Owl Pasture - turn left at bottom of hill, stop by second hackberry							
Stake 1 - ~2 meters WNW of agarita, flanked by 2 persimmons							
1.00	1	4.85	47				discovered by BA 8/00; tagged, some tubercle damage, green, OK 2/01; dead, collected for weevil study 4/01; two seedlings replanted under rock in hole (1.01 & 1.02)
1.01							green, good 4/01
1.02							green, good 4/01
2.00	1	5.07	56				discovered by BA 8/00; tagged 2/01; green, good 2 & 4/01 (collected weevil on ground beside plant)
North Owl Pasture							
29.00	2928	3.11	83	dead			discovered 3/17/97; non-blooming 98; hollow, weevils? 3/99
30.00	2928	3.14	3	6.9	12 fr	11+ 2A	discovered 3/10/97; blooming 98; good 3 & 5/99, 3 & 5/00; many small exit holes, COD weevils 2/01
45.00	2928	18.47	240	mia			discovered 4/23/97; sick/dying 98; mia 99, 3 & 5/00, 2 & 5/01

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
33.00	2929	0.43	280	1.9	0	0	discovered 3/13/97; blooming 98; poor, only a few tubercles left 3/99; good, green 5/99; misshapen, green, one reddish tubercle, OK 3/00; green, good 5/00, 2 & 5/01
34.00	2932	5.91	260	mia			mia 99, 3 & 5/00, 2 & 5/01
35.00	2932	1.58	215	mia			discovered 3/17/97; identity questionable; sick/dying 98; mia 99, 3 & 5/00, 2 & 5/01
36.00	2932	1.77	214	mia			discovered 3/17/97; identity questionable; non-blooming 98; mia 99, 3 & 5/00, 2 & 5/01
37.00	2932	11.72	210	4.3	2	dead	discovered 3/17/97; blooming 98; good 3/99; hollow, collected by WHC 5/99; dead, COD weevils
38.00	2932	11.76	210	4	2 fr	dead	discovered 3/17/97; blooming 98; good 3/99; squishy, collected by WHC 5/99; dead, COD may be weevils
59	2932	17.37	75	mia			not habitat at these directions; discovered 5/28/97; fruit with bl? 98; mia 99, 3 & 5/00, 2 & 5/01
60	2932	17.37	73	mia			not habitat at these directions; discovered 5/28/97; tiny 98; mia 99, 3 & 5/00, 2 & 5/01
39.00	2935	0.61	180	mia			discovered 3/17/97; blooming 98; mia 99, 3 & 5/00, 2 & 5/01
40.00	2935	0.67	185	mia			discovered 3/17/97; blooming 98; mia 3 & 5/00, 2 & 5/01
West Fawn Pasture							
42.00	2824	0.00	0	dead			discovered 4/11/97; 1 we? 98; COD unknown
Plot 8 Pasture							
43.00	2811	0.26	194	5.3	5 fr	3+1A	discovered 4/16/97; green, good 3 & 5/99; brown and tan near base, green on top, very squishy, loosely rooted, poor, removed for weevil study 3/00; dead, COD unknown
44.00	2811	0.30	180	4.4	2 fr	1+1A	discovered 4/16/97; green, good 3 & 5/99; dead, weevil larvae inside stem, stem with reddish-brown liquid inside, removed for weevil study 3/00
44.10	2811	0.30	202	4	0	0	3rd misshapen head 3 & 5/99; dead, weevil larvae inside stem, stem with reddish-brown viscous liquid inside, removed for weevil study 3/00

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
Plot 9 rebar in second opening, south from 19th large fence post from gate (including gate fence post)							
70.00	2593	5.35	293				discovered by Bill Armstrong 3/00; green, good 3 & 5/00, 2 & 5/01
South Owl 2 (Max's Site) - Site discovered 3/01; Plot added on 4/30/01; South Owl main road, at b							
turn right, go 0.1 mi; turn left, go 0.1 mi, site on left							
1.00			116				reddish-green, OK 4/01
		1.71					
2.00			116				reddish-green, OK 4/01
		1.62					
3.00			118				3.00 is in front of 4.00; green, OK 4/01
		1.70					
4.00			118				4.00 is behind 3.00; green, OK 4/01
		1.70					
5.00			118				5.00 is in front of 6.00; red, OK 4/01
		1.73					
6.00			118				6.00 is behind 5.00; green, OK 4/01
		1.73					
7.00			116				green, good 4/01
		1.20					
8.00			110				green, good 4/01
		1.95					
9.00			114				green, good 4/01
		2.02					
10.00			112				green, good 4/01
		2.46					
11.00			114				green, good 4/01
		2.69					
12.00			114				green, good 4/01
		2.80					

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
13.00			104				green, good 4/01
		3.10					
14.00			112				green, OK 4/01
		2.06					
15.00			103				green, OK 4/01
		3.20					
16.00			103				one measurement only, green, OK 4/01
		3.20					
17.00			103				green, OK 4/01
		3.22					
18.00			103				one measurement only, green, good 4/01
		3.32					
19.00		3.23	103				one measurement only, green, OK 4/01
20.00		3.82	103.5				green, good 4/01
21.00		2.60	97				reddish-green, OK 4/01; dead plant (COD weevils beside) 4/01
22.00		2.50	117				green, good 4/01
23.00		1.46	118				green, good 4/01
24.00		1.83	136				green, good 4/01
25.00		2.35	132				green, good 4/01

**Ancistrocactus tobuschii**  
**Monitoring Data for**  
**Kerr WMA**

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PL#	STAKE	DIST.	ANGLE	99DM	99FL	99FR	NOTES
26.00		2.65	131				green, good 4/01
27.00		1.77	155				three apical meristems, plant reddish- olive, new spine growth, OK 4/01
28.00		1.64	149				green, good 4/01
29.00		1.74	149				in front of 30 and 27, not tagged 4/01; green, OK 4/01
30.00		1.74	149				behind 29 and in front of 27, not tagged 4/01; green, OK 4/01
31.00		1.75	149				left of 29 and 30 and in front of 27, not tagged 4/01; green, OK 4/01
32.00		1.825	160				green, good 4/01
33.00		1.83	158				green, good 4/01
34.00		1.87	160				green, OK 4/01
35.00		1.90	160				green, good 4/01
36.00		1.93	160				green, OK 4/01
37.00		1.90	162				green, good 4/01

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[illegible]

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Butterfly

PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Stake 47A is 0.2 mi South from North gate & South road jct, ~ 70 paces Northwest from road, by pinyon-agarita-Texas persimmon clump; Stake 47A = GPS13; R021722A																
1.00	47A	25.93	38										2.99	1+ 2fr	3	green, OK, hunkering 4/99; green, good 2/00; some orange tubercles, OK 4/00; maroon, OK 2/01; maroonish-olive, poor 5/01
2.00	47A	29.71	46										1.75	1+1fr	2	green, OK, hunkered 4/99; green, good 2/00; some orangish tubercles, OK 4/00; olive, OK 2/01; green with reddish tubercle tips, OK 5/01
3.00	47A	28.25	45										2.13	1	1	reddish, OK, hunkering 4/99; maroonish, OK 2 & 4/00; green, good 2/01; purplish-green, OK 5/01
3.10	47A	28.37	45													right of 3.20 & 3.30; green, good 2 & 4/00, 2 & 5/01
3.20	47A	28.36	45													between 3.10 & 3.30; green, good 2 & 4/00, 2 & 5/01
3.30	47A	28.37	46													left of 3.10 & 3.20; green, good 2 & 4/00, 2 & 5/01

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Butterfly

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
4.00	47A	24.20	55										1.99	3	1 disp	reddish, OK 4/99; dark green, good 2/00; orangish, OK 4/00; maroonish-brown, OK 2/01; olive, OK 5/01
5.00	47A	~25.50	247										2.24		0	olive, OK, discovered 4/99; reddish, OK 2 & 4/00; green with a few red tubercle tips, OK 2/01; dull olive, OK 5/01
6.00	47A	~25.67	251										1.41		0	discovered 4/99; green, good 4/99; hunkered, OK 2 & 4/00, 2 & 5/01
7.00	47A	~25.64	249										0.57		0	discovered 4/99; OK 4/99; under rock, maroonish, OK 2 & 4/00; body solid, COD unknown 2/01
8.00	47A	~25.41	245										2.26		0	discovered 4/99; green, good 4/99; flower pink, stigma green, plant dark green, good 2/00; hunkered, dark green, OK 4/00, 2 & 5/01
9.00	47A	25.63	246													hunkered, OK 2 & 4/00, 2 & 5/01
47.10	47A	35.38	42	4.30	1+3 fr	disp	5.10	4	4	Dead						
47.11	47A	34.64	41	6.10	1+8 fr	disp	6.90	10	6+4A	Dead						killed by being dug up by unknown assailant 2/98
																killed by being dug up by unknown assailant 2/98

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Butterfly

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
47.111	47A	34.68	41							1.30	0	mia	1.08	0	0	seedling of 47.11, discovered 2/98; plant mia 5/98; green, good 4/99; green, good 2 & 4/00, 2/01
47.112	47A	34.69	41													green, good 2 & 4/00, 2 & 5/01
47.113	47A	34.74	41													green, good 2 & 4/00, 2 & 5/01
47.114	47A	34.75	41													green, good 2 & 4/00, 2 & 5/01
47.115	47A	34.73	42													green, good 2 & 4/00, 2 & 5/01
47.12	47A	34.20	43	3.40	2 fr	2A	Dead									
47.13	47A	33.34	41	3.50	1+3 fr	disp	4.40	5	3+2A	4.60	3	disp	3.99	0	3A	COD unknown, just spines left, tag removed 2/97 dull green, OK 4/99; two stemmed, stem closest to stake, green, good 2 & 4/00, 2 & 5/01
47.131	47A	33.37	41													green, good 2 & 4/00, 2 & 5/01



Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Butterfly

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
1.00	47B	7.73	89										3.49	6fr	2+2A+ 1disp	a few orange tubercle tips 4/99; popping out of crustose lichen, green, good 2 & 4/00; maroonish, OK 2/01; maroon with red tubercle tips at base, OK 5/01
2.00	47B	12.51	23										1.74	2	1	green, OK, hunkering 4/99; green, good 2 & 4/00; just spines left, COD unknown 2/01
3.00	47B	12.75	18										1.77	2	1disp	green, good 4/99; green, good 2 & 4/00; slightly maroonish-green, OK 2 & 5/01
3.01	47B	12.77	18													at 5 o'clock on 3.00, discovered 5/01; one measurement only 5/01; green, OK 5/01
4.00	47B	16.11	192										2.11	1+1fr	2	green, good 4/99; tag and plant mia 2 & 4/00, 2 & 5/01
5.00	47B	2.53	69										0.79		0	discovered 4/99; green, good 4/99, 2 & 4/00, 2/01; hunkered, green, OK 5/01
47.40	47B	4.80	81	3.30	5 fr	5	4.20	5	2+3A	3.10	0	0	Dead			1 fruit very small but produced at least 1 seed 5/96; tag mia, retagged 2/96; looks dead but firmly rooted 2 & 5/98; hollow chambers, COD weevils 2/99

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Butterfly

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
47.41	47B	3.40	79	3.80	6 fr	rest disp	4.10	4	1+3A	Dead						2 fruit with a few seeds left within 10 cm of plant, small ants walking by 5/96; COD unknown 2/98
47.42	47B	3.33	55	1.80	1 fr	disp	2.10	1	0	2.10	1	0	1.79	1		2 orangish, hunkering, OK 4/99; popping out, dull green, OK 2 & 4/00; green with a few tan tubercle tips, OK 2/01; maroonish-green, OK 5/01
47.430	47B	2.50	37	2.70	1	0	2.70	2	1A	3.30	3	2+1A	Dead			just spines - COD unknown 2/99
47.431	47B	2.52	37	0.90	0	0	mia			mia			0.63	mia		0 measured in one direction only 4/99, 2/00, 2/01; green, good, relocated 4/99; plant mia 2/00; relocated, green, good 4/00; hunkered, OK 2/01; popped out, green, good 5/01
47.432	47B	2.56	37	1.20	0	0	1.00	0	0	1.30	0	0	1.24	0		0 measured in one direction only 2/98, 2/99, 2/00, 2/01; green, good 4/99, 2 & 4/00, 2 & 5/01
47.433	47B	2.55	37	0.90	0	0	0.70	0	0	1.60	0	0	0.89	0		0 measured in one direction only 2/98, 2/99, 2/00, 2/01; green, good 4/99, 2 & 4/00, 2 & 5/01
47.44	47B	2.30	14	2.50	2 fr	2	2.10	0	0	2.00	2	mia	1.73	0		0 plant shriveled but fleshy, fruit with holes 5/96; tag moved 2/97; retagged 5/97; relocated 2/99; green, good 4/99, 2 & 4/00; olive, OK 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Butterfly**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
47.441	47B	2.35	14				1.00	0	mia	mia			mia			This plant has no roots, may have washed here during flood 2/97; mia 5/97, 2 & 5/98, 2 & 4/99
47.450	47B	2.44	35	4.10	3 fr	disp	3.50	0	0	3.30	3	3	3.28	2	1+1 disp	under prickly pear; four seedlings at base 5/97; 3 seedlings in 2/98 & 5/98; tubercle tips red, OK 4/99; green, good 2/00; maroonish, OK 4/00, 2 & 5/01
47.451	47B	2.41	35	0.90	0	0	0.90	0	0	1.00	0	0	1.00	0	0	green, good 4/99; green, good 2 & 4/00, 2/01; hunkered, green, OK 5/01
47.452	47B	-2.41	35				1.20	0	0	1.40	0	0	1.20	0	0	green, good 4/99, 2 & 4/00, 2/01; hunkering, green, OK 5/01
47.453	47B	2.43	35										0.84	0	0	green, good 4/99, 2 & 4/00, 2/01; green, OK 5/01
47.454	47B	2.37	37													green, good, hunkered 2 & 4/00; filled with orange mush, COD fly larvae 2/01
47.455	47B	2.41	35													left of 47.456, discovered 2/01; not tagged, green, good 2/01, mia 5/01

**Ancistrocactus tobuschii Data for Kickapoo Caverns SNA - Butterfly**

PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
47.456	47B	2.41	35													behind 47.451, discovered 2/01; not tagged, green, good 2 & 5/01
47.46	47B	3.40	57							2.00		2A	2.92	1+2fr	4+1disp	beside rock, discovered 5/98; green, hunkering, OK 4/99; green, good 2 & 4/00; squishy, shrunkn, spines gray, poor 2/01; olive, OK 5/01
47.470	47B	4.65	65										2.10	2	1+1A	dull green, hunkering, OK 4/99; only spines left, COD unknown 2/00
47.471	47B	4.83	65										1.22			0 green, good, hunkered 4/99, 2 & 4/00, 2 & 5/01
47.48	47B	5.09	85										1.55	1	1	green, OK, hunkering 2 & 4/99; green, good 2 & 4/00; galleries, chambers, exit holes, COD weevils 2/01

Data taken and recorded by Jackie Poole 5/8/96, 2/12/97, 5/5/98, 4/23/99, 4/28/00, 2/16/01, 5/01/01

Data taken by Gena Janssen and recorded by Jackie Poole 2/17/98

Data taken by Dave Stuart and recorded by Jackie Poole 5/6/97

Data taken by Jackie Poole and recorded by Linda Hedges 2/99

Data taken by Jackie Poole and recorded by Craig Scofield 2/9/00

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Daniel's Site**

1 of 1

[illegible]

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - JD-0 Site**

1 of 3

PL#	STK#	DIST	ANGLE	99DM	NOTES
0.4 mi North/Northeast of bunkhouse on main road North, West side of road, South of Whiskey Bottle Site, look for small flagged persimmon ~2m off road; plot set up in 9/99					
Rebar is double flagged by a persimmon					
1.00	1.46	338	0.60	OK 9/99, 2/00; olive, OK 4/00; edge of grass clump, green, good 2/01; edge of small dug hole, plant green, good 4/01	
2.00	1.78	346	0.43	OK?, may not be A. tobuschii 9/99; base of grass clump, OK 2/00; green, good 4/00; edge of grass clump, green, good 2 & 4/01	
3.00	1.90	351	1.09	green, good, almost buried 9/99; green, good, popping out 2 & 4/00; bluish-green, good 2/01; green, good 4/01	
4.00	2.01	10	0.96	OK, almost buried 9/99; green, good, popping out 2 & 4/00; green, good 2 & 4/01	
5.00	1.92	16	3.23	green, good 9/99; flowers yellow, plant green, good 2 & 4/00, 2 & 4/01	
6.00	2.09	22	0.86	OK?, almost buried 9/99; dull green, OK, edge of armadillo hole 2 & 4/00; green, OK 2 & 4/01	
7.00	2.26	21	0.96	green, good, almost buried 9/99; green, good, popping out 2 & 4/00; green, good 2 & 4/01	
8.00	2.94	22	1.77	green, good, edge of agarita 9/99, 2 & 4/00, 2 & 4/01	
9.00	2.17	28	1.27	green, good 9/99, 2/00; olive, OK 4/00; green, good 2 & 4/01	

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - JD-0 Site**

2 of 3

PL#	STK#	DIST	ANGLE	99DM	NOTES			
10.00		1.66	29	0.43	OK?, A. tobuschii? 9/99; green, good, pebble on top 2 & 4/00; green, OK 2 & 4/01			
11.00		1.72	76	1.70	green, good 9/99, 2 & 4/00, 2 & 5/01			
12.00		2.00	66	2.35	green, good 9/99, 2 & 4/00; totally sunken, only spines at surface, may be dead 2/01; dead, COD unknown 5/01			
13.00		1.92	64	0.54	OK, almost buried 9/99; good, green, popping out 2/00; hunkered, olive, OK 4/00; green, good 2 & 4/01			
14.00		1.83	65	1.51	green, good 9/99, 2 & 4/00; plant mia 2 & 4/01			
15.00		1.69	44	0.37	green, good 9/99; OK, dull green 2/00; green, good 4/00; pale green, OK 2 & 4/01			
16.00		1.76	56	1.94	orangish-green, OK 9/99; dull green, OK 2/00; reddish, OK 4/00; plant mia 2 & 4/01			
17.00		2.44	36	1.37	green, good 9/99, 2 & 4/00; slightly maroonish-green, OK 2/01; green, good 5/01			
18.00		2.36	42	1.82	green, good 9/99; flowers pinkish, green, good 2/00; olive, OK 4/00; green, good 2 & 5/01			
19.00		2.90	71	1.34	green, good, hunkered 9/99, 2 & 4/00; olive, OK 2/01; green, good 5/01			

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - JD-0 Site**

3 of 3

PL#	STK#	DIST	ANGLE	99DM	NOTES
20.00		3.00	67	2.56	hooded during weevil study in summer 99; green, good 9/99, 2 & 4/00; olive, OK 2 & 5/01
21.00		3.16	69	1.97	green, OK, hunkered 9/99, 2 & 4/00; green, good 2 & 5/01
22.00		4.58	31	5.37	green, OK, few orange tubercles 9/99; hooded during weevil study in summer 99; purplish green, OK 2 & 4/00, 2/01; olive, OK 5/01
23.00		4.75	36	1.31	OK?, only spines showing, hunkered 9/99; purplish green, OK, out 2 & 4/00, 2/01; green, good 5/01
24.00		4.86	31	0.76	green, OK, almost buried 9/99, 2 & 4/00, 2/01; coming out, green, OK 5/01
25.00		4.70	30	0.85	green, good, base of grass clump 9/99, 2 & 4/00, 2/01; plant mia 5/01

Data collected by Jackie Poole 9/15/99, 9/20/99, 2/8/00 with Craig Scofield, 4/28/00, 2/09/01, 5/01/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - JD-1 Site**

1 of 2

PL#	DIST	ANGLE	99DM	NOTES					
Site is located 0.5 mi South of Green Cave, through an opening on the East side of road just before creek crossing <b>Double flagged rebar</b> - ~30m (~60 paces) @ 145 degrees from road to creek; ~37m (~74 paces) from creek to fence; ~30m (~60 paces) @ 115 degrees from fence crossing; plot established 9/15/99									
1.00	1.74	9	1.99	green, with some orange tubercle tips, OK 9/99; poor, purplish 2/00; looks dead 4/00; COD weevils (galleries) 2/01					
2.00	1.84	14	2.30	green, OK 9/99, 2/00; looks like just spines left 4/00; dead, just spines left, COD unknown 2/01					
3.00	2.17	17	2.36	olive green, OK 9/99, 2/00; looks dead 4/00; just spines left, COD unknown 2/01					
3.01	2.17	17		seedling of 3.00, ~1cm from pin flag; green, OK 2/01; buried by gravel, only spines visible, poor 5/01					
4.00	2.19	17	2.00	green, good 9/99; one measurement only 2/00; dull green, OK 2/00; plant mia 4/00, 2 & 5/01					
5.00	1.33	207	1.94	one measurement only 2/00; green, good, hunkered 9/99, 2/00; hunkered, olive, OK 4/00; covered by Selaginella, green, OK 2 & 5/01					
6.00	1.34	207	0.94	green, OK, hunkered 9/99; green, hunkered, good 2/00; hunkered, green, OK 4/00; popped out, green, good 2 & 5/01					
7.00	1.36	204	2.42	green, some tubercle tips tan, OK 9/99; collected by Bill Calvert, dead, killed by weevils					
8.00	1.61	212	2.17	green, OK, hunkered 9/99; gray spines, red body, poor 4/00; body solid, COD unknown 2/01					
9.00	9.90	238	2.20	green, good 9/99; poor, squishy, at edge of rock 2/00; looks dead 4/00; body solid, COD unknown 2/01					
10.00	10.38	239	3.63	sunken in center, some red tubercles, poor 2/00; new spine growth, olive, OK 4/00; top green, base yellowish-olive, OK 2/01; galleries, COD weevils 5/01					

**Ancistrocactus tobuschii Data for Kickapoo Caverns SNA - JD-1 Site**

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**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - JD-2 Site**

1 of 1

PL#	STK#	DIST	ANGLE	99DM	NOTES
Site is located in NW area of park near dead pinyon on hilltop					
Stake is ~8m @ 200 degrees from dead pinyon					
1.00		3.04	63	3.02	yellowish green, OK 9/99; hollow, killed by weevils, Dead 2/00
2.00		2.73	63	3.11	orangish, OK 9/99; hollow, killed by weevils, Dead 2/00
Data collected by Jackie Poole 9/20/99, 2/8/00					

**Ancistrocactus tobuschii Data for Kickapoo Caverns SNA - JD-3 Site**

1 of 1

PL#	STK#	DIST	ANGLE	99DM	NOTES
Site is 0.6 mi North of residence; walk along fence from where road crosses creek, at a fence drainage crossing with several large pinyons (go past small drainage with hog panel & junipers), there is an old, large split pinyon on the North bank of the drainage, the stake is ~25m @ 107 degrees from the old, large split pinyon or 0.8 mi from residence, look for fence corner or brace, just before it is the large, old, split pinyon; plot set up 9/20/99					
1.00	JD-3	1.67	314	2.73	OK, yellowish, squishy 9/99; OK, orangish-green 2/00; maroonish, OK 4/00, 2/01; dull olive-green, OK 4/01
2.00	JD-3	2.96	280	5.08	totally orangish, poor 9/99; very poor, totally orange 2 & 4/00; dry solid, tannish-orange, looks dead, collected 2/01
3.00	JD-3	3.68	233		good, green 2/00; yellow-green, OK 4/00; body intact, COD unknown 2/01
Data collected by Jackie Poole 9/20/99, 2/8/00, 4/26/00, 2/19/01, 4/25/01					

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Kelly Bryan Memorial Site**

1 of 1

[illegible]

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Linda's Site**

1 of 4

PL#	DIST	ANGLE	99DM	99FL	99FR	NOTES
1.0 mi from Green Cave and 0.2 mi from main gate, south side of road						
Rebar 30m from road to the south; GPS17 = R021723A						
1.00	15.62	290	2.25	1+1fr	0	maroonish, OK 4/99; hooded during weevil study in summer 99; maroonish with whitish speckles, OK 2/00; reddish-green, OK 4/00; dry, solid, COD unknown 2/01
2.00	15.50	290	4.12	1+2fr	2 disp	hooded during weevil study in summer 99; very dark green, good 4/99 & 2/00; ants swarming fruit, plant green, good 4/00 ; slightly maroonish-green, good 2 & 5/01
3.00	15.40	290	4.11	3+2fr	2+2A	red, OK 4/99; maroonish, OK 2 & 4/00; side nibbled, maroonish, OK 2/01; green, OK 5/01
4.00	15.92	300	3.97	1	1A	maroonish, OK 4/99, 2 & 4/00, 2/01; blue-green, good 5/01
5.00	15.85	300	2.48	1	1A	green, good 4/99, 2/00; reddish, green, OK 4/00, 2/01; maroonish-green, OK 5/01
6.00	15.84	300	1.89	1	1A	dull green, OK 4/99, 2/00; reddish, OK 4/00; olive, OK 2 & 5/01
7.00	15.80	300	2.49	0	0	green, good 4/99, 2 & 4/00; maroonish-green, OK 2/01; green, good 5/01
8.00	5.51	96	4.80	2+5fr	4+1A	maroonish, OK 4/99; reddish, tubercles, overall maroonish, OK 2/00; dark green, OK 4/00; green with some tan tubercles, OK 2/01; dull green, OK 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Linda's Site**

2 of 4

PL#	DIST	ANGLE	99DM	99FL	99FR	NOTES
9.00	6.94	120	2.06	2+1fr	3	green, OK, hunkered 4/99; maroonish, OK, hunkered 2/00; dark green, OK 4/00; dark olive, good 2/01; dark purple, OK 5/01
10.00	11.90	87	2.76	3+1fr	2+ 2 disp	hooded during weevil study in summer 99; green, good 4/99; maroonish, good 2/00; green, good 4/00; maroonish-green, OK 2/01; small chunk eaten out of side, reddish-green, OK 5/01
11.00	11.35	104	3.03	4	4	green, OK, hunkering 4/99; maroonish, good 2/00; hunkering, green, OK 4/00; green with maroonish tubercle tips, OK 2 & 5/01
12.00	14.66	121	2.36	2+2fr	2+ 2 disp	hooded during weevil study in summer 99; reddish, OK 4/99; maroonish, OK 4/00, 2 & 5/01
13.00	18.45	105	4.56	3+5fr	disp	dull green, OK 4/99, 2/00; yellowish, OK 4/00; green with some tan tubercle tips, OK 2/01; green, good 5/01
14.00	18.63	123	2.82	2+1fr	2+ 1 disp	reddish, OK 4/99, 2/00; green, good 4/00; olive, OK 2/01; blue-green, good 5/01
15.00	15.52	124	2.35	3+1fr	4	hooded during weevil study in summer 99; green, OK, hunkering 4/99; green, good 2 & 4/00, 2/01; dull green, OK 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Linda's Site**

3 of 4

PL#	DIST	ANGLE	99DM	99FL	99FR	NOTES
16.00	55.65	111	3.78	4+2fr	5	hooded during weevil study in summer 99; green, good 4/99; fruit red 4/00; nibbled on a few tubercles, green with tan tubercle tips, OK 2/01; green, good 5/01
17.00	~75.50	~116	3.76	5	4+1A	maroonish, OK 4/99; olive green, good 2 & 4/00; maroonish, OK 2/01; very squishy; maroonish, poor 5/01; dead, COD maggots (fly larvae) 5/01
17.01	~75.53	~116				left of 17.02; discovered 2/00; green, good 2 & 4/00; green, OK 2/01; dead, COD fly larvae 5/01
17.02	~75.53	~116				right of 17.01; discovered 4/00; green, good 4/00; green, OK 2/01; just spines left, COD unknown 5/01
18.00	~77.70	~269	2.31	2	2	right of 23.00; green, OK, hunkering 4/99; green, good, popping out 2/00; olive green, OK 4/00, 2/01; green, good 5/01
19.00	~77.70	~268	1.80		0	discovered 4/99; green, good 4/99, 2/00; covered with litter, green, good 4/00; plant mia 2 & 5/01
20.00	11.65	266	3.63		0	hooded during weevil study in summer 99; green, good 9/99; maroonish, most spines gray, very few new spines, poor 2/00; new spine growth, maroonish, OK 4/00; body hollow, Moneilema?, dead 2/01
20.01	11.63	266				right of 20.02; discovered 4/00; green, good 4/00, 2/01; COD unknown 5/01
20.02	11.63	266				left of 20.01; discovered 4/00; green, good 4/00; plant mia 2 & 5/01
21.00	11.80	263	2.24		0	discovered summer 99; green, good 9/99, 2 & 4/00, 2/01; shrunken, orangish, poor 5/01; dead COD weevils 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Linda's Site**

4 of 4

PL#	DIST	ANGLE	99DM	99FL	99FR	NOTES
22.00	11:56	267				discovered 4/00; green, good 4/00; just spines left, COD unknown 2/01
23.00	~77.70	~269				left of 18.00; discovered 4/00; green, good 4/00, 2 & 5/01

Data collected by Jackie Poole 2/17/99 with Linda Hedges, 4/23/99, 9/15/99, 2/9/00 with

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - NE Corner Site**

PL#	DIST	ANGLE	99DM	99FL	99FR	NOTES
0.4 mi North of main gate on FM 674, at North boundary fence on west side of road, 150 m South/Southwest of fence corner; GPS16 = R021718A						
1.00	47.05	149	2.41	1	1	green, good 4/99, 2 & 4/00, 2 & 4/01
2.00	25.69	33	2.55	1+1fr	0	loose spine cluster, otherwise green, good 4/99; green, good 2 & 4/00, 2 & 4/01
3.00	~25.7	~30				discovered 2/01; lopsided, green, OK 2 7 4/01
Data taken by Jackie Poole 2/17/99 with Linda Hedges, 4/23/99, 2/15/00, 4/28/00, 2/09/01, 4/26/01						

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - North Gate Site**

1 of 2

PL#	DIST	ANGLE	99DM	99FL	99FR	NOTES
GPS18 = R021819A						
1.00	29.13	320	3.59	1	1	reddish, OK 4/99; OK 2/00; reddish, poor, collected by Bill Calvert 4/00; dead, COD unknown
2.00	4.25	57	4.46	3+2fr	3+2A	green, good 4/99; green, good 2 & 4/00; green, good but with half of plant eaten on one side, appears to be scarred over, probably mammal herbivory 2/01; apex now at ground level, plant green, good 4/01
2.01	3.99	54				discovered 2/01; green, good 2 & 4/01
2.02	4.04	57				discovered 4/01; green, OK 4/01
3.00	4.04	80	2.21	1	1	green, OK, hunkered 4/99; popping out 2/00; grayish-green, poor sunken in center, OK 4/00; olive green, OK 2/01; dull green, OK 4/01
4.00	28.55	78	4.21	3+1fr	4	green, good 4/99; grayish-green, OK 2/00; body green, tubercles orange, OK 4/00; green, some tubercles purplish, good 2/01; maroonish, OK 4/01
5.00	62.26	88	5.09	7	disp	green, good 2 & 4/00, 2 & 4/01
5.01	62.29	88	1.25		0	green, good, discovered 4/99; at six o'clock; green, good 2 & 4/00, 2 & 4/01
5.02	62.25	88				at two o'clock; green, good 2 & 4/00, 2 & 4/01
5.03	62.28	88				at five o'clock; green, good 2 & 4/00, 2 & 4/01
5.04	62.27	88				at 4 o'clock, discovered 4/01; green, OK 4/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - North Gate Site**

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**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Quail Transect**

1 of 1

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Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Ray's Site

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
1.00	1	14.45	4	2.00	0	nd	2.30	1	0	3.20	3	0	3.10	4	disp	3.30	3	3	4.30	2	1A, disp	3.21	2fr	2	tubercle & spine cluster loose, scarred over 5/97; good 2/98 & 4/99; almost uprooted on edge of hole, green, good 2/00; dead, removed for weevil study but no evidence of weevils 4/00
4.00	1	14.20	10	5.10	7	6	5.10	5	5	5.80	9	0	Dead												hollow, maybe weevils 2/96
5.00	1	13.45	10	4.50	3	3	4.60	5	5	4.20	7	6 S	4.40	7	disp	Dead									holes in stem caused by weevils? 5/97
5.01	1	13.58	10													0.80	0	0	mia			mia			discovered 2/97; mia 98, 99; lots of rooting in area 2/00; plant mia 2 & 4/00, 2 & 4/01
6.00	1	14.44	12	1.90	0	0	2.00	0	0	3.10	2	1	3.00	2	disp	3.50	3	2	4.10	1	1+1A	3.63	3	3	green, good 4/99; green, good, almost covered by Aristida purpurea 2/00; olive, OK 4/00, 2 & 4/01
7.00	1	14.10	14	3.10	2	1	4.10	3	3	4.70	7	1+1A	4.40	5	disp	4.80	5	4+1A	5.30	8	4+1A	4.25	5fr	3	in shade of pricklypear; pricklypear dead 2/98; tag mia, replaced, probably lost in rooting nearby 2/99; dark green, good 4/99, 2/00; a few yellowish tubercles, OK 4/00; dead, COD weevils 2/01
7.10	1	13.88	20													2.50	2	1+1A	3.50	5	4A	3.36	3+1fr	1+2A	loose spine clusters 2/97; good 2/98; next to serious rooting but unharmed 2/99; dark green, good, fruit yellow, flabby 4/99; green, good 2/00; orangish, OK 4/00; green, good 2 & 4/01
8.00	1	14.26	14	3.40	2	2	4.00	2	1	5.40	4	1A	4.00	6	8 disp	5.50	7	7	5.70	4	disp?	4.59	5fr	3+2A	plant has two tags; green, good 4/99, 2 & 4/00, 2/01; dead, COD fly maggots 5/01
9.00	1	12.98	15	3.30	2	1	3.10	0	0	3.10	3	2	Dead												pup from damaged stem 2/94; hollow, maybe weevils 2/96
10.00	1	14.50	15	5.60	1	1	6.50	8	8	6.70	10	0	5.30	10	1, disp	Dead									COD unknown, stem hollow, weevils suspected 2/97
10.01	1	14.18	24													0.70	0	0	0.90	0	0	0.99	0	0	seedling of 10.00; measured in one direction only 2/98; green, good 4/99, 2 & 4/00, 2/01; purplish-green, OK 4/01
10.02	1	14.15	24																			1.00	0	0	tag loose, plant OK 4/99; COD unknown 2/00
10.03	1	14.19	23																			2.17	0	0	hooded during weevil study in summer 99; green, good 4/99, 2 & 4/00, 2 & 4/01

Ancistrocactus tobuschii Data for  
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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
10.10	1	15.10	34							2.60	2	2	2.70	4	4 disp	3.20	2	2	3.20	2	2	3.31	3	2	around tree; hole dug right beside 5/98; green, squishy, OK, new spine growth 2/99; hooded during weevil study in summer 99; green, good 2/00; green, squishy, OK 4/00; green, good 2 & 4/01
10.11	1	16.35	39																						discovered 4/00; reddish, OK 4/00, 2/01; green, good, OK 4/01
10.20	1	18.30	43							3.00	0	0	2.70	1	0	3.50	2	1+1A	3.20	3	3	Dead			thru pine; one seedling by end of tag, seven seedlings at plant base 5/97; one seedling (10.21) by end of tag & 3 seedlings (10.22, 10.23, one dead 2/99) by plant base 5/98; parent somewhat hollow, maybe weevils 2/99
10.21	1	18.25	43																			0.71	0	0	hunkered, dull green, OK 2 & 4/00; green, OK, covered by plantago 2/01; green, good 4/01
10.22	1	18.32	43																			1.27	0	0	leftmost of 10.23; green, good 2/00; hunkered, OK 4/00; green, good 2 & 4/01
10.23	1	18.32	43																			1.21	0	0	right of 10.22; green, good 2/00; hunkered, OK 4/00; green, good 2 & 4/01
10.24	1	18.41	43																			1.75	0	0	tag mia, replaced, green, good 4/99; hooded during weevil study in summer 99; green, good 2 & 4/00, 2 & 4/01
10.25	1	18.41	43																			1.85	0	0	right of 10.24, green, good 4/99; hooded during weevil study in summer 99; green, good 2 & 4/00, 2 & 4/01
10.26	1	18.30	43																			0.50		0	discovered 4/99; green, good, hunkered 2 & 4/00; green, almost spineless, poor 2/01; normal spines, plant green, OK 4/01
10.27	1	18.38	43																			0.55		0	discovered 4/99; very hunkered, green, good 2/00; very hunkered, OK 4/00, 2/01; coming out, green, good 4/01
10.28	1	18.33	43																			0.41		0	discovered 4/99; plant mia 2 & 4/00, 2 & 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
10.30	1	16.15	58							3.70	3	1	3.20	4	2 disp	4.70	3	3+1A	3.90	3	1+1A	3.34	1	0	thru pine; 1 seedling 2/95; 3 seedlings 5/95; 1 seedlings 2 & 5/96; 3 seedlings 5/98 & 2/99; buried in grass 2/99; 2 seedlings, buried in grass, plant green, good 4/99, 2 & 4/00; seedlings mia, plant green, good, covered by grass 2 & 4/01
10.31	1	16.18	58													1.60	0	0	2.40	0	0	1.73	0	0	seedling of 10.30; measured in one direction only 2/98; buried in grass 2/99 & 4/99, green, good 4/99, 2 & 4/00, 2 & 4/01
10.40	1	~15.20	~65													4.10		5	5.40	10	7	5.21	3+5fr	2+1A	redo tag (recorded as 11.40); measured around pinyon; discovered 5/97; several flowers partially eaten 2/99; green, good 4/99; hooded during weevil study in summer 99; maroonish, good 2/00; dull green, good 4/00; dead, no weevils, COD unknown 2/01
10.41	1	~15.38	~65													2.30		1A	3.30	0	0	3.99	0	0	redo tag (recorded as 11.40); measured around pinyon; discovered 5/97; rock on top, removed 2/99; hooded during weevil study in summer 99; green, good 4/99, 2 & 4/00; looks trampled, dead, just spines, COD unknown, not weevils 2/01
11.00	1	16.17	65	4.10	0	0	4.70	2	2	5.20	2	0	3.70	3	3	6.00	4	5	6.00	6	disp?	5.16	2+3fr	4	in prickly pear; flowers partially eaten 2/99; green, good 4/99, 2/00; partially covered by ant mound, green, OK 4/00; coming out of ant mound, green, good, tiny flower buds 2/01; green, good 4/01
11.01	1	16.85	66																			0.81		0	discovered 4/99; just spines left, COD unknown 2/00
11.100	1	16.83	68	4.40	2	2	4.30	2	2	2.20	1	1	1.70	3	1+1 disp	2.60	3	2+1A	2.20	0	0	2.27	0	0	12 seedlings 3/93; green, good 4/99; green, OK 2 & 4/00, 2 & 4/01
11.101	1	16.66	~76																						shrouded 2/00; green, good 2 & 4/00; olive, OK 2 & 4/01
11.102	1	17.00	~74																						discovered 2/01; buried in grass, green, good 2 & 4/01
11.11	1	16.83	68	0.40	0	0	0.40	0	0	1.60	0	0	1.50	1	disp	1.60	0	0	dead						dead, COD unknown 2/98

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
11.12	1	16.83	68	1.00	0	0	1.00	0	0	1.30	0	0	1.70	1	1 disp	2.10	1	1	2.20	0	0	dead			red spots 2/98 & 5/98; hollow, maybe weevils 2/99
11.13	1	16.83	68	2.00	0	0	2.40	1	0	3.10	1	1	3.50	2	2	3.50	4	3+1A	dead						dead, COD unknown 2/98
11.14	1	16.83	68	1.30	0	0	1.30	0	0	2.00	1	0	1.40	0	0	1.20	0	0	1.20	0	0	1.08	0	0	0 measured in one direction only 2/98; plant mia 2 & 4/00, 2/01
11.15	1	16.83	68	0.50	0	0	0.50	0	0	0.80	0	0	mia	mia	0	0.70	0	0	0.80	0	0	0.98	0	0	0 measured in one direction only 2/98; green, good 2 & 4/00; plant mia 2/01
11.16	1	16.83	68	1.10	0	0	1.10	0	0	1.00	0	0	1.10	0	0	1.00	0	0	1.50	0	0	1.23	0	0	0 measured in one direction only 2/98; green, good 2 & 4/00; hunkered, green, OK 2/01; popping out, green, good 4/01
11.17	1	16.83	68	1.00	0	0	1.10	0	0	0.80	0	0	0.60	0	0	0.50	0	0	0.80	0	0	0.70	mia	0	0 measured in one direction only 2/98; relocated 4/99; green, OK 2 & 4/00, 2 & 4/01
11.20	1	16.83	68	3.00	0	0	3.00	1	1	Dead	na	na													3 seedlings 3/93; dead 2/95, killed by pin
11.22	1	16.83	68	0.40	0	0	0.50	0	0	mia	mia	mia	mia			mia									prob. killed by pin, 2/95
11.23	1	16.83	68	0.50	0	0	0.70	0	0	mia	mia	mia	mia			mia									prob. killed by pin, 2/95
11.24	1	16.83	68									nd	nd	0	0	mia			mia			mia			sdln on top of 11.20 tag, replanted & watered 2/96; uprooted, looks dead 5/96; mia 98, 99, & 00
11.30	1	16.71	68	2.50	0	0	3.60	3	nd	4.10	5	3	3.90	6	5	5.60	9	9+1A	dead						COD unknown, 2 seedlings 2/98; seedlings mia 2 & 4/99
11.31	1	16.83	68	0.50	0	0	0.40	0	0	mia	mia	mia	mia			mia									mia 95, 96, 97
11.32	1	16.83	68	0.70	0	0	0.70	0	0	mia	mia	mia	mia			mia									mia 95, 96, 97
11.33	1	16.83	68	0.50	0	0	0.80	0	0	mia	mia	mia	mia			mia									mia 95, 96, 97
11.34	1	16.83	68	0.50	0	0	0.60	0	0	mia	mia	mia	mia			mia									mia 95, 96, 97
11.36	1	16.83	68										0.40	0	mia	mia			mia			mia			seedling by tag, replanted & watered; plant & tag mia 2/97, 2/99 & 4/99
11.37	1	16.83	68										0.30	0	mia	mia			mia			mia			plant & tag mia 2/97, 2/99 & 4/99
11.38	1	16.83	68													0.40	0	0	0.60	0	0	mia			redo tag (recorded as 11.18); measured in one direction only 2/98; plant & tag mia 2 & 4/99, 2 & 4/00, 2 & 4/01
11.39	1	16.83	68													0.90		0	0.90	0	0	mia			redo tag (recorded as 11.19); discovered 5/97; measured in one direction only 5/98; plant & tag mia 2 & 4/99, 2 & 4/00, 2 & 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
11.40	1	16.83	68													0.60		0	mia			mia			redo tag (recorded as 11:20); discovered 5/97; plant & tag mia 2/99, 2 & 4/00, 2 & 4/01
11.50	1	17.15	78																2.00	1	1A	2.57	1+2fr	2+1A	discovered 2/98; green, good 4/99, 2 & 4/00, 2 & 4/01, 2 & 4/01
11.60	1	17.42	78																			2.43		0	OK, purplish, discovered 4/99; hooded during weevil study in summer 99; dull green, good 2/00; dull green, OK 4/00, 2 & 4/01
11.70	1	17.55	78																			2.91		0	discovered 4/99; green, good 4/99; stigma pink, flowers dusky yellow, green, good, 2/00; dull green, OK 4/00; dead, COD unknown, not weevils 2/01
11.80	1	18.04	75?																			2.40		0	discovered 4/99; green, good 2 & 4/00, 2 & 4/01
11.90	1	17.92	76?																			1.11		0	discovered 4/99; measured in one direction only, under rock, greer , good 4/99, 2 & 4/00; either 2 plants or one plant with 2 heads, green, good 2/01; only 1 plant with one head, green, good 4/01
12.00	1	11.60	65	4.70	4	4	2.90	1	0	4.10	2	2	4.30	5	4	5.10	4	3+1A	5.80	8	8	5.42	2+2fr	2+2A	under yucca; great 2/98 & 5/98; something partially ate yucca, Tobusch flowers partially eaten 2/99; green, good, rooting in area 4/99; green, good 2 & 4/00; tag mia, replaced, green, good 2/01; uprooted, much rooting by yuccas, replanted, green, good 4/01
12.10	1	10.15	71													1.80		0	2.20	1	1	2.01	2	1A	discovered 5/97; measured in one direction only 5/98; digging in area, green, good 4/99; green, good 2 & 4/00, 2/01; pale dull green, OK 4/01
12.20	1	10.30	71													1.60		0	2.00	2	2A	1.82	0	0	discovered 5/97; digging in area, green, good 4/99; hooded during weevil study in summer 99; dark green, good 2/00; one side yellowish, OK 4/00; dead, COD possibly weevils 2/01

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PL #	ST #	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
13.00	1	9.57	65	2.10	0	0	2.70	0	0	3.00	1	1	3.00	nd	0	Dead									2/96 looks dead, gray spines; COD unknown
14.00	1	9.64	65	2.70	0	0	3.30	1	1	3.20	1	0	Dead												dead 2/96
14.01	1	9.72	69										1.60	0	0	mia			mia			mia			Dead tag & plant mia 2/98; tag found, plant mia 5/98; tag says 14.10; plant found, stem & root solid, COD unknown 4/99
15.00	1	6.81	66	5.40	5	5	5.80	5	5	5.00	7	7	4.90	5	5 disp	6.10	5	5	6.10	7.1 disp		5.25	7fr	1+5A	swarming piss ants; hooded during weevil study in summer 99, bad 7/99; dead, COD disp; unknown, maybe weevils, plant partially removed by weevil researcher, 3 small plants ( 15.01-15.03) at cage 9/99
15.01	1	6.90	73																						seedling of 15, behind 15.02 & 15.03, discovered 2/00; green, good, shrouded 2 & 4/00; green, good 4/01
15.02	1	6.88	73																						seedling of 15.00, between 15.01 & 15.03, discovered 2/00; dull green, OK, shrouded 2 & 4/00; green, OK 4/01
15.03	1	6.87	73																						seedling of 15.00, left of 15.04 & in front of 15.02, discovered 2/00; green, good, shrouded 2 & 4/00; green, good 2 & 4/01
15.04	1	6.87	73																						seedling of 15.00, right of 15.03 & in front of 15.01 & 15.02, discovered 4/00; green, good, shrouded 4/00; green, OK 2 & 4/01
16.00	1	8.67	66	0.90	0	0	1.00	0	0	1.40	0	0	1.00	0	0	1.30	0	0	1.50	0	0	1.41	0	0	0 measured in one direction only 2/98; green, good 4/99; dull green, OK, accidentally sat on 2/00; dull green, few spines 4/00; grayish, few spines, root exposed, poor 2/01; looks dead, hard and firmly rooted 4/01
16.10	1	8.70	68																1.90		1	1.88	0	0	in hole in rock at edge of pinyon, discovered 5/98; poor 2/99; yellow green, OK 4/99, 2 & 4/00; slightly purplish-green, OK 2/01; dull green, OK 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
20.00	1	9.05	68	1.60	0	0	1.60	0	0	1.50	0	0	1.70	0	0	2.60	3	1+1A	2.60	1	1	2.15	1fr		1A hunkered down in Selaginella & lichens 2/99; popping out, dull green, OK 4/99; green, good 2 & 4/00; pale yellowish-green, OK 2/01; apex shifted toward ground, dull olive, OK 4/01
21.00	1	9.35	68	2.00	0	0	nd	nd	1	2.70	3	1	2.70	3	3A	4.20	4	3+1A	4.80	4	disp?	3.69	4fr		2A by rock 3/93; measured in one direction only 2/98; olive 2/99; olive, OK 4/99; green with a few yellow tubercle tips, good 2 & 4/00; yellowish-green, OK 2 & 4/01
21.10	1	9.29	77							2.70	1	0	1.70	2	1 disp	3.30	3+2fr	3+2A	3.50	2	2A	Dead			between rocks; looks dead, gray spines, but firmly rooted 5/98; fairly solid but small chambers, killed by weevils 2/99
21.20	1	9.30	72													2.80	2	1	3.50	2	2	3.24	2fr	1+1A	green, good 4/99; only spines left, COD unknown 2/00
21.30	1	9.86	72													1.10	0	0	2.00	0	0	2.07	1fr	1 disp	very nestled in, measured in one direction only 2/98; very nestled in, tag chewed, replaced 5/98; hunkered down in Selaginella 2/99; popping out, green, good 4/99, 2 & 4/00; plant mia 2 & 4/01
21.40	1	9.88	72													1.20	0	0	1.60	0	0	1.68	0	0	very nestled in, measured in one direction only 2/98; very nestled in 5/98 & 2/99; popping out, green, good 4/99, 2 & 4/00; dead, COD unknown; no weevil galleries 2/01
22.00	1	8.50	68	2.60	1	1	2.70	2	2	2.50	2	0	2.40	0	0	3.10	2	2	3.60	2	2	2.96	2fr	2	squished? 3/93; measured in one direction only 2/98; hunkered down in Selaginella 2 & 4/99, 2/00; green, good 2/00; hunkered, OK 4/00; hunkered, green, good 2 & 4/01
23.00	1	8.47	68	3.00	1	1	3.00	2	0	3.00	2	0	3.60	3	disp	3.90	3	4	3.60	3	disp?	2.77	1+2fr	1	green, good 4/99, 2 & 4/00, 2 & 4/01
24.00	1	12.42	69	2.50	1	1	3.10	1	0	2.40	3	1	2.80	3	3, disp	3.70	5	4+1A	3.60	2	2	3.15	1	0; removed	1 flower eaten 2/95; flowers partially eaten 2/99; OK, dull green 4/99; hooded during weevil survey in summer 99; very poor, removed by weevil researcher 9/99; killed by weevils

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
24.10	1	14.90	82	3.30	1	1	3.60	3	3	2.00	3	0	2.40	2	2,disp	3.20	3+2	3+2	3.80	1+1fr	0	L2.23 R2.58	L 1fr R 2fr	L 1 R 2	damaged 2/94; 2 seedlings 2/94; 2 seedlings at base 2/96; 3+ pups; adult partially eaten by small mammal; adult hunkered down, OK; two apical meristems, each flowering, five seedlings or pups at base (#24.11-15); maybe 2 or 3 more seedlings not yet tagged 5/97; 2 apical meristems measured as one, 2 or 3 more seedlings 2/98; maybe one seedling between 24.11 and 24.12, maybe one seedling in front of right head of 24.10 2/99; reddish, OK 4/99; orangish, OK 4/00; L-purplish, OK, R-green, OK 2/01; L-yellowish-green, OK, R-green, OK 4/01
24.11	1	14.94	82													0.90	0	0	0.80	0	0	0.60	0	0	0 seedling or pup of 24.10; measured in one direction only 2/98; green, good 4/99, 2 & 4/00; purplish-green, OK 2/01; green, good 4/01
24.12	1	14.95	82													1.10	0	0	1.00	0	0	0.90	0	0	0 seedling or pup of 24.10; measured in one direction only 2/98; green, good 4/99, 2 & 4/00; purplish-green, OK 2/01; green, good 4/01
24.13	1	14.96	82													1.30	0	0	1.70	0	0	1.97	2fr	2	seedling or pup of 24.10; measured in one direction only 2/98; maroonish, OK 4/99; green, OK 2 & 4/00; green, OK 2/01; green, good 4/01
24.131	1	14.96	82																						discovered 2/01; green, OK 2 & 4/01
24.14	1	14.97	82													0.70	0	0	1.10	0	0	1.17	0	0	0 seedling or pup of 24.10; measured in one direction only 2/98, 2/00; green, good 2 & 4/00, 2 & 4/01
24.15	1	14.98	82													0.90	0	0	1.50	0	0	1.30	0	0	0 seedling or pup of 24.10; measured in one direction only 2/98, 2/00; green, good 2 & 4/00, 2 & 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
24.16	1	14.97	82																			0.82		0	between the 2 heads of 24.10 & between 24.15 and 24.12, 24.13 is left; discovered 4/99; green, good 2 & 4/00; hunkered, just spines showing 2 & 4/01
24.17	1	14.98	82																			0.55		0	between 24.10L and 24.11, discovered 4/99; one measurement only 2/00; green, OK 2 & 4/00; hunkered, green, OK 2 & 4/01
24.18	1	14.97	82																			0.99		0	right of 24.17, in front of 24.10, discovered 4/99; one measurement only 2/00; OK 2 & 4/00; green, good 2 & 4/01
24.19	1	14.98	82																			0.85		0	behind 24.18, right of 24.10 left, discovered 4/99; one measurement only 4/99, 2/00, 2/01; OK 2 & 4/00; green, OK 2 & 4/01
24.191	1	14.99	82																			0.90		0	behind 24/19, right of 24.10 left; discovered 4/99; green, good 2 & 4/00; one measurement only, green, OK 2/01; green, good 4/01
24.20	1	14.92	84													2.50	2	1+1A	2.80	2	0	2.81	1+1fr	1+1A	green, good 4/99, 2 & 4/00, 2 & 4/01
24.30	1	14.98	84													0.90	0	0	0.3?	0	0	1.29	0	0	green, good 4/99, 2 & 4/00; purplish green, OK 2 & 4/01
24.31	1	14.88	87																						by upper left edge of 24.3 tag, discovered 4/01; green, OK 4/01
24.40	1	14.97	82																			1.60		0	right of 24.10 cluster, discovered 4/99; green, good 2 & 4/00, 2 & 4/01
25.00	1	7.29	70	2.40	1	1	3.30	1	1	3.50	2	1	3.50	2	2,disp	4.00	3	2+1A	3.60	2	disp?	2.81	1fr	0	very orange 2/98; green, good 2/99 & 4/99; dark green, a few maroon tubercles, OK 2 & 4/00; purplish-green, OK 2/01; green, good 4/01
26.00	1	7.12	72	0.90	0	0	1.10	0	0	3.40	1	1	2.90	0	0	3.40	2	1	3.60	2	disp?	3.00	1	0	seedling by tag; seedling mia 2/96; seedling refund & tagged (26.1); flowers partially eaten 2/99; olive, OK 4/99; sinking into ground, olive, OK 2/00; stepped on, green, good 4/00; dead, COD unknown 2/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
26.01	1	7.29	70																						discovered 2/01; under dead body of parent, dull green, OK 2/01; just spines showing, OK 4/01
26.10	1	~7.10	72													nd		0	1.30	0	0	1.24	0	0	measured in one direction only, tagged 2/98; green, good 4/99, 2 & 4/00; olive, OK 2 & 4/01
27.00	1	7.47	72	4.00	3	3	4.10	2	2	Dead	na	na													only spines left
28.00	1	7.47	72	2.30	1	1	2.50	0	0	2.50	0	0	Dead												3 sdln 3/93; 4 sdln 2/94; 2 seedlings 2 & 5/95; all seedlings mia 2/96
29.00	1	7.91	70	1.00	1		1.00	0		2.00	1		2.60	2	2,disp	4.10	5	3+2A	4.70	5	3	4.30	5fr	2	light green, OK 4/99; reddish green, OK 2 & 4/00, 2/01; hunkered, OK 4/01
29.10	1	7.60	82																			2.89	1+2fr	2	under rock, flowers partially eaten 2/99; green, good 4/99, 2 & 4/00; dead COD weevils 2/01
30.00	1	8.42	75	5.20	4	4	5.50	2	1	4.80	5	0	4.60	3	3+1 disp	6.20	5	1+1A	6.30	4	4	5.48	4+1fr	4+1A	4 seedlings 3/93; 0 seedlings 2/95; short flowers 2/95; visited by honeybee 2/96; upper tubercles have spine clusters removed 2/97; buried in grass 2/99; stink bugs, green, good 4/99; green, good 2 & 4/00; purplish-green, OK 2/01; feels hollow and squishy, filled with maggots 4/01
31.00	1	6.40	74	1.90	0	0	2.10	0	0	2.50	1	0	2.10	nd	0	2.90	2	0	mia			mia			tag & plant mia 2/98, 5/98, 4/99, 2 & 4/00
32.00	1	8.63	76	2.40	1	1	2.40	1	1	2.30	2	1A	2.10	2	0	2.70	1	mia	mia			mia			lots of rooting in vicinity, nail found, plant & tag mia 5/97, 2/98, 5/98 & 2/99
32.10	1	8.65	93													2.80		1	2.60	1	1	1.95	0	0	discovered 5/97; hunkered down in Selaginella 2/99; popping out, green, good 4/99; pulling back in Selaginella, maroonish, OK, shrouded 2/00; shroud loose and removed, plant green, good 4/00; olive, OK 2 & 4/01
32.11	1	8.67	93																						seedling of 32.1, discovered 2/01; not tagged, olive, OK 2 & 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES	
33.00	1	10.62	80	2.70	1	1	2.60	0	0	2.00	1	2	2.00	2	1A, 1	2.90	1	1A	3.30	1	0	2.56	2fr	0	reddish 2 & 5/97; green 2/98; hunkered down in Selaginella 2/99; maroon, OK 4/99; hooded during weevil study in summer 99; bad 7/99; looks dead, removed by weevil researcher 9/99; dead, COD maybe weevils	
34.00	1	11.60	90	2.10	0	0	2.00	0	0	1.20	0	0	mia			mia			mia							plant & tag mia; tag relocated 5/98
35.00	1	11.37	82	1.80	0	0	1.70	0	0	1.20	0	0	1.10	0	0	1.70	0	0	1.60	0	0	1.32	0	0	0	
35.10	1	10.98	83																							green, good, popping out of Selaginella 2 & 4/00; tag mia, replaced, purplish-green, OK 2/01; tag loose, replaced, small chunk eaten out of one side, scarred over, dull purplish-green, OK 4/01
35.20	1	11.30	82																							discovered 2/01; hunkered, green, OK 2 & 4/01
35.30	1	11.64	83																							discovered 4/01; green, good 4/01
35.40	1	11.62	83																							discovered 4/01; green, good 4/01
35.50	1	11.62	83																							discovered 4/01; green, good 4/01
36.00	1	11.50	82	1.70	0	0	1.70	0	0	1.80	0	0	2.20	1	1	2.70	1	1	3.10	1	1	2.86	1	1	1 disp	hunkered down in Selaginella 2/99; popping out, dull green, OK 4/99; green, good, popping out 2 & 4/00; dead, COD weevils/galleries 2/01
37.00	1	11.15	82	1.80	0	0	1.90	0	0	1.90	0	0	1.60	0	0	2.40	0	0	2.90	2	1	2.52	1fr	1	1	maroon, OK 4/99; olive, OK 2/00; ants swarming fruit, plant maroonish, OK 4/00; dull gray-green, OK-poor 2/01; active weevil feeding, removed for weevil study 5/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
37.10	1	10.98	92													2.80		1	2.60	1	1A	2.23	0	0	discovered 5/97; spines gray, body olive, bad 2/99; gray spines, olive body, OK 4/99 & 2/00; new spine growth, dull green, OK 4/00; dead, dry and powdery inside, COD unknown 2/01
37.20	1	11.01	95																						discovered 2/01; green, OK 2 & 4/01
38.00	1	10.32	82	4.50	2	2	3.80	2	1	3.10	0	0	3.00	0	0	4.20	0	1+1A	4.60	4	1	4.17	0	0	green, good 4/99; buried in grass, accidentally trampled, green, good 2/00; dull green, OK 4/00; dead, headless weevil on outside of cactus, nothing inside, collected for weevil research 2/01
38.10	1	11.56	110													2.30	2	1	2.70	1	disp?	2.44	1fr	1 disp	green with a few orange tubercle tips, OK 4/99; hooded during weevil study in summer 99; spines gray, body dull dark green, some tubercles gold, digging beside, shrouded 2/00; shroud missing, dead, COD unknown 4/00
38.20	1	11.75	108													1.70	0	0	1.80	0	0	1.35	0	0	measured in one direction only 2/98; not looking good, spines gray, body dark green 2/99; OK, dark green, new spines 4/99; dark green, OK, pulling into soil 2 & 4/00; shrouded 2/00; shroud missing 4/00; hunkered, maroonish, OK 2/01; collected for weevil study 5/01
38.30	1	11.86	106													2.10	0	0	2.40	0	0	2.18	1fr	1A	green, good 4/99, 2 & 4/00; rock on top, removed 2/00; dark blue-green, good 2 & 4/01
38.40	1	11.72	106													1.50	0	0	1.10	0	0	1.38	0	0	measured in one direction only 2/98; hunkered down in dirt 2/99; hunkered in dirt, green, good 4/99, 2 & 4/00, 2 & 4/01
38.50	1	11.99	105																						discovered 4/00; green, good 4/00; dark green, good 2/01; reddish-green, OK 4/01
38.60	1	11.43	104																						discovered 2/01; green, good 2/01
38.70	1	12.66	102																						discovered 2/01; between two rocks, green, good 2 & 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
39.00	1	10.05	84	4.30	0	0	4.20	1	1	3.30	0	0	Dead												2 seedlings 3/93; 7 seedlings 2/94; dead, tag removed, grub hole & hollow stem 2/96
39.10	1	10.05	84	0.40	0	0	0.60	0	0	0.80	0	0	0.70	0	0	1.30	0	0	1.30	0	0	1.15	mia	0	measured in one direction only 2/98; plant & tag mia 2/99; relocated, retagged, green, good 4/99; tag and plant mia 2/00; relocated, hunkered, green, OK 4/00; covered by vegetation, green, OK 2 & 4/01
39.20	1	10.05	84	0.40	0	0	0.50	0	0	0.40	0	0	0.60	0	0	0.40	0	0	Dead						may be dead, looks gray 5/97; dead, COD unknown 2/98
39.30	1	10.05	84	0.40	0	0	0.40	0	0	0.40	0	0	0.40	mia	0	0.40	0	0	Dead						mia in 2/96; relocated & measured in 5/96; maybe dead, looks gray 5/97; dead, COD unknown 2/98
39.40	1	10.05	84	0.40	0	0	0.50	0	0	0.40	0	0	0.50	0	0	mia			mia			mia			accidentally removed when parent removed, replanted & watered; plant & tag mia 2/97, 2 & 5/98; plant mia, tag relocated 2/99; plant & tag mia 4/99
39.50	1	10.05	84							0.20	0	mia	0.50	mia	0	mia			mia			mia			tag missing; mia 2/96; relocated & measured 5/96; plant & tag mia 2/97, 2/99 & 4/99
39.60	1	10.05	84													0.40	0	0	0.50	0	mia	mia			may be dead, looks gray 5/97; mia 5/98; plant & tag mia 2 & 4/99, 2 & 4/00, 4/01
39.70	1	10.05	84													0.40	0	0	0.40	0	0	mia			may be dead, looks gray 5/97; plant & tag mia 2 & 4/99, 2 & 4/00, 4/01
39.80	1	10.13	84																						discovered 4/01; one measurement only, green, OK 4/01
40.00	1	18.89	78	2.40	0	0	2.70	1	1	3.00	1	1	2.90	2	2	3.20	0	0	3.20	2	2	3.36	0	0	green, good 4/99, 2 & 4/00; green, good, one tiny flower bud? 2/01; green, good 4/01
40.10	1	17.35	83										3.20	4	3,disp	4.70	5	3+2A	4.50	2	2	3.72	2+1fr	2	visited by honeybee; green, good 4/99; dark green, good 2 & 4/00; dead, COD weevils (galleries & exit holes) 2/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
40.20	1	17.30	85																4.60	6	disp?	4.49	7+2fr	9	discovered 2/98; 2 flowers partially eaten 2/99; green, good 4/99; two apical meristems, but still appears to be one stem, green, great 2/00; one fruit partially eaten, green, good 4/00; green, OK 2 & 4/01
40.30	1	17.93	80?																			1.26		0	discovered 4/99; under rock; green, good 4/99, 2 & 4/00; dull green, OK 2/01; green, good 4/01
40.31	1	17.91	80																						discovered 2/01; dull green, OK 2/01; new spine growth on side, green, OK 4/01
40.40	1	17.96	80?																			1.79		0	discovered 4/99; green, good, 4/99, 2 & 4/00, 2 & 4/01
40.50	1	18.85	83																						discovered 2/00; green, good 2 & 4/00; dark green, OK 2/01; green, good 4/01
40.60	1	18.85	84																						discovered 2/00; green, loose, good 2 & 4/00; green, good 2 & 4/01
40.70	1	18.87	84																						discovered 2/00; green, loose, good 2 & 4/00; tag mia, replaced, green, one brown tubercle, OK 2/01; pale green, good 4/01
41.00	1	18.62	78	5.60	3	3	5.20	3	3	4.40	3	3	4.10	3	3	4.30	2	2	4.30	0	0	Dead			8 seedlings 3/93; 10 seedlings 4/94; some seedlings 2/95; 1 seedling 2/96 & 2/97 (41.04); not looking good, 4 new seedlings 2/98; looks dead, one seedling dead 5/98; hard, dry, COD unknown 2/99
41.01	1	18.60	78	0.50	0	0	nd	nd	nd	mia	mia	mia	0.50	0	0	0.60	0	0	1.30	0	0	Dead			couldn't distinguish to recensus 2/94; hard, dry, solid, COD unknown 2/99
41.02	1	18.58	78	0.50	0	0	nd	nd	nd	mia	mia	mia	1.10	mia	0	0.50	0	0	0.90	0	0	0.55	0	0	couldn't distinguish to recensus 2/94; mia 2/96; relocated & measured 5/96; measured in one direction only 2/98; hunkered 4/99; plant mia 2 & 4/00, 2 & 4/01
41.03	1	18.58	78													0.40	0	0	0.80	0	0	Dead			measured in one direction only 2/98; hard, dry & solid, COD unknown 2/99

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
41.04	1	18.62	78													0.70	0	0	nd	0	0	Dead			too many seedlings in the area to tell which one was 41.04 2/98; hard, dry, solid, COD unknown 2/99
41.05	1	18.65	78																1.10	0	0	0.69	0		0 behind 41.06; measured in one direction only 2/98, 2/00; tagged 2/98; green, good 2 & 4/00, 2 & 4/01
41.06	1	18.65	78																1.20	0	0	0.77	0		0 in front of 41.05; measured in one direction only, tagged 2/98; green, OK 2 & 4/00, 2 & 4/01
41.07	1	18.56	78																			0.39			0 discovered 4/99; measured in one direction only, OK 4/99; plant mia 2 & 4/00, 2 & 4/01
41.08	1	18.60	78																						originally tagged as 41.07; discovered 4/01; green, OK 4/01
41.10	1	18.53	78													0.80	0	0	1.00	0	0	0.74	0		0 measured in one direction only 2/98; green, good 4/99, 2 & 4/00; under grass, green, OK 2 & 4/01
42.00	1	18.45	82	1.40	0	0	1.30	0	0	1.10	0	0	1.10	0	0	1.60	0	0	1.80	0	0	1.75	0		0 very in the ground 2/96; measured in one direction only 2/98; green, good 4/99, 2 & 4/00, 2 & 5/01
43.00	1	18.50	89	1.00	0	0	1.10	0	0	1.10	0	0	1.40	0	0	1.70	0	0	1.50	0	0	2.09	0		0 wedged under rock, measured in one direction only & 2/98; green, good 4/99, 2 & 4/00, 5/01
44.00	1	18.50	90	1.70	0	0	1.70	0	0	1.90	0	0	1.90	1	1,disp	2.90	2	1+1A	3.60	1	disp	3.44	1		1 green, good 4/99, 2 & 4/00; yellowish-green, OK 2/01; green, good 5/01
45.00	1	18.32	86	1.90	0	0	1.80	1	0	2.30	2	2	2.40	2	1+1 disp	3.20	2	3	3.40	3	disp	3.09	2+1fr	3	3 hole in stem; no hole 2/96; dull green, OK 4/99; collected, killed by weevil 2000
45.10	1	20.47	95										1.30	2	2A	3.20	1	1	2.90	1	1	2.77	0		0 orangish, OK 4/99, 2/00; olive, OK 4/00; dead, COD weevils (exit holes) 2/01
45.11	1	21.06	97																						discovered 2/01; green, OK 2/01; green, good 5/01
45.20	1	21.33	93										2.90	3	1A	4.60	5	4+1A	4.60	5	5	4.04	2+4fr	disp?	flowers partially eaten 2/99; green, good 4/99; green with maroonish tubercle tips, good 2/00; green, good 4/00; dead, COD weevils (galleries & exit holes) 2/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
45.21	1	21.33	95													0.70	0	0	1.50	0	0	1.52	0	0	0 measured in one direction only 2/98; green, good 4/99; hooded during weevil study in summer 99; hood missing 9/99; dull green, OK 2/00; purplish, OK 4/00; just spines left, COD unknown 2/01
45.30	1	21.82	94										3.00	5	1	5.10	6	4+2A	5.70	9	4	4.84	1+5fr	3 disp	tag says 41.30; buds pinkish, lower tubercles orangish 5/97; retagged 98; spines dull gray, poor, flowers partially eaten 2/99; olive, OK 4/99; dead, killed by weevil 6/99
45.31	1	21.88	94																			0.77		0	discovered 4/99; measured in one direction only 4/99; OK 4/99; yellow-green, OK 2 & 4/00, 2 & 5/01
45.32	1	21.89	94																			0.75		0	discovered 4/99; measured in one direction only 4/99; OK 4/99; yellow-green, OK 2 & 4/00; barely visible, poor 2/01; dead, just spines left, COD unknown 5/01
45.33	1	21.90	94																			0.59		0	discovered 4/99; measured in one direction only 4/99, 2/00; OK 4/99; yellow-green, OK 2 & 4/00; barely visible, poor 2/01; dead, just spines left, COD unknown 5/01
45.34	1	21.91	94																			1.38		0	discovered 4/99; green, good 4/99; yellow-green, OK 2/00; olive, OK 4/00; yellowish-green, OK 2 & 5/01
45.35	1	21.70	97																						left of 45.36, discovered 2/01; green, OK 2/01; green, good 5/01
45.36	1	21.71	97																						right of 45.35, discovered 2/01; green, under rock, OK 2 & 5/01
45.40	1	18.15	92										1.50		0	2.40	2	2	2.60	2	2	2.34	1+1fr	Dead	discovered 5/96; flowers partially eaten 2/99; dark green, OK 4/99; dead, killed by weevil 6/99

PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
45.50	1	17.67	92										1.40		0	2.20	1	0	2.70	0		2.65	1fr	1	discovered 5/96; measured in one direction only 2/98; under rock 2/99; green, good 4/99; hooded during weevil study in summer 99; dull green, OK 2 & 4/00; dead, COD weevils (chambers, exit holes) 2/01
45.51	1	17.92	93																						discovered 2/01; in grass, lanky, green, OK 2/01; green, good 5/01
45.52	1	18.03	93																						discovered 2/01; in grass, green, good 2 & 5/01
45.53	1	18.11	94																						discovered 5/01; green, good 5/01
45.60	1	22.20	96													3.10	2	2	3.80	3	3	3.41	1+2fr	1+1A	one small seedling by tag 2/97; seedling Dead mia 2/99; olive green, OK, spines gray 4/99; dead, killed by weevil 6/99
45.70	1	20.65	95																3.70	4	disp	3.32	4	0	discovered 2/98; all flowers partially eaten 2/99; dull dark green, OK 4/99; green, good 2 & 4/00, dark purplish-green, OK 2/01; dull, dark green, OK 5/01
45.80	1	20.58	95																2.30	1	1	1.88	1	disp?	discovered 2/98; flowers partially eaten 2/99; green, good 2 & 4/00; olive-green, OK 2/01; dull green, OK 5/01
45.90	1	20.59	95																2.50	1	0	1.92	1	disp?	discovered 2/98; dead, COD unknown 2/00
45.91	1	20.55	96																1.20	0	0	1.15	0	0	discovered 2/98; in rock crevice, right of tag, one measurement only 2/98, 2/99, 2/00, 2/01; green, good 4/99, 2 & 4/00, 2 & 5/01
45.92	1	20.55	96																1.40	0	0	0.96	0	0	discovered 2/98; in rock crevice, right of tag, one measurement only 2/98, 2/99, 2/00, 2/01; green, good 4/99, 2 & 4/00, 2 & 5/01
46.00																									tag but no plant 2/00, 2/01
46.10	1	11.96	101																						discovered 4/00; green, good 4/00; tag mia, replaced, slightly reddish-green, OK 2/01; slightly purplish-green, OK 5/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES	
47.00	1	14.20	90	3.50	1	1	3.20	0	0	2.70	0	0	3.60	2	1+1 disp	Dead										between rocks, only measured in one direction; COD unknown, stem hollow, no insects but maybe weevils 2/97
47.20	1	37.80	92							3.30	5	3	2.80	nd	1A	4.40	4	4A	3.20	3	2+1A	2.84	1+2fr	2	very maroon, looks bad 5/97; maroon, OK, behind juniper 2/98, 2 & 4/99; totally maroon, poor 2/00; purplish, OK 4/00; dark olive 2/01; pale green, OK 5/01	
48.00	1	8.93	102	2.20	0	0	2.20	0	0	2.00	1	0	2.20	4	1 disp	2.80	2	2	2.80	2	2	2.30	1fr	disp?	green, good 4/99, 2/00; stepped on?, purplish, OK 4/00; dead, COD weevils (galleries, chambers, exit holes) 2/01	
48.10	1	7.52	123										1.80	1	0	2.00	0	0	2.30	0	0	2.19	0	Dead	discovered 5/96; hunkered, OK 4/99; hooded during weevil study in summer 99; dead, COD unknown 9/99	
48.11	1	8.53	113																						discovered 9/99; green, good, hunkered 9/99, 2 & 4/00; tag mia, replaced 4/00, 2/01; hunkered, dark green, OK 2 & 5/01	
48.12	1	8.60	113																						discovered 9/99; green, good, hunkered 9/99, 2 & 4/00; tag mia replaced, hunkered, green, OK 2/01; ants swarming, partly covered with ant dirt, green, OK 5/01	
48.13	1	8.65	113																						left of 48.14, 48.15, 48.16 and in front of 48.17, discovered 9/99; green, a few orange tubercles, OK, hunkered 9/99; dark green, OK 2 & 4/00; tag mia replaced, reddish, hunkered, ants swarming, poor 2/01; very hunkered, green with some red tubercle tips, poor 5/01	
48.14	1	8.65	113																						right of 48.13 & left of 48.15 & 48.16 & in front of 48.17, green, OK 9/99, 2 & 4/00; tag mia, replaced, ants swarming, hunkered, poor 2/01; very hunkered, green, poor 5/01	

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
48.15	1	8.65	113																			1.54			right of 48.13 & 48.14, left of 48.16 & in front of 48.17; green, good 9/99, 2 & 4/00; tag mia, replaced, ants swarming, dark green, OK 2/01' almost covered with ant dirt, green, OK 5/01
48.16	1	8.65	112																			1.84			right of 48.13, 48.14 & 48.15, & in front of 48.17; green, good 9/99, 2 & 4/00; tag mia, replaced, hunkered, poor 2/01; looked dead but not infested, COD researchers 5/01
48.17	1	8.67	113																			2.44			behind 48.13 - 48.16, dull green, a few orange tubercles, OK 9/99; dark purplish green, OK 2/00; green, good 4/00; ants building mound on plant, plant green, OK 2/01; partly covered with ant dirt, green, OK 5/01
48.17 <sup>1</sup>	1	8.81	115																						discovered 5/01; green, OK 5/01
48.18	1	8.58	112																			1.83			discovered 9/99; green, good 9/99, 2 & 4/00; dead, COD unknown 2/01
48.19	1	8.59	113																						discovered 4/00; olive, OK 4/00; tag mia, replaced 2 & 5/01; hunkered, poor 2/01; hunkered, green, OK 5/01
48.20	1	9.73	124																2.40	2	2A	2.42	2	2	discovered 2/98; green, good 4/99; green, good, hunkering 2 & 4/00; dead, stem hollow, COD unknown 2/01
48.21	1	9.06	120																			1.38			discovered 9/99; green, good, under rock 9/99, 2 & 4/00; tag mia, replaced, plant dark green, OK, ants swarming 2/01; dead, galleries and chambers, COD weevils 5/01
48.211	1	9.20	119																						hunkered, OK 2 & 4/00; tag mia, replaced 4/00, 2/01; olive, hunkered, OK 2/01; dead, COD weevils in root 5/01
48.212	1	9.15	119																						discovered 4/00; green, good 4/00; tag mia, replaced, olive, hunkered, OK 2/01; dead, COD unknown 5/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
48.213	1	9.14	119																						in front of 48.213, discovered 2/01; hunkered, olive, OK 2/01; dead, COD unknown 5/01
48.214	1	8.80	118																						discovered 2/01; dark olive, poor 2/01; dead, galleries, chambers, puparia, COD weevils 5/01
48.215	1	7.64	117																						discovered 2/01; hunkered, dark green, OK 2 & 5/01
48.216	1	7.87	117																						discovered 2/01; olive, OK 2/01; green, good 5/01
48.217	1	7.66	119																						discovered 2/01; between small rocks, light green, OK 2/01; very hunkered, poor 5/01
48.22	1	7.63	110																			0.86			discovered summer 99; hunkered 9/99, 2 & 4/00; tag mia, replaced 4/00; hunkered, olive, OK 2 & 5/01
48.23	1	7.65	112																			0.71			measured in one direction only, right of 48.24 & 48.25, discovered summer 99; hunkered 9/99, 2 & 4/00; tag eaten, replaced 4/00, 2/01; hunkered, olive, OK 2/01; dead, gallery, COD weevils 5/01
48.24	1	7.66	112																			0.65			discovered summer 99; between 48.23 & 48.25, hunkered 9/99, 2 & 4/00; tag eaten, replaced 4/00, 2/01; hunkered, olive, OK 2/01; possible puparia, COD weevils? 5/01
48.25	1	7.65	112																			0.89			discovered summer 99; left of 48.23 & 48.24, hunkered 9/99; hunkered, green, good 2 & 4/00; tag eaten, replaced 4/00, 2/01; hunkered, olive, OK 2 & 5/01
48.26	1	7.69	112																			0.55			discovered in summer 99; measured in one direction only, hunkered 9/99; hunkered, OK 2/00; green, OK 4/00; tag loose, replaced 4/00; hunkered, olive, OK 2/01; dead, COD unknown 5/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
48.27	1	7.81	112																			1.61			discovered summer 99; green, good 9/99; hunkered, OK 2/00; green, OK 4/00; tag loose, replaced, plant yellowish-green, OK 2/01; dead, weevil larva inside, COD weevils 5/01
48.28	1	7.94	111																			1.45			discovered summer 99; green, good 9/99, 2 & 4/00; tag loose, replaced 4/00; hunkered, olive, half red, OK 4/01; dead, hollow, COD weevils 5/01
48.29	1	8.23	112																						discovered 4/00; hunkered, OK 4/00; hunkered, olive, OK 2 & 5/01
48.30	1	10.23	124																2.90	3	disp	2.81	3+2fr	5	discovered 2/98; measured in one direction only 2/98 & 2/99; hooded during weevil study in summer 99; dull green, OK 4/99, 2/00; olive, OK 4/00; tag loose, replaced, ants swarming, gray spines, green body, OK 2/01; COD weevils 5/01; one seedling replanted in hole 5/01
48.31	1	10.58	124																			1.26		0	discovered 4/99; green, good 4/99; hooded during weevil study in summer 99; covered by loose prickly pear pad, removed, green, good 2/00; olive, OK 4/00, 2/01; dead, COD weevils 5/01
48.32	1	9.78	122																						discovered 4/00; green, good 4/00; tag mia, replaced, plant olive, OK 2 & 5/01
48.40	1	10.08	125																1.90	3	disp	1.92	1fr	1	measured in one direction only, discovered 2/98; hunkered down in Selaginella 2 & 4/99; solid, dry, COD unknown 2/00
48.50	1	10.52	130																2.40	1	0	2.40	1fr	1 disp	discovered 2/98; dull green, OK 4/99; reddish green, OK 2/00; ants swarming, plant green, good 4/00, 2 & 5/01
48.60	1	10.49	128																			1.01	0	0	hunkered in Selaginella 2/99; popping out, green, good 4/99, 2 & 4/00; slimy orange inside, dead, COD unknown 2/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
48.70	1	10.64	131																			0.89	0	0	green, good, tag mia, replaced 4/99; hunkered 2 & 4/00; ants swarming, hunkered, maroonish, poor 2/01; dead, COD weevils 5/01
48.80	1	10.32	129																			1.26	0	0	hunkered in Selaginella 2/99; green & good 4/99; green, good, hunkered 2 & 4/00; tag mia, replaced 2/01; plant hunkered, green, OK 2 & 5/01
48.81	1	10.11	129																						discovered 2/01; green, good 2 & 5/01
48.90	1	10.35	129																			1.34	0	0	hunkered in Selaginella 2/99; popping out, OK, green, good 4/99; hunkered, OK 2 & 4/00, 2/01; hunkered, green, OK 5/01
48.91	1	5.11	146																						discovered 2/01; pale olive, OK 2 & 5/01
49.00	1	25.04	121													5.30	8	8	5.60	6	all disp.	4.82	1+5fr	6	tag eaten, retagged 5/97; hooded during weevil study summer 1999; green, good 4/99, 2 & 4/00; dead, COD weevils (galleries) 2/01
49.10	1	25.00	121													1.40	0	0	1.80	0	0	1.99	1	1	measured in one direction only 2/98; flowers partially eaten 2/99; green, good 4/99, 2 & 4/00; dead, COD Moneilema?, one large chamber 2/01
49.20	1	25.10	122																			1.70		0	discovered 4/99; hunkered, green, good 2 & 4/00; dead, COD Moneilema?, one large chamber 2/01
49.30	1	22.06	119																			0.83			discovered summer 99; looks dead, but firmly rooted 9/99; green, new spiine growth, OK 2 & 4/00; tag mia, replaced 4/00, 2 & 5/01; olive, OK 2 & 5/01
49.40	1	22.10	118																			2.07			slightly orangish, discovered 7/99; slightly orangish, OK 9/99; maroonish, OK, shrouded 2/00; shroud loose, removed 4/00; plant green, good 4/00; tag mia, replaced 2 & 5/01; pale green, OK 2/01; green, OK 5/01
49.50	1	22.24	118																			1.56			discovered 9/99; army green, OK 9/99, 2/00; green, good 4/00; pale olive, OK 2/01; green, good 5/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
49.60	1	22.17	115																						discovered 4/00; hunkered, OK 4/00; plant and tag mia 2 & 5/01
49.70	1	22.27	120																						discovered 2/01; olive, OK 2/01; tag mia, replaced, pale green, good 5/01
49.80	1	22.40	118																						discovered 2/01; edge of grass clump, green, good 2/01; tag mia, replaced, plant green, good 5/01
49.90	1	22.19	118																						discovered 5/01; hunkered in Selaginella, green, OK 5/01
49.91	1	22.30	118																						discovered 5/01; red at base, green above, OK 5/01
50.10	1	25.75	120													2.30	0	0	3.40	3	2	4.52	3+4fr	7	in seed ring; measured in one direction only 2/98 & 2/99; green, good 4/99; very poor, removed by WC, no evidence of weevils 2/00
50.20	1	25.81	120													1.60	0	0	2.90	2	1	2.80	1+2fr	3	in seed ring; measured in one direction only 2/98 & 2/99; green, good 4/99, 2 & 4/00, 2 & 5/01
50.30	1	25.87	119													0.70	0	0	1.00	0	0	0.93	0	0	in seed ring; measured in one direction only 2/98; green, good 4/99; dull green, OK 2/00; green, good 4/00, 2 & 5/01
50.40	1	26.01	118																			2.81		3	discovered 4/99; very poor, removed by WC, seven seedlings, dead, maybe weevils 2/00
50.41	1	24.32																							discovered 5/01; green, good 5/01
50.42	1	24.36																							discovered 5/01; green, good 5/01
50.50	1	26.10	118																			2.51		1	left of 50.60 & 50.61; discovered 4/99; dark green, OK 2/00; maroonish, OK 4/00; olive, OK, several seedlings behind it 2/01; dark olive, OK 5/01
50.51	1	26.12	118																			1.15		0	left of 50.60 & 50.61, behind 50.52; discovered 4/99; dark green, OK 2/00; hunkered, OK 4/00; green, OK 2/01; green, OK 5/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
50.52	1	26.11	118																						at 7 o'clock on 50.50, in front of 50.51, discovered 5/01; one measurement only 5/01; OK 5/01
50.53	1	26.10	118																						at 8 o'clock on 50.50, left and above 50.51 & 50.52, discovered 5/01; one measurement only 5/01; OK 5/01
50.54	1	26.10	118																						left of 50.53, in front of 50.54, discovered 5/01; OK 5/01
50.55	1	26.11	118																						behind 50.54 and left of 50.51 & 50.52, discovered 5/01
50.56	1	26.10	118																						at 9 o'clock on 50.50, discovered 5/01; OK 5/01
50.57	1	26.08	118																						at 11 o'clock on 50.50, discovered 5/01; green, OK 5/01
50.60	1	26.12	118																			2.45			1 right of 50.50 & 50.51; discovered 4/99; getting squeezed, dark green, OK 2 & 4/00; just spines left, COD unknown 2/01
50.61	1	26.10	118																			1.78			0 right of 50.50 & 50.51; discovered 4/99; dark green, OK 2/00; green, good 4/00; just spines left, COD unknown 2/01
50.70	1	26.19	118																			1.77			0 discovered 4/99; green, good 2 & 4/00, 2 & 4/01
50.80	1	26.34	118																			1.99			0 discovered 4/99; hooded during weevil study in summer 99; olive green, OK 2 & 4/00; tag chewed, replaced, plant olive, OK 2 & 5/01
51.00	1	26.02	107	?	?	?	?	?	?	3.50	3	0	3.50	4	2 disp	4.30	5	4+1A	4.30	3	disp	3.74	0		0 5 seedlings 5/95; 4 seedlings at base 2/96; 3 seedlings 2/97 (51.01-51.03); poor, spines dull gray, body olive 2/99; spines dull gray, body olive, OK 4/99, 2/00; reddish, OK 4/00; olive, OK 2/01; flabby, maroon, poor 5/01
51.01	1	26.02	107													0.90	0	0	0.80	0	0	0.79	0		0 measured in one direction only 2/98 & 2/99; OK 4/99; hooded during weevil study in summer 99; dull green, OK 2 & 4/00; green, OK 2/01; green, good 5/01

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51.02	1	26.02	107													0.60	0	0	0.70	0	0	0.97	0	0	between 51.01 & 51.04, measured in one direction only 2/98; OK 4/99, 2 & 4/00; green, OK 2 & 5/01
51.03	1	26.02	107													0.50	0	0	mia			mia			mia 98, 99, 00
51.04	1	26.02	107													0.70	0	0	0.90	0	0	0.89	0	0	behind 51.01 & 51.02, measured in one direction only 2/98 & 2/99; OK 4/99, 2 & 4/00; green, OK 2 & 5/01
51.05	1	26.02	107													0.30	0	0	mia			mia			mia 98, 99, 00
51.06	1	26.02	107													0.40	0	0	0.40	0	0	mia			between & left of 51.02 & 51.04, measured in one direction only 2/98; mia 4/99, 2 & 4/00; green, OK 2 & 5/01
51.07	1	26.02	107																						between and right of 51.01 & 51.02, discovered 5/01; one measurement only, green, OK 5/01
51.10	1	26.23	107							0.50	0	0	mia			0.80	0	0	1.30	0	0	1.24	0	0	5 seedlings 5/95; tag & plant mia 2/96; needs tag 2/97; tag moved & replaced 5/97; measured in one direction only 2/98; OK 2 & 4/00; hunkered, OK 2 & 5/01
51.20	1	26.86	108										0.90	0	0	1.30	0	0	1.80	0	0	1.47	0	0	measured in one direction only 2/98 & 2/99; hunkered down 2/99 & 4/99; popping out, OK 2/00; green, good 4/00; olive, OK 2 & 5/01
51.30	1	26.25	108										0.80	0	0	1.20	0	0	1.30	0	0	1.28	0	0	tag mia, retagged 5/97; measured in one direction only 2/98; tag mia, replaced, green, good 4/99, 2 & 4/00; olive, OK 2 & 5/01
51.40	1	26.13	107													0.90	0	0	1.00	0	0	1.00	0	0	nestled in, measured in one direction only 2/98; nestled in 2/99; OK 4/99, 2 & 4/00; hunkered, green, OK 2 & 5/01
51.50	1	26.13	107													0.90		0	0.80	0	0	0.76	0	0	discovered 5/97; measured in one direction only 2/98; OK 4/99, 2 & 4/00; green, OK 2 & 5/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
51.60	1	26.15	107													0.60		0	mia			0.52	mia	0	discovered 5/97; relocated, OK 4/99, 2 & 4/00; green, OK 2 & 5/01
51.70	1	26.22	108													0.60		0	0.70	0	0	0.79	mia	0	discovered 5/97; nestled in, measured in one direction only 2/98; OK 4/99; poor, grayish, hard, maybe dead 2/00; green, OK 4/00, 2 & 5/01
51.80	1	25.94	108													1.10		0	1.30	0	0	1.49	0	0	discovered 5/97; measured in one direction only 2/98; hooded during weevil study in summer 99; green, good 4/99, 2/00; plant mia 4/00 & 2/01; purplish-green, OK 5/01
51.81	1	25.99	108													0.90		0	mia			mia			discovered 5/97; poor, hard, maybe dead 2/00; green, OK 4/00; almost covered by gravel, green, OK 2/01; hunkered, green, OK 5/01
51.82	1	26.02	108													1.20		0	1.60	0	0	1.38	0	0	discovered 5/97; OK 4/99, 2 & 4/00; green, OK 2 & 5/01
51.83	1	26.03	108													1.20		0	1.20	0	0	1.37	0	0	discovered 5/97; OK 4/99, 2 & 4/00; green, OK 2 & 5/01
51.90	1	26.59	106													2.40		1	2.30	1	0	2.47	0	0	discovered 5/97; tag mia, replaced, slightly trampled 2/99; hunkered, poor, maroonish 4/99, 2/00; new spine growth, olive, OK 4/00, 2 & 5/01
52.00	1	42.30	124	4.80	2	2	4.60	2	1	5.10	9	1+4	4.30	3	0	4.90	5	5	4.90	3	3	4.09	0	1A	2 seedlings 3/93; flowers eaten 2/95; 7 seedlings; 4 scars 5/95; brownish green, 2 seedlings at base 2/98; 3 seedlings at base 5/98; getting maroonish 1 seedling at base 2/99; getting maroonish, 2 seedlings at base 4/99; removed by JMP, larvae inside 2/00; six seedlings (2 uprooted), placed rock in hole 2/00; all mia 4/00, parent dead, killed by weevil
52.10	1	42.30	124	0.30	0	0	0.60	0	0	mia		na	0.60	0	0	0.50	0	0	0.80	0		0.59	0	0	seedling 1" from 52.00 3/93; still there 2/94; measured in one direction only 2/98 & 2/99; green, good 4/99; hunkered, OK 2 & 4/00; green, good 2 & 5/01

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52.11	1	42.30	124										0.60	0	0	mia			mia			mia				
52.20	1	8" East of 52								2.00	0	0	1.80	1	0	3.00	2	2	3.40	3	3	2.93	3fr	2 disp	seedling in rock crack below 52.10 OK, maroonish 4/99; hooded during weevil study in summer 99; looks dead, maybe weevils, removed by weevil researcher 9/99	
52.30	1	42.46	128										1.60	0	0	2.20	0	1	1.90	2	2	1.98	1fr	0	green, good 4/99, 2 & 4/00, 2 & 5/01	
52.40	1	42.26	124										1.60	1	1	1.60	1	1	1.80	1	disp	1.45	0	0	measured in one direction only 2/98 & 2/99; green, good 4/99, 2 & 4/00; green, OK 2 & 5/01	
52.50	1	42.37	124																						discovered 2/00; green, good 2 & 4/00; plant mia 2 & 5/01	
53.00	1	48.55	133																						discovered 2/01; purplish, OK 2/01; green, OK 5/01	
54.00	1	48.38	133																						discovered 2/01; dark blue-green, OK 2/01; green, good 5/01	
54.01	1	48.45	133																						discovered 5/01; green, OK 5/01	
55.00	1	52.75	134																						discovered 2/01; split open, green, poor 2/01; dead, COD unknown 5/01	
56.00	1	52.50	135																						discovered 2/01; olive, OK 2 & 5/01	
57.00	1	52.65	135																						discovered 2/01; hunkered, green, OK 2/01; COD unknown 5/01	
58.00	1	52.69	135																						discovered 2/01; olive, OK 2 & 5/01	
59.00	1	52.70	135																						discovered 2/01; COD maggots 5/01	
60.00	1	52.72	135																						discovered 2/01; olive, OK 2/01; dead, COD maggots 5/01	
61.00	1	52.60	135																						discovered 2/01; under rock, olive, OK 2 & 5/01	
62.00	1	52.77	136																						discovered 2/01; olive, OK 2 & 5/01	
62.01	1	52.80	136																						discovered 2/01; green, OK 2 & 5/01	
63.00	1	52.65	136																						discovered 2/01; dark green, OK 2 & 5/01	
64.00	1	48.12	134																						discovered 2/01; hunkered, green, OK 2 & 5/01	

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
65.00	1	48.00	134																						wedged between two rocks, discovered 2/01; green, good 2 & 5/01
66.00	1	47.96	134																						discovered 2/01; reddish-green, OK 2 & 5/01
67.00	1	47.91	134																						between rocks, discovered 2/01; olive, OK 2 & 5/01
68.00	1	47.89	134																						discovered 2/01; dull green, some reddish tubercle tips, OK 2 & 5/01
69.00	1	47.80	134																						discovered 2/01; purplish, OK 2/01; olive, OK 5/01
70.00	1	47.80	134																						discovered 2/01; green, good 2 & 5/01
71.00	1	47.78	134																						discovered 2/01; dark olive, OK 2 & 5/01
72.00	1	47.87	134																						discovered 2/01; green, OK 2 & 5/01
73.00	1	47.80	134																						discovered 5/01; green, OK 5/01
74.00	1	47.83	134																						discovered 5/01; green, OK 5/01
75.00	1	47.65	134																						discovered 5/01; green, OK 5/01
76.00	1	47.55	134																						discovered 5/01; in grass clump; green, good 5/01
77.00	1	47.52	135																						discovered 5/01; green, OK 5/01
78.00	1	47.08	135																						discovered 5/01; green, OK 5/01
79.00	1	48.47	136																						discovered 5/01; green, good 5/01
80.00	1	48.33	136																						wedged between three rocks, discovered 5/01; one measurement only, green, good 5/01
																									discovered 5/01; green, OK 5/01
Stake 2 = GPS2; R021620A																									
1.00	2	53.30	172																						
2.00	2	53.31	172																						left of 2.00, discovered 5/01; green, good 5/01
3.00	2	53.40	172																						right of 1.00, discovered 5/01; green, good 5/01
																									discovered 5/01; olive, OK 5/01

Ancistrocactus lobuschii Data for  
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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
53.00	2	2.86	298	2.50	0	0	2.60	1	1	1.90	0	0	2.30	0	0	3.60	1	1	2.70	0	0	2.43	0	0	looks bad 2/96; new spines 5/96; looks OK, green, covered by soil & litter from heavy rains 2/97; uncovered 2/98; OK 5/98 & 2/99; green, good 4/99; shrouded 2/00; shroud missing 4/00; olive, OK 2 & 4/01
54.00	2	1.97	316	3.00	2	2	2.80	1	0	3.00	3	3	3.40	2	2 disp	4.10	2	2	3.80	2	2 disp	3.35	2fr	Dead	ants swarming fruit 5/96; dug up as it looked dead, spines dull gray, squishy, but partially green with roots, replanted 2/99; removed for weevil study, killed by weevils 4/99
55.00	2	3.12	340	3.50	3	3	3.60	2	2	2.30	0	0	Dead												
56.00	2	4.31	338	2.80	0	0	2.70	1	1	2.40	1	1 scar	2.60	1	1A	3.30	2	2	3.60	2	2	3.56	1fr	1	looks bad 5/95; hollow, just spines 2/96 1 scar 5/95; fruit yellowish, soft, plant OK, a few orange tubercles 4/99; hooded during weevil study in summer 99; dull green, OK 2 & 4/00; dull green, OK, sort of collapsed on one side 2 & 4/01
56.01	2	4.40	341																						coming up at edge of tag, discovered 2/01; not tagged, green, good 2/01; green, OK 4/01
56.10	2	4.36	337																			1.42			discovered summer 99; olive green, OK, squishy, tagged 9/8/99; dull green, OK 2/00; green, good 4/00, 2 & 4/01
57.00	2	4.25	340	1.30	0	0	1.30	0	0	1.30	0	0	1.40	0	0	2.30	1	1A	3.00	1	1	2.30	0	0	very hunkered down 2/99; coming out, green, good 4/99, 2 & 4/00; dull green, OK slightly hunkered 2 & 4/01
57.10	2	4.10	346										2.60	3	disp	3.50	3	3	3.50	2	disp	4.01	2+1fr	3	green, good 4/99, 2 & 4/00; green with one reddish tubercle tip, OK 2 & 4/01
57.20	2	3.24	350																						discovered 4/00; reddish, OK 4/00, 2/01; olive, OK 4/01
60.00	2	7.96	344	1.40	0	0	1.50	0	0	1.80	1	1	1.90	0	1 disp	2.80	1	1A	3.10	1	1	2.93	1+1fr	3	tag loose, retagged 2/99; green, good 4/99; maroonish, OK 2 & 4/00; tag mia, replaced, plant hunkered, green, OK 2/01; popping out, green, good 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
60.10	2	7.91	346													0.80		0	1.30	0	0	1.39	0	0	discovered 5/97; measured in one direction only 2/98; tag loose, replaced 2/99; green, good 4/99; hunkered, green, good 2 & 4/00; tag loose, replaced, yellowish-green, OK 2/01; green, good 4/01
60.11	2	7.97	345																						coming up ~1cm down slope from tag 60.10, discovered 2/01; not tagged, green, OK 2 & 4/01
60.20	2	9.15	344																			1.80			discovered summer 99; green, good, tagged 9/8/99; reddish green, OK 2/00; green, good 4/00; reddish-green, good 2 & 4/01
60.30	2	10.91	340																			1.52			discovered summer 99; hunkered 9/99; hunkered, green, good 2 & 4/00; popping out, dull green, OK 2/01; hole eaten in center, scarred over, dull dark green, poor 4/01
60.40	2	10.95	337																			1.08			discovered summer 99; left of 60.41; hunkered 9/99; popping out, green, good 2 & 4/00, 2 & 4/01
60.41	2	10.96	337																			1.28			discovered summer 99; right of 60.40, hunkered 9/99; popping out, green, good 2 & 4/00, 2/01; center eaten, scarred over, hard, tan, very poor 4/01
60.50	2	11.09	337																			1.14			left of 60.51 & 60.52, discovered summer 99; hunkered 9/99; popping out, green, good 2 & 4/00, 2/01; hunkered, green, OK 4/01
60.51	2	11.10	337																			1.05			right of 60.50 & 60.52, discovered 9/99; hunkered 9/99; popping out, green, good 2 & 4/00, 2/01; hunkered, green, OK 4/01
60.52	2	11.09	337																						between 60.50 & 60.51, discovered 2/00; green, OK 2 & 4/00, 2 & 4/01

Ancistrocactus tobuschii Data for  
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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
60.600	2	11.07	337																			0.73			right of 60.604 & 60.50, discovered 9/99; hunkered 9/99; hunkered, green, good 2 & 4/00; purple-green, hunkered, OK 2/01; green, OK 4/01; tag mia, replaced 2 & 4/01
60.601	2	11.10	337																			0.75			behind 60.612; discovered 9/99; measured in one direction only 9/99; hunkered 9/99; hunkered, green, good 2 & 4/00; purplish-green, hunkered, OK 2/01; popping out, green, good 4/01; tag mia, replaced 2 & 4/01
60.602	2	11.08	337																			1.26			right of 60.603; discovered 9/99; measured in one direction only 9/99; hunkered 9/99; hunkered, green, good 2 & 4/00; purplish-green, OK 2/01; mostly eaten to soil surface, only 2 tubercles left, tan color very poor 4/01; tag mia, replaced 2 & 4/01
60.603	2	11.08	337																			1.38			left of 60.602, discovered 9/99; hunkered 9/99; hunkered, green, good 2 & 4/00; popping out, green, good 2/01; mostly eaten to soil level, only 2 tan colored tubercles left, very poor 4/01; tag mia, replaced 2 & 4/01
60.604	2	11.06	337																			1.10			12 o'clock, left of 60.600 and in front of 60.605, 60.602 & 60.603; discovered 9/99; hunkered 9/99; hunkered, green, good 2 & 4/00; popping out, purplish-green, good 2/01; eaten to soil level, remaining body gold, very poor 4/01; tag mia, replaced 2 & 4/01
60.605	2	11.07	337																			0.83			10 o'clock between 60.604 & 60.606; discovered 9/99; hunkered 9/99; green, good 2 & 4/00; plant mia 2 & 4/01; tag mia, replaced 2 & 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
60.606	2	11.08	337																			0.53			9 o'clock behind 60.605, left of 60.603, discovered 9/99; hunkered 9/99; hunkered, green, good 2 & 4/00; tag mia, replaced 2 & 4/01; popping out, green, good 2 & 4/01
60.607	2	11.11	337																			0.91			behind 60.606 & 60.603, in front of 60.608; discovered 9/99; hunkered 9/99; dull green, hunkered, OK 2 & 4/00, 2/01; tag mia, replaced 2 & 4/01; popping out, green, good 4/01
60.608	2	11.12	337																			0.65			left of 60.609 and right of 60.610; discovered 9/99; hunkered 9/99; green, good 2 & 4/00; reddish-green, OK 2/01; tag mia, replaced 2 & 4/01; green, good 4/01
60.609	2	11.12	337																			0.62			right of 60.608 and behind 60.607, discovered 9/99; hunkered 9/99; green, good 2 & 4/00; tag mia, replaced 2 & 4/01; green, OK, hunkered 2/01; green, good 4/01
60.610	2	11.12	337																			0.37			left of 60.608, discovered 9/99; measured in one direction only 9/99; hunkered 9/99; behind 60.607 and left of 60.611; hunkered, green, good 2/00; green, good 4/00; tag mia, replaced 2 & 4/01; reddish-green, OK, hunkered 2/01; hunkered, green, good 4/01
60.611	2	11.12	337																			0.86			right of 60.610 and behind 60.601, discovered 9/99; hunkered 9/99; green, good, hunkered 2 & 4/00; tag mia, replaced 2 & 4/01; olive green, OK 2/01; green, good 4/01
60.612	2	11.09	337																						behind 60.600, right of 60.602, in front of 60.601, discovered 2/00; green, good 2 & 4/00; tag mia, replaced 2 & 4/01; purplish-green, OK, hunkered 2 & 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
60.613	2	11.12	337																						discovered 2/00; between and behind 60.610 & 60.608; green, good 4/00; tag mia, replaced 2 & 4/01; plant mia 2 & 4/01
60.70	2	11.09	337																			1.40			discovered 9/99; hunkered 9/99; hunkered, green, good 2 & 4/00, 2 & 4/01
61.00	2	7.87	346	0.60	0	0	nd	nd	0	mia	mia	mia	mia			mia			mia			mia			plant & tag mia 2 & 5/96, 2 & 5/97, 2 & 4/00
61.10	2	7.87	346	0.40	0	0	0.50	0	0	0.90	0	0	1.00	0	0	1.40	0	0	1.80	0	0	1.73	0	0	nestled in, measured in one direction only 2/98; nestled in 2/99; green, good 4/99; nestled in, green, good 2 & 4/00, 2 & 4/01
61.20	2	7.87	346	0.40	0	0	0.40	0	0	0.50	0	0	0.40	0	0	0.70	0	0	1.10	0	0	1.82	0	0	measured in one direction only 2/98; green, good 4/99; dark green, good 2 & 4/00, 2 & 4/01
61.30	2	7.87	346	0.60	0	0	0.60	0	0	1.00	0	0	1.30	0	0	1.60	1	1A	mia			0.88	mia	0	nestled in 2/96; tag & nail loose 2/98 & 2/99; relocated, green, good, tag & nail loose 4/99; hunkered, green, good 2 & 4/00; tag and nail loose, replaced, plant very hunkered, green, OK 2 & 4/01
61.40	2	7.87	346	0.80	0	0	0.70	0	0	mia	mia	mia	0.60	0	0	0.80	0	mia	mia			mia			retagged 2/97; plant & tag mia 5/97, 2/98, 5/98, 2/99 & 4/99
61.50	2	7.87	346	0.80	0	0	0.80	0	0	mia	mia	mia	mia		0	1.10	0	0	2.30	1	1A	2.19	1fr	1	tag mia 2/96; relocated & retagged 5/96; nestled in 2/98 & 2/99; green, good 4/99; nestled in, green, good 2 & 4/00; tag and nail loose, plant mia 2 & 4/01
61.60	2	8.19	355							0.80	0	0	1.20	mia	0	mia			mia			mia			under rock; mia 2/96; relocated 5/96; tag loose, not at same measurement 2/97
61.70	2	8.05	346													1.10	0	0	1.40	0	0	1.55	0	0	between rocks; measured in one direction only 2/98, 2/99, 2/00; green, good 4/99, 2 & 4/00; purplish-green, good 2/01; green, good 4/01
61.80	2	7.50	344													0.60		0	1.10	0	0	0.71	0	0	in rock crack; discovered 5/97; tag mia, retagged 2/99; green, good 4/99; just spines left, COD unknown 2/00

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
61.90	2	7.95	346													0.60		0	mia			0.89	mia	0	discovered 5/97; tag & plant mia 2/98 & 5/98; tag back, but plant still mia 2/99; relocated, green, good 4/99; nestled in, green, good 2 & 4/00; tag and plant mia 2 & 4/01
62.00	2	7.89	346	1.20	0	0	0.90	0	0	0.80	0	0	1.30	0	0	1.80	0	0	2.20	1	1A	2.58	0	0	7 seedlings 3/93; under rock 2/94; 5+seedlings 2/94; no seedlings 2/96; green, good 4/99, 2 & 4/00; hunkered, green, OK 2 & 4/01
62.10	2	7.80	346										1.50	0	0	1.20	0	0	1.80	0	0	1.70	0	0	loose in soil 2/96; still loose, healthy 2/97 & 5/97, 2 & 4/99; still loose, green, good 2 & 4/00; green, good 2 & 4/01
62.20	2	7.90	348?																		2.12		0	discovered in shin oak clump 4/99; green, good 4/99, 2 & 4/00; olive, OK 2 & 4/01	
64.00	2	8.27	355	4.60	3	3	4.80	3	2	4.50	5	0	4.70	7	disp.	Dead									COD unknown, stem hollow, no insects 2/97
65.00	2	8.18	356	5.90	6	5	5.50	3	0	4.60	4	2	4.30	5	2,disp	Dead									1 fr. with hole & seeds dispersed 5/96; COD unknown, stem solid
65.10	2	6.09	340													1.90		0	2.30	2	1A	2.45	1A	0	discovered 5/97; hooded during weevil study in summer 99; green, good 4/99, 2 & 4/00; dark green, good 2/01; maroonish-green, OK 4/01
65.20	2	6.13	339													0.60		0	0.90	0	0	0.89	0	0	discovered 5/97; really hunkered down 2/99; popping out, green, good 4/99, 2/00; hunkering, green 4/00; popping out, dark green, OK 2 & 4/01
66.00	2	6.48	356	1.10	0	0	1.40	0	0	1.80	1	0	2.10	nd	1	3.20	2	nd	3.30	3	3	3.01	2fr	2	maybe stepped on 2/98; hunkered in Selaginella, OK 2/99; green, good 4/99, 2 & 4/00; good 2 & 4/01
66.10	2	7.80	6																		0.68		0	discovered 4/99; left of 66.20, at edge of seed ring; OK 4/99; loose, light green, OK, under leaves 2 & 4/00; COD unknown 2/01	

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES	
66.20	2	7.80	6																			0.49		0	discovered 4/99; right of 66.10, at edge of seed ring; OK 4/99; loose, light green, OK, under leaves 2 & 4/00, 2/01; plant mia 4/01	
67.00	2	4.63	356	3.00	1	1	3.10	0	0	2.70	1	0	2.80	nd	disp	3.70	1	1	3.70	1	disp	3.14	2fr	2	buried in leaves 2/99; popping out, green, good 4/99, 2 & 4/00; tag mia, replaced 4/00; olive green, OK 2/01; green, good 4/01	
67.10	2	4.43	354													3.00		0	2.90	1	disp	3.11	2fr	2	discovered 5/97; buried in leaves 2/99; green, good 4/99, 2 & 4/00; reddish-green, OK 2/01; olive and gold, poor 4/01	
68.00	2	4.72	358	1.90	0	0	1.90	0	0	2.00	0	0	2.10	1	1A	2.80	0	0	2.90	1	1A	3.35	0	0	0	tag moved & slightly chewed, replaced 2/97; tag replaced 2/98; almost buried, green, good 4/99, 2 & 4/00; coming out, green, good 2 & 4/01
69.00	2	4.70	358	1.20	0	0	mia		0	1.60	0	0	1.50	0	0	2.20	0	0	2.20	0	0	2.41	0	0	0	buried in leaves 2/97 & 2/98; tag mia, replaced 2/98; plant loose in leaves but rooted 2/99; almost buried, green, OK 4/99; totally buried, very loose, green, good 2/00; coming out, green, good 4/00, 2/01; almost buried in leaves, green, good 4/01
70.00	2	4.26	0	0.90	0	0	1.10	0	0	1.40	0	0	2.00	0	0	2.20	1	1	2.60	0	0	2.10	0	0	0	buried in leaves 2/97 & 2/98; buried in leaves, tag mia, retagged 2/99; good, green 4/99; coming out, good, green 2 & 4/00, 2 & 4/01
71.00	2	4.13	358	0.80	0	0	0.90	0	0	0.90	0	0	1.10	0	0	2.10	0	0	2.00	1	1	2.42	0	0	0	buried in leaves 2/97 & 2/98; green, good 4/99, 2 & 4/00, 2 & 4/01
72.00	2	4.16	0	1.10	0	0	nd	nd	0	1.20	0	0	1.00	0	0	1.70	0	0	1.60	0	0	1.74	0	0	0	buried in leaves 2/97, 2/98 & 2/99, tag mia, retagged 2/99; totally buried, green, almost spineless 4/99; popping out, green, OK 2 & 4/00, 2 & 4/01
73.00	2	4.23	2	1.50	0	0	1.70	0	0	1.80	0	0	1.90	0	0	2.40	0	0	2.30	0	0	2.46	0	0	0	buried in leaves 2/97, 5/97, 2/98 & 2/99, tag mia, retagged 2/99; green, good 4/99; pale green, OK 2/00; green, good 4/00; getting buried in leaf litter, green, OK 2 & 4/01

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PL #	ST#	DIST	ANGLE	93DM	93FL	93FR	94DM	94FL	94FR	95DM	95FL	95FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
74.00	2	3.81	2	1.20	0	0	1.50	0	0	1.60	0	0	1.80	0	0	2.30	0	0	2.30	0	0	2.59	0	0	buried in leaves 2/97; buried in leaves & grass 2/98 & 2/99; good 4/99; pale green, OK 2 & 4/00; almost buried in leaves, green, good 2 & 4/01
76.00	2	3.18	0	2.60	1	1	2.80	1	0	Dead															Dead 95
76.10	2		?							1.60	0	0	mia			mia			mia						pup of 76.00; mia 96, 97 & 98
77.00	2	3.40	6	1.00	0	0	0.90	0	0	0.90	0	0	1.10	0	0	1.50	0	0	1.50	0	0	1.52	0	0	green, good, new spine growth 4/99; green, OK 2 & 4/00; green, good 2 & 4/01
78.00	2	3.48	10	0.90	0	0	1.10	0	0	1.40	0	0	1.70	0	0	2.10	0	0	2.40	1	1	1.91	0	0	green, good, new spine growth 4/99; dull green, OK 2/00; green, good 4/00; olive, OK 2/01; green, good 4/01
79.00	2	3.97	30	1.90	0	0	2.40	0	0	2.80	1	1S	2.50	nd	1 disp	3.30	1	1A	2.70	1	1	2.60	1fr	1	tag moved, replaced 5/97; green, good 4/99; yellowish-green, OK 2/00; green, good 4/00; COD unknown but not weevils 2/01; three seedlings (79.01-79.03)
79.01	2	3.90	34																						left of 79.02, seedling of 79.00 (plant 79 removed & replaced with rock), discovered 2/01; not tagged, green, OK 2 & 4/01
79.02	2	3.90	34																						right of 79.01, seedling of 79.00 (plant 79 removed & replaced with rock), discovered 2/01; not tagged, green, OK 2 & 4/01
79.03	2	3.90	34																						behind 79.01 & 79.02, seedling of 79.00 (plant 79 removed & replaced with rock), discovered 2/01; not tagged, green, OK 2 & 4/01
80.00	2	5.10	0	2.40	0	0	2.70	1	1	2.60	2	2	3.50	nd	2	4.00	2	1+1A	4.30	1	1	4.03	0	1	barely rooted 2/98; uprooted, replanted 2/99; dark green, OK 4/99; very loose, green, good, tag mia, replaced 2/00; up rooted, removed for weevil study, no evidence of weevils, COD unknown 4/00
81.00	2	3.90	34													1.80	0	0	2.60	1	1A	2.90	0	0	tag moved & chewed, retagged 5/97; good 4/99; green, good 2 & 4/00, 2 & 4/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Ray's Site**

[illegible]

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Shag Carpet**

1 of 4

PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Stake 1 is straight up from trough, mid-slope; GPS3 = R021622A																
1.00	1	24.80	189	3.90	3fr	2+1 disp	3.30	0	1	3.40	2	2	3.27	1+2fr	3	heavily shaded by three awn 2/97; green, good 4/99; goldish-green, OK 2/00; green, good 4/00, 2 & 5/01
1.10	1	24.80	189	2.80	0	0	2.60	0	0	2.40	0	0	mia			heavily shaded by three awn 2/97; gone without a trace 2 & 4/99; only spines left, COD unknown 2/00
2.00	1	22.48	194	4.30	0	0	4.40	0	0	Dead						looks grayish, but still firm 2/97; new spine growth 5/97; weevils tunnels, dead 2/98
2.01	1	22.58	194				1.00	0	0	0.90	0	0	1.31	0	0	no hooked spines, may not be AT 2/97; looks like At 2/98; under rock, green, good 4/99; tag mia, just spines left, COD unknown 2/00
3.00	1	8.70	265	2.60	1fr	1disp	3.10	0	0	2.60	1	1	2.69	1fr	1 disp	tag mia, replaced 2/97; purplish, OK 4/99; spines dull gray, body purple, poor 2/00; new spine growth, orangish, OK 4/00; reddish, OK 2/01; dark green, OK 5/01
3.10	1	8.80	265	1.80	0	0	2.30	0	0	2.00	0	0	2.20	0	0	tag mia, replaced 2/97; green, good 4/99; flowers paritally eaten, plant dark green, OK 2 & 4/00; purplish-green, OK 2/01; hunkered, green, OK 5/01
3.20	1	3.90	262				1.30	0	0	1.20	mia	0	1.51	0	0	no hooked spines, may not be A. tobuschii 2/97; starting to develop hooks 5/97; rock atop, removed 5/98; green, good 4/99; goldish-green, OK 2/00; olive, OK 4/00; green, good 2 & 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Shag Carpet**

2 of 4

PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
3.30	1	8.91	269				0.60	0	0	0.90	0	0	mia			no hooked spines, may not be A. tobuschii 2/97; loose in soil, root exposed 5/97; bad 5/98; plant mia 99, 00, 01
3.40	1	8.63	263							1.30	0	0	1.48	0	0	measured in one direction only, discovered 2/98; green, good 4/99, 2/00; olive, OK 4/00; under rock, green, OK 2 & 5/01
3.50	1	8.25	263							2.80	1	1A	2.70	2fr	1 disp	stepped on, discovered 2/98; green, good 2 & 4/00, 2 & 5/01
3.51	1	8.26	265										1.15			discovered 4/99; OK 4/99; tag mia, retagged, under rock, green, good 2 & 4/00, 2 & 5/01
3.60	1	7.33	265							2.00	1	1	2.21	0	0	discovered 2/98; green, good 4/99; OK 2/00; green, OK 4/00, 2 & 5/01
3.70	1	7.33	262							1.10	0	0	1.39	0	0	measured in one direction only, to the right of 3.80, discovered 2/98; measured in one direction only 2/99, 2/00; green, good 4/99, 2 & 4/00; green, OK 2 & 5/01
3.80	1	7.33	262							0.80	0	0	0.95	0	0	measured in one direction only, to the left of 3.70, discovered 2/98; green, good 4/99; just spines left, COD unknown 2/00

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Shag Carpet**

3 of 4

PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
4.00	1	24.46	83	3.50	3fr	2+1 disp	3.80	1	1	3.30	3	3 disp	3.18	3	3	dull green, OK 4/99; maroonish, spines dull gray, poor 2/00; orange, poor 4/00; new apical growth, gray at base, purplish-green, OK 2 & 5/01
4.10	1	21.29	77	1.70	1fr	1 disp	2.40	1	1	2.30	1	1	2.13	1+2fr	3	reddish, OK 4/99, 2/00; reddish-green, OK 4/00, 2 & 5/01
4.20	1	19.03	~77				2.00	0	0	1.90	1	1	1.84	1fr	1	tag mia, retagged 5/97; olive green, OK 4/99; lighth reddish-green, loose, poor 2/00; reddish-green, OK 4/00; rock fell on top, removed, green, OK 2 & 5/01
5.00	1	5.02	65							4.50	6	5+1A	2.72	2fr	2	discovered 2/98; green, good 4/99; green, good, flowers partially eaten 2 & 4/00; green, good 2 & 5/01
6.00	1	~42.30	~75													discovered 2/01; purplish-green, good 2 & 5/01
7.00	1	~22.00	~84													discovered 2/01; dark olive, OK 2 & 5/01
8.00	1	~21.96	~84													discovered 2/01; under rock, green, good 2 & 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Shag Carpet**

4 of 4

PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
9.00	1	7.72	348													discovered 5/01; olive, OK 5/01
Stake 2 is at top of hill, in opening beyond junipers and oaks; GPS4 = R021622B																
5.00	2	9.57	322	3.60	1+5fr	disp	4.10	6	1+2disp	4.00	5	5	4.03	6fr		4 bad 5/96; green, healthy, 4 flowers partially eaten, tag mia, replaced 2/97; purplish with orange tubercle tips, small ants on fruits 4/99; goldish, poor 2/00; reddish-olive, OK 4/00; reddish-olive, poor 2/01; purplish-green, OK 5/01
Data taken and recorded by Jackie Poole on 2/13/97 & 5/6/97; 5/5/98; 2/16/99, 4/21/99, 2/15/00, 4/26/00, 2/9/01, 5/2/01																
Data taken by Gena Janssen and recorded by Jackie Poole on 2/18/98																

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Stuart Cave

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
The <b>reference point</b> is a pink-topped rebar, ~50 paces Northwest of the largest pinon, 2.1 mi North of the lodge on main road to north gate, or 0.2 mi Northeast of road intersection below Green Cave; GPS9 = R021522B																
1.00	45	9.63	250										1.22			measured over Vasey oak; discovered summer 99; green, good 9/99, 2 & 4/00, 2 & 5/01
1.10	45	9.18	245													discovered 2/01; dark reddish-green, OK 2/01; green, good 5/01
2.00	45	11.88	250										3.08			discovered summer 99; measured over Vasey oak, wedged between rocks 9/99; measured in one direction only 9/99, 2/00; olive green with some orange tubercles, OK 9/99, 2 & 4/00; just spines left, COD unknown 2/01
3.00	45	11.54	253										2.38			measured over Vasey oak; discovered summer 99; purplish, OK, 9/99, 2 & 4/00; just spines left, COD unknown 2/01
4.00	45	~11.57	254										1.22			measured over Vasey oak; discovered summer 99; one measurement only 2/00; green, hunkered, OK 9/99, 2 & 4/00; plant mia 2/01; spine clusters and hole in vicinity, COD unknown 5/01
5.00	45	~11.61	254										2.74			measured over Vasey oak; discovered summer 99; one measurement only 9/99, 2/00; dark green, OK, under rock 9/99 & 2/00; purplish, OK 4/00; green, OK 2/01; purple, OK 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Stuart Cave**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
6.00	45	~11.66	254										2.37			measured over Vasey oak; discovered summer 99; one measurement only 2/00; green, good, under rock 9/99, 2 & 4/00, 2 & 5/01
7.00	45	12.12	256										2.59			measured over Vasey oak; discovered summer 99; green, good, under rock 9/99; dark green, good 2 & 4/00; COD unknown, just spines left 2/01
8.00	45	12.31	258										1.41			measured over Vasey oak; discovered summer 99; green, hunkered, OK 9/99; olive, OK 4/00; just spines left; COD unknown 2/01
45.10	45	11.85	62	6.30	7 fr	1A, disp	7.30	7	6	6.30	4	4	5.71	1+3fr	3+1A	green, good 4/99, 2 & 4/00, 2 & 5/01
45.11	45	12.05	64	0.70	0	0	0.80	0	0	0.90	0	0	1.24	0	0	OK 4/99; dull green, OK 2 & 4/00; green, OK 2 & 5/01
45.12	45	12.10	63	2.40	1 fr	4	2.90	1	1	3.40	2	2	3.20	0	0	very shaded by juniper 2/99; green, good 4/99, 2 & 4/00, 2 & 5/01
45.13	45	11.97	62	1.00	0	0	1.00	0	0	1.80	0	0	1.45	0	0	almost buried in juniper litter 2/99; totally buried, green, good 4/99; mia 2/00; totally buried, green, good 4/00; plant and tag mia 2/01; buried in juniper litter, green, OK 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Stuart Cave**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
45.14	45	11.43	64	2.40	0	0	2.70	0	0	3.50	2	2	3.45	3	3	under rock; green, good 4/99; plant mia 2 & 4/00, 2 & 5/01
45.15	45	12.18	68	1.60	1 fr	1	2.20	2	2	2.40	2	2	2.26	1+1fr	2A	under prickly pear; tag mia, retagged 2/97; one measurement only 2/00; maroonish, OK 4/99; dull green, OK 2/00; getting covered by litter, green, OK 4/00; very maroonish, poor 2/01; green, OK 5/01
45.20	45	~39.05	~140	7.70	7 fr	disp	7.80	10	11	7.50	10	4	Dead			measured through junipers; plant reddish; spines dying 2/98; hollow, probably weevils 2/99
45.21	45	~39.08	~139	1.70	0	1	1.70	1	1	2.00	0	0	Dead			measured through junipers; hollow, probably weevils 2/99
45.24	45	39.90	~136				2.40		3	Dead						discovered 5/97; just a spine cup, COD unknown 2/98
45.25	45	39.70	~137				1.10		0	1.00	0	0	Dead			discovered 5/97; COD unknown 2/99
45.30	45	1.00	206	2.40	1fr	disp	2.80	2	3	3.20	3	3	3.25	1+2fr	2	ants swarming fruits 5/98; green, good 4/99; hooded during weevil study in summer 99; dull green, OK 2 & 4/00, 2 & 5/01
45.31	45	0.74	246	1.80	0	0	2.30	3	2	2.50	3	2+1A	3.05	1+2fr	3	tag moved, retagged 2/97; green, good 4/99; hooded during weevil study in summer 99; dull green, OK 2 & 4/00, 2 & 5/01
45.40	45	~7.60	~215	8.10	6+15 fr	1+1A, disp	8.60	14	29	7.60	7	3+1A	Dead			measured through Vasey oaks & persimmons; 3 flowers with petals eaten 2/96; very purplish 2/98; hollowish, weevils? 2/99

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Stuart Cave

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
45.41	45	7.55	211	1.10	0	0	2.00	0	0	2.20	2	0	2.71	2+1fr	3	measured through Vasey oaks & persimmon; green, good 4/99; accidentally stepped on 2/00; purplish, OK 4/00, 2 & 5/01
45.42	45	7.63	223	4.80	2+1 fr	2	5.40	2	6	5.20	0	0	4.20	0	0	measured through Vasey oaks & persimmon; loose on lower side 2/98; almost buried in juniper litter, very shaded 2/99; out of litter, green, good 4/99; hooded during weevil study in summer 99; green, good one flower eaten 2/00; dark green, good 4/00, 2/01; dark purplish-green, OK 5/01
45.43	45	~8.73	~219				3.50	3	4	Dead						measured over Vasey oaks & persimmon; COD unknown 2/98
45.44	45	8.92	223				4.90	4	5	4.70	5	2	4.59	4fr	3	measured over Vasey oaks & persimmon; under juniper; green, good though shaded 4/99; hooded during weevil study in summer 99; purplish-green, good, flowers pinkish 2/00; green, good 4/00; purplish-green, OK 2/01; dark green, good 5/01
45.45	45	9.32	233				1.80	1	0	1.90	2	2A	1.90	1+1fr	3	measured over Vasey oaks & juniper; green, good 4/99; hooded during weevil study in summer 99; dull green, OK 2 & 4/00; green, good 2 & 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Stuart Cave**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
45.46	45	7.45	207							2.50	1	1A	2.70	2	1+1A	measured over Vasey oaks; green, good 4/99; dark green, good 2 & 4/00, 2 & 5/01
45.50	45	~7.40	~234	4.40	5+4 fr	4+3A	5.40	5	6	Dead						measured over Vasey oaks; death by weevil larvae, larvae killed 2/98
45.51	45	6.92	240	3.00	2+1 fr	3	3.40	2	3	3.40	2	2	4.10	3	2+1A	measured over Vasey oaks; tag mia, retagged 2/97; tag loose 2/99; maroonish, OK 4/99; dull gray green, OK 2 & 4/00; green, good 2/01; maroonish, OK 5/01
45.52	45	7.37	254				1.70		1	1.80	1	0	1.76	1+1fr	1+1A	measured over Vasey oaks; discovered 5/97; one very small bud 2/98; hunkered down 2/99; maroon, OK 4/99; hooded during weevil study in summer 99; purplish-gray 7/26 to 8/9/99, may not be due to hood placement; reddish-purple, OK 2 & 4/00; COD unknown 2/01
Stake 45A is behind a coyotillo between a prickly pear and a small juniper, ~8 meters from road edge																
45.22	45A	4.29	101	1.30	0	0	1.50	1	2	1.70	1	1A	1.56	0		0 measured through junipers; maroonish, OK 4/99; covered with caliche road dust, dull green 2/00; maroonish, OK 4/00; olive, OK 2 & 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Stuart Cave**

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[illegible]

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Tank Hill

1 of 3

PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98 DM	98 FL	98 FR	99 DM	99 FL	99 FR	NOTES
Tank Hill site is ~0.1-0.2 miles Southwest of water tank on top of hill, 1.0 miles Southwest of lodge on main road to residence																
Stake 44A is 131 degrees to the tank on the hill, North end of road; GPS5 = R021814A																
1.00	44A	62.88	257										3.13	1+1fr	1+disp	plant gone without a trace 2 & 4/00, 2 & 4/01
44.00	44A	47.77	78	2.60	2 fr	2A	2.50	3	2	2.40	1	1	2.70	1	2	yellowish, bad 5/97; dark green, pulled into Selaginella 2/98, 4/99; hunkered, maroonish, OK 4/00; olive, OK 2 & 4/01
44.10	44A	48.54	78	3.00	2 fr	2A	4.00	3	4	4.20	3	3	4.56	4fr	4	fruits turning red 5/97; green & good 2/98; OK 4/99; some reddish tubercle tips, OK 4/00; green, good 2 & 4/01
44.11	44A	47.76	78	6.00	0	mia	mia			mia			mia			check tag, may be marked 44.10, if so change to 44.11; tag mia also 2/97, 2/98, 5/98, 2/99 & 4/99
44.20	44A	23.19	80	4.80	4 fr	1A, rest disp	Dead									COD unknown, only scattered spines left 2/97
44.30	44A	59.64	248	2.50	2 fr	Dead										Plant gone, root & a few spines left; tag removed
44.40	44A	57.17	248	3.40	2 fr	Dead										Plant gone, root & a few spines left; tag removed
44.80	44A	60.39	250	2.40		disp	3.10	2	2	3.10	1	1	mia			orangish 5/98; tag & plant missing 2/99, 4/99; tag still mia, COD unknown 2/00
44.81	44A	~60.51	250													seedling of 44.80, on left of 44.82, discovered 2/00; green, good 2/00; reddish, hunkered, OK 4/00, 2/01; green, OK 4/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Tank Hill**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98 DM	98 FL	98 FR	99 DM	99 FL	99 FR	NOTES
44.82	44A	~60.51	250													seedling of 44.80, on right of 44.81, discovered 4/00; hunkered, green, OK 2 & 4/01
44.83	44A	~60.53	250													seedling of 44.80, discovered 4/00; hunkered, green, OK 2 & 4/01
44.84	44A	~60.59	250													discovered 4/01; hunkered, green, OK 4/01
44.85	44A	~60.60	250													discovered 4/01; green, OK 4/01
<b>Stake 44B</b> is South of road, below hill, 85 degrees to tank; GPS6 = R021815A																
1.00	44B	27.70	190													discovered 2/00; olive-green, good 2 & 4/00, 2/01; hunkered, green, OK 4/01
2.00	44B	18.63	247													discovered 4/01; green, good 4/01
3.00	44B	18.70	247													discovered 4/01; olive, OK 4/01
4.00	44B	18.77	247													discovered 4/01; green, good 4/01

**Ancistrocactus tobuschii Data for Kickapoo Caverns SNA - Tank Hill**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98 DM	98 FL	98 FR	99 DM	99 FL	99 FR	NOTES
5.00	44B	18.99	247													discovered 4/01; maroonish-green, OK 4/01
44.50	44B	25.75	206	5.70	2	1,disp	6.30	6	9	5.60	6	6	5.17	3+2fr	5	piss ants swarming fruits, plant yellowish 5/97; green again 2/98; dull green-maroon, OK 4/99; maroonish, OK-poor 2/00; orangish, poor 4/00; COD weevil (one chamber) 2/01
44.60	44B	25.62	206	2.20	2 fr	disp	2.70	3	1	2.90	3	2A	2.17	1fr	disp	fruit chewed on 5/97; hunkered down 4/99; pale green, a few orange tubercles, OK 2 & 4/00, 2 & 4/01
44.70	44B	26.37	25	3.40	1+2 fr	disp	3.60	3	1+2A	4.00	4	2+2A	3.73	5	4+1A	green, good 4/99; slightly green, maroonish, good 2/00; good 4/00; green, good 2 & 4/01
44.80	44B	20.00	247													green, good 2/00; plant and tag mia 4/00; green, good 2 & 4/01
44.90	44B	16.06	232													green, good 2/00; orange-green, OK 4/00; weevil larvae inside, dead 2/01

Data taken and recorded by Jackie Poole 2/12/97, 5/5/97, 5/5/98, 2/99 with Dave Stuart, 4/21/99, 2/9/00, 4/26/00, 2/19/01, 4/25/01  
Data taken by Gena Janssen & recorded by Jackie Poole 2/18/98

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.2 mi North & East of lodge along main road to North gate, go up drainage to fenceline Stake 46 is the 147th large fencepost east from the large west fencepost in creek																
1.00	46	17.83	198										4.33	2+3fr	4+1A	grayish-green, OK 4/99; grayish-green, good 2/00; olive, OK 4/00; dark maroonish-green, OK 2/01; green, good 4/01
1.01	46	17.86	198													discovered 4/01; green, good 4/01
1.10	46	17.75	198													discovered 2/01; hunkered, green, good 2/01; dead, COD unknown 5/01
2.00	46	10.60	199										3.95	5	1	maroonish, OK 4/99; orangish-maroonish-green, OK 2 & 4/00; orangish-maroonish-green, good 2 & 4/01
2.01	46	10.69	199													not at base of 2.00, discovered 2/01; green, OK 2/01; green, good 4/01
2.02	46	10.68	199													base of 2.00, left of 2.03 & 2.04, discovered 2/01; hunkered, green, OK 2 & 4/01
2.03	46	10.68	199													base of 2.00, between 2.02 & 2.04; green, good 2 & 4/01
2.04	46	10.67	199													base of 2.00, right of 2.02 & 2.03; green, good 2 & 4/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.05	46	10.62	199													at 2 o'clock on 2.00, discovered 4/01; green, good 4/01
2.06	46	10.67	199													at 7 o'clock on 2.00, discovered 4/01; green, OK 4/01
2.07	46	10.67	199													at 7:30 o'clock on 2.00, discovered 4/01; green, OK 4/01
2.08	46	10.66	199													at 8 o'clock on 2.00, discovered 4/01; green, OK 4/01
2.09	46	10.65	199													at 8:30 o'clock on 2.00, discovered 4/01; green, OK 4/01
2.10	46	10.64	199													at 8:45 o'clock on 2.00, discovered 4/01; green, OK 4/01
2.11	46	10.63	199													at 9 o'clock on 2.00, discovered 4/01; green, OK 4/01
2.12	46	10.64	200													discovered 4/01; olive, OK 4/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.13	46	11.50	199													discovered 2/01; originally tagged as 2.10, green with a few red tubercle tips, OK 2/01; dark green, OK 4/01
3.00	46	52.09	271										5.05	3+3fr	3+2A	very reddish 2/99; very reddish, OK 4/99; most spines gray, some new growth, no flowers, removed 2/00; dead, COD unknown 2/00
4.00	46	16.13	197										3.46		2A	reddish, OK, discovered 4/99; hooded during weevil study in summer 99; green, good, spines growing into shroud 9/99; olive green, good 2/00; rock on top, green, good 4/00; olive, OK 2/01; dark green, good 4/01
4.10	46	17.26	197													in grass clump, discovered 2/01; green, good 2 & 4/01
5.00	46	~17.20	198										1.57		0	discovered 4/99; injured, new head off side, OK 4/99; green, good 2 & 4/00, 2 & 4/01
6.00	46	~17.24	198										3.04		0	discovered 4/99; hunkered, green, OK 4/99; green, good 2 & 4/00, 2 & 4/01
7.00	46	~17.42	198										3.09		1A	discovered 4/99; green, good 4/99; hooded during weevil survey in summer 99; green, a little shrunken, OK 9/99; green, good 2 & 4/00, 2/01; dark green, hunkered, OK 4/01

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
8.00	46	~17.54	198										2.81			0 discovered 4/99; green, good 4/99, 2 & 4/00; maroonsih, OK 2/01; green, good 4/01
9.00	46	~17.56	198										0.87			0 discovered 4/99; green, good 4/99, 2 & 4/00, 2 & 4/01
10.00	46	~15.76	199										1.46			0 discovered 4/99; green, good 4/99, 2 & 4/00, 2 & 4/01
11.00	46	~15.78	199										1.36			0 discovered 4/99; left side of cluster 11-12; green, good 4/99, 2 & 4/00, 2 & 4/01
12.00	46	~15.78	199										1.53			0 discovered 4/99; right side of cluster 11-12; one measurement only 2/00; green, good 4/99, 2 & 4/00, 2 & 4/01
12.10	46	~15.8	199													discovered 4/01; green, good 4/01
13.00	46	~16.56	198										0.88			0 discovered 4/99; top left side of cluster 13-17; green, good 4/99, 2/00; green, OK 4/00, 2 & 4/01
14.00	46	~16.55	198										1.45			0 top middle of cluster 13-17; discovered 4/99; green, good 4/99; olive green, good 2 & 4/00, 2 & 4/01

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
15.00	46	~16.56	198										0.79			0 top right of cluster 13-17, discovered 4/99; green, good 4/99, 2/00; hunkered, OK 4/00, 2 & 4/01
16.00	46	~16.57	198										0.68			0 behind 14.00, discovered 4/99; green, good 4/99; olive green, good 2 & 4/00; green, OK 2 & 4/01
17.00	46	~16.58	198										0.64			0 behind & right of 16.00, discovered 4/99; green, good 4/99; olive green, good 2 & 4/00; hunkered, green, OK 2 & 4/01
18.00	46	17.59	199										1.61			0 discovered 4/99; green, good, hunkered 4/99, 2 & 4/00, 2/01; popping out, green, good 4/01
18.01	46	~17.64	199													discovered 2/01; coming out at top of tag, green, OK 2 & 4/01
18.02	46	~17.65	199													discovered 4/01; coming up at lower right edge of tag, OK 4/01
19.00	46	17.62	199										0.91			0 behind 18.00 & left of 20.00, discovered 4/99; green, good, hunkered 4/99, 2 & 4/00, 2 & 4/01
20.00	46	17.59	199										0.64			0 right of 19.00, discovered 4/99; green, good 4/99, 4/00, 2 & 4/01

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
20.10	46	17.61	199													between 18.00 & 21.00; green, hunkered, good 2/00; hunkered, OK 4/00; hunkered, green, good 2 & 4/01
21.00	46	~17.57	199										1.40			0 under Texas kidneywood, discovered 4/99; green, good 4/99, 4/00, 2 & 4/01
22.00	46	~18.39	200										2.57			2A discovered 4/99; dull green, OK 4/99; maroonish, OK 2/00; green with some orange tubercles, OK 4/00; slightly maroonish-green, OK 2/01; bluish-green, good 4/01
23.00	46	~18.79	200										4.12			1A discovered 4/99; slightly reddish, OK 4/99; hooded during weevil study in summer 99; green with spine growth & some orange tubercles, OK 9/99; green with spine growth & some orange tubercles, good 2/00; maroonish, OK 4/00, 2 & 4/01
23.01	46	18.88	200													at 4 o'clock position on 23.00, discovered 4/01; one measurement only, green, good 4/01
23.02	46	18.89	200													at 4:30 o'clock position on 23.00, discovered 4/01; one measurement only, green, good 4/01

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
23.03	46	18.89	200													at 5 o'clock position on 23.00, discovered 4/01; one measurement only, green, OK 4/01
23.04	46	18.90	200													at 6 o'clock position on 23.00, discovered 4/01; one measurement only, green, good 4/01
23.10	46	19.07	200													discovered 4/01; loose, green, OK 4/01
24.00	46	~17.42	~204										2.71		1A+disp	dull green, OK, discovered 4/99; hooded during weevil study in summer 99; green, good, shroud totally off 9/99, 2/00; ants swarming fruit, green, good 4/00; slightly maroonish-green, good 2/01; green, good 4/01
24.10	46	~17.48	~210													discovered 5/01; green, good 5/01
24.20	46	~17.49	~210													discovered 5/01; green, OK 5/01
25.00	46	9.60	193										1.11			0 discovered 4/99; green, good, under rock 4/99, 2 & 4/00, 2 & 4/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
26.00	46	12.38	186										2.17			discovered summer 99; green, good 9/99, 2 & 4/00; ants in flowers, plant green, good 2/01; green, good 4/01
27.00	46	12.43	188										4.10			discovered summer 99; green, good 9/99, 2 & 4/00, 2 & 4/01
27.01	46	12.47	188										0.87			discovered 9/99; green, good, hunkered, not tagged 9/99, 2 & 4/00; green, good 2 & 4/01
28.00	46	12.57	195										4.07			discovered summer 99; green, good 9/99, 2 & 4/00, 2 & 4/01
29.00	46	12.39	198										1.75			discovered summer 99; green, good 9/99, 2 & 4/00, 2 & 4/01
29.01	46	12.43	198										0.91			discovered 9/99; green, hunkered, good 9/99; 2 & 4/00; hunkered, reddish, OK 2/01; green, good 4/01
30.00	46	16.82	201										1.11			discovered summer 99; orange, OK, hunkered, squishy 9/99; reddish, hunkered, OK 2/00; hunkered, green, OK 4/00, 2 & 4/01

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
30.10	46	16.79	199													discovered 4/01; hunkered, green, good 4/01
31.00	46	16.85	200										0.68			discovered summer 99; dark green, OK, hunkered 9/99; olive green, hunkered, OK 2 & 4/00, 2 & 4/01
32.00	46	16.90	197										0.96			discovered summer 99; green, good, hunkered, almost buried 9/99; hunkered, green, OK 4/00, 2/01; popped out, green good 4/01
33.00	46	18.89	198										1.55			discovered & shrouded 7-9/99; green and good 9/99, 2 & 4/00; maroonish, OK 2/01; maroonish-green, OK 4/01
34.00	46	~19.25	199										1.13			discovered & shrouded 7-9/99; shroud loose, green, good, hunkered 9/99; green, good 2 & 4/00; dark green, OK 2/01; green, good 4/01
35.00	46	11.40	~210													discovered 2/00; green, good 2 & 4/00; olive, OK 2/01
35.01	46	11.44	~210													at 6 o'clock on 35.00, discovered 4/01; one measurement only, green, good 4/01

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
35.02	46	11.44	~210													at 5 o'clock on 35.00, discovered 4/01; one measurement only, hunkered, OK 4/01
35.03	46	11.40	~210													at 3 o'clock on 35.00, discovered 4/01; one measurement only, green, OK 4/01
35.04	46	11.39	~210													at 2 o'clock on 35.00, discovered 4/01; one measurement only, green, OK 4/01
35.05	46	11.38	~210													at 1:30 o'clock on 35.00, discovered 4/01; one measurement only, green, OK 4/01
35.06	46	11.37	~210													at 1 o'clock on 35.00, discovered 4/01; one measurement only, green, good 4/01
35.07	46	11.37	210													at 12:30 o'clock on 35.00, discovered 4/01; one measurement only, green, OK 4/01
35.08	46	11.37	210													at 12 o'clock on 35.00, discovered 4/01; one measurement only, green, OK 4/01

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
35.09	46	11.37	210													at 11:30 o'clock on 35.00, discovered 4/01; green, good 4/01
35.10	46	11.46	209													discovered 4/01; green, good 4/01
35.11	46	11.37	210													at 11 o'clock on 35.00, discovered 4/01; one measurement only, green, OK 4/01
35.12	46	11.39	210													at 10 o'clock on 35.00, discovered 4/01; one measurement only, green, OK 4/01
35.13	46	11.37	210													above 35.11 & left of 35.09; discovered 4/01; green, good 4/01
36.00	46	~18.90	~190													discovered 4/00; green, good 4/00; tag mia, replaced, plant dark with a few red tubercle tips, good 2 & 4/01
37.00	46	~12.60	~228													discovered 4/01; blue-green, good 4/01
38.00	46	12.26	~214													discovered 4/01; green, good 4/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
39.00	46	12.28	~214													discovered 4/01; green, good 4/01
40.00	46	12.30	~214													discovered 4/01; green, good 4/01
41.00	46	12.44	~215													discovered 4/01; olive, OK 4/01
42.00	46	12.49	~216													discovered 4/01; hunkered, green, OK 4/01
43.00	46	12.53	~214													on left of 43.00, discovered 4/01; green, OK 4/01
44.00	46	12.54	~214													on right of 42.00, discovered 4/01; green, OK 4/01
45.00	46	12.59	~214													discovered 4/01; green, good 4/01
46.10	46	28.70	184	2.30	3	1	2.10	0	Dead							tag uprooted, retagged 2/97; COD unknown 5/97
46.11	46	28.85	184				1.30	0	0	1.50	0	0	1.76	1fr	1A	hunkered, green, good 4/99, 2 & 4/00, 2/01; popping out, green, good 4/01
46.20	46	28.70	184	2.00	0	0	1.60	0	Dead							tag mia, retagged 2/97; COD unknown 5/97

Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
46.30	46	28.70	184	1.10	0	0	Dead									There was a large dead plant beside 46.1-46.3. This plant was found dead in 2/96 (COD unknown, stem black inside but not hollow). This plant (46.30) was a pup (its root coming off the large plant's root). The pup had a hole in the stem from which a larva was collected 2/97.
46.50	46	28.35	184				2.20	0	0	Dead						plant maroon 5/97; dead larva inside 2/98
47.00	46	13.20	~218													discovered 4/01; green, good 4/01
48.00	46	13.14	~219													discovered 4/01; hunkered, green, OK 4/01
49.00	46	12.49	~213													discovered 4/01; green, OK 4/01
50.00	46	16.98	~204													discovered 4/01; olive, OK 4/01
<b>Stake 46A</b> is the 3rd rusty T-post east from the large fencepost in the creek; GPS 12 = R021822A																
46.40	46A	26.65	193	2.40	1 fr	1	2.90	2	1	2.90	1	1A	2.89	0		0 fruit torn apart, dispersing seeds 5/96; one very small bud 2/98; yellowish at base, green, new spine growth on top, OK 4/99; olive green, OK 2 & 4/00; maroon, poor 2/01; new spine growth at apex, maroon, poor 4/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Vireo Territory**

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**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Wait Gate Site**

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PL#	STK#	DIST	ANGLE	99DM	99FL	99FR	NOTES
Site is 0.7 mi South of main gate, at red gate (0.3 mi from county line); GPS15 = R021716A							
1.00		14.48	10	1.57	0		green, good 4/99; dark purplish-green, OK 2/00; green, good 4/00; maroonish-green, hunkered, OK 2 & 5/01
1.01		13.48	9	1.00			on right of 1.01 & 1.02; discovered 5/99; green, good 5/99; one measurement only 2/00; dull green, OK, under rock 2 & 4/00, 2/01; tag chewed, replaced 2/01; green, good 5/01
1.02		13.48	9	1.17			on left of 1.01 & 1.02; discovered 5/99; green and good 5/99; dull green, hunkered in Selaginella, OK 2 & 4/00, 2/01; tag chewed, replaced 2/01; coming out, green, good 5/01
1.03		13.67	9	0.64			discovered 5/99; OK, seedling of larger dead plant 5/99; purplish, hard, OK 2/00; green, OK 4/00; tag mia, replaced, olive, OK 2/01; green, good 5/01
1.04		13.69	9	0.52			discovered 5/99; OK, seedling of larger dead plant 5/99; dull green, OK 2 & 4/00; tag mia, replaced, accidentally uprooted, replanted 2/01; grayish-green, poor 2 & 5/01
1.041		13.75	9				discovered 2/01; grayish-green, poor 2/01; green, OK 5/01
1.05		13.98	8	2.31			discovered 5/99; OK, apical meristem reddish 5/99; dull grayish-red, OK 2/00; reddish, OK 4/00; plant and tag mia 2 & 5/01
1.06		13.99	8	0.99			discovered 5/99; green, good 5/99; green, hunkering, OK 2 & 4/00; tag eaten, replaced, grayish-green, OK 2 & 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Wait Gate Site**

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PL#	STK#	DIST	ANGLE	99DM	99FL	99FR	NOTES
1.07		14.46	20	2.02			0 discovered 5/99; green, good , hunkered in gravel and Selaginella 5/99, 2 & 4/00; bluish-green, OK 2/01; hunkered, green, OK 5/01
1.08		14.98	21	2.23			0 under small juniper, discovered 5/99; green, good 5/99, 2 & 4/00; partially covered by juniper litter, green, OK 2 & 5/01
1.10		14.65	4				discovered 2/01; grayish-green, OK 2/01; maroonish-green, OK 5/01
1.20		13.83	13				discovered 2/01; green, good 2 & 5/01
1.30		14.06	13				discovered 2/01; hunkered in Selaginella, green, OK 2/01; green, good 5/01
2.00		15.12	10	3.10	5	1+3disp	OK, 2/99; poor, reddish, 4/99; hooded during weevil study during summer 99; green, good, 9/99; reddish, OK 2/00; reddish-green, OK 4/00; tag and plant mia 2 & 5/01
2.10		12.90	25				discovered 2/00; dull green, OK 2 & 4/00; tag and plant mia 2 & 5/01
2.11		12.90	25				discovered 2/01; edge of grass clump; gray-green, poor 2/01; hard, dry, COD unknown 5/01
2.20		13.12	24				discovered 2/00; maroon, OK 2/00; yellowish, OK 4/00; apex damaged, maroon, poor 2/01; green, good 5/01
2.30		10.24	15				discovered 2/01; hunkered in Selaginella, green, good 2 & 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Wait Gate Site**

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PL#	STK#	DIST	ANGLE	99DM	99FL	99FR	NOTES
2.40		10.51	13				discovered 2/01; hunkered in Selaginella, green, good 2 & 5/01
3.00		12.17	211	6.28	6+1fr	2+3disp	maroon, good 4/99; maroon, OK 2/00; some maroonish tubercles, OK 4/00; some maroonish tubercles, bluish-green, good 2/01; reddish-green, good 5/01
4.00		12.57	211	2.55	1+1fr	0	poor, plant partially eaten 4/99; hunkered, green, good 2 & 4/00, 2/01; popped out, green, good 5/01
4.10		12.55	216				discovered 5/01; hunkered in Selaginella, green, OK 5/01
5.00		12.13	209	6.57	7+7fr	13+1A	maroonish, OK 4/99; dull reddish-green, OK, fresh flowers yellow, fade to pinkish dusky yellow (Photos 1-4) 2/00; some orange tubercles, OK 4/00; maroonish-green, OK 2/01; purplish-green, OK 5/01
5.10		12.28	212				discovered in grass and Selaginella 2/00; green, good 2 & 4/00, 2 & 5/01
5.20		11.22	212				discovered 2/01; maroonish-green, OK 2 & 5/01
6.00		12.56	209	2.04	2+1fr	2	OK, green, 4/99; maroon, OK 2 & 4/00, 2 & 5/01
7.00		12.05	209	1.02	0	0	tag loose, dull green, OK 4/99; maroon, hunkered, OK 2/00; hunkered, dull green, OK 4/00; bluish-green, OK 2 & 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Wait Gate Site**

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PL#	STK#	DIST	ANGLE	99DM	99FL	99FR	NOTES
8.00		12.64	208	2.50	1	1	reddish, OK, fruit has hole 4/99; maroon, OK 2/00; reddish-green, OK 4/00; purple, OK 2 & 5/01
9.00		12.47	207	1.59	0	0	two-headed plant, head closest to stake, spines gray 4/99; reddish, OK (Photos 5-6) 2 & 4/00, 2/01; dull reddish-olive, OK 5/01
9.01		12.47	207	1.66	0	0	two-headed plant, head farthest from stake, reddish, poor 4/99; reddish, OK 2 & 4/00, 2/01; dull reddish-olive, OK 5/01
10.00		12.45	202	3.33	0	Dead	two-headed plant, head on left looking toward stake, dead 4/99
10.01		12.45	202	1.38	0	Dead	two-headed plant, head on right, dead 4/99
11.00		12.57	207	0.97	0	0	dull green, OK 4/99; red, poor 2 & 4/00, 2/01; reddish-green, OK 5/01
12.00		12.46	207	0.93	0	0	green, good 4/99; reddish-green, OK 2 & 4/00; dull reddish-green, poor 2/01; pale reddish-green, OK 5/01
13.00		12.57	207	1.59	0	0	dull green, OK 4/99, 2 & 4/00; reddish at base, otherwise pale olive, OK 2 & 5/01
13.01		12.59	207	0.68	0	0	on right, OK 4/99; dull gray-green, poor 2/00; maybe dead 4/00, 2/01; green, OK 5/01
13.02		12.59	207	0.51	0	0	on left, pinkish, OK 4/99; mia 2/00; relocated under rock, green, good 4/00; plant mia 2/01; relocated under rock, green, OK 5/01
14.00		12.30	206	1.69	0	Dead	
15.00		12.28	206	0.91	0	Dead	

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Wait Gate Site**

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PL#	STK#	DIST	ANGLE	99DM	99FL	99FR	NOTES
16.00		10.86	207	1.45			0 discovered 4/99; dull green, OK, stepped on 4/99, 2/00 (misshapen); pale green, OK 4/00; plant mia 2 & 5/01
17.00		10.99	207	2.59		1A	17.00 is on left; dull green, OK, stepped on, discovered 4/99; starting to form two heads, measured as one 2/00; maroon, OK 2 & 4/00; reddish-green, OK 2 & 5/01
17.01		10.99	207				17.01 is on right, reddish-green, OK 2 & 5/01
18.00		11.10	207	2.20		1	green, good, stepped on, discovered 4/99; hooded during weevil study in summer 99; dull green, OK, 9/99; reddish, OK 2 & 4/00, 2/01; pale maroonish-olive, OK 5/01
19.00		11.60	208	1.27		0	green, hunkered, squishy, OK 9/99; hunkered, dull green, OK 2 & 4/00; tag mia, replaced, maroonish-green, OK 2/01; maroon, OK 5/01
20.00		14.45	214	0.94		0	green, hunkered, OK 9/99, 2 & 4/00; pale green with pale reddish tubercle tips, OK 2 & 5/01
21.00		14.52	213	1.83		0	purplish-green, hunkered, OK 9/99, 2 & 4/00; popped out, purplish-green, OK 2 & 5/01
22.00		7.52	203				discovered 2/00; green with a few reddish tubercles, OK 2/00; orangish, OK 4/00; purplish-orange, OK 2/01; orangish-olive, OK 5/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Wait Gate Site**

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PL#	STK#	DIST	ANGLE	99DM	99FL	99FR	NOTES
23.00		7.50	124				under small persimmon, discovered 2/00; green with a few gold tubercles, good 2/00; orangish, OK 4/00; maroon, poor 2/01; green with red tubercle tips, OK-poor 5/01

Data collected by Jackie Poole 2/17/99 with Linda Hedges, 4/99, 5/1/99, 9/15/99, 2/15/00, 4/28/00, 2/15/01, 5/01/01

**Ancistrocactus tobuschii Data for  
Kickapoo Caverns SNA - Whiskey Bottle**

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
<b>Stake WB1 is ~ 125 paces East of road through small opening, 0.4 mi North of lodge on main road to North gate. GPS8 = R021520A</b>																
1.00	WB1	34.85	97	5.10	7 fr	disp	4.60	0	Dead							COD=weevils
1.10	WB1	34.72	97	2.80	1 fr	disp	2.40	0	Dead							COD=weevils
1.20	WB1	34.77	96	4.10	1 fr	0	Dead									reddish, not looking good 2 & 5/96; COD unknown, no weevils or insect exit holes, tag removed 2/97
1.30	WB1	35.36	100	4.40	8 fr	2A, rest disp	4.40	0	Dead							COD=weevils; pin flag stuck in cactus; larva collected from nearby <i>Coryphantha echinus</i> 5/97
1.40	WB1	~32.62	~105	4.00	3fr	0, disp?	3.90	3	3	Dead						distance measured around juniper; plant turning yellow 5/96; dead, filled with 5 or 6 larvae (collected) & orange mush 2/98
2.00	WB1	31.30	209	3.40	4 fr	1+1A	3.90	4	4	4.00	5	5	Dead			hollow, probably weevils 2/99
2.10	WB1	31.57	209	3.90	5 fr	disp	4.90	5	6	4.90	7	4	4.18	5+3fr	3+4 disp	flower & stigma bright yellow, plant dull green, OK, 2/99; small ants swarming fruits 4/99; tubercles getting orangish, OK 2 & 4/00; inside powdery, COD unknown 2/01
2.20	WB1	33.33	205	4.10	4 fr	2+1	4.60	4	6	3.80	2	Dead				dead, weevil collected 5/98
2.30	WB1	33.40	209	8.00	5+8 fr	4A+1 dehisc	8.40	9	14	Dead						COD unknown, not really hollow (i.e., weevils) 2/98
2.40	WB1	35.22	205				3.30	3	3	3.20	3	1+1A	3.42	4fr	3A	hunkered in <i>Selaginella</i> , some reddish tubercles 2/99; green, good 4/99; green, good 2/00 (one flower eaten), 4/00; green, good 2 & 5/01
2.41	WB1	35.03	205				4.50		5	4.60	4	4A	4.65	5+3fr		8 discovered 5/97; tag mia, replaced 98; flowers & stigma bright yellow, tag severely chewed, replaced 2/99; dark green, good 4/99, 2/00 (3 flowers eaten), 4/00; ~10% eaten, scarred over, slightly purplish-green, OK 2/01; olive, OK 5/01

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PL #	STK #	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
2.50	WB1	36.75	208				3.30	2	2+1A	3.40	4	2	2.99	3fr	2+1A	tag mia, replaced 98 & 2/99; squishy 2/99; maroonish olive, firm, OK 4/99, 2/00 (stigma and flowers pinkish); maroonish 2/01; olive, OK 5/01
2.60	WB1	~32.95	205							2.40	1	1	2.22	2+1fr	1+1 disp	around juniper, discovered 2/98; edge of rock; flowers & stigma bright yellow 2/99; green, good 4/99; green, good, rock partially on top 2 & 4/00, 2 & 5/01
2.70	WB1	30.95	208													purplish-orange green, OK 2/00; green, OK 4/00; olive, OK 2 & 5/01
3.00	WB1	~57.58	~198	5.10	6 fr	6A	4.50	0	0	4.70	5	4	3.92	4+1fr	2+3A	measured beside juniper and through agarita; flowers & stigma yellow; a little maroon, OK 4/99; hollow, weevil chambers and five weevils, Dead 2/00
3.10	WB1	~57.25	~198				3.00	2	2	2.90	0	0	Dead			by rock; hollow, probably weevils 2/99

Data taken and recorded by Jackie Poole 3/5/96 & 5/9/96; 2/12/97; 5/5/98; 2/15/99, 4/21/99, 2/8/00 with Craig Scofield, 4/28/00, 2/9/01, 5/02/01  
 Data taken by David Stuart and recorded by Jackie Poole 5/5/97  
 Data taken by Gena Janssen and recorded by Jackie Poole 2/18/98

**Ancistrocactus tobuschii Data for  
Private Preserve, Kerr County**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
The reference point (rebar) is in front of a pruned juniper. GPS1 R030914A																
1.00		7.93	73	2.20	1	0	3.20	1+1B	1A	2.90	1	1	3.10	3fr	2	good 3/98; pulling into soil 5/98 & 3/99; popping out, olive, OK 5/99; out, green, good 3 & 5/00; green with some red and orange tubercle tips, misshapen, OK 2 & 4/01
2.00		8.03	73	1.90	1	0	2.50	1+1B	2	1.90	2	2	2.77	2	2	dead plant beside 3/96; dead plant gone, getting covered by lichens, but looking good 3 & 5/98, 3/99; olive, OK 3/99; slightly hunkered, green with a few orange tubercles, OK 3 & 5/00; pale green, OK 2/01; green, good 4/01
3.00		8.22	75	2.80	1+1fr	2	2.80	3	1A	2.70	0	0	2.80	2	3	very small buds 3/97; OK 3 & 5/98, 3/99; green, good 5/99; olive, OK 3/00; green, good 5/00; yellowish-green, OK 2/01; green with yellowish tubercle tips, OK 4/01
3.01		8.18	75										0.40		0	discovered 5/99; green, OK 5/99, 3 & 5/00; green, good 2 & 4/01
4.00		7.94	76	3.30	1+2fr	3	3.60	2+2B	1+3A	4.10	3	3	3.60	1+1fr	2	good 3 & 5/98, 3/99; maroon, OK 5/99 & 3/00; orangish, OK 5/00; reddish olive, OK 2 & 4/01
5.00		6.97	74	4.10	0	0	4.50	3B	3	4.30	3	3	dead			of the cluster 5-6, 5 is on the right looking toward the reference point; good 3 & 5/98; dead, solid and dry, granular and fluffy inside, COD unknown 3/99

**Ancistrocactus tobuschii Data for  
Las Rincones**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
6.00		6.96	74	3.40	0	0	4.00	1+2B	3	3.50	1	1	dead			of the cluster 5-6, 6 is to the left of 5; OK 5/98; dead, solid, dry, fluffy - granular inside, COD unknown 3/99
7.00		7.05	76	3.10	2	2	3.10	1+2B	2	3.00	1	2	3.03	1fr	1	good 3 & 5/99; good, green 3 & 5/00, 2 & 4/01
8.00		7.13	76	4.50	3	3	5.30	2+2B	4	4.90	0	0	4.43	2+1fr	3	plant good, tag loose 3/99; good 5/99; slightly reddish, good 3 & 5/00; green, good 2 & 4/01
9.00		7.08	74	1.60	0	0	2.30	0	0	2.40	0	0	2.52	0	0	green, good 5/99, 3 & 5/00, 2 & 4/01
9.01		7.01	74										2.38		0	green, good, discovered 5/99, 3 & 5/00, 2 & 4/01
10.00		7.11	78	1.40	0	0	1.40	0	0	1.50	0	0	1.92	0	0	good 3 & 5/99; green, good 3 & 5/00, 2 & 4/01
11.00		8.68	79	2.40	2	1	mia			mia			mia			disappearance due to fire ants?; no more fire ants, plant mia 3 & 5/97, 3 & 5/98, 3/99 and 5/99
12.00		6.77	86	2.60	0	0	3.20	1	1	3.70	3	3	3.15	1+1fr	2	of the cluster 12-15, 12 is left of 15, closest to the reference point; good 5/98, 3 & 5/99, 3/00; green, good 5/00, 4/01

**Ancistrocactus tobuschii Data for  
Las Rincones**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
13.00		6.80	86	2.90	1	0	3.20	2B	2	2.80	0	1	4.19	2	1+1A	of the cluster 12-15, 13 is behind and to the right of 12; flower buds look odd 3/97; good 5/98, 3 & 5/99; green, good 3 & 5/00, 2/01; green, good 4/01
14.00		6.80	86	3.30	2	2	3.40	2B	0	3.90	2	2	3.92	2	3	of the cluster 12-15, 14 is behind 12 & to the left of 13; buds barely formed 3/97; good 5/98, 3 & 5/99; green, good 3 & 5/00, 2/01; green, good 4/01
15.00		6.80	86	2.30	0	0	2.80	1B	0	3.00	1	1	2.93	1	1	of the cluster 12-15, 15 is to the left of 14; bud very small 3/97; good 5/98, 3 & 5/99; reddish, OK 3 & 5/00; olive, OK 2 & 4/01
16.00		6.65	88	2.60	2	0	3.30	1B	1	3.10	0	1	3.43	2	2	plant crushed 3/96; OK 3/97, 3/98 & 5/98, 3/99; olive, OK 5/99; green, good 3 & 5/00; chunk missing on one side, scarred over, green, OK 2 & 4/01
17.00		6.20	88	2.30	1	1	3.50	3B	2+1A	3.30	3	3	3.42	1	1	on right of 18.00; good 5/98, 3/99; green, good 5/99; forming a new apical meristem, green, good 3 & 5/00, 2/01; dead, chambers & galleries, COD - weevils, collected for weevil study 4/01

**Ancistrocactus tobuschii Data for  
Las Rincones**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
18.00		6.20	66	2.20	0	0	3.20	3B	3	3.40	1	1	2.93	3	3	on left of 17.00; good 5/98, 3/99; green, good 5/99, 3 & 5/00; green with some reddish tubercles, OK 4/01
19.00		6.57	88	2.00	0	0	2.80	1+1B	2	3.10	1	1	3.40	2+2fr	4	good 3 & 5/99; green, good 3 & 5/00, 2 & 4/01
19.01		6.54	88										1.54			0 left of 19.02, discovered 5/99; green, good 5/99, 3 & 5/00; just spines left, COD unknown 2/01
19.02		6.55	88										1.41			0 on right of 19.01, discovered 5/99; slightly maroonish, OK 5/99; green, good 3 & 5/00; filled with orange liquid, no insect sign, COD probably fly larva 2/01
20.00		6.51	94	2.80	2	2	3.70	3B	3	4.60	3	5	4.45	4+1fr	5	tag mia, replaced 3/98; good 3/99; good, green 5/99; turning goldish at base, otherwise green, OK 3 & 5/00, 2/01; green, good 4/01
20.01		6.79	95													discovered 2/01, in solution pocket in rock, green, good 2/01; covered by pissant dirt, OK 4/01
21.00		6.41	94	1.70	0	0	1.80	0	0	2.10	2	2	2.09	1	0	of the cluster 21-23, 21 is to the left and behind 22 and 23; good 5/98, 3/99; green, good 5/99; reddish, OK 3/00; green, good 5/00; reddish olive, OK 2/01; reddish, poor 4/01

**Ancistrocactus tobuschii Data for  
Las Rincones**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
22.00		6.38	94	3.40	2	2	4.40	2B	2	4.70	4	3+1A	4.26	2+1fr	3	of the cluster 21-23, 22 is to the left of 23; looks good 5/98, 3/99; maroonish, OK 5/99; olive, OK 3 & 5/00; marronish-olive, OK/poor 2/01; forming a second apical meristem, green, OK 4/01
23.00		6.38	94	3.20	2	2	4.00	2B	2	3.80	3	3	3.97	1+1fr	2	of the cluster 21-23, 23 is to the right of 22; good 5/98, 3/99; maroonish, OK 5/99; olive, OK 3 & 5/00, 2/01; yellow-green at the base, green above, new spine growth 4/01
23.01		6.36	94													discovered 4/01, 12 o'clock on 23, green, OK 4/01
24.00		6.58	94	2.40	0	0	2.50	0	0	2.50	0	0	dead			grayish red, firmly rooted, looks bad 3 & 5/97; about one-third eaten, grayish red, bad 3/98; misshapen, OK 5/98; dead, solid, granular, COD unknown 3/99
25.00		6.45	99	2.20	0	0	2.80	1B	1A	2.70	2	2	2.94	1+1fr	2	good 3/99; maroonish, OK 5/99 & 3/00; orangish, OK 5/00; olive, OK 2 & 4/01
26.00		6.30	99	2.70	0	0	3.00	0	0	3.20	0	0	3.24	1+1fr	1+1A	good 3/99; maroonish, OK 5/99 & 3/00; olive, OK 5/00; maroonish, OK-poor 2/01; maroonish-green, OK 4/01

**Ancistrocactus tobuschii Data for  
Las Rincones**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
27.00		6.18	99	3.40	3	3	4.00	2BB	1+1A	4.10	3	3	3.60	2	2	good 3/99; green, good 5/99; reddish, OK 3/00; green, good 5/00, 2 & 4/01
28.00		5.82	93	2.80	0	0	3.90	4B	4	4.20	2?	3	3.85	0	0	of the cluster 28-37, 28 is in the center; OK, reddish 3/99, 5/99, 3 & 5/00; new head forming on left side 5/00; new head gone, plant squishy, reddish, loose, poor 2/01; collected for weevil study 2/01
29.00		5.82	93	1.70	0	0	2.60	3B	2A	2.50	0	0	2.06	0	0	of the cluster 28-37, 29 is behind and right of 28; OK, reddish 3/99, 5/99, 3 & 5/00; squishy, seems dead 2/01; collected for weevil study 2/01
30.00		5.84	93	2.00	0	0	2.10	0	0	2.10	0	0	1.83	0	0	of the cluster 28-37, 30 is to the left of 29; OK, reddish 3/99, 5/99, 3 & 5/00; squishy, maybe dead 2/01; collected for weevil study 2/01
30.01		5.84	93				1.10	0	0	1.20	0	mia	mia			between 30.00 & 31.00, behind 28.00; not tagged 3/97; mia 5/98, 3/99, 5/99, 3 & 5/00, 2/01; surrounding plants collected for weevil study 4/01
31.00		5.84	93	1.70	0	0	2.70	0	0	2.40	0	0	1.25	0	0	of the cluster 28-37, 31 is behind 28.00 and 30.00; getting squeezed out, reddish, OK 3 & 5/99, 3 & 5/00; squishy, tan, looks dead, collected for weevil study 2/01
32.00		5.84	93	1.10	0	0	2.10	0	0	1.90	0	0	1.61	0	0	of the cluster 28-37, 32 is to the left of 31; reddish, OK 3/99, 5/99, 3 & 5/00; green, OK 2/01; collected for weevil study 2/01
32.01		5.84	93							0.80	0	0	1.24	0	0	of the cluster 28-37, 32.01 is below or behind 34.00, not on tag, discovered 3/98; reddish, OK 3 & 5/99, 3 & 5/00; plant mia 2/01; surrounding plants collected for weevil study 2/01

Ancistrocactus tobuschii Data for  
Las Rincones

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
33.00		5.83	93	1.20	0	0	1.60	0	0	1.30	0	0	1.67	0	0	of the cluster 28-37, 33 is left (below) 32; reddish, OK 5/99, 3 & 5/00; green, OK 2/01; collected for weevil study 2/01
34.00		5.82	93	1.50	0	0	1.60	0	0	1.50	0	0	1.19	0	0	of the cluster 28-37, 34 is to the left of 33 and to the right of 35, behind & between 35 & 36; reddish, OK 3 & 5/99, 3 & 5/00; weevil larva inside 2/01
35.00		5.81	93	1.40	0	0	1.80	0	0	1.70	0	0	1.82	0	0	of the cluster 28-37, 35 is to the left of 28, behind and between 36 & 37; reddish, OK 3 & 5/99, 3 & 5/00; green, OK, collected for weevil study 2/01
35.01		5.80	93				1.00	0	0	1.10	0	mia	mia			between 36.00, 35.00 & 34.00; not tagged 3/97; mia 5/98, 3 & 5/99, 3 & 5/00, 2/01; surrounding plants collected for weevil study 2/01
36.00		5.79	93	1.70	0	0	1.60	0	0	1.70	0	0	2.26	0	0	of the cluster 28-37, 36 is far left of 37; producing additional apical meristems?, reddish, OK 3/99; reddish, OK 5/99; forming a new apical meristem on left, reddish, OK 3 & 5/00; producing 3 new heads, plant red, squishy, loose, poor, collected for weevil study 2/01
37.00		5.80	93	1.90	0	0	2.10	0	0	2.00	0	0	2.21	0	0	of the cluster 28-37, 37 is the closet to stake; reddish, OK 3/99, 3 & 5/00; green with reddish tubercle tips, OK, collected for weevil study 2/01
37.01		5.68	93													beside rock, discovered 5/00; one measurement only 5/00; green, good 5/00, 2 & 4/01
38.00		5.99	95	5.90	6+1fr	7	6.40	4B	4	6.10	3	5+1A	6.05	2+1fr	3+1A	good 3/99; olive, OK 5/99, 3 & 5/00; green with reddish tubercle tips, OK 2 & 4/01

**Ancistrocactus tobuschii Data for  
Las Rincones**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
39.00		5.91	94	3.60	0	0	3.90	3B	3A	3.10	0	0	dead			poor 3 & 5/98; solid, granular, COD unknown 3/99
40.00		5.71	94	3.90	0	0	3.90	0	0	Dead	Dead	Dead				40 is to the right of 41; yellow-orange on top, bad 5/97; stem solid, COD unknown 3/98
41.00		5.68	94	3.30	1	1	3.70	3B	2+1A	3.80	3	3	3.79	2+2fr	3+1A	41 is to the left of 40; good 3/99; olive, OK 5/99; purple, partially covered with ant litter, OK 3 & 5/00; gray green with purplish tubercles, lopsided, OK 2/01; reddish-green, new green apical growth, OK 4/01
42.00		5.89	97	2.80	2	2	3.20	1B	1A	2.80	1	1	2.45	1+1fr	2	42 is to the right of 43; good 3/99; good, green 5/99; reddish, OK 3/00; green, good 5/00; purplish green, OK 2/01; green, good 4/01
43.00		5.88	97	2.80	2	2	3.00	1B	1A	2.70	0	1	2.84	2	2	43 is to the left of 42; good 3/99; good, green 5/99; reddish, OK 3 & 5/00; greenish yellow, OK 2 & 4/01
44.00		5.80	97	1.30	0	0	1.70	0	0	1.90	0	0	1.86	0	0	of the cluster 44-46, 44 is the farthest on the right, a 4th head may be coming out; no 4th head 3/98; reddish, OK 3/99, 5/99, 3/00; purplish, OK 5/00, 2 & 4/01
44.01		5.80	97				1.10	0	0	mia			mia			in front of and between 44.00 & 45.00; not tagged 3/97; mia 3 & 5/98, 3/99, 5/99, 3 & 5/00

**Ancistrocactus tobuschii Data for  
Las Rincones**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
45.00		5.80	97	1.50	0	0	1.50	0	0	1.70	0	0	1.85	0	0	of the cluster 44-46, 45 is between 44 and 46, a 4th head may be coming out; no 4th head 3/98; reddish, OK 3 & 5/99, 3/00; purplish, OK 5/00, 2 & 4/01
46.00		5.80	97	1.80	0	0	2.10	0	0	2.40	0	0	2.54	0	0	of the cluster 44-46, 46 is the farthest on the left, a 4th may be coming out; no 4th head 3/98; reddish, OK 3 & 5/99, 3/00; purplish, OK 5/00, 2 & 4/01
47.00		5.74	96	3.10	2	2	3.40	0	0	3.40	0	0	2.50	0	0	becoming 2-headed 5/98; not 2-headed, reddish, OK; 3 apical meristems, reddish, OK 5/99, 3/00; four-headed, green, good 5/00; exit holes, cause of death weevils 2/01
48.00		5.60	96	1.80	0	0	1.90	0	0	1.80	0	nd	1.67	0	0	good 3/99; maroonish, OK 5/99; olive, OK 3/00; green, good 5/00, 2 & 4/01
49.00		5.39	98	3.10	0	1	3.20	1B	1	3.70	2	2	3.12	0	1	49 is to the right of 50; dull green, OK 3/99 & 5/99; purplish-yellowish green, OK 3/00; covered with litter, OK 5/00; purplish tan, poor 2/01; reddish green, OK 4/01
50.00		5.40	98	2.70	0	0	2.60	0	0	2.70	0	0	2.33	0	0	50 is to the left of 49; dull green, OK 3/99, 5/99, 3/00; covered with litter, OK 5/00; dull green, OK 2/01; green, good 4/01
51.00		5.42	98	2.20	0	0	2.10	0	0	2.20	0	0	1.80	0	0	OK, 3/99; misshapen, olive, OK 5/99, 3/00; covered with litter, OK 5/00; blue green, OK 2/01; looks dead, collected for weevil study 4/01

**Ancistrocactus tobuschii Data for  
Las Rincones**

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
52.00		5.89	111	2.10	0	0	2.60	0	0	2.30	0	0	2.30	0	0	of the cluster 52-59, 52 is the rightmost of the closest three heads to the reference point; dull green, OK 3/99, 5/99, 3/00; green, good 5/00; olive, OK 2 & 4/01
53.00		5.89	111	1.70	0	0	2.20	0	0	2.50	0	0	2.28	0	0	of the cluster 52-59, 53 is between 52 and 54; dull green, OK 3/99, 5/99, 3/00; green, good 5/00; green, OK 2 & 4/01
54.00		5.90	111	2.60	0	0	2.90	0	0	2.90	0	0	2.52	0	0	of the cluster 52-59, 54 is the leftmost of the closest three heads to the reference point; dull green, OK 3/99, 5/99, 3/00; green, good 5/00, 2 & 4/01
55.00		5.91	111	3.10	0	0	3.40	0	0	3.60	0	0	3.28	0	0	of the cluster 52-59, 55 is behind 52-54 and is the rightmost head of the 2nd line of heads; dull green, OK 3/99, 5/99, 3/00; green, good 5/00; olive, OK 2 & 4/01
55.01		5.93	110													discovered 3/00; reddish, OK 3/00; hunkered, OK 5/00; blue green, OK 2 & 4/01
56.00		5.94	111	2.30	0	0	2.80	0	0	2.60	0	0	2.25	0	0	of the cluster 52-59, 56 is behind 55; dull green, OK 3/99, 5/99, 3/00; green, good 5/00; olive, OK 2 & 4/01

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
57.00		5.93	111	3.10	0	0	3.10	0	0	2.80	0	0	2.78	0	0	of the cluster 52-59, 57 is between 55 and 58 in the middle line of heads; dull green, OK 3/99, 5/99, 3/00; green, good 5/00, 2 & 4/01
58.00		5.94	111	2.00	0	0	1.80	0	0	1.40	0	0	1.61	0	0	of the cluster 52-59, 58 is to the left of 57; dull green, OK 3/99, 5/99, 3/00; green, good 5/00, 2 & 4/01
59.00		5.95	111	1.10	0	0	1.30	0	0	1.10	0	0	1.05	0	0	of the cluster 52-59, 59 is behind and between 57 & 56; dull green, OK 3/99, 5/99, 3/00; green, good 5/00; hunkered, green, OK 2 & 4/01
60.00		6.45	109	2.80	0	0	2.80	0	0	2.60	0	0	2.64	0	0	of the cluster 60-62, 60 is closest to the reference point on the right; poor 3/98; greening up, OK 5/98 & 3/99; olive, OK 5/99; maroonish, OK 3/00; dull green, OK 5/00, 2 & 4/01
60.01		6.89	110										2.66	0		discovered 5/99; green, OK 5/99, 3/00; green, good 5/00, 2 & 4/01
61.00		6.44	109	2.40	0	0	2.30	0	0	2.00	0	0	1.72	0	0	of the cluster 60-62, 61 is the closest to the reference point on the left; poor 3/98; greening up, OK 5/98 & 3/99; olive, OK 5/99; maroon, OK 3/00; olive, poor 5/00 & 2/01; reddish-green, root partly exposed, poor 4/01

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
62.00		6.47	109	2.00	0	0	2.10	0	0	1.90	0	0	1.86	0	0	of the cluster 60-62, 62 is behind 60 and 61; poor 3/98; greening up, OK 5/98, 3/99; olive, OK 5/99; maroon, OK 3/00; olive, OK 5/00; maroonish green with exposed tan spineless lower stem, poor 2 & 4/01
62.01		6.46	109				1.60	0	0	1.50	0	0	1.44	0	0	behind 61.00 & to the left of 62.00; not tagged 3/97; poor 3/98; greening up, OK 5/98, 3/99; olive, OK 5/99; green, OK 3/00; yellowish, OK 5/00; gray green with exposed tan spineless lower stem, poor 2 & 4/01
63.00		6.38	111	3.10	1	1	3.50	1B	1A	3.80	0	1	3.79	0	0	good 3/99; green, good 5/99; green with some reddish tubercle tips, OK 3 & 5/00, 2 & 4/01
64.00		5.84	102	1.60	0	0	1.50	0	0	1.60	0	0	1.52	0	0	good 3/99; green, good 5/99, 3 & 5/00, 2 & 4/01
65.00		5.14	79	2.20	0	0	2.50	0	0	2.20	0	0	2.08	0	0	of 65 and 66, 65 is closest to the reference point; fire scarred?, poor 3/98; OK 5/98; dull green, OK 3/99 & 5/99; reddish-green, OK 3/00; yellowish-olive, OK 5/00 & 2/01; reddish green, OK 4/01
66.00		5.15	79	3.20	0	0	3.70	1	1	3.80	0	0	3.60	0	1	of 65 and 66, 66 is behind 65; fire scarred?, poor 3/98; OK 5/98, 3/99; dull green, OK 5/99 & 3/00; yellowish-olive, OK 5/00; green with some red tubercle tips, OK 2 & 4/01

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
66.01		5.15	79				0.80		0	0.90	0	0	1.01	0	0	not tagged, discovered 5/97; to right of 66; OK 3/99, 5/99, 3 & 5/00; just spines left, cause of death unknown 2/01
66.02		4.65	86										0.72		0	discovered 5/99; green, OK 5/99, 3 & 5/00; maroonish green, OK 2/01; green, OK 4/01
67.00		5.22	81	1.30	0	0	1.60	0	0	1.90	0	0	2.01	0	0	getting covered by crustose lichen, OK 3/99; popping out, green, good 5/99, 3 & 5/00, 2 & 4/01
68.00		5.42	81	1.80	0	0	2.30	0	0	2.40	1	1	2.57	1fr	1	very reddish, OK 3/99, 5/99, 3/00; orangish, OK 5/00, 2/01; reddish at base with new green apical growth, OK 4/01
69.00		5.48	79	1.30	0	0	1.40	0	0	1.40	0	0	1.80	0	0	getting covered by crustose lichen, OK 3/99; popping out, green, good 5/99, 3 & 5/00, 2 & 4/01
69.01		5.48	79				0.60	0	0	0.60	0	0	0.66	0	0	to left of 69.00; not tagged 3/97; almost covered by crustose lichens, OK 3/99; coming out, green, good 5/99; green, OK 3 & 5/00, 4/01
70.00		5.20	82	1.50	0	0	1.60	0	0	2.10	0	0	2.10	0	0	getting covered by crustose lichens, OK 3/99; green, good 5/99; tag loose, green, good 3/00; green, good 5/00; olive, OK 2/01; green, good 4/01

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
71.00		5.38	82	1.80	0	0	1.70	0	0	1.50	0	0	1.99	0	0	green, good 5/99, 3 & 5/00, 2 & 4/01
72.00		5.46	81	0.60	0	0	0.70	0	0	0.80	0	0	0.89	0	0	reddish, few spines, poor 3/97; OK 5/97; root becoming exposed, plant OK 3/98; root more covered 5/98; OK 3/99; olive, OK 5/99, 3/00; hunkering, OK 5/00, 2 & 4/01
73.00		4.88	45	3.70	1+1fr	2	4.20	2B	2	3.80	2	1A	3.56	1+2fr	3	maroon, OK 3 & 5/98; some loose spines, hunkering, getting misshapen, OK, dull green 3/99; maroon, OK 5/99, 3 & 5/00; purple, OK 2 & 4/01
74.00		2.95	46	1.50	0	0	1.60	0	0	Dead	Dead	Dead				only spines left, COD unknown 3/98
75.00		2.85	49	3.10	1+1fr	2	3.70	2B	1+1A	Dead	Dead	Dead				mushy red inside, COD unknown 3/98
75.10		3.10	44				0.90	0	0	1.00	0	0	1.07	0	0	hunkered 3/99; green, good, hunkered 5/99; green, OK 3 & 5/00, 2 & 4/01
75.20		3.15	44				1.50	0	0	1.90	0	0	2.02	0	0	hunkered 3/99; popping out, green, good 5/99; one flower damaged, plant green, good 3 & 5/00; purplish-green, OK 2 & 4/01
75.30		3.03	41				0.90	0	0	1.00	0	0	1.08	0	0	hunkered 3/99; green, good, hunkered 5/99; coming out, green, good 3/00; hunkering, OK 5/00 & 2/01; popping out, green, OK 4/01

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
75.40		3.66	40				3.40	1+1B	2A	3.30	0	0	3.63	2fr	2	green, good 5/99, 3 & 5/00, 2 & 4/01
75.50		3.45	44													discovered 3/00; green, good 3 & 5/00, 2 & 4/01
76.00		2.01	45	3.20	0	0	3.30	0	0	3.40	0	0	3.41	1+1fr	1+1A	good 3/99; dull green, OK 5/99; tag mia, replaced 3/00; green, good 3 & 5/00, 2 & 4/01
77.00		2.09	45	3.40	0	0	Dead									COD unknown, yellow viscous liquid inside 3/97
78.00		2.35	22	3.00	1	1	2.80	1B	1	2.70	1	1A	2.70	1+1fr	2	barely stepped on 3/98; yellow-green, OK 3/99; reddish, OK 5/99; light green, OK 3 & 5/00, 2 & 4/01
78.01		2.27	26										0.91		0	discovered 5/99; OK 5/99; just two pale green tubercles, poor 3/00; hunkered, green, OK 5/00, 2 & 4/01
78.02		2.25	26										0.64		0	discovered 5/99; OK 5/99; hunkered, OK 3 & 5/00, 2 & 4/01
79.00		2.57	24	2.30	0	0	2.30	0	0	2.30	0	0	dead			fire scarred?, badly stepped on, gray, hard, poor 3/98; olive green, OK 5/98; solid, hard, dry, COD unknown 3/99

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
80.00		2.59	27	2.70	0	0	3.00	0	0	2.90	0	0	2.61	0	0	fire scarred?, gray, hard, poor 4 & 5/98, 3/99; dull green, OK 5/99, 3 & 5/00, 2/01; green, OK 4/01
81.00		2.17	30	1.30	0	0	1.40	0	0	1.50	0	0	1.32	0	0	hunkered, OK 3/99; popping out, dull green, OK 5/99; green good 3 & 5/00, 2 & 4/01
82.00		5.97	8	3.00	2	0	4.50	1+4B	2+3A	4.40	3	3	5.24	4?	1+3?A	of the pair 82-83, 82 is on the left; good, flowers granulated by ants 3/99; green, good 5/99, 3/00; yellowish, good 5/00; ca. 20% of plant eaten, green with maroonish tubercles, OK 2/01; lower part maroonish green, upper stem green with new growth, OK 4/01
83.00		5.97	8	2.60	2	2	4.00	5B	3+1A	4.30	4	5	5.44	4?	4?A	of the pair 82-83, 83 is on the right; good, flowers granulated by ants 3/99; green, good 5/99, 3/00; some yellowish tubercles, good 5/00; some tubercle damage, plant maroonish-green, OK 2/01; maroonish-green at base with new green apical growth, OK 4/01
83.01		6.20	12										1.21		0	discovered 5/99, green, good, popping out of crustose lichen 5/99, 3/00; hunkered, OK 5/00; popping out, blue green, OK 2/01; green, OK 4/01
84.00		5.91	6	3.00	2	0	3.90	2+3B	5	mia			mia			of the pair 84-85, 84 is on the left; mia 3 & 5/98, 3/99, 5/99, 3 & 5/00

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
85.00		5.94	6	2.10	1	0	2.80	1+2B	1+2A	mia			mia			of the pair 84-85, 85 is on the right; mia 3 & 5/98, 3/99, 5/99, 3 & 5/00
86.00		2.54	124	4.10		2	4.30	1+2B	3	4.80	1	1	4.97	2fr	2	found in 5/96; great 5/98, 3/99; green 5/99, 3 & 5/00; green, good 2 & 4/01
87.00		3.00	133	3.10		0	3.60	0	0	3.50	1	1	3.79	0	0	found in 5/96; good 3/99; green, good 5/99, 3 & 5/00, 2 & 4/01
87.10		4.26	108													under juniper, discovered 3/00; green, OK, hunkered in juniper needles 3 & 5/00, 2 & 4/01
87.20		4.29	108													under juniper, discovered 3/00; yellowish at base, OK 3/00; green, OK 5/00; pale green, tan at base, OK 2 & 4/01
88.00		7.47	79	2.90		0	3.40	3	2+1A	2.90	0	0	2.90	0	0	found in 5/96; of the cluster 88-94, 88 is closest to the reference point between 89 and 94; reddish, OK 3/99, 5/99, 3 & 5/00, 2/01; collected for weevil study 2/01
88.10		7.45	79							1.10	0	0	1.00	0	0	left of 89.10, in front of 88; discovered 3/98; green, good 5/99, 3 & 5/00; exit holes, COD - weevils 2/01
88.20		7.45	79										0.54	0	0	left of 88.10, in front of 88, OK, discovered 3/99; OK 5/99, 3/00; green, good 5/00; exit holes, COD - weevils 2/01

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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
89.00		7.47	79	1.00		0	1.30	0	0	1.40	0	0	1.22	0	0	found in 5/96; of the cluster 88-94, 89 is right of 88 & in front of 90.1; reddish, OK 3/99 & 5/99; green, good 5/00; exit holes, COD - weevils 2/01
89.10		7.46	79							1.10	0	0	0.69	0	dead	in front of 89, right of 88; discovered 3/98; seems dead, just spines, firmly attached 3/99; gone, COD unknown 5/99
90.00		7.47	79	1.80		0	2.50	2	1+1A	2.40	2	2	2.47	0	0	found in 5/96; of the cluster 88-94, 90 is behind and right of 89, and rightmost; reddish, OK 3 & 5/99; very red, OK 3 & 5/00; exit holes, COD - weevils 2/01
90.10		7.49	79							1.30	0	0	mia			between 88 & 90; discovered 3/98; mia 3/99, 5/99, 3 & 5/00, 2/01; surrounding plants collected for weevil study 2/01
91.00		7.49	79	0.80		0	1.40	0	0	1.50	0	0	1.26	0	0	found in 5/96; of the cluster 88-94, 91 is behind 88 & 90, & to the right of 92; reddish, OK 3/99 & 5/99, 3 & 5/00; exit holes, COD - weevils 2/01
91.10		7.51	79							0.80	0	0	0.82	0	0	below 91, between 90 & 92; discovered 3/98; reddish, OK 3/99 & 5/99; green, OK 3/00; green, good 5/00; exit holes, COD weevils 2/01
92.00		7.49	79	1.50		0	2.20	1	0	2.00	0	0	2.49	0	0	found in 5/96; of the cluster 88-94, 92 is between 91 and 93; reddish, OK 3/99 & 5/99; green with a few orange tubercles, OK 3 & 5/00; exit holes, COD - weevils 2/01
93.00		7.49	79	1.10		0	1.10	0	0	1.40	0	0	1.67	0	0	found in 5/96; of the cluster 88-94, 93 is farthest from the reference point on the left; reddish, OK 3/99 & 5/99; green, OK 3/00; orangish, OK 5/00; exit holes, COD - weevils 2/01

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST	ANGLE	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
94.00		7.48	79	1.90		0	2.10	0	0	2.00	0	0	2.11	0	0	found in 5/96; of the cluster 88-94, 94 is closest to the reference point on the left; reddish, OK 3/99 & 5/99; green, OK 3 & 5/00; exit holes; COD - weevils 2/01
95.00		4.55	80	1.60		0	1.80	0	0	1.60	0	0	0.78	0	dead	found in 5/96; in solution hole in rock; bad, probably dead; loose yet firmly rooted 3/99; dead, COD unknown, removed by WHC 5/99
96.00		6.47	91	1.20		0	1.40	0	0	1.50	0	0	1.96	0	0	found in 5/96; OK, hunkering 3/99; popping out, green, good 5/99; green, good 3/00; hunkered, green, good 5/00 & 2/01
97.00		7.22	79							1.10	0	0	1.17	0	0	discovered 3/98; OK, getting covered by crustose lichens 3/99; popping out, green, OK 5/99; reddish-green, OK 3 & 5/00; green, OK 2/01; green, good 4/01
97.10		7.24	80													discovered 3/00; green, OK 3 & 5/00, 2/01; green, good 4/01
98.00		6.34	70							2.80	0	0	2.48	2fr	2	discovered 3/98; dull green, OK 3/99 & 5/99; slightly reddish, OK 3 & 5/00; hunkered, green, OK 2 & 4/01
98.01		6.25	70										1.29		0	in solution pocket, slightly maroon, OK, discovered 5/99; green, OK 3 & 5/00; olive, OK 2 & 4/01

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[illegible]

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Stake 1 is 31.41 m at 253 degrees from 20 mph sign under and between small live oaks over agaritas; Stake 1 = GPS1 R030119A																
1.00	1	5.40	44	1.80	0	0	2.30	0	0	2.80	0	0	mia		0?	burned 1/96; burned shell beside 3/96; OK, shell gone 5/96; green, good 3/97, 5/97, 3/98 & 5/98; a few spines in vicinity 3/99; 2 seedlings or 2 tubercles 4/99; two plants 1.01 and 1.02 2/00
1.01	1	5.38	42													tubercle or seedling of 1.00; green, good 2 & 4/00; olive, OK 2 & 5/01
1.02	1	5.39	42													tubercle or seedling of 1.00; green, good 2 & 4/00; olive, OK 2 & 5/01
2.00	1	6.35	42	5.10	4	2	4.40	4	4	4.60	3	2	nd	0	0	not burned 1/96; OK-poor; dull greenish-red 5/96; green & good 97 OK; tubercle tips getting orange 98; eaten down to soil level 3/99; very poor; 2 spine clusters 4/99; pup coming off of eaten stem, pup bad, not measured 2/00; looks dead 4/00; pup dead, parent dead, COD herbivory 2/01
2.01	1	6.33	42	1.50	0	0	2.10	0	0	2.50	1	1	nd	0	mia	burned 1/96; good 5/96, 3/97, 5/97, 3/98; getting buried 5/98; eaten down to soil level 3/99; plant mia 4/99; green, good 2/00; olive, OK 2/01; green, good 5/01
3.00	1	6.29	38	2.50	0	0	2.30	1	1	2.60	0	0	2.45	0	0	burned 1/96; dead (?) one beside 3/96; OK, dead one still there 5/96; dead one gone, green, good 3 & 5/97; green, good with a few tan tubercle tips 3/98 & 5/98; green, OK 3/99 & 4/99; light green, OK 2 & 4/00; squishy, pale green with tan tubercle tips, poor 2/01; dead, COD unknown 5/01

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
4.00	1	5.48	37	4.50	1A	0	5.00	3B+2A?	4+1A	5.60	3	3	4.70	2	2	green, good 3/97 & 5/97; a little purplish at the base, good 3/98; orangish 5/98; green, good 3/99 & 4/99; green top, reddish base, good 2/00; green, good 4/00, 2 & 5/01
4.10	1	5.39	38				3.20	1+1 fr	2	3.20	1	1	nd	0	Dead	fire scars, dark purplish green, OK 3 & 5/97; purplish green, OK 3/98; orangish 5/98; eaten down below soil level 3 & 4/99, COD herbivory
5.00	1	5.00	42	3.30	1 fr	0	3.60	4(2A?)	4	3.90	1	0	mia	mia	0	burned 1/96; OK 5/96, 3/97 & 5/97; a little purplish & yellowish, deer shit on plant, OK 3/98; green, good 5/98; loose spines nearby 3/99; seedling or tubercle present 4/99; green, good 2 & 4/00, 2 & 5/01
5.10	1	5.93	39							2.50	1	1	nd	0	0?	discovered 3/98; getting buried 5/98; eaten down below soil level 3/99; spine cluster or seedling present 4/99; green, good 2 & 4/00, 2 & 5/01
6.00	1	4.99	39	4.30	2A+1fr	0	5.00	6(3A?)	5 (1 disp.)	4.60	4fr	2+2A	mia			burned 1/96; poor, maroon in color, new growth faded 5/96; dark green, good 3/97; partially eaten 5/97; maroon again, OK 3/98 & 5/98; loose spines in vicinity 3/99; gone without a trace 4/99; tag and plant mia 2 & 4/00, 2 & 5/01
7.00	1	5.98	28	3.70	0	0	3.40	3	2+1A	3.80	0	0	3.53	0	0	burned 1/96; OK 5/96; green, good, being shaded by Schrankia 97; green, good, shaded by little bluestem 98, 99, 00; green, with a few yellow tubercle tips, good 2/01; green, good 5/01
8.00	1	4.12	31	3.50	1+1fr	2	5.20	3+3fr+1A	5+1A	5.10	3	3	dead			burned 1/96; OK 5/96; tag mia, retagged, good 3/97 & 5/97; tag mia, retagged, fantastic 3/98 & 5/98; whole plant eaten, only spines left 3/99

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
9.00	1	3.94	31	3.50	1	2	4.20	4+2fr	6	4.30	3	3	nd	0	mia	burned 1/96; OK 5/96; good, green 3/97, 3/98 & 5/98 eaten down to soil level 3/99; tag and plant gone without a trace 4/99; 9.01 and 9.02 probably tubercles of 9.00; mia 00, 01
9.01	1	3.93	34													possibly tubercle of 9.00; green, good 2 & 4/00, 2 & 5/01
9.02	1	3.95	34													possibly tubercle of 9.00; green, good 2 & 4/00, 2 & 5/01
10.00	1	4.93	17	5.10	4	3	6.00	5+3fr	7	6.50	5	2+2A	nd	0	0	burned 1/96; OK 5/96; great 3/97; several fruit partially eaten 5/97; OK; slightly goldish 3/98; yellowish & orange 5/98; mostly eaten, 1 tubercle left 3/99 & 4/99; gone, tag removed, COD mammal herbivory 2/00
11.00	1	4.40	18	2.40	0	0	2.60	0	0	2.90	2	1+1A	nd	mia	0	burned 1/96; OK 5/96; tag mia, retagged, good 3 & 5/97; OK, yellowish 3/98; green, pulling into dirt 5/98; gone without a trace 3/99; new growth off old stem 4/99; green, good 2 & 4/00; body hollow, COD Moneilema 2/01
12.00	1	8.06	301	3.40	1	0	5.50	2+3fr	3+1A	5.50	2	2	5.22	3fr+2	4+1A	burned 1/96; OK 5/96; good 3/97 & 5/97; tag mia, replaced, good 3/98, 5/98, 3/99; good, green 4/99 & 2/00; a few orange tubercle tips, OK 4/00; one gallery and exit hole, COD Moneilema? 2/01
13.00	1	6.52	70													discovered 2/00; green, good 2 & 4/00; trampled, olive with a few orange tubercle tips, OK 2/01; green, OK 5/01

Stake 2 is 24.90 m at 194 degress from the 20mph sign over agarita; Stake 2 = GPS2 R030120A

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
13.00	2	7.17	356	2.40	1fr	0	3.10	0		3.80	0	0	3.01	3	1A	burned 1/96; OK 5/96; one-third eaten, scarred over, greenish purple, poor 3/97; better, only a slight scar 5/97; trampled a lot, OK, new growth in center 3/98; right in path, green, level with ground 5/98, 3/99; spine clusters loose, OK 4/99; green, good 2/00; purplish, OK 4/00; becoming two-headed, green with purplish tubercles, OK 2/01; only one apical meristem, within a much larger basal stem, green, OK 5/01
14.00	2	10.00	348	4.20	2+1A	1	5.30	1B+2+2fr	4+1A	5.90	4	4A	5.19	2+4fr	6	burned 1/96; OK 5/96; green, good 3/97 & 5/97; green, good, flowers smashed 3/98; green, good 5/98, 3/99, 4/99 & 2/00; covered with ant litter 2/00; coming out, green, good 4/00; plant collapsed, mushy, gooey red-orange, collected, dead 2/01
14.01	2	10.03	348	1.20	0	0	1.50	0	0	1.40	0	0	1.36	0	0	burned 1/96; OK 5/96; tag mia, retagged, OK 3/97; almost buried in dirt 5/97; popped cut, good, tag mia, replaced 3/98; good 5/98, 3/99; green, good 4/99; covered with ant litter, OK 2/00; coming out, green, good 4/00; tag mia, replaced, misshapen, green, OK 2/01; orange, hunkered, poor 5/01
15.00	2	9.85	348	7.00	0	0	3.20	1+1fr	2	3.80	1	1	2.74	1	1	slightly burned 1/96; good 5/96, 3/97, 5/97, 3/98, 3/99; under live oak seedling, green, good 4/99 & 2/00; covered with ant litter 2/00; out, dull green, OK, covered with live oak leaves 4/00; may have suffered apical damage, green, OK 2/01; green, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
16.00	2	8.96	343	4.10	1	1	4.10	1B+2+1fr	4	4.00	1	1	3.91	0	0	burned 1/96; OK 5/96 & 3/97; tag mia, retagged, good 5/97; reddish, OK 3/98; poor 5/98; spines dull whitish-gray, body green with maroon overcast 3/99; goldish green, new spine growth, OK 4/99; top green, lower body tan, OK 2/00; goldish, OK 4/00; maroonish, OK 2 & 5/01
17.00	2	10.41	339	4.30	3	2	4.60	3B+2	1+2A	4.00	1	1	3.72	2+2fr	3+1A	burned 1/96; one flower slightly eaten 3/96; poor, reddish 5/96; green, OK 3/97; OK, slightly covered with dirt 5/97; good with a few red tubercle tips 3/98 & 5/98; slightly maroonish green; good 3/99 & 4/99; green, OK, covered with ant litter 2 & 4/00; dead, body hollow, COD Moneilema 2/01
17.01	2	10.38	339	0.70	0	0	0.70	0	0	0.70	0	0	1.17	0	0	slightly burned 1/96; OK 5/96; green, good 3/97; almost buried in dirt 5/97; popped out, good 3/98 & 5/98; OK 3/99; OK, green 4/99; pl mia 2 & 4/00; relocated, dead, just spines left, COD unknown 2/01
17.02	2	10.43	339				1.00		0	1.20	0	0	1.27	0	0	discovered 5/97; looks good 3/98, 5/98, 3/99; good; green 4/99; mia 2 & 4/00; relocated, dead, hollow, too small for Moneilema, COD unknown 2/01
18.00	2	10.39	339	3.60	1	0	4.40	1B+2+1fr	3+1A	5.10	3	3	3.90	3+1fr	4	burned 1/96; OK 5/96; green, good 3 & 5/97; tag mia replaced, green, good 3/98; green, good 5/98, 3/99 & 4/99; green, OK, covered with ant litter 2 & 4/00; body hollow, COD Moneilema 2/01
19.00	2	11.67	343	4.40	4	0	5.60	1B+3+4fr	9	5.80	4	4	4.71	4fr	2+1A	burned 1/96; OK-poor, a few new spines 5/96; OK 3/97; great 5/97 & 3/98; good 5/98; OK 3/99; yellowish, OK 4/99; green, good, covered with ant litter 2 & 4/00; apex damaged, some spineless tubercles, green, OK 2/01; new apex green, good, rest of plant slightly orangish-green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
19.01	2	11.22	340				2.00		1+1A	2.30	1	1	1.90	1		1 slightly orangish, fruit abortion probably due to trampling, discovered 5/97; tubercle tips reddish, otherwise good 3/98; same but sinking into ground 5/98 & 3/99; coming out, dull green, OK 4/99; green, OK, misshapen, stepped on? 2/00; green with a few reddish tubercle tips, OK 4/00; new apex forming, green with a few reddish tubercle tips, OK 2/01; green, good 5/01
20.00	2	8.84	338	5.30	4	3	4.80	2B+3	6	4.80	0	3	5.11	6		6 burned 1/96; OK, new growth 5/96; green, good 3 & 5/97; OK, tubercle tips orangish 3/98; green, good 3/99 & 4/99, 2 & 4/00, 2 & 5/01
21.00	2	10.18	323	3.00	1	1	3.80	1+2fr	3	3.80	1	1	3.33	1fr		1 not burned 1/96; looks good 5/96, 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99; partly covered with litter, green, good 2/00; out of litter, green, good 4/00; green with one yellow tubercle, OK 2/01; green, OK 5/01
22.00	2	10.56	311	4.50	2	3	4.70	2B+3	1+1A	4.60	0	0	3.94	0		0 not burned 1/96; reddish at base 3/96; OK, greener 5/96; mostly reddish 3/97; purplish 5/97; red with some new green growth at top, bad 3/98; poor, maroon, new spine growth 5/98; spines gray, body green, OK 3/99; reddish goldish green, OK 4/99; purple, OK 2/00; reddish, poor 4/00; green with red tubercle tips, OK 2/01; maroonish, OK 5/01
22.10	2	10.66	311				2.00	0	0	2.00	0	0	2.03	0		0 to left of 22.20; no fire scars, good 3/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00; yellowish green, OK 2/01; green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
22.20	2	10.66	311				2.30	0	0	2.20	0	0	2.45	0	0	to right of 22.10; no fire scars, good 3/97, 3/98, 5/98, & 3/99; green, good 4/99, 2 & 4/00; getting buried, yellowish-green, OK 2/01; green, OK 5/01
22.30	2	10.00	309				4.60	1B+2	3	4.50	1	1	3.96	0	0	no fire scars, good 3/97; a few yellow tubercle tips, good 3/98; poor, mostly yellow 5/98; goldish, OK 3/99 & 4/99; base yellowish, green top, OK 2/00; olive, OK 4/00; some damage to apical meristem and tubercles, green with tan tubercle tips, OK 2 & 5/01
22.40	2	7.78	308				5.30	1B+3	4	4.50	2	2	4.51	0	0	in juniper branches; no fire scars, good 3/97; getting yellowish, OK 3/98; good, a few yellow tubercle tips 5/98; dark maroonish green, OK 3/99; good 4/99; green, good 2 & 4/00; green with maroonish tubercle tips, OK 2 & 5/01
22.50	2	8.73	311							4.50	3	3	3.40	4	3+1A	discovered 3/98; OK, yellowish-green 5/98 & 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
23.00	2	4.06	308	1.70	0	0	1.90	1B	1	2.20	0	0	2.04	0	0	not burned 1/96; good 5/96, 3/97, 5/97, 3/98 & 5/98; hunkered down, green, OK 3/99; green, good, coming out 4/99; a little misshapen 2/00; green, OK 2 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
24.00	2	4.13	307	1.70	0	0	2.20	0	0	0.90	2	0	1.05	0	0	not burned 1/96; good 5/96; OK, slightly purplish 3/97; green, good 5/97; a few dry tubercles and spines in vicinity, cause unknown, 2 tubercles left, green, OK 3/98; green, good, level with soil 3/99; green, good, popping out 4/99; green, good 2 & 4/00; olive, OK 2/01; green, OK 5/01
25.00	2	4.17	306	1.80	0	0	2.70	1B+1+1fr	2+1A	2.50	1	1	2.26	2fr	2	burned 1/96; OK 5/96; green, good 3/97, 5/97, 3/98, 5/98, 3/99, 4/99, 2/00 & 4/00, 2 & 5/01
25.01	2	4.24	304				1.00		0	1.30	0	0	1.32	0	0	discovered 5/97; good 3/98, 5/98 & 3/99; olive, OK 4/99; covered by rock 2/00; green, good 2 & 4/00, 2 & 5/01
26.00	2	4.35	297	3.90	2	2	4.90	2B+2+2fr	6	4.70	3	3	3.89	1+4fr	5	burned 1/96; OK 5/96; green, good 3/97 & 5/97 getting a few reddish or yellowish tubercle tips, OK 3/98; green, OK 5/98; slightly maroon, OK 3/99 & 4/99; green, good 2 & 4/00, 2 & 5/01
26.10	2	5.36	290				2.10		0	2.50	0	0	2.25	3fr	3A	discovered 5/97; OK 3/98; good 5/98 & 3/99; green, good 4/99, 2/00 & 4/00, 2/01; slightly maroonish, good 5/01
26.20	2	5.37	290				2.00		0	2.30	0	0	1.88	0	0	discovered 5/97; good 3/98, 5/98, 3/99; green, good 4/99, 2/00 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
27.00	2	7.37	285	2.70	2	2	3.40	3	1+1A	4.10	4	4	3.69	4fr	4	not burned 1/96; OK, fruit split open 5/96; rock on top, flowers smashed, stem OK 3/97; good 5/97; OK, a little yellowish 3/98; green, good 5/98 & 3/99; buried in grass, grass dying back, plant green, good 4/99 & 2/00; slightly reddish at base, otherwise green, good 4/00; maroonish-green, good 2/01; olive, OK 5/01
27.10	2	10.20	278				4.40	2+4fr	5	4.60	4	1	3.46	4fr	4	no fire scars, good 3/97 & 3/98; OK, trampled 5/98; hunkered down 3/99; hunkered down, OK 4/99; green, good 2 & 4/00; sunken slightly on one side, green, OK 2 & 5/01
27.20	2	10.80	278				2.00	0	0	2.40	1	1A	1.74	0	0	no fire scars, good 3/97; almost buried, OK 5/98; tag upside down under rock, plant totally buried 3/99; barely above soil, green, OK 4/99 & 2/00; popped out, dull green, OK 4/00; maroonish, OK 2/01; pale blue-green, OK 5/01
27.30	2	10.98	277				4.20	1+4fr	4+1A	4.40	1	0	Dead			no fire scars, slightly reddish, OK 3/97; good 3/98; poor, trampled 5/98; plant hard, dry, solid, COD unknown 2/98
27.40	2	10.84	275				3.80	2+1fr	3	4.40	4	3	3.52	4fr	2A	no fire scars, good 3/97; partially eaten (~25%), good 3/98 & 5/98; almost buried 3/99; coming out, green, good 4/99, 2/00 & 4/00; several tubercle tips damaged, green, good 2/01; slightly maroonish-green, good 5/01
27.50	2	11.43	271				3.30	2+1fr	1	3.40	3fr	1	2.93	4fr	4+1A	no fire scars, good 3/97 & 3/98; fruit eaten down to base, plant good 5/98; covered with silt 3/99; coming out, purplish, OK 4/99; green, good 2 & 4/00; misshapen, purplish, poor 2/01; misshapen, purplish, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
27.60	2	10.03	286										3.76	0	Dead	uprooted, but a few roots still in soil, still green 3/99; maroon with green apex & new spine growth, OK 4/99; taken for weevil study 5/6/99 by WHC; COD unknown, no evidence of weevils
27.70	2	10.24	284										2.75	1fr	1A	almost buried 3/99; coming out, olive 4/99; green, good 2 & 4/00; green with some maroonish tubercles, OK 2/01; maroonish, OK 5/01
27.80	2	10.24	284										1.64	0	0	good 3/99; green, good 4/99, 2 & 4/00; apical meristem damaged, new apex forming, green, OK 2/01; green, good 5/01
28.00	2	9.51	282													green, good 2 & 4/00, 2 & 5/01
29.00	2	9.04	288													green, good 2 & 4/00, green with some maroonish tubercle tips, good 2/01; green, good 5/01
30.00	2	9.98	290													green, good 2/00; slightly reddish, OK 4/00; partially eaten, green, OK 2/01; apex shifted, green, OK 5/01
31.00	2	11.80	323													green, good 2 & 4/00, 2 & 5/01
32.00	2	5.00	305													green, good 2 & 4/00; green with some maroonish tubercle tips, OK 2/01; olive OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
33.00	2	4.73	309													green, good 2 & 4/00, 2 & 5/01
Stake 3 is 20.20 m at 239 degrees from the Camping Area sign pole closest to road; Stake 3 = GPS4 R030220A																
28.00	3	2.71	22	3.90	1	1	4.80	1B+2+3fr	6	4.90	2	1+1A	5.26	2+2fr	2+2A	burned 1/96; OK 5/96; green, good 3/97, 5/97, 3/98 & 5/98; green, good, flowers partially eaten 3/99; green, good 4/99; yellowish-green, OK 2/00; green, good 4/00, 2 & 5/01
29.00	3	3.35	21	4.10	0	0	4.80	2fr+1A	2+1A	4.40	3?	3A	3.89	2	1+1A	burned 1/96; OK 5/96 & 3/97; good 5/97; stepped on, flowers smashed, otherwise good 3/98; poor, yellowish 5/98; green, a few tan tubercles, OK, flowers partially eaten 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
30.00	3	2.81	43	2.60	0	0	2.30	0	mia	2.60	0	0	2.49	0	mia	slightly burned 1/96; dead plant at base 3/96; OK 5/96; in grass, green, good 3/97; plant & tag mia 5/97; deep in grass, good 3/98, 5/98 & 3/99; pl & tag mia 4/99; green, good, in grass 2 & 4/00, 2/01; green, OK 5/01
31.00	3	4.67	16	2.90	1	0	2.70	2+1fr	3	2.20	0	0	1.82	0	0	burned 1/96; good 5/96; OK 3/97; good 5/97; OK, a few reddish tubercles 3/98; green, trampled 5/98; green, OK 3/99 & 4/99, 2 & 4/00; body hollow, COD Moneilema 2/01
32.00	3	3.04	10	3.20	0	0	3.00	1+1fr	1+1A	3.00	1	1A	3.27	2	1+1A	burned 1/96; OK 5/96; good, green 3/97, 5/97, 3/98, 5/98 & 3/99; OK 4/99; green, slightly reddish, OK 2/00; green, good 4/00; green with some marronish tubercle tips, OK 2/01; green, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
32.10	3	3.28	17	0.90	na	0	1.30	0	0	1.90	0	0	1.59	0	0	not burned 1/96; discovered 5/96, good, originally tagged as 349; retagged, good 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00; maroonish-green, OK 2 & 5/01
32.20	3	3.46	10	1.00	na	0	1.20	0	0	1.60	0	0	1.61	0	0	not burned 1/96; discovered 5/96, good, originally tagged as 348; retagged, good 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
33.00	3	3.60	352	3.20	0	0	3.00	3	2+1A	2.90	2	2	3.00	0	0	burned 1/96; OK 5/96 & 3/97; good 5/97; a few tan tubercle tips, good 3/98; OK, olive green 5/98 & 3/99; green, OK 4/99, 2 & 4/00; pale green, OK 2/01; green, OK 5/01
33.10	3	3.11	5	0.90	na	0	1.20	0	0	1.20	0	0	1.38	0	0	not burned 1/96; discovered 5/96, good, originally tagged as 347; retagged, good 3/97 & 5/97; sort of misshapen, good 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00; misshapen, green, OK 2 & 5/01
33.20	3	3.16	5	1.50	na	0	1.90	0	0	1.70	0	0	1.80	1	1	not burned 1/96; found 5/96, good, originally tagged as 346; retagged, good 3/97, 5/97, 3/98 & 5/98; OK, hunkered, petals eaten 3/99; dull dark green, OK 4/99; green, good 2 & 4/00, 2 & 5/01
33.30	3	3.26	355				1.10		0	1.40	0	0	1.25	0	0	discovered 5/97; good 3/98; buried 5/98; buried, OK 3/99; popped out, green, good 4/99; green, good 2 & 4/00, 2 & 5/01
34.00	3	3.38	343	2.20	0	0	2.90	2	1+1A	3.40	1	1A	3.07	2+1fr	3A	not burned 1/96; good 5/96, 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
34.10	3	3.22	350							2.10	0	0	2.27	0		0 discovered 3/98; good 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
35.00	3	3.13	1	2.00	0	0	2.30	1B+1	1+1A	2.50	1	1	2.15	1		1A burned 1/96; OK 5/96; good, green 3/97, 5/97, 3/98 & 5/98; OK, a few loose spines 3/99; goldish, OK 4/99; dull green, reddish at base, OK 2/00; green, OK 4/00; apex damaged, purplish, OK 2/01; green with some red tubercles, OK 5/01
35.10	3	3.52	3													discovered 2/01; green, OK 2 & 5/01
36.00	3	2.82	355	2.40	0	0	2.80	0	0	mia			3.04	0		0 burned 1/96; OK 5/96; in grass clump, good, green 3/97 & 5/97; plant & tag mia 3/98 & 5/98; edge of little bluestem, green, good 3 & 4/99; green, good 2 & 4/00, 2 & 5/01
37.00	3	6.29	322	1.70	0	0	2.50	1	0	3.10	2	1+1A	2.97	1+2fr		3 burned 1/96; good 5/96 & 3/97; tag mia, replaced, good 5/97, 3/98, 5/98 & 3/99; good, green 4/99, 2 & 4/00; trampled, green, OK 2/01; maroonish-green, OK 5/01
38.00	3	4.52	296	2.90	2	0	3.10	1B+1+2fr	3+1A	2.80	0	0	2.03	0		0 burned 1/96; OK 5/96, 3/97 & 5/97; OK to poor, light green, some tubercle tips orange, center sunken 3/98; yellow-orange 5/98; plant collapsing on one side, pup forming 3/99; pup green, good 4/99; only pup measured, old head yellowish, pup green, good 2 & 4/00; old head collapsed, pup green, good 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
39.00	3	5.78	290	1.90	0	0	2.60	1fr	1	2.40	1	1	mia			not burned 1/96; OK 5/96; good, green 3/97 & 5/97; almost buried in ant mound, tag mia, OK 3/98; tag relocated, plant good 5/98; tag and plant mia, ant mound 3/99 & 4/99; tag and plant relocated 2/00; green, good 2 & 4/00, 2 & 5/01
40.00	3	5.77	289	3.00	0	0	3.30	3	2+1A	Dead						burned 1/96; OK 5/96; good, green 3 & 5/97; only loose spines in vicinity; tag mia, COD unknown 3/98
41.00	3	5.80	289	2.10	0	0	2.70	1B	0	nd	0	0	2.69	2	1+1A	burned 1/96; OK 5/96; good, green 3/97 & 5/97; totally buried, only spine tips sticking out, tag mia 3/98 & 5/98; tag and plant back, green, good 3/99 & 4/99; plant mia 2 & 4/00, 2 & 5/01
42.00	3	5.18	287	2.00	0	0	2.10	1fr+1A	2A	1.80	0	0	1.96	0	0	burned 1/96; OK 5/96; reddish, poor 3/97; good, green 5/97, 3/98, 5/98, 3/99, 4/99, 2 & 4/00; green, OK 2/01; geen, good 5/01
43.00	3	5.35	287	1.90	0	0	2.30	1	1A	2.10	1	1A	1.83	0	0	burned 1/96; OK 5/96 & 3/97; good 5/97, 3/98, 5/98 & 3/99; olive, OK 4/99; green, OK 2/00; green, good 4/00; hunkered, marronish, OK 2/01; green, OK 5/01
44.00	3	5.31	287	1.80	0	0	1.80	0	0	1.00	0	0	1.79	1fr	0	on left of 46.00; burned 1/96; OK 5/96 & 3/97; good 5/97, 3/98, 5/98 & 3/99; olive, OK 4/99, 2 & 4/00, 2/01; green, good 5/01
45.00	3	5.32	287	2.30	0	0	2.30	1	1A	2.30	1	1	2.04	0	0	on right of 45.00; burned 1/96; OK 5/96; poor & reddish 3/97; OK, dull green 5/97; good 3/98, 5/98 & 3/99; olive, OK 4/99; reddish-green, OK 2/00; dull green, OK 4/00; hunkered, olive, OK 2/01; hunkered, reddish-olive, poor 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
46.00	3	5.32	287	1.70	0	0	1.70	0	0	1.90	0	0	1.65	0	0	slightly burned 1/96; OK 5/96 & 3/97; good 5/97, 3/98, 5/98, & 3/99; olive, OK 4/99; green, good 2 & 4/00; hunkered, green, OK 2/01; green, good 5/01
47.00	3	5.37	286	2.40	0	0	2.80	2fr	2	2.50	1	1	2.18	0	0	burned 1/96; OK 5/96; poor, purplish 3/97; OK, dull green 5/97, 3/98, 5/98, 3/99 & 4/99; reddish olive green, OK 2 & 4/00, 2 & 5/01
47.01	3	5.41	286				0.80		0	1.10	0	0	1.04	0	0	at edge of 47.00 tag; discovered 5/97; OK 3/98 & 5/98; almost buried 3/99; coming out, dull green, OK 4/99; purplish, OK 2/00; olive, OK 4/00; plant mia 2 & 5/01
47.02	3	5.35	286				0.50		0	mia			mia			under rock; discovered 5/97; plant missing 3/98, 5/98, 3/99, 4/99, 2 & 4/00 (tag is here)
48.00	3	5.14	285	1.50	0	0	1.80	1	1A	1.70	0	0	1.44	0	0	not burned 1/96; OK 5/96 & 3/97; good 5/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
49.00	3	5.18	285	2.70	0	0	3.10	2fr	2	2.60	0	0	2.27	0	0	not burned 1/96; OK 5/96 & 3/97; good 5/97; OK 3/98, 5/98 & 3/99; maroonish, OK 4/99; purplish, OK 2/00; olive, OK 4/00; body solid, COD unknown 2/01
50.00	3	4.77	285	3.20	1	0	4.20	2+3fr	3+2A	4.20	2	2	3.77	3	3A	burned 1/96; OK 5/96, 3/97, 5/97, 3/98; OK, olive green 5/98; flowers partially eaten, green, good 3/99; maroonish, OK 4/99; pale tan-green, OK 2/00; goldish, OK 4/00, 2/01; orangish-green, OK 5/01
50.01	3	4.79	285							0.90	0	0	1.09	0	0	discovered 3/98; green, good 3/99, 4/99, 2 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
51.00	3	5.94	287	2.30	1	0	3.00	0	0	3.60	2	2	3.15	3fr	1A	badly burned 1/96; new growth, OK 5/96 & 3/97; in fire ant mound, tag mia, replaced, good 5/97; good, tag mia, replaced, fire ant mound moved 3/98 and 3/99; maroonish, OK 4/99; green with tan base, good 2 & 4/00; one tubercle gone, green with maroonish tubercle tips, OK 2/01; maroonish, OK 5/01
51.10	3	9.87	289				4.60	1B+1+1fr	2+1A	4.90	1	1	3.90	3fr	3A	no fire scars, good 3/97, 3/98, 5/98 & 3/99; good, green 4/99, 2 & 4/00; some tubercle tips damaged, green, OK 2/01; slightly trampled, maroonish, OK 5/01
51.20	3	8.90	283							2.10	1	1A	2.03	2fr	2A	discovered 3/98; OK 3/99; maroonish, OK 4/99; green, good 2 & 4/00; green with some maroonish tubercle tips, OK 2/01; green, good 5/01
51.30	3	9.93	289													left of 51.40, discovered 2/00; green, good 2 & 4/00, 2/01
51.40	3	9.94	289													right of 51.3, discovered 4/00; green, good 4/00, 2/01; tag mia, replaced 2/01; apex detached, collected, green, with fruit forming, remaining body scarred over, new apex forming, green, OK 5/01
52.00	3	5.62	280	2.50	1	0	3.10	2fr	2	3.10	1	0	3.10	2fr	2	burned 1/96; flower smashed 3/96; new growth, OK 5/96, 3 & 5/97; flower smashed, plant good 3/98; yellowish, OK 5/98; poor, yellow 3/99; OK, reddish 4/99 & 2/00; yellowish-red, poor 4/00; soft, olive-maroon, poor 2/01; weevil galleries, COD weevils 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
53.00	3	6.72	267	4.80	2	1	4.90	2+3fr	4+1A	5.00	4	4A	4.76	5	5A	burned 1/96; good 5/96; under rock, tag mia, replaced, good 3/97; good 5/97; fantastic 3/98; good 5/98 & 3/99; tag mia, replaced, flowers partially eaten 4/99; green, very good 2 & 4/00; green with some maroonish tubercle tips, OK 2/01; green, good 5/01
54.00	3	4.78	260	3.30	1	0	3.70	1B+4	4+1A	3.20	2	1	3.12	1	0	burned 1/96; flower smashed 3/96; good 5/96 & 3/97; a few orange tubercles, OK 5/97; dark dull green, OK 3/98; purplish 5/98; OK, purplish petals eaten 3/99 & 4/99; reddish, OK 2/00; olive, OK 4/00; large hole in top, but body solid. COD unknown 2/01
55.00	3	3.47	256	1.90	0	0	2.80	0	0	3.30	0	0	3.45	0	0	slightly burned 1/96; good 5/96, 3/97, 5/97, 3/98, 5/98, & 3/99; good, green 4/99, 2 & 4/00, 2 & 5/01
56.00	3	3.38	256	2.20	0	0	2.10	0	0	2.40	0	0	2.39	0	0	badly burned 1/96; new growth, OK 5/96; fire scar still visible at base, good, green 3/97, 3/98, 5/98, 3/99 & 4/99; green, good 2 & 4/00, 2 & 5/01
<b>Stake 4 is 27.52 m at 160 degrees from Camping Area sign pole closest to road</b>																
57.00	4	1.25	254	2.30	0	0	2.60	1+1fr	2	2.80	1	1	2.84	1+1fr	1+1A	burned 1/96; OK 4/96, 3/97, 5/97; a few dead orange tubercle tips, OK 3/98, 5/98; green, good, flowers partially eaten 3/99; reddish, OK 4/99; purplish-green, tan at base, good 2/00; a few red and tan tubercles, OK 4/00; large chunk eaten out of one side, plant green with some tan tubercles, OK 2/01; green, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
57.01	4	1.28	254				2.80	1+1fr	1+1A	3.00	0	0	2.97	2fr	2	already tagged, OK 3/97; one tan tubercle, otherwise good 3/98; green, good, fruit partially eaten 3/99; reddish, OK 4/99; purplish-green, tan at base, good 2/00; a few red and tan tubercles, OK 4/00; hole in side, green with tan tubercle tips, OK 2 & 5/01
58.00	4	1.10	246	2.90	0	0	3.00	3	3	2.90	2	2	2.09	2fr	1A	burned 1/96; OK 4/96, 3/97; good 5/97; good, one brown tubercle tip 3/98; OK, shrinking 5/98; 2 fruit partially eaten 3/99; green, good 4/99; slightly purplish-green, good 2/00; green, good 4/00; sunken on one side, green, OK 2/01; green, good 5/01
59.00	4	1.33	245	3.10	2	2	4.00	1+2fr	2+1A	3.90	2	2	3.24	3fr	3A	not burned 1/96; OK 4/96, 3/97; good 5/97, 3/98; OK, shrinking 5/98; fruit partially eaten 3/99; reddish, OK 4/99; purplish, good 2/00; goldish, OK 4/00; maronish, OK 2 & 5/01
59.01	4	1.26	254	2.40	0	0	2.20	1+1fr	2	2.30	0	0	2.04	0	0	burned 1/96; looks OK 4/96 & 3/97; good 5/97, 3 & 5/98, 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
59.10	4	2.46	245										1.82		0	dull green, OK, discovered 4/99; green, good 2 & 4/00, 2 & 5/01
60.00	4	1.44	240	3.50	2	0	4.30	4	5	4.40	3	2+1A	3.56	1+3fr	4A	burned 1/96; OK 4/96 & 3/97; fire scars still visible 3/97; fire scars no longer visible, OK 5/97; a few tan tubercle tips, good 3/98 & 5/98; fruit mostly eaten, very maroon, OK 3/99; very maroon, OK 4/99; lumpy, a little soft, purplish, OK 2/00; goldish, OK 4/00; purplish, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
61.00	4	1.55	240	3.60	2	0	4.10	3	3	4.70	2	2	3.10	4fr	3A	burned 1/96; OK 4/96 & 3/97; fire scars still visible 3/97; barely visible, good 5/97; a few tan tubercle tips, good 3/98; a few tan tubercle tips, OK 5/98; very maroon, OK, hunkered down 3/99 & 4/99; purplish, good 2/00; goldish, OK 4/00; purplish, OK 2 & 5/01
62.00	4	1.55	234	2.40	0	0	2.60	2	1	2.50	0	0	2.49	0	0	not burned 1/96; OK 4/96; good 3/97; asymmetrical tip growth, loose spines nearby 5/97; good 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
63.00	4	2.29	231	2.50	0	0	2.70	0	0	2.90	0	0	2.56	0	0	burned 1/96; OK 4/96; good 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99; in grass, green, good 2 & 4/00, 2 & 5/01
63.10	4	2.22	233				1.80		0	1.70	0	0	1.53	0	0	discovered 5/97; good 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
64.00	4	2.83	226	2.70	0	0	3.20	2	2	3.00	0	0	2.80	0	0	not burned 1/96; good 4/96; OK 3/97, 5/97, 3/98 & 5/98; OK, maroon 3/99 & 4/99; olive green, OK 2 & 4/00; body solid, COD unknown 2/01
65.00	4	3.23	218	3.00	0	0	2.80	1	1	2.80	0	0	2.72	0	0	burned 1/96; OK 4/96; good 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99 & 2/00; olive, OK 4/00 & 2/01; green, OK 5/01
66.00	4	3.24	218	2.70	0	0	2.60	2	1A	2.90	1	1A	2.56	1fr	0	burned 1/96; OK 4/96; flowers open even though overcast 3/97; good 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99; green, little brown at base, good 2/00; olive, OK 4/00, 2/01; reddish-green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
67.00	4	7.45	240	2.60	0	0	2.80	0	0	2.30	0	0	2.53	0	0	not burned 1/96; OK 4/96; OK-poor 3 & 5/97; OK 3/98; OK but getting buried in juniper litter 5/98; buried in juniper litter, poor, goldish 3/99 & 4/99; maybe dead, top flat and sunken, totally buried, no color, firmly rooted 2 & 4/00; body solid, COD unknown 2/01
68.00	4	8.58	241	2.30	0	0	2.60	0	0	2.10	0	0	1.42	0	0	not burned 1/96; poor 4/96 & 3/97; OK 5/97, 3/98 & 5/98; almost buried 3/99; popping out, OK, goldish 4/99; dull green, OK 2 & 4/00, 2 & 5/01
68.10	4	8.05	242										2.09		0	beside rock, measured in one direction only, green, good, discovered 4/99; green, good 2 & 4/00 & 2/01; green, OK 5/01
68.20	4	8.27	245													discovered 2/00; green good 2 & 4/00, 2 & 5/01
69.00	4	9.00	249	2.10	0	0	2.10	0	0	2.20	0	0	1.55	0	0	not burned 1/96; OK 4/96, 3/97, 5/97, 3/98 & 5/98; almost buried 3/99 & 4/99; partially buried, OK 2/00; coming out, goldish, OK 4/00; hunkered, greenish-gold, OK 2/01; hunkered, green, OK 5/01
70.00	4	10.85	241	1.80	0	0	1.60	0	0	Dead						not burned 1/96; reddish 3/96; OK, reddish 4/96; OK, green, but soil eroded at base 3 & 5/97; stem solid, spines all loose, fungal growth inside 3/98
71.00	4	5.24	261	2.20	1	0	2.20	0	0	2.30	0	0	2.27	0	0	not burned 1/96; flower smashed 3/96; good 4/96, 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
72.00	4	5.95	259	3.20	0	0	3.40	1	1	3.20	0	0	3.11	0	0	burned 1/96; OK 4/96; fire scars still visible, OK 3/97; fire scars barely visible, good 5/97; yellowish at base, OK 3/98; maroonish, OK 5/98; yellowish-green, OK 3/99 & 4/99; slightly purplish, OK 2 & 4/00, 2/01; green, good 5/01
72.01	4	6.05	258	1.90		0	1.80	0	0	1.90	0	0	1.92	mia	0	not burned 1/96; discovered 4/96, good, beside rock; OK 3/97; good 5/97; OK 3/98 & 5/98; plant and tag mia 2/99; almost buried, green, OK 4/99; green, OK, partially buried in juniper needles 2 & 4/00; hunkered, green, OK 2/01; popping out, green, good 5/01
73.00	4	0.65	83	2.70	0	0	2.90	3	3	2.80	2	2	2.51	nd	mia	burned 1/96; OK 4/96; good 3/97, 5/97, 3/98; olive green, OK 5/98; hunkered, green, good 3/99; ant mound, plant mia 4/99, 2 & 4/00, 2 & 5/01
73.01	4	0.72	78													discovered 4/00; olive, OK 4/00, 2/01; olive, poor 5/01
74.00	4	~8.1	282	3.10	0	0	3.50	1	1	4.00	1	1	3.87	0	0	measured over mimosa; burned 1/96; OK 4/96; good 3/97, 5/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 4/00, 2 & 5/01
74.10	4	~7.87	285				0.60	0	0	0.70	0	0	0.80	0	0	measured over mimosa; not burned, OK 3/97, 3/98, 5/98 & 3/99; dull green, OK 4/99; green, good 2/00; olive, OK 4/00; spines all white, body green, poor 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
75.00	4	~7.63	284	1.60	0	0	2.00	0	0	1.80	0	0	1.63	0	0	measured over mimosa; burned 1/96; good 4/96, 3/97, 5/97, 3/98 & 5/98; poor, loose in soil 3/99; green, good 4/99; partially covered by juniper litter, OK 2/00; popping out, OK 4/00; green, good 2 & 5/01
75.10	4	~11.29	284	1.60		0	2.10	1	1	1.90	0	0	1.98	0	0	burned 1/96; discovered 4/96, OK; originally tagged as 87.10; good 3/98 & 5/98; OK 3/99; green, good 4/99; green, good, buried, replaced tag 2/00; green, good 2 & 5/01
75.20	4	11.30	284										2.18	0	0	3-headed clump (75.20, 75.21, 75.22), upper right, green, good 4/99, 2 & 4/00, 2 & 5/01
75.21	4	11.31	284										1.85	0	0	3-headed clump (75.20, 75.21, 75.22), upper left, green, good 4/99, 2 & 4/00, 2 & 5/01
75.22	4	11.32	284										1.36	0	0	3-headed clump(75.20,75.21,75.22), rear, green, good 4/99, 2 & 4/00, 2 & 5/01
76.00	4	~7.66	284	1.70	0	0	1.60	0	mia	mia			mia			measured over mimosa; burned 1/96; hunkered down 4/96 & 3/97; pale & poor 3/97; plant missing 5/97, 3/98 & 5/98; plant and tag mia 3/99 & 4/99
76.10	4	~7.60	285				0.60	0	0	0.50	0	0	0.53	0	0	measured in one direction only 3/98, 3/99, 2/00; measured over mimosa; under rock; good 3/97; loose in soil, good 3/98; OK 5/98; good 3/99; green, good 4/99; OK 2/00; green, OK 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
76.20	4	~7.61	285				0.70	0	0	0.70	0	0	1.00	0	0	on right of 76.3, measured in one direction only 3/98, 3/99, 2/00; measured over mimosa; under rock; good 3/97, 3/98, 5/98, 3/99; green, good 4/99; OK 2/00; goldish, OK 4/00; green, good 5/01
76.30	4	~7.62	285				1.10	0	0	1.10	0	0	1.03	0	0	on left of 76.2, measured in one direction only 3/99, 2/00; measured over mimosa; under rock; good 3/9, 5/98; good 3/99; green, good 4/99; OK 2/00; green, OK 4/00; green, good 5/01
76.40	4	~7.65	285				1.00	0	0	0.90	0	0	1.06	0	0	measured in one direction only, 3/99, 2/00; measured over mimosa; under rock; good 3/97 & 5/98; OK 3/99; olive, OK 4/99; OK 2/00; olive, OK 4/00; loose, green, OK 2 & 5/01
77.00	4	7.53	277	2.30	0	0	2.20	0	0	2.20	0	0	2.42	0	0	burned 1/96; good 4/96, 3/97, 5/97, 3/98 & 5/98; OK 3/99; OK, dull green 4/99; good 2/00; slightly goldish at base, OK 4/00, 2/01; green, OK 5/01
78.00	4	7.97	287	2.10	0	0	2.80	1	1	2.40	0	0	1.72	0	0	not burned 1/96; OK 4/96, 3/97, 5/97 & 3/98; good 5/98; OK 3/99; very red, poor 4/99; slightly damaged, purple and tan spots, OK 2/00; olive, OK 4/00; shrunken, purplish, poor 2/01; brownish purple at base, green above, OK 5/01
78.10	4	8.00	286							1.10	0	0	1.25	0	0	discovered 3/98; good 5/98 & 3/99; green, good 4/99, 2 & 4/00; olive, OK 2 & 5/01
78.20	4	8.89	289													discovered 2/00; green good 2 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
79.00	4	9.09	292	2.90	0	0	3.20	2	2	3.70	1	1A	2.15	0	0	burned 1/96; good 4/96, 3/97, 5/97, 3/98; OK, something took a bite & spit it out beside the plant 5/98; green, good 3/99 & 4/99, 2 & 4/00, 2 & 5/01
79.10	4	1.35	290										1.12		0	green, good, discovered 4/99; buried, green, OK 2/00; popping out, green, OK 4/00; eroded out, green, OK 2 & 5/01
80.00	4	6.80	288	1.90	0	0	2.20	0	0	1.60	0	0	1.35	0	0	not burned 1/96; OK 4/96; buried in juniper needles, OK 3/97, 5/97, 3/98, 5/98, 3/99 & 4/99; dull green, OK 2 & 4/00; hunkered, olive, OK 2 & 5/01
80.10	4	12.12	289				1.60	0	0	1.70	0	0	1.30	0	0	fire scars, looks OK 3/97; originally tagged as 87.20; fire scars no longer visible, good 3/98; light green, OK 5/98; green, good 3/99 & 4/99; green, good 2/00; tannish at base, OK 4/00; green, good 2/01; olive, OK 5/01
81.00	4	6.76	284	1.40	0	0	1.50	0	0	1.60	0	0	1.19	0	0	not burned 1/96; looks OK 4/96 & 3/97; buried in juniper needles, looks good 5/97, 3/98 & 5/98; almost totally buried 3/99 & 4/99; green, OK 2 & 4/00; hunkered, green, OK 2 & 5/01
81.10	4	6.85	300				1.80	0	0	1.70	0	0	1.47	0	0	no fire scars, OK 3/97; good 5/97; orangish on one side, OK 3/98; green, OK 5/98, 3/99 & 4/99; reddish, OK 2/00; olive, OK 4/00; reddish-green, OK 2 & 5/01
81.20	4	0.35	302							1.50	0	0	1.41	0	0	discovered 3/98; poor 3/99; olive, OK 4/99; green, OK 2 & 4/00; bite out of side, green, OK-poor 2/01; green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
82.00	4	2.65	81	4.50	4	3	4.30	6+1fr	7+1A	4.90	4	3A	4.81	1	1	burned 1/96; reddish, ~ OK 4/96; fire scars still visible, good, green 3/97, 5/97, 3/98, 5/98, 3/99, 4/99, 2 & 4/00; green with some pale red tubercle tips, OK 2 & 5/01
82.10	4	2.79	96				1.50	0	0	mia			mia			fire scars, OK 3/97; good 5/97; ant mound in area, tag & plant mia 3/98, 5/98, 3 & 4/99; resurfaced, green, good 2/00; ant mound in area, plant and tag mia 4/00; green, OK 2 & 5/01
82.20	4	2.63	79													discovered 2/01; green, good 2/01; olive, OK 5/01
82.30	4	2.66	79													discovered 2/01; green, good 2 & 5/01
83.00	4	5.25	112	1.70	0	0	1.60	1	1	1.70	0	0	1.76	0	0	burned 1/96; OK 4/96; good 3 & 5/97, 3 & 5/98, 3/99; green, good 4/99 & 2/00; pale green, OK 4/00; yellowish-green, OK 2 & 5/01
83.01	4	5.26	112	1.50	0	0	1.30	0	0	1.40	0	0	1.53	0	0	burned 1/96; OK 4/96; good 3/97, 5/97, 3/98, 5/98, 3/99; green, good 4/99, 2 & 4/00; yellowish-green, OK 2 & 5/01
84.00	4	11.70	140	3.50	0	0	3.80	3	1+2A	4.40	0	0	3.67	2	0	badly burned 1/96; with bizarrely deformed pup 3/96; OK, new growth, pup rock-like, spineless, & yellow 4/98; fire scar still visible, good, pup a green nub 3/97; pup white 5/97; pup gone, other plant good 3/98, 5/98 & 3/99; good, green 4/99; green, good 2 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
85.00	4	15.59	145	4.30	0	0	4.20	2	3	4.80	0	0	3.99	0		0 burned 1/96; good, new growth, very green 4/96; flowers open in rain, in little bluestem clump; good 3/97, 5/97, 3/98, 5/98, & 3/99; green, good 4/99, 2 & 4/00; body hollow, COD Moneilema 2/01
86.00	4	15.66	145	3.00	0	0	3.20	1+1fr	2	3.10	1	1	2.90	1		1 burned 1/96; OK 4/96; fire scars still visible, OK 3/97; fire scars gone, good 5/97, 3/98 & 5/98; hunkered 3/99; maroonish, OK 4/99; partially buried, purplish, dull, OK 2/00; goldish, OK 4/00; sunken, purplish-olive, poor 2/01; dark olive, OK 5/01
87.00	4	15.42	144	3.00	1	0	3.30	1	1	nd	nd	Dead				burned 1/96; OK 4/96; fire scars still visible, OK 3/97; fire scars just barely visible, OK 5/97; just spines left, COD unknown 5/98
<b>Reference Point 5</b> is 31.25m at 256 degrees from 'No Collecting' sign, post closest to road, left of juniper, over agaritas and mountain laurels; Stake 5 = GPS5; R030222A 2001 - Stake out of ground, triangulated from 88.31 and 92.01																
88.00	5	6.91	41	1.70	0	0	2.00	0	0	2.30	0	0	1.75	0		0 burned 1/96; good 4/96 & 3/97, edge of little bluestem clump; buried in clump, good 3/98 & 5/98; poor 3/99; green, OK 5/99; green good 2 & 4/00; green, OK 2/01; green, good 5/01
88.10	5	4.68	~68	2.80		0	3.10	1+1fr	2	2.40	0	1	2.13	1fr		1 burned 1/96; discovered 4/96, OK, originally tagged as 343; fire scars still visible, at base of fire ant mound, OK 3/97; ant mound gone, plant OK 3/98; mound back, partially covering plant and completely covering tag 5/98; ant mound gone, green, good 3/99 & 5/99; green, good, partially buried 2/00; popping out, green, good 4/00, 2 & 5/01
88.11	5	4.68	64							0.30		0	mia			discovered 5/98; tag and plant mia 2 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
88.20	5	5.09	75	3.00		0	3.40	1+2fr	3	3.30	2	2	2.36	1fr	1disp	burned 1/96; OK, reddish 4/96, originally tagged as 344; old fire scars still visible, OK, reddish 3/97; fire scars barely visible, good 5/97; a little yellow-orange on a few basal tubercles 3/98; ants swarming plant, OK 5/98, 3/99 & 5/99; partially buried, misshapen, reddish, tan at base, OK 2/00; reddish-orange green, OK 4/00; green with red tubercle tips 2 & 5/01
88.30	5	3.61	52				3.60	3	2	3.80	0	0	2.76	3	1+2A	fire scars at base, good 3/97; sort of lop-sided, good 3/98; a few yellowish tubercle tips, OK 5/98; hunkered, OK 3/99; hunkered, OK, orangish 5/99; partially buried, green, good 2/00; hunkered, red, OK 4/00 & 2/01; tubercles misshapen, reddish-green, OK 5/01
88.31	5	3.54	52													discovered 2/00; green, good 2 & 4/00, 2 & 5/01
88.40	5	4.14	56				3.60	3+3fr	4	2.70	1	0	2.40	1	1A	no fire scars, good 3/97; flowers fallen off, good 3/98; poor, shrunk, spines loose 5/98; maroonish, OK 3/99; getting covered 5/99; beside rock, green, good 2 & 4/00; covered with debris, purplish, OK 2/01; uncovered, dark green, OK 5/01
88.41	5	3.81	68										1.19		0	pedasteled, olive green, OK, discovered 5/99; green, OK 2 & 4/00; tag loose, replaced, plant green, OK 2/01; green, good 5/01
88.42	5	4.39	62										1.92			0 green, good 5/99, 2 & 4/00 & 2/01; green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
88.43	5	4.50	62													discovered 2/01; green, good 2 & 5/01
88.50	5	4.30	63				2.70	1	1	2.60	1	1	2.41	1		1 no fire scars, good 3/97, 3/98, 5/98 & 3/99; dull green, OK 5/99; green, good 2 & 4/00, 2 & 5/01
88.60	5	4.95	71				2.10		1	2.00	1	1	1.36	0		0 no fire scars, good 3/97, 3/98; pulling into soil, OK 5/98 & 3/99; popping out, green, OK 5/99; green, good 2 & 4/00; maroonish, OK 2/01; dull reddish-green, OK-poor 5/01
88.70	5	5.60	71				2.70	2	2	2.20	0	nd	1.36	0		0 fire scars at base, OK 3/97, 3/98; hunkered, OK 3 & 5/99; partially buried, green, basally discolored 2/00; goldish-green, OK 4/00, 2 & 5/01
88.80	5	5.96	53													discovered 2/00; green, good 2/00; olive, OK 4/00; green with tan tubercle tips, OK 2 & 5/01
88.81	5	5.89	53													discovered 2/00; hunkered, green, OK 2 & 4/00, 2/01; coming out, green, OK 5/01
89.00	5	5.65	79	2.40	0	0	2.70	2	2	2.70	1	1A	1.96	1fr	1A	not burned 1/96; good 4/96; reddish at base, OK 3 & 5/97; reddish at base, good 3/98; a little orangish, OK 5/98, 3/99 & 5/99; green, good 2/00; olive, OK 4/00; green with a few red tubercle tips, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
89.01	5	5.64	79	0.70	0	0	0.80	0	0	1.00	0	0	0.80	0	0	not burned 1/96; good 4/96, to the left of 89, behind 89.02 & 89.03; good 3/97, 5/97, 3/98, 5/98, 3/99 & 5/99; green, good 2 & 4/00, 2 & 5/01
89.02	5	5.63	79	0.80	0	0	0.90	0	0	1.00	0	0	1.05	0	0	not burned 1/96; good 4/96, left of 89.00, in front of 89.01; good 3/97, 5/97, 3/98, 5/98, 3/99 & 5/99; green, good 2 & 4/00, 2 & 5/01
89.03	5	5.64	79	0.90	0	0	1.20	0	0	1.10	0	0	0.92	0	0	not burned 1/96; good 4/96; to the left of 89.01 and behind 89.04; good 3/97, 5/97, 3/98, 5/98, 3/99 5/99; green, good 2 & 4/00, 2 & 5/01
89.04	5	5.63	79	0.80	0	0	1.20	0	0	1.10	0	0	1.18	0	0	not burned 1/96; good 4/96; left of 89.02 and in front of 89.03; good 3/97, 5/97, 3/98, 5/98, 3/99 & 5/99; green, good 2 & 4/00, 2 & 5/01
90.00	5	4.82	85	2.90	2	2	3.50	2+2fr	4	3.40	3	3	2.50	2fr	1+1A	not burned 1/96; reddish at base 3/96; good 4/96, 3 & 5/97; by rock, yellowish at base, tag loose, by 91.00 3/98; OK 5/98, 3/99 & 5/99; purplish, tan at base, OK 2/00; olive green, OK 4/00; olive with some red tubercle tips, OK 2/01; green with darker tubercle tips, OK 5/01
91.00	5	5.00	90	2.20	1	1	2.90	2	2	2.30	1	1	1.78	0	0	not burned 1/96; good 5/96, 3 & 5/97, 3/98; pulling into soil, OK 5/98 & 3/99; green, good 5/99; partially buried, green, good 2 & 4/00, 2 & 5/01
92.00	5	3.78	94	3.70	2	2	4.70	3+2fr	5	2.40	2	Dead				not burned 1/96; good 5/96, 3 & 5/97, 3/98; root solid, dry, COD unknown 5/98
92.01	5	4.75	94							1.90		1	2.31	0	0	good, discovered 5/98; good 3/99, 5/99; green, good 2/00; partially in ant dirt, green, OK 4/00; out, green, good 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
92.02	5	4.71	95													discovered 4/00; one measurement only 4/00; green, good 4/00, 2 & 5/01
93.00	5	4.86	105	5.10	3	1	5.80	4+4fr	7	6.00	0	0	5.00	3+2fr	3+1A+ 1disp	burned 1/96; OK 5/96; fantastic 3 & 5/97; tag loose, by 92, yellow at tubercle bases, OK 3/98; good 5/98, 3/99 & 5/99; green, good 2/00; a few orange tubercle tips, OK 4/00; green with a few orange tubercle tips, good 2/01; green, good 5/01
94.00	5	5.19	108	2.60	0	0	3.60	1+2fr	3	3.00	1	1	3.34	4fr	1+2disp	burned 1/96; OK 5/96; good 3 & 5/97; tag mia, replaced, good 3/98; OK 5/98; green, good, hunkered 3/99; maroonish, OK 5/99; slightly reddish, OK 2/00; reddish-orange at base, OK 4/00; green with red tubercle tips, trampled? In path, OK 2/01; maroonish, OK 5/01
Reference point 6 is 30.30m at 326 degrees from 20mph sign; Stake 6 = GPS6; R030215A																
95.00	6	0.91	270	3.30	0	0	3.70	5fr	5	4.60	3	1A	3.60	2+3fr	5	OK 3/96; good 5/97, 3/98; getting buried 5/98 & 3/99; popping out, green, good 4/99; slightly purplish-green, OK 2 & 5/00; body hollow, COD Moneilema 2/01
95.10	6	3.74	270				2.30	1fr	1	2.50	1	1	2.19	1fr	1	good 5/97, 3/98, 5/98, 3/99 & 4/99; reddish-green, OK 2/00; olive, OK 5/00; green, good 2 & 5/01
96.00	6	4.26	338	3.30	3	2	3.90	1fr	1A	3.60	2	2	3.47	3	3	OK 3/96; good 5/97, 3/98, 5/98, 3 & 4/99; purplish, OK 2/00; misshapen (stepped on in past?), olive, OK 5/00; some tubercle damage, otherwise green, good 2/01; green, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
96.01	6	6.45	346							3.60		0	3.95	0		0 good, discovered 5/98; good 3/99, 4/99; green, good 2 & 5/00, 2 & 5/01
96.10	6	10.02	345				3.80	1fr	1	5.10	1	1	4.95	1		1 good 5/97; in small fire ant mound, good 3/98 & 5/98; slightly buried, good 3/99 & 4/99; green, good 2 & 5/00; olive, OK 2/01; slightly maroonish, OK 5/01
96.20	6	10.02	345				4.20	2fr	2	4.80	3	3	3.65	0		0 to right of 96.30; good 5/97; fire ants, good 3/98 & 5/98; slightly buried, yellowish, OK 3/99; coming out, green, good 4/99; green, good 2 & 5/00, 2 & 5/01
96.30	6	10.01	345				3.60	0	0	4.30	3	3	3.53	0		0 good 5/97, 3/98, 5/98, 3 & 5/99; green, good 2 & 5/00, 2 & 5/01
96.40	6	10.35	348				3.70	0	0	3.40	0	0	2.49	0		0 closest to stake; OK 5/97, 3/98; good 5/98; almost buried in juniper litter, OK 3/99 & 4/99; green-yellow, OK, partially buried in juniper litter 2 & 5/00, 2 & 5/01
96.50	6	10.39	348				3.10	0	0	3.70	0	0	2.67	0		0 left of 96.60 & behind 96.40; OK 5/97, 3/98; good 5/98; almost buried in juniper litter, OK 3/99 & 4/99; partially buried in juniper litter, green, good 2 & 5/00; partially buried in juniper litter, yellow-green, OK 2 & 5/01
96.60	6	10.38	348				2.50	0	0	3.00	0	0	2.58	0		0 right of 96.50 & behind 96.40; OK 3/98; good 5/98; almost buried in juniper litter, OK 3/99 & 4/99; partially buried in juniper litter, green, good 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
97.00	6	9.95	354	3.30	0	0	4.10	2fr	1+1A	4.10	0	0	3.05	0		0 good 3/96 & 5/97; purplish, OK 3/98; green, good 5/98 & 3/99; slightly buried in juniper litter, popping out, green, good 4/99; purplish green, good 2/00; green, good 5/00, 2 & 5/01
98.00	6	9.94	354	3.30	0	0	4.00	0	0	4.00	0	0	2.93	0		0 good 3/96; purplish, OK 3/98; green, good 5/98 & 3/99; green, good 4/99; dull green, good 2/00; some orange tubercle tips, body green, good 5/00; some tubercle damage, green, good 2/01; green, good 5/01
99.00	6	10.24	334	2.10	0	0	2.50	2fr	2	3.10	2	2	2.42	1fr	1	OK 3/96, 3/98, 5/98, 3 & 4/99; olive green, OK 2/00; green, good 5/00; olive, OK 2/01; green, OK 5/01
100.00	6	9.63	337	2.70	0	0	2.90	1	1A	3.00	0	0	2.66	1	disp?	OK 3/96, 3/98, 5/98 & 3/99; dull green, OK 4/99; dark green, good 2/00; green, good 5/00; reddish-orangish gold, poor 2/01; bottom root rot; collected for weevil study 5/01
100.10	6	9.34	340							2.50	0	0	2.35	0	0	good, discovered 3/98; maroon, OK 5/98; green, good 3 & 4/99; green, good 2 & 5/00, 2/01; dull green, OK 5/01
101.00	6	9.65	333	2.40	0	0	3.10	2fr	2	3.30	1	1	2.75	3fr	2+1A	OK 3/96; a few tubercles yellow-green 3/97; a few purplish tubercles, good 3/98; being buried in ant mound 5/98; slightly buried, OK 3/99; maroonish, OK 4/99; purplish green, good 2/00; orangish at base, OK 5/00; green with some red and tan tubercle tips, OK 2 & 5/01
102.00	6	10.16	332	2.60	1	1	3.50	2fr	2	3.30	2	2	2.70	1fr	1	OK 3/96; good 3 & 5/97; a little purplish, OK 3/98, 5/98 & 3/99; green, good 4/99; olive green, OK 2 & 5/00; greenish-yellow, poor 2/01; olive, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
103.00	6	9.87	334	2.70	1	1	2.80	1fr	1A	3.30	2	2	2.27	1fr	1	OK 3/96; good 5/97, 3/98, 5/98 & 4/99; green, good 2 & 5/00, 2 & 5/01
104.00	6	10.39	332	2.30	0	0	2.90	1+1fr	2	2.90	1	1	2.39	1fr	1	good 3/96; a little yellowish, OK 3/98, 5/98 & 3/99; tag mia, replaced, OK 4/99; yellow, OK 2/00; olive, OK 5/00; yellow-green, OK 2 & 5/01
104.10	6	10.82	336							1.60	0	0	1.16	0	0	discovered 3/98; good 3/98 & 5/98; tag loose, plant almost buried 3/99; popping out, dull green, OK 4/99; dull green, OK 2/00; green, good, OK 5/00; partially buried, green, OK 2 & 5/01
104.20	6	10.85	336							0.70	0	0	0.52	0	0	discovered 3/98; OK 3/98 & 5/98; totally buried, tag chewed, replaced 3/99; almost buried, purplish, OK 4/99; buried, green, OK 2/00; coming out, reddish, OK 5/00; buried, green, OK 2 & 5/01
105.00	6	10.39	333	2.10	0	0	2.20	0	0	2.30	1	1	2.02	0	0	good 3/96; purplish, OK 3/98 & 5/98; very purple, poor 3/99; purplish, OK 4/99; reddish, OK 2 & 5/00; green with some reddish tubercle tips, OK 2 & 5/01
106.00	6	10.40	333	2.00	0	0	2.50	0	0	2.50	0	0	1.67	0	0	OK 3/96; between rocks 3/97; good 5/97; a few yellowish tubercles, OK 3/98 & 5/98; poor, yellow green 3/99; olive, OK 4/99; reddish, OK 2/00; a few orangish tubercle tips, OK 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
107.00	6	10.28	332	2.90	0	0	3.40	0	0	3.40	1	1	2.85	0	0	OK 3/96; good 3 & 5/97; yellowish, OK 3/98, 5/98, 3 & 4/99; seedling in front of plant (107.01), dull green, good 2 & 5/00; pale green, OK 2/01; olive, OK 5/01
107.01	6	10.27	332													seedling at base of 107; green, OK, not tagged 2 & 5/00; olivish-red, poor 2/01; olive, OK 5/01
107.02	6	10.31	332													discovered, not tagged, behind 107 5/00; green, good 5/00; partially buried in juniper litter, green, OK 2 & 5/01
107.03	6	10.29	336													discovered 5/01; not tagged, at left upper corner of 107.00 tag; green, OK 5/01
107.10	6	10.87	334							2.40	0	0	1.91	0	0	discovered 3/98; good 3/98 & 5/98; good, slightly buried in juniper litter 3/99; coming out, green, good 4/99; olive green, OK 2/00; green, good 5/00, 2 & 5/01
108.00	6	9.18	333	1.50	0	0	1.70	0	0	1.60	0	0	1.82	0	0	OK 3/96; by rock, measured in one direction only 3/97; good 5/97, 3/98; olive green, OK 5/98; edge of ant mound, green, OK 3 & 4/99; green, reddish tubercles, OK 2/00; green, good 5/00, 5/01
109.00	6	9.94	337	2.40	0	0	2.90	3fr	3	2.90	1	1	2.24	1	0	OK 3/96; good 3/98 & 5/98; flower partially eaten, almost buried in ant mound, tag buried 3/99; out of mound, green, good 4/99; green reddish tubercle tips, OK 2 & 5/00; body with galleries and small exit hole, COD weevils? 2/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
110.00	6	9.55	332	2.90	2	2	3.10	2fr	2	3.40	1	1	3.20	1+2fr	3	OK 3/96; good 5/97, 3/98; yellow, OK 5/98; green, good 3 & 4/99; green, good 2/00; basally yellow, OK 5/00; some tubercle damage, green, good 2 & 5/01
110.01	6	9.46	332				0.70		0	0.90	0	0	0.32	0	0	seedling, discovered 5/97; good 3/98; buried, good 5/98, 3 & 4/99; buried, green, good 2 & 5/00, 2 & 5/01
110.02	6	9.52	334													discovered 5/00; not tagged, between 110 and its tag; green, OK 5/00, 5/01
111.00	6	9.22	332	2.80	2	2	3.00	4fr	4	3.20	2	2	2.83	3fr	2	OK 3/96, 3/98 & 5/98; good 3 & 4/99; green, good 2/00; some yellowish tubercle tips, OK 5/00; green, good 2/01; pale green, OK 5/01
112.00	6	9.33	336	2.00	0	0	mia			mia			mia		mia	good 3/96; plant & tag mia 3/97 & 5/97; ant mound in vicinity, plant & tag mia 3/98, 5/98, 3/99 & 4/99
112.10	6	9.90	336	1.60		0	~2.4	0	0	2.30	0	0	2.42	0	0	good, discovered 5/96; to the left of 112.2; measured in one direction only 3/97; good 3/98 & 5/98; good, slightly buried 3/99; good 4/99; green, good 2 & 5/00, 2 & 5/01
112.20	6	9.90	336	1.80		0	~2.3	0	0	2.10	0	0	2.65	1fr	1	discovered 5/96, good; to the right of 112.2; measured in one direction only 3/97; good 3/98, 5/98, 3/99 & 4/99; green, good 2/00; some slightly reddish tubercle tips, good 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
113.00	6	10.15	327	3.50	3	3	4.60	4fr	4	4.70	3	3	3.74	1+2fr	2+1A	OK 3/96; a little yellowish, OK 3/98; green, good 5/98; OK, yellow-green 3/99; olive, good 4/99; little yellowish at base, good 2/00; green, good 5/00, 2/01; a few yellow tubercle tips at base, otherwise green, good 5/01
114.00	6	10.47	326	3.20	0	0	3.80	2fr	2	3.90	0	0	3.38	0	0	good 3/96, 3/98, 5/98, 3/99 & 4/99; partially buried, reddish, OK 2/00; maroonish, OK 5/00; reddish-gold, poor 2/01; reddish-olive, OK 5/01
115.00	6															not assigned in 1996, 1997, 1998, 1999
116.00	6	7.85	334	2.20	1A	0	3.10	1+2fr	2+1A	3.10	0	0	2.59	2	2	good 3/96; a little yellowish, OK 3/98, 5/98, 3/99 & 4/99; tubercle tips reddish, OK 2 & 5/00; some tubercle damage, green, good 2 & 5/01
116.10	6	7.73	338													discovered 2/01; green, good 2 & 5/01
117.00	6	7.40	336	2.20	0	0	3.20	0	0	3.40	2	2	3.07	3 fr	3	OK 3/96; a little reddish 3/97; good 3/98, 5/98, 3/99 & 4/99; reddish tubercle tips, good 2 & 5/00; green, good 2 & 5/01
117.01	6	7.40	336				1.40	0	0	1.20	0	0	1.12	0	0	seedling, measured in one direction only 3/97; OK 5/97; good 3/98, 5/98, 3/99 & 4/99; green, good 2 & 5/00, 2 & 5/01
118.00	6	7.07	333	1.70	1	0	2.50	1A+1fr	1A	2.70	0	1	2.13	0	0	fire scars at base, OK 3/96; fire scars barely visible 5/97; no fire scars visible, slightly yellowish, OK 3/98; 2 spine clusters & tubercles pulled off, small digging beside, OK 5/98; green, OK 3/99; green, good 4/99; green, OK 2 & 5/00; looks dead, but firmly rooted, collected 2/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
118.10	6	7.25	332				2.80	0	0	2.40	0	0	2.28	0	0	good 5/97, 3/98, 5/98, & 4/99; green, good 2 & 5/00, 2 & 5/01
118.20	6	7.79	347				1.80	0	0	1.60	0	0	1.25	0	0	good 5/97, 3/98, 5/98, 3/99 & 4/99; dark green, good 2/00; purplish, OK 5/00; green, good 2 & 5/01
119.00	6	~6.81	333	1.60	0	0	2.30	0	0	2.20	0	0	1.90	0	0	12 o'clock position in cluster, good 3/96; measured in one direction only 3/97; good 3/98 & 5/98; good, almost buried in ant mound 3/99; out of mound, green, good 4/99; body solid, dry, powdery, COD unknown 2/00
120.00	6	~6.81	333	1.60	0	0	2.40	1fr	1	2.30	0	0	2.05	0	0	2 o'clock position in cluster, good 3/96; measured in one direction only 3/97; good 3/98 & 5/98; good, almost buried in ant mound 3/99; out of mound, green, good 4/99; body solid, dry, powdery, COD unknown 2/00
121.00	6	~6.81	333	1.40	0	0	1.70	0	0	1.70	0	0	1.82	0	0	4 o'clock position in cluster, good 3/96; measured in one direction only 3/97; good 3/98 & 5/98; good, almost buried in ant mound 3/99; out of mound, green, good 4/99; body solid, dry, powdery, COD unknown 2/00
122.00	6	~6.81	333	1.80	0	0	2.40	2fr	2	2.50	0	0	2.02	0	0	6 o'clock position in cluster, good 3/96; measured in one direction only 3/97; good 3/98 & 5/98; good, almost buried in ant mound 3/99; out of mound, green, good 4/99; body solid, dry, powdery, COD unknown 2/00
123.00	6	~6.81	333	1.30	0	0	2.00	0	0	1.70	0	0	1.54	0	0	10 o'clock position in cluster, good 3/96, 3/98, 5/98; good, almost buried in ant mound 3/99; out of mound, green, good 4/99; body solid, dry, powdery, COD unknown 2/00
Plants 119.00 through 123.00 were all one plant																
124.00	6	6.95	331	2.20	1	1	2.30	3fr	3	3.10	0	0	2.82	1+1fr	2	OK 3/96, 3/98; good 5/98, 3/99 & 4/99; olive green, OK 2/00; yellowish at base, OK 5/00 & 2/01; reddish basally, otherwise green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
124.10	6	6.75	334													discovered 2/01; green, OK 2 & 5/01
125.00	6	6.75	328	3.50	4	4	4.10	5fr	5	3.60	2	3	2.89	3+1fr		4 good 3/96; a few orange tubercles, OK 5/97, 3/98 & 5/98; green, good 3/99, 4/99 & 2/00; yellow at base, OK 5/00; some tubercle damage, green, OK 2 & 5/01
125.10	6	5.38	331				3.30	3fr	3	3.10	0	0	2.51	1+1fr		1 good 5/97; very yellow-orange, poor 3/98; orange, OK 5/98; olive green, few orange tubercles, OK 3/99, 4/99 & 2/00; slightly orangish at base, otherwise green, OK 5/00; ants swarming, pale green, OK 2/01; some yellow tubercle tips, OK 5/01
126.00	6	6.50	328	2.20	0	0	4.00	0	0	3.90	0	0	3.56	1fr		1 good 3/96, 3/98 & 5/98; good, dead bee on plant 3/99; green, good 4/99, 2 & 5/00 & 2/01; maroonish at base, otherwise, green, good 5/01
127.00	6	6.98	323	2.70	0	0	3.20	1A+2fr	2	3.50	3	2	2.91	1+1fr		0 OK 3/96; under rock, measured in one direction only 3/97, 3/98; good 5/97, 3/98; OK 5/98; good 3/99 & 4/99; green, good 2 & 5/00 & 2/01; green, OK 5/01
127.01	6	6.81	325													discovered 5/01; green, OK 5/01
127.10	6	7.53	324				2.00	1	1	1.80	0	0	1.72	0	0	0 good 5/97, 3/98, 5/98, 3 & 4/99; green, good 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
127.20	6	6.97	321													discovered 2/01; green, good 2 & 5/01
127.30	6	6.78	321													discovered 2/01; yellow-green, OK 2 & 5/01
127.40	6	6.61	320													discovered 2/01; green, OK 2 & 5/01
127.50	6	6.59	320													discovered 2/01; a few damaged tubercles, green, OK 2 & 5/01
127.60	6	6.67	320													discovered 2/01; hunkered, green, OK 2/01; popped out, green, good 5/01
128.00	6	7.15	317	3.40	2	1	5.30	5fr	5	4.80	3	3	4.61	4+1fr	5	good 3/96; a little yellowish, OK, fruit already dispersing 5/97; very yellowish near base, OK 3/98, 5/98, 3/99, 4/99, 2 & 5/00; green, OK 2/01; green, good 5/01
128.10	6	6.63	312				3.30	2fr	2	3.00	0	0	2.42	0	0	good 5/97; new apical growth, several tubercles reddish, OK 3/98 & 5/98; yellow-green, OK 3/99 & 4/99; hollow chambers, weevils? 2/00
128.11	6	6.62	312													seedling of 128.10, discovered 2/00; OK 5/00; plant mia 2 & 5/01
128.20	6	7.30	312							2.00		0	2.49	0	0	discovered 5/98, good 3/99 & 4/99; green, good 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
128.30	6	7.37	312							1.90		0	2.21	1		1 discovered 5/98, good 3/99 & 4/99; green, good 2 & 5/00; green with some yellowish tubercles, OK 2 & 5/01
128.40	6	6.31	317													discovered 2/01; a few damaged tubercles, green, OK 2/01; reddish-green, OK 5/01
128.50	6	6.35	318													discovered 2/01; green with some red tubercle tips, OK 2 & 5/01
129.00	6	7.50	312	2.40	1	1	2.70	1+1fr	2	2.50	0	0	2.46	0	0	0 OK 3/96; a little reddish, OK 3/98, 5/98, 3/99 & 4/99 & 2/00; dull green, OK 5/00 & 2/01; olive, OK 5/01
130.00	6	7.45	308	2.20	0	0	2.20	1fr	1	2.40	0	0	2.44	0	0	0 good 3/96; rock flipped on top, partially covering plant, rock removed, plant good 3/98, 5/98, 3/99 & 5/99; dark green with some purplish tubercle tips, OK 2 & 5/00 & 2/01; maroonish-green, OK 5/01
131.00	6	7.41	330	2.70	1	1	3.40	3fr	2+1A	3.30	1	1	2.88	1	1	1 OK 3/96, 3/98 & 5/98; good 3/99 & 5/99; green with a few orange tubercle tips, good 2/00; green with a few orange tubercle tips, OK 5/00; tag mia replaced, plant green with a few yellow tubercle tips, OK 2/01; green, good 5/01
131.10	6	7.55	330													discovered 2/01; green, good 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
132.00	6	9.45	328	3.00	0	0	3.70	3fr	2	4.20	1	1	3.51	3	3	old fire scar at base, OK 3/96; scar barely visible, good 5/97; fire scar no longer visible, good 3/98, 5/98, 3 & 4/99; green, good 2 & 5/00; tag mia, replaced, plant green, good 2 & 5/01
133.00	6	9.71	331	3.80	3	3	4.90	5fr	5	5.00	4	4	4.03	5fr	4+1A	OK 3/96; turning red 3/97; seedling (133.01) at base 5/97; totally maroon, good 3/98; maroon, OK 5/98; maroon, OK, shrunken on one side 3/99 & 4/99; mostly purplish, but good 2/00; dark green, good 5/00; slightly purplish-green, good 2 & 5/01
133.01	6	9.68	331							1.20	0	0	1.42	0	0	seedling of 133, 1st seen 5/97, 1st measured & tagged 3/98; good 5/98, 3/99 & 4/99; green, good 2 & 5/00, 2 & 5/01
134.00	6	8.85	331	2.40	0	0	2.90	1A	1A	3.30	2	2	2.76	1	1A	OK 3/96; good 5/97, 3/98; a few yellow & red tubercles, OK 5/98, 3 & 4/99; mottled green, OK 2 & 5/00; some damaged tubercles, green, good 2/01; maroonish-green, OK 5/01
135.00	6	10.20	327	4.10	2	0	5.30	1+5fr	nd	5.30	3	4	4.92	2+1fr	3	OK 3/96; turning red 3/97, 3/98 & 5/98; getting buried 3/99; coming out maroonish, good 4/99; totally out, dark green, good 2/00; orangish-green, OK 5/00; purplish-green with some orange tubercle tips 2/01; purplish-green, good 5/01
136.00	6	9.67	323	2.50	1	0	3.00	2fr	2	3.00	2	2	2.87	3	3	good 3/96; OK, dullish green 3/97; good 3/98; getting buried, good 5/98 & 3/99; reddish, OK 4/99; green with reddish tubercle tips, good 2/00; green with reddish tubercle tips, OK 5/00; large chamber in body, COD Moneilema? 2/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
137.00	6	9.80	323	3.00	1	1	3.20	2fr	2	3.10	1	1	2.71	0	0	OK 3/96; a little reddish, OK 3/98; green, good 5/98, 3/99, 4/99, 2 & 5/00, 2 & 5/01
137.01	6	9.15	326													discovered 5/01; green, OK 5/01
138.00	6	9.90	323	2.50	0	0	3.60	3fr	3	4.00	3	3	3.09	3	3	to the left of 139, good 3/96, 3/98, 5/98, 3/99 & 5/99; green, good 2 & 5/00; green with some purplish tubercle tips, good 2 & 5/01
139.00	6	9.92	323	2.00	2	2	3.80	3fr	3	4.20	2	2	4.62	5	5	to the right of 138, good 3/96, 3/98, 5/98, 3/99 & 5/99; green, good 2 & 5/00, 2 & 5/01
140.00	6	9.90	320	2.10	0	0	2.00	0	0	1.80	0	0	2.10	0	0	good 3/96 & 3/97, 3/98 & 5/98; good at edge of little bluestem clump & ant mound 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
141.00	6	10.71	323	5.20	2+1fr	1	6.00	7fr	5+2A	6.30	3	2+1A	5.63	4fr	4	OK 3/96; good 5/97; a little reddish, OK 3/98 & 5/98; a few spines loose, a little reddish, OK 3/99; green, good 4/99; green with reddish tubercle tips, OK 2 & 5/00; green with reddish tubercle tips, good, one flower partially eaten 2/01; green, good 5/01
141.01	6	10.68	323	1.60	0	0	2.60	0	0	2.80	0	0	2.48	2fr	1	good 3/96, 3/98, 5/98, 3/99 & 4/99; green, good 2 & 5/00, 2 & 5/01
141.02	6	10.66	323				1.40	0	0	1.70	0	0	1.57	0	0	0 good 3/98, 5/98, 3/99 & 5/99; green, good 2 & 5/00, 2/01; partially buried in juniper litter, green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
141.10	6	10.85	328				3.20	1fr	1	3.10	0	0	3.52	0	0	0 OK 5/97, 3/98; gray overall, buried in Juniper needles, poor 5/98 & 3/99; coming out, good 4/99; coming out, green, good 2 & 5/00; olive, OK 2 & 5/01
142.00	6	11.57	323	3.40	1	1	3.90	3fr	3	4.00	2	2	3.70	0	0	0 OK 3/96; good 3/98, 5/98, 3/99 & 4/99; caving in on one side, green, OK 2/00; new apical growth, green, good, old body poor 5/00; old body barely visible, new growth green, OK 2 & 5/01
143.00	6	10.73	315	2.80	2	2	3.80	3fr	3	3.70	3	3	3.49	2+1fr	3	3 good 3/96, 3/98; dull green, OK 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
144.00	6	11.73	317	2.80	1+1fr	2	3.40	3fr	3	3.40	0	0	3.14	1fr	1	1 good 3/96; OK, dull reddish green 5/97, 3/98 & 5/98; OK, dull reddish-green, getting buried 3/99; coming out, green, good 4/99, 2 & 5/00; out, green, good 2 & 5/01
144.10	6	13.31	321							4.10	2	3	3.57	1fr	1	1 discovered 3/98, reddish, OK & 5/98; reddish, OK, ants in soil cracks and holes around plant 3/99; reddish, OK 4/99 & 2/00; brownish-green, OK 5/00; reddish, OK-poor 2 & 5/01
145.00	6	10.95	318	2.60	0	0	3.20	2fr	2	3.70	2	2	3.07	2+1fr	3	3 OK 3/96; good 3/98 & 5/98; OK, spines dull gray, body yellow-green 3/99; dark green, good 4/99, 2 & 5/00; blue-green, good 2/01; green, good 5/01
146.00	6	5.51	319	2.30	0	0	2.80	0	0	3.00	0	0	2.71	0	0	0 good 3/96, 3/98; OK 5/98; good 3 & 4/99; green, good 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
147.00	6	4.95	306	2.30	0	0	2.80	2fr	1+1A	2.90	1	1	2.51	1fr	0	OK 3/96, 3/98 & 5/98; OK, maroonish 3 & 4/99, 2 & 5/00; olive with some yellow tubercles, OK 2 & 5/01
147.10	6	4.83	319				1.20	0	0	0.80	0	0	1.10	0	0	maybe double headed 3/97; OK 5/97; definitely double-headed, the left head of 147.10 & 147.11, OK 3/98; good 5/98, 3/99 & 4/99; misshapen, green, OK 2/00; olive, OK 5/00; green, OK 2 & 5/01
147.11	6	4.83	319							0.70	0	0	0.61	0	0	the right head of 147.10 & 147.11, not tagged, OK 3/98 & 3/99; good 4/99; green, OK 2/00; olive, OK 5/00, 5/01
147.20	6	4.85	321										1.81	0	0	edge of rock, green, good 3 & 4/99; old fire scar at base, green, OK 2 & 5/00; olive, OK 2/01; green, good 5/01
147.30	6	4.93	313										2.79	0	0	green, good 3 & 4/99, 2 & 5/00, 2 & 5/01
147.40	6	4.71	316													green, good 2 & 5/00, 2 & 5/01
147.50	6	4.74	316													green, good 2/00; yellowish-green, OK 5/00; green, good 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
148.00	6	5.25	308	1.90	0	0	1.90	0	0	2.10	0	0	1.73	0	0	old fire scar at base, OK-poor 3/96; reddish 5/96; dead 3/97; yellowish-gray, firmly rooted, not dead 5/97; yellowish-green, OK 3/98 & 5/98; OK, green, a little misshapen 3/99; golden, new spine growth, poor 4/99; old fire scar at base, purplish-yellowish green, poor 2/00; maroonish, OK 5/00; maroonish-yellow, poor 2/01; purple, poor 5/01
148.10	6	5.70	309				2.20		0	2.20	0	0	1.90	0	0	discovered 5/97; OK, 3/98 & 5/98; poor 3/99; green, good 4/99; yellowish, OK 2 & 5/00; olive, OK 2/01; green, OK 5/01
149.00	6	11.04	316	1.70	0	0	1.80	0	0	1.30	0	0	1.13	0	Dead	poor 3/96; red, spines gray 3 & 5/97; dark body; white gray spines, poor, maybe dead 3/98; probably dead 5/98, 3/99, 4/99; measured in one direction only 3/99; removed by WHC 5/6/99; COD unknown, no evidence of weevils
150.00	6	10.96	316	2.30	0	0	2.20	0	0	2.30	1	1	2.06	0	1	old fire scars, OK 3/96; good 3/97; OK, dull green 5/97; good 3/98; no fire scars visible, dull green, OK 5/98; green, good 3/99, 4/99, 2 & 5/00, 2 & 5/01
151.00	6	11.04	316	2.60	0	0	3.00	1fr	1	2.70	0	0	Dead			OK 3/96; 1/3 of stem caved in, poor 3/98; misshapen, maroonish, OK 5/98; just spines clusters left, COD unknown 3/99
152.00	6	11.45	316	1.60	0	0	1.80	0	0	2.00	0	0	1.77	0	0	by rock, to the right of 153, OK 3/96; measured in one direction only, OK 3/98 & 5/98; maroonish, OK 3/99; green, good 4/99; green, OK 2 & 5/00, 2 & 5/01
153.00	6	11.45	316	1.30	0	0	1.30	0	0	1.20	0	0	0.88	0	0	to the left of 152, OK 3/96, 3/98; buried, poor 5/98; popping out, maroonish green, OK 3/99 & 4/99; hunkered, green, OK 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
154.00	6	11.77	314	3.10	0	0	3.90	0	0	3.90	0	0	3.66	0		0 good 3/96; shaded 3/97, 3/98, 5/98, 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
155.00	6	11.84	314	2.40	0	0	2.10	0	0	2.10	0	0	1.99	0		0 OK 3/96; shaded 3/97, 3/98 & 5/98; shaded, yellow-green, OK, almost buried 3/99; coming out, goldish, OK 4/99, 2 & 5/00, 2 & 5/01
156.00	6	10.70	316	3.50	0	0	Dead									dead 3/96 & 5/96; COD unknown, just spines left 3/97
157.00	6	10.90	317	2.70	0	0	2.70	1fr	1A	2.80	1	1	2.23	1fr	0	OK 3/96; good 3/98; getting buried, good 5/98; OK, squishy 3/99; olive, OK 4/99; green, good 2 & 5/00; olive, OK 2 & 5/01
157.10	6	10.99	316				3.00	1	1	2.70	1	1+1A	2.58	2+1fr	2	OK 5/97; in grass clump, good 3/98; in grass clump & ant mound, good 5/98 & 3/99; one flower eaten, green, good 4/99; dark green, good 2/00; maroonish, OK 5/00; slightly maroonish-green, good 2 & 5/01
158.00	6	10.18	314	2.50	0	0	3.10	1	1	3.40	1	1	3.52	3	3	good 3/96, 3/98, 5/98, 3/99 & 4/99; yellowish dull green, OK 2 & 5/00; green with basal yellow tubercles, OK 2 & 5/01
158.10	6	4.56	313	1.30	na	0	1.40	0	0	1.30	0	0	1.26	0		0 discovered 5/96, good, 3/98; OK 5/98 & 3/99; green, good 4/99; pulled into soil, green, good 2 & 5/00, 2 & 5/01
159.00	6	10.37	311	2.70	0	0	3.00	1+2fr	3	3.20	3	3	3.12	3		3 OK 3/96, 3/98; good 5/98 & 3/99; reddish-orange at base, OK 4/99; reddish, OK 2 & 5/00 & 2/01, red with new green apical growth, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
159.01	6	10.60	314										0.95			0 discovered 5/99; green, OK 5/99; green, OK, hunkered 2 & 5/00; olive, OK 2 & 5/01
160.00	6	10.00	308	2.60	0	0	3.40	2	2	3.30	1	1A	3.42	2		0 OK-poor 3/96; good 3/97; OK, yellowish green 5/97; good 3/98, 5/98, 3/99; good, green 4/99; light purplish at base, OK 2/00; yellowish at base, OK 5/00; green with some red tubercle tips, OK 2 & 5/01
161.00	6	10.10	305	3.30	0	0	3.90	2	1+1A	3.70	0	1	3.25	0		0 poor 3/96; OK, maroonish green 5/97, 3/98, 5/98, 3/99; dark green, slightly red, good 4/99, 2 & 5/00, 2/01; reddish-green, OK 5/01
162.00	6	11.06	307	2.80	0	0	2.90	0	0	2.70	0	0	2.43	0		0 OK 3/96, 3/98, 5/98, 3/99, 4/99 & 2/00; dull green, OK 5/00, 2/01; grayish-green, poor 5/01
162.10	6	10.88	305													discovered 2/01; yellowish-green, OK 2 & 5/01
163.00	6	10.46	302	2.30	0	0	3.20	0	0	3.30	0	1A	Dead			OK 3/96; good 5/97, 3/98 & 5/98; huge larva (probably Moneilema) collected 3/99
164.00	6	11.89	302	2.60	0	0	3.00	0	0	3.10	0	0	2.70	0		0 good 3/96, 3/98, 5/98, 3 & 4/99; light green, a few orangish tubercle tips 2/00; orangish, OK 5/00; tag mia, plant dead, just spines left, COD unknown 2/01
165.00	6	5.52	290	1.90	0	0	2.20	0	0	2.40	1	1	1.89	0		0 to the left of 166 & 167, OK 3/96, 3/98, 5/98; maroon, OK 3 & 4/99; one measurement only, green, good 2 & 5/00, 2/01; dark green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
165.10	6	4.41	296				4.50	1+4fr	5	4.60	1	1	4.00	1+2fr	3	good 3/97; a few orangish tubercle tips, OK 3/98 & 5/98; green, good 3 & 4/99; reddish, good 2/00; a few orangish tubercle tips, OK 5/00; purplish-green, OK 2/01; olive, OK 5/01
166.00	6	5.47	290	1.60	0	0	1.80	0	0	2.00	0	0	1.82	0	0	in between 165 & 167, OK 3/96; good 3/98, 5/98, 3/99 & 4/99; dull green, OK 2 & 5/00; maroonish, OK 2/01; sunken, maroon, poor 5/01
167.00	6	5.47	290	1.30	0	0	1.40	0	0	1.40	0	0	1.34	0	0	to the right of 165 & 166, OK 3/96; good 3/98, 5/98, 3/99 & 4/99; reddish-green, OK 2/00; green, good 5/00, 2 & 5/01
167.10	6	5.51	285				1.90		0	1.70	0	0	1.22	0	0	old fire scar (white tubercles) visible at base, OK, discovered 3/97; OK 3/98, 5/98 & 3/99; maroonish, OK 4/99; green, OK 2 & 5/00; just spines left, COD unknown 2/01
167.20	6	4.44	287				2.30		0	2.50	0	0	2.03	1fr	1	discovered 5/97, good, 5/97, 3/98, 5/98, 3/99 & 4/99; green with reddish tubercle tips 2/00; green with yellowish tubercle tips, OK 5/00; rock flipped on, removed, green, OK 2/01; green with some yellow tubercle tips, OK 5/01
167.30	6	4.32	288				1.00		0	1.10	0	0	1.09	0	0	discovered 5/97; ant mound, tag mia, replaced, good 3/98 & 5/98, OK, 3/99; green, good 4/99 & 2/00; split across top, some dead spines, green, OK 5/00; just spines left, COD unknown 2/01
167.40	6	3.50	284							5.10	2	2	4.11	2+3fr	5	discovered 3/98, good 5/98; green, good, 4/99, 2 & 5/00; two flowers partially eaten, plant green, good 2/01; green, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
167.50	6	3.98	285													discovered 2/01; green, good 2/01; reddish-orange, poor 5/01
168.00	6	5.33	273	3.00	4	3	4.00	4fr	4	3.50	2	2	3.11	2fr	2	OK 3/96; very orangish-red, OK 3/98 & 5/98; maroonish-green, OK 3 & 4/99; reddish, OK 2/00; yellowish at base, otherwise green, OK 5/00; maroon, OK 2 & 5/01
169.00	6	4.32	274	3.20	2	2	4.10	3fr	3	4.00	2	2	2.88	1+2fr	2+1A	good 3/96; OK, yellowish green 3/97, 3/98; pulling into ground, yellowish, OK 5/98; green, OK, sinking into ground on one side 3/99; no longer sinking, green, good 4/99; green, good 2 & 5/00; dull green with purplish tubercles, OK 2 & 5/01
169.10	6	4.52	287				4.00	3fr	3	3.60	1	1	2.94	1fr	1	good 5/97, 3/98 & 5/98; green, good 4/99, 2 & 5/00; hunkered, loose spines, green, OK 2/01; green with tannish tubercles at base, OK 5/01
170.00	6	5.77	273	4.30	3	3	5.50	2+2fr	4	5.60	2	2	5.31	1+2fr	3	good 3/96; fantastic 3/98 & 5/98; good 3 & 4/99; green, good 2 & 5/00, 2/01; dark bluish-green, good 5/01
171.00	6	4.65	268	2.90	1	1	3.40	2fr	2	3.20	0	0	2.74	1fr	1A	good 3/96; one fruit missing top 3/97; OK, dull green 5/97; very reddish, poor 3/98; reddish, OK 5/98; yellow-green, OK 3 & 4/99; purplish, OK 2/00; orangish, OK 5/00; green with red tubercles, OK 2/01; maroonish, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
172.00	6	3.41	265	2.80	1	0	3.60	3fr	3	3.50	3	3	1.95	0	Removed;	plant smashed 3/96; OK 5/96; reddish tubercle tips, OK 3/98 & 5/98; looks dead, but firmly rooted 3/99; probably dead 4/99; collected by WHC 5/6/99; COD unknown; no evidence of weevils
173.00	6	2.65	264	3.10	1+2fr	3	3.70	4fr	4	3.90	3	3	3.39	3	2+1A	OK 3/96; red 3/97; gold-yellow, poor 5/97; totally maroon with a few tan tubercle tips, OK 3/98 & 5/98; goldish, poor 3/99; OK, yellow on one side 4/99; purplish, slightly shrunk, OK/poor 2/00; orangish at base, OK 5/00; purplish, OK 2/01; green with some purplish tubercles, OK 5/01
174.00	6	4.67	266	2.90	1+2fr	2	3.40	3fr	3	3.10	0	0	2.71	1fr	1	good 3/96; turning red 3/97; some orangish tubercles 5/97; reddish with some orangish tubercle tips, OK 3/98 & 5/98; green, good 3/99 & 4/99; purplish, OK 2/00; slightly purplish green, OK 5/00; green, good 2 & 5/01
174.10	6	4.62	264													discovered 2/01; purplish-green, OK 2 & 5/01
175.00	6	5.09	266	3.00	3?	2	3.60	3fr	3	3.40	1	1	2.82	2fr	2	flowers smashed 3/96; OK 5/96; a little reddish 3/97; a little reddish, OK 3/98, 5/98, 3 & 4/99; orangish, OK 2 & 5/00; olive with reddish tubercle tips, OK 2/01; dull green, OK 5/01
175.01	6	5.07	266	0.60	0	0	0.90	0	0	0.90	0	0	0.47	0	0	good 3/96, 3/98 & 5/98; very poor, just a tubercle left 3/99; green, good 4/99; dull green, OK 2 & 5/00, 2/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
176.00	6	4.82	268	2.80	1+1fr	2	2.60	0	0	2.70	0	0	2.30	0	0	good 3/96, 3/98; shaded but good 5/98; green, good 3 & 4/99, 2 & 5/00, 2 & 5/01
177.00	6	4.85	268	2.70	1	1	3.60	3fr	3	3.20	0	0	2.36	1fr	1	good 3/96; shaded but good 3/98, 5/98 & 3/99; green, good 4/99; buried in grass clump, green, good 2 & 5/00, 2 & 5/01
178.00	6	4.88	268	3.40	0	0	4.20	2fr	1+1A	4.20	0	0	3.21	2	2	good 3/96; one fruit may be aborted 3/97; good 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00; pill bug eating plant, plant purplish-green, OK 2/01; 10% chunk gone, scarred over, green, OK 5/01
178.01	6	4.73	273										2.95		0	discovered 5/99; green, good 5/99, 2 & 5/00; blue-green, OK 2/01; purplish-green, OK 5/01
179.00	6	4.95	268	3.20	0	0	4.20	2fr	2	4.40	2	2	2.85	0	0	good 3/96, 3/98, 5/98, 3 & 4/99; green, good 2 & 5/00; purplish-green, OK 2 & 5/01
180.00	6	5.72	268	1.20	0	0	1.40	0	0	1.40	0	0	1.42	0	0	almost buried, OK 3/96; popping up through crustose lichens, measured in one direction only 3/97; popped out 5/97; good, 3/98; OK 5/98; hunkering down 3/99; coming out, green, good 4/99 & 2/00; hunkered, green, OK 5/00; coming out, dull green OK 2/01; green, OK 5/01
181.00	6	6.13	268	2.40	0	0	2.70	2fr	2	2.80	1	1	2.36	1fr	1	OK 3/96; reddish, OK 3/98, 5/98, 3 & 4/99; slightly soft, reddish-green, OK 2 & 5/00; orange, poor 2/01; root rot, collected for weevil study 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
182.00	6	6.37	268	1.80	0	0	1.90	0	0	2.40	0	0	1.89	0	0	OK 3/96; almost buried 5/96; coming out 5/97; above ground, good 3/98 & 5/98; almost buried 3/99; coming out, green, good 4/99; green, good 2 & 5/00; pale green OK 2/01; green, good 5/01
182.01	6	6.18	269													discovered 5/01; green, good 5/01
183.00	6	6.25	268	0.80	0	0	0.80	0	0	1.00	0	0	0.99	0	0	OK 3/96, 3/98; pulling underground, OK 5/98; poor, hunkered 3/99; coming out, dull green, poor 4/99; dull green, OK 2 & 5/00; hunkered, green with gold and orange tubercles, OK 2/01; buried, very poor 5/01
183.10	6	6.32	268							1.20	0	0	1.15	0	0	discovered 3/98, good 5/98; hunkered, OK 3/99; green, good, popped out 4/99; half-buried, green, good 2 & 5/00; almost buried in juniper litter, olive, OK 2 & 5/01
184.00	6	5.90	256	3.00	1	0	3.90	5fr	6	4.90	3	1	4.10	4fr	3+1A	OK 3/96; buried in fire ant mound, OK 5/97; out of mound, good 3/98; getting buried again 5/98, 3/99; totally out, green, good 4/99, 2 & 5/00; all flowers and some tubercles partly eaten, but plant green, good 2/01; green, good 5/01
185.00	6	4.82	249	3.10	2	2	3.90	4fr	3+1A	3.80	2	3	2.57	2+2fr	1+1disp	good 3/96; a few reddish tubercle tips, OK 3/98, 5/98, & 3/99; hunkered, maroonish, OK 4/99; purplish, OK 2/00; light purplish-green, OK 5/00; one flower partly eaten, purplish, OK 2/01; purplish-green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
185.10	6	3.73	253				3.40		3	3.30	1	1	2.83	2fr	2	good, discovered 5/97; a few yellowish tubercle tips, partially buried in ant mound, OK 3/98, 5/98; green, good, out of mound 3/99 & 4/99; slightly purplish, OK 2/00; yellowish pale green, OK 5/00; body pale green, tubercles dark green, OK 2/01; maroonish tubercle tips, body pale green 5/01
185.20	6	3.50	245													discovered 5/00; misshapen, yellowish basally; otherwise green, OK 5/00; body hollow, COD Moneilema 2/01
186.00	6	4.78	249	3.10	2	2	3.60	1fr	1	3.30	1	1	3.15	1	1	good 3/96; a little reddish, OK 5/97; good 3/98, 5/98, 3 & 4/99, 2 & 5/00, 2/01(tag mia, replaced); green, good 5/01
187.00	6	4.80	249	1.60	0	0	2.70	1fr	1	2.30	0	0	2.03	0	0	good 3/96; a few orangish tubercles, OK 5/97, 3/98 & 5/98; green, good 3 & 4/99, 2 & 5/00, 2 & 5/01
187.10	6	5.15	245													discovered 2/01; green, good 2/01; plant mia 5/01
188.00	6	9.87	269	3.20	0	0	3.40	0	0	3.40	0	0	3.18	0	0	OK 3/96; good 3/98 & 5/98; getting buried by juniper litter, OK 3/99; tag uprooted and chewed, replaced, plant coming out, green, OK 4/99; green, good 2 & 5/00, 2 & 5/01
189.00	6	10.09	264	2.50	0	0	2.50	0	0	Dead						OK-poor 3/96; reddish, hunkered down, bad 5/97; stem solid, dry, COD unknown 3/98
189.10	6	6.00	262				2.70	0	0	2.80	0	0	2.53	2fr	1A	yellowish green, OK 5/97, 3/98, 5/98, 3/99 & 4/99; olive green, OK 2/00; yellowish, OK 5/00; pale green with reddish tubercle tips, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
189.20	6	6.45	262				2.90	1fr	1	2.70	0	1	2.28	1fr	1	very dark green, OK 5/97; very dark green, good 3/98 & 5/98; good, hunkered 3/99; coming out, green, good 4/99; purplish, good 2/00; dark green, few spines, good 5/00; one flower partly eaten, plant blue-green, good 2 & 5/01
189.21	6	6.48	262													not tagged, behind on right of 189.20, discovered 2/01; green, good 2 & 5/01
189.30	6	6.53	264				6.20	6fr	6	5.80	2	1	Dead			great 5/97, 3/98 & 5/98; stem not hollow or dry solid, COD unknown 3/99
189.40	6	6.90	264				2.70	2fr	2	2.60	1	1	2.10	2fr	1	good 5/97, 3/98; shrinking into ground, OK 5/98 & 3/99; coming out, green, good 4/99; green, good 2 & 5/00, 2 & 5/01
189.50	6	7.76	258													left of 189.6, discovered 2/01, green, good 2 & 5/01
189.60	6	7.77	258													right of 189.5, discovered 2/01; green, good 2 & 5/01
190.00	6	10.51	264	2.50	1	0	3.10	2fr	2	3.20	1	0	2.66	0	0	OK 3/96, 3 & 5/98, 3/99; maroonish, OK 4/99; olive green, good 2/00; dark green, good 5/00; green with maroonish tubercle tips, good 2 & 5/01
191.00	6	10.17	264	2.70	0	0	3.00	2	2A	3.40	0	0	2.39	0	0	OK 3/96, 3 & 5/98, 3/99; green, good 4/99; olive green, OK 2/00; slightly reddish at base, OK 5/00; green with some reddish tubercle tips, good 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
191.10	6	10.17	262													discovered 2/01; hunkered, green, good 2 & 5/01
192.00	6	11.50	259	2.40	0	0	3.10	1A+1fr	1	3.20	1	1	2.73	2fr	1+1A	OK 3/96; good 3/98; pulling into soil, OK 5/98; green, good 3/99 & 4/99; purplish, good 2 & 5/00; pale purplish-green, good 2 & 5/01
193.00	6	10.52	260	2.90	1	1	3.70	2fr	2	3.90	1	1A	2.65	2fr	2	reddish, OK 3/96; maroon, OK 3 & 5/97, 3/98; buried, poor 5/98; resurfacing, OK 3/99; reddish, OK 4/99; soft, olive green, OK 2/00; orangish, OK 5/00; green with orangish tubercle tips, OK 2 & 5/01
194.00	6	9.98	260	2.30	0	0	2.40	0	0	2.60	0	0	2.16	0	0	old fire scar, OK 3/96; very reddish, very poor 3/98, 5/98, 3/99; yellowish, OK 4/99; fire scarred, purplish-yellowish, fair/OK 2/00; maroonish basally, OK 5/00; maroonish basally, good 2 & 5/01
195.00	6	8.88	259	3.30	2	2	4.40	1A+2fr	2	4.00	3	3	3.80	2	2	good 3/96; getting slightly yellow, OK 5/97, 3/98, 5/98, 3/99 & 4/99; tubercle tips slightly purplish-green, good 2/00; tubercle tips slightly purplish-yellowish, OK 5/00; green with purplish tubercle tips, OK 2/01; yellowish-green, OK 5/01
195.10	6	8.46	264				3.10	0	0	2.70	1	0	2.32	0	0	good 5/97; a few yellowish tubercle tips, getting buried in juniper litter, OK 3/98; poor 5/98 & 3/99; yellow-green, OK 4/99; green, good 2 & 5/00, 2/01; partly eaten, scarred over, green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
195.20	6	8.29	260				2.20		1	2.60	0	0	1.96	0	0	0 good, discovered 5/97; good 3/98 & 5/98; almost buried in juniper litter, poor 3/99; reddish, OK 4/99; solid, dry, hard as a rock, COD unknown 2/00
196.00	6	8.92	258	2.70	1A	0	3.30	2fr	2	3.00	0	0	2.48	0	0	OK 3/96, dead plant between 196 & 196.01; dead plant gone, poor, orangish 5/97; slightly reddish, OK 3/98, 5/98 & 3/99; yellow-green, OK 4/99; slightly reddish, OK 2/00; orangish tubercle tips, OK 5/00; green with maroonish tubercle tips, OK 2 & 5/01
196.01	6	8.95	258	1.60	0	0	2.10	0	0	2.30	1	1A	2.13	1fr	1	good 3/96, dead plant between 196.01 & 196; dead plant gone 5/97; good 3/98; buried, poor 5/98; yellow-green, OK 3 & 4/99; green, OK 2 & 5/00, 2 & 5/01
197.00	6	8.72	258	1.20	0	0	1.50	0	0	1.90	0	0	1.16	0	0	good 3/96, 3/98 & 5/98; yellow-green, squishy, OK 3/99; firm, green, good 4/99; green, good 2 & 5/00, 2/01; slightly reddish-green, OK 5/01
198.00	6	9.43	259	2.50	1	0	3.10	2	2	2.90	0	0	2.38	0	0	OK 3/96; turning red & yellow 3/97 & 5/97; tubercle tips reddish, OK 3/98, 5/98 & 3/99; yellow-green, OK 4/99; green, good 2/00; a few reddish tubercle tips, OK 5/00, 2 & 5/01
199.00	6	9.49	259	1.30	0	0	2.10	0	0	2.30	0	0	1.95	0	0	good 3/96, 3/98 & 5/98; OK 3/99; green, good 4/99; half buried in juniper needles, lumpy, green, good 2 & 5/00; coming out, green, good 2/01; olive, OK 5/01
200.00	6	10.07	259	2.20	0	0	2.60	2fr	2	2.30	0	0	1.96	0	0	good 3/96; OK, turning a little orangish 5/97; a few reddish tubercle tips, good 3/98; OK 5/98; good 3/99; green, good 4/99; green, good, partially buried in ant mount 2 & 5/00; green with some orange tubercle tips, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
201.00	6	10.25	259	1.40	0	0	1.70	0	0	1.50	0	0	1.11	0	0	OK 3/96; old fire scar at base; OK 3/98, 5/98, 3/99 & 4/99; dull green, OK 2 & 5/00; green good 2 & 5/01
202.00	6	8.36	256	2.90	1	1	3.10	2fr	2	3.10	0	0	2.75	2fr	2	OK 3/96; reddish 5/96, smaller dead one beside; dead one gone, live plant reddish 3/97; yellowish, poor 5/97; reddish, poor 3/98; reddish, OK 5/98, 3/99; goldish, OK 4/99; olive green, OK 2/00; goldish, OK 5/00; some tubercles damaged, plant maroonish-orangish-green, OK 2 & 5/01
203.00	6	8.90	253	3.00	2	2	3.20	2fr	1	3.20	1	1	2.73	2	2	smashed 3/96; OK 5/96; poor, orangish tubercles 5/97; tubercle tips orangish, OK 3/98, 5/98, 3/99 & 4/99; stepped on 5/99; purplish, OK 2/00; almost totally red, new green apical growth, OK 5/00; purplish-green, OK 2 & 5/01
203.10	6	7.50	254				3.50	1fr	1	3.40	1	1	2.92	1	1	good 5/97, 3/98, 5/98, 3/99; green, good 4/99; tubercles purplish, good 2 & 5/00, 2/01; green, good 5/01
203.20	6	8.93	254				2.30	0	0	2.30	0	0	2.35	0	0	good 5/97, 3/98, 5/98, 3 & 4/99; green, good 2 & 5/00, 2 & 5/01
203.30	6	7.99	254													discovered 5/01; green, good 5/01
203.31	6	7.92	254													discovered 5/01; green, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
204.00	6	8.69	246	2.90	1+1fr	2	4.10	1+2fr	3	3.50	2	2A	3.36	3		3 good 3/96; a few yellowish tubercle tips, OK 3/98 & 5/98; green, good, hunkering 3/99; coming out 4/99; green, OK, probably stepped on 2/00; green, good 5/00; purplish-green, OK 2/01; green, good 5/01
205.00	6	8.19	246	2.00	0	0	2.90	1	1	3.20	0	0	3.58	3		4 old fire scar, good 3/96, 3/98, 5/98, 3/99; good, green 4/99, 2 & 5/00, 2 & 5/01
206.00	6	8.08	246	1.00	0	0	1.50	0	0	1.70	0	0	1.63	0		0 OK 3/96; old fire scars; OK 3/98; totally buried in ant mound 5/98; mound gone, maroon, OK 3/99; orangish, OK 4/99; slightly purplish, good 2/00; olive, OK 5/00; slightly purplish-green, good 2/01; purple, becoming misshapen, OK 5/01
206.10	5	4.87	230							2.90		0	3.88	2		2 good, discovered 5/98; good 3/99; green, good 4/99, 2 & 5/00; green with a few yellow tubercle tips, good 2 & 5/01
206.20	6	2.49	183										3.83	4		4 discovered 3/99; good, green 4/99; dark green, good 2 & 5/00, 2 & 5/01
206.30	6	4.35	193													discovered 5/00; green, good 5/00; dull green OK 2/01; slightly reddish-green, OK 5/01
<b>Reference point 7</b> is in the next opening down the main road from Reference point 6. Stake 7 = GPS7; R030315A																
207.00	7	0.57	197	1.70	0	0	2.40	2fr	1+1A	3.00	0	0	2.25	3		3 good 3/96, 3/98, 5/98, 3/99; a few tan tubercles, OK 4/99 & 2/00; a few orange tubercles, otherwise green, good 5/00; green, good 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
208.00	7	0.59	197	1.30	0	0	2.20	1fr	1	2.60	1	1	2.66	3	3	good 3/96, 3/98, 5/98, 3/99; maroonish 4/99; maroonish, OK 2/00; orangish, OK 5/00; body solid, COD unknown 2/01
209.00	7	0.44	186	3.50	1	1	3.70	3fr	3	4.30	3	2+1A	2.67	0	Dead	OK 3/96; purplish green, OK 3/98; orangish, OK 5/98; shrinking into and pulling away from soil 3/99; COD unknown 4/99
209.10	7	0.59	170	2.40		0	2.70	2A	0	3.20	1	1	3.03	2	2	OK, discovered 5/96; orangish at base, OK 3/98, 5/98 & 3/99; maroonish, OK 4/99 & 2/00; light green with yellow splotches, OK 5/00; tag mia, replaced, plant purplish-green, OK 2/01; slightly misshapen, green, OK 5/01
209.20	7	2.32	181										1.15		0	discovered, green, good 4/99; dark green, OK 2/00; green, good 5/00, 2 & 5/01
210.00	7	4.87	174	2.40	2	0	3.40	2fr	1+1A	3.10	1	1	3.10	3fr	3	OK 3/96; measured in one direction only, under rock 3/97; measured in one direction only, OK 3/98, 5/98, 3/99; getting buried in ant mound, green, good 4/99; out of ant mound, green, OK 2 & 5/00; green, good 2 & 5/01
211.00	7	4.67	169	4.40	1+2fr	0	4.70	1A+4fr	3+2A	4.60	2	2	4.28	3fr	1+2A	OK 3/96; very purplish-gold, poor 3/98, 5/98, 3/99; goldish, OK 4/99; goldish-red, OK 2/00; orangish, OK 5/00; olive, OK 2 & 5/01
211.10	7	4.87	167													discovered under rock 5/00; one measurement only, green, good 5/00; just spines left, COD unknown 2/01
212.00	7	4.87	176				2.40	0	0	2.60	0	0	2.10	0	0	OK 3/98, 5/98 & 3/99; green, good 4/99 & 2/00; purplish green, OK 5/00, 2/01; yellowish-green, OK 5/01
212.10	7	3.49	178										1.12	0		0 loosely rooted on litter & soil, reddish green, OK 3/99, 4/99 & 2/00; olive, OK 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
212.20	7	4.23	181													discovered under rock 2/00; green, OK 2/00; grayish base, apically green, OK 5/00, 2 & 5/01
213.00	7	4.89	176	2.10	2	2	2.30	0	0	2.60	0	0	1.98	1	0	OK 3/96; measured in one direction only 3/97; OK 3/98, 5/98, 3/99; green, good 4/99; dark green, OK 2 & 5/00; purplish-green with some red tubercle tips 2/01; yellowish-green, OK 5/01
214.00	7	5.61	174	3.70	0	0	3.70	4fr	4	3.90	2	2	3.14	3fr	1	OK 3/96; tubercle tips maroon, OK 3/98, 5/98 & 3/99; tag mia, replaced 3/99; green, good 4/99; fungus?, dry, powdery, dead 2/00
215.00	7	5.38	160	3.30	1+1fr	2	4.30	3fr	3	4.20	2	2	Dead			OK 3/96; a little orangish 5/97; orangish & reddish, OK 3/98 & 5/98; solid, dry, corky inside; COD unknown 3/99
215.10	7	5.30	150							2.60	0	0	1.99	0	0	discovered 3/98, a few tubercle tips orangish 3/98 & 5/98; olive green, OK 3/98; green, good 4/99; dull green, some reddish tubercle tips, OK 2 & 5/00; partly covered in old ant litter, yellow-green, OK 2/01; green, good 5/01
215.20	7	5.50	152							1.00	0	0	0.97	0	0	discovered 3/98; good 3/98 & 5/98; good, totally buried 3/99; popping out, green, good 4/99, 2 & 5/00; green, OK 5/01
215.30	7	5.22	144							2.70	0	0	2.45	0	0	OK 3/98, 5/98, 3/99, 4/99, 2/00; dull green, OK 5/00; orangish-olive, poor 2/01; collected for weevil study, COD - rot 5/01
215.40	7	5.38	148													discovered 2/01; green, OK 2/01; green, good 5/01
216.00	7	5.31	164	2.70	0	0	3.20	1fr	1	Dead						OK 3/96; stem solid & dry, COD unknown 3/98
216.10	7	5.84	165							1.20	0	0	Dead			discovered 3/98; on left of pair 216.10 & 216.20; good 3/98; reddish, OK 5/98; spines loose, body solid 3/99, COD unknown

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
216.20	7	5.84	165							1.60	0	0	1.06	0	0	discovered 3/98; on right of pair 216.10 & 216.20; good 3/98; reddish, OK 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
216.30	7	6.52	170													discovered 2/01; green, good 2 & 5/01
216.40	7	6.17	168													discovered 2/01; green, good 2 & 5/01
217.00	7	1.79	128	2.80	1	1	3.40	2+1fr	3	3.60	3	3	3.99	2+1fr	2+1disp	good 3/96; a little reddish, OK 3/98 & 5/98; green, good 3/99, 4/99, 2 & 5/00, 2 & 5/01
218.00	7	1.33	159	2.30	0	0	2.30	0	0	2.10	0	0	1.93	0	0	OK 3/96, 3/98 & 5/98; poor, hunkering, maroon 3/99; green, good 4/99; maroonish, OK 2/00; hunkering, green, OK 5/00; body dry, powdery, COD unknown 2/01
219.00	7	1.82	121	3.00	1	1	3.30	2	2	2.90	1	0	2.95	0	0	OK 3/96, 3/98, 5/98, 3/99; green, good 4/99; very dark green, OK 2 & 5/00; green, good 2 & 5/01
220.00	7	2.17	121	3.20	0	0	3.30	2+1fr	3	Dead						OK 3/96; fungus inside 3/98
220.10	7	2.30	82				4.00	1+3fr	1A	4.50	3	3	4.48	0	0	good 3/98 & 5/98; a few brown tubercle tips, good 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
220.20	7	4.21	125				2.10		0	2.30	0	0	2.05	0		0 good, being covered by crustose lichen on one edge, pushing lichen away 5/97; popped out, OK 3/98 & 5/98; tag chewed, replaced, maroon, OK 3/99 & 4/99; olive green, OK 2/00; green, good 5/00; maroonish, OK 2 & 5/01
220.21	7	4.06	126				2.80		0	2.20	0	0	2.08	0		0 good 5/97; OK 3/98 & 5/98; poor, sunken, grayish 3/99; maroonish, OK 4/99; green, good 2 & 5/00; hunkered, green, OK 2/01; popped out, green, OK 5/01
220.30	7	4.57	125				2.40		0	2.60	0	0	2.11	0		0 OK 5/97; good 3/98, 5/98 & 3/99; tag loose 3/99; green, good 4/99, 2/00; maroonish, OK 5/00; green, OK 2 & 5/01
220.40	7	4.51	123				2.10		0	2.30	0	0	2.04	0		0 OK 5/97; purplish, OK 3/98, 5/98 & 3/99; tag loose 3/99; olive, OK 4/99; green, OK 2/00; elongating; green, OK 5/00, 2 & 5/01
220.50	7	4.37	120				1.70		0	Dead						old fire scars at base, OK 5/97; stem solid, COD unknown 3/98
221.00	7	1.21	128	2.90	0	0	2.90	1fr	1	3.00	0	0	2.74	0		0 OK 3/96; purplish 3/97; green with a few brown tubercles 5/97, 3/98; mostly red, OK 5/98; olive green, OK 3/99 & 4/99; very dark green, OK 2/00; slightly misshapen, green, OK 5/00; blue-green, good 2 & 5/01
221.10	7	0.86	~126	3.10		0	3.90	2fr	2	3.90	2	2	4.14	1		1 OK, discovered 5/96; a few tan tubercle tips, OK 3/98 & 5/98; slightly maroon, OK 3/99; maroon, OK 4/99; dark green, a few tan tubercle tips 2/00; green with a few tan tubercle tips, good 5/00; just spines left, COD unknown 2/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
222.00	7	1.10	115	2.20	1	0	3.10	2	2A	2.60	0	0	2.17	2		2 OK 3/96; partially buried, OK 3/98 & 5/98; maroon, OK 3/99; maroonish green, OK 4/99, 2/00; hunkering, green, OK 5/00; red, orange, and green tubercles swollen and bloated, about to pop, weird 2/01; one large chamber, COD Moneilema 5/01
223.00	7	1.22	115	1.50	0	0	1.90	1+1fr	2A	2.20	1	1	2.28	2		2 good 3/96, 3/98; withdrawing, OK 5/98; OK, maroon, edge of ant mound 3/99; green, good, ant mound gone 4/99; very dark green, OK 2 & 5/00; dark green good 2 & 5/01
224.00	7	0.96	100	3.20	2	2	3.50	3fr	1+2A	3.50	2	2	3.14	3		3 OK 3/96, 3/98, 5/98 & 3/99; OK, maroonish 4/99; edge of ant mound, tag mia, replaced, green, good 2 & 5/00; slightly maroonish-green, good 2 & 5/01
225.00	7	1.24	100	2.90	2	1	3.00	2fr	2	2.90	0	0	2.79	3		3 OK 3/96; partially buried, OK 3 & 5/98; slightly buried, green, good 3 & 4/99; dull green, OK 2 & 5/00; green, good 2 & 5/01
225.01	7	1.23	100	1.20	0	0	1.00	0	0	1.40	0	0	1.16	0		0 OK 3/96; buried 5/96; measured in one direction only 3/97 & 3/99; above ground 5/97; OK 3/98 & 5/98; buried, ~10 o'clock on 225, out of ground, OK 4/99; green, OK 2/00; almost buried, OK 5/00; popped out, green good 2 & 5/01
226.00	7	1.32	100	2.80	1	1	2.80	1+1fr	2	3.10	2	2	2.64	2	2+1A	good 3/96, 3/98, 5/98 & 3/99; light green, OK 4/99 & 2/00; green, good 5/00, 2 & 5/01
227.00	7	1.33	88	2.60	1	1	2.70	1fr	1	2.80	1	1	2.43	2		2 good 3/96; a little purplish, OK 3/98, 5/98 & 3/99; green, good 4/99; light green, a few tan tubercle tips, OK 2/00; getting misshapen, green, OK 5/00; green, good 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
228.00	7	5.25	111	1.80	0	0	1.70	0	0	1.50	0	0	mia			OK 3/96; old fire scars, yellowish, poor 3 & 5/97; almost buried, few spines, green, OK 3 & 5/98; 2mm seedling in area 3/99; mia 4/99; dry, powdery, fungus? 2/00
228.10	7	4.11	104				2.30		1	2.40	0	0	1.94	0	0	good, discovered 5/97; a little smashed by rock flipped on top, rock removed, green, OK 3/98, 5/98, 3/99; green, good 4/99, 2 & 5/00, 2/01 (accidently sat on) & 5/01
228.20	7	4.65	105				2.50		0	2.60	0	0	2.17	0	0	old fire scars at base, OK, discovered 5/97; good 3/98, 5/98 & 3/99; green, good 4/99 & 2/00; yellowish, OK 5/00; green apically, yellow at base OK 2 & 5/01
228.21	7	4.68	105				0.60		0	0.70	0	0	0.53	0	0	OK, discovered 5/97; root exposed on one side, plant OK 3/98; root not exposed, plant OK 5/98; hunkered, OK 3/99; popping out, green, OK 4/99, 2 & 5/00; spineless, blue-green, poor 2/01; new spine growth, green, OK 5/01
228.22	7	4.68	109													discovered 2/00; hunkered 2/00; green, OK 5/00; popped out, blue-green, OK 2 & 5/01
228.24	7	4.90	105													discovered 2/01; green, OK 2/01; green, good 5/01
228.30	7	4.86	105				1.40		0	1.40	0	0	1.28	0	0	slightly buried in juniper needles, good, discovered 5/97; popping out, good 3/98 & 5/98; pulling back in, OK 3/99; green, good 4/99, 2 & 5/00; red, orange, and green, OK 2/01; COD root rot 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
229.00	7	5.25	112	1.30	0	0	1.40	0	0	1.20	0	0	0.84	0	0	OK 3/96; almost buried 5/96 & 3/97; coming out 5/97; almost buried, OK 3/98 & 5/98; buried, OK 3/99; popping out, OK 4/99; buried, OK 2/00; hunkered, green, OK 5/00; buried, green, OK 2 & 5/01
230.00	7	6.66	104	3.00	0	0	2.60	0	0	2.60	0	Dead				good 3/96; tubercle tips yellow 3/97; poor, new growth 5/97; OK 3/98; red & mushy inside, COD unknown 5/98
231.00	7	5.91	101	2.50	0	0	3.00	0	0	2.90	0	0	1.83	0	0	good 3/96; almost buried in juniper litter 5/96, 3/97, 5/97, 3/98, 5/98; 3/99, 4/99, 2/00; almost buried in juniper litter, green; OK 5/00, 2/01; COD root rot 5/01
232.00	7	5.85	101	2.80	0	0	2.80	0	0	2.60	0	0	1.95	0	Removed; dead	good 3/96; OK 3/98 & 5/98; poor, gray, loose 3/99; almost buried in juniper litter 4/99; dead, removed by WHC 5/6/99, COD unknown, no evidence of weevils
233.00	7	5.32	101	2.40	0	0	2.60	0	0	2.50	0	0	2.40	0	0	old fire scars, reddish, poor 3/96; red, spines gray 3/97 & 5/97; red, OK 3/98 & 5/98; poor, inaroon, gray spines 3/99; goldish, OK 4/99; solid, dry, hard as a rock, COD unknown 2/00
234.00	7	5.27	101	2.00	0	0	Dead									old fire scars 3/96; dead 5/96; COD unknown
234.10	7	3.60	95				4.20	1+2fr	3	3.80	0	1	3.58	0	0	"floating" in little bluestem clump, good 3/97, 5/97, 3 & 5/98, 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
234.20	7	3.00	108				3.30	1	1	3.70	1	1+1A	3.69	0	0	good 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
234.30	7	3.01	108				3.70	1	1	3.80	0	0	3.90	0	0	good 3/98, 5/98, 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
234.40	7	3.97	100													discovered 2/01; green, OK 2/01; tag loose, green, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
235.00	7	5.28	104	0.60	0	0	0.90	0	0	mia			mia			OK 3/96; mia 3/98, 5/98, 3/99, 4/99, 2 & 5/00; dead plant uprooted next to tag; dry powdery inside, COD unknown 2/01
235.10	7	4.73	105				1.10		0	1.30	0	0	0.81	0		0 good, discovered 5/97; getting covered by crustose lichen, OK 3/98 & 5/98; buried by lichen, OK 3/99; popping out, green, good 4/99, 2 & 5/00, 2 & 5/01
236.00	7	5.05	100	2.90	0	0	2.80	0	0	2.80	0	0	2.14	0		0 OK 3/96, 3/98 & 5/98; hunkered, OK 3/99; back out, olive, OK 4/99; green, good 2/00; green, OK 5/00, 2 & 5/01
236.10	7	5.13	~104	1.20		0	1.50	0	0	1.20	0	0	1.16	0		0 OK, discovered 5/96; buried 3/97; coming out 5/97; covered by flipped rock, rock removed, good 3/98; OK 5/98; buried in juniper litter, OK 3/99 & 4/99; green, OK 2/00; coming out, green, good 5/00; almost buried in juniper litter, green, OK 2 & 5/01
237.00	7	3.87	84	3.10	2	2	3.50	1+1fr	2	3.70	2	2	3.60	3	2+1A	OK 3/96; good 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00; floweres partly eaten, one tubercle damaged, ants swarming, green, good 2/01; green, good 5/01
238.00	7	3.96	79	2.80	1	0	3.30	3	3	2.90	1	1	2.82	2		2 good 3/96; a few reddish tubercles, good 3/98; OK 5/98 & 3/99; green, good 4/99; solid, dry, COD unknown 2/00
239.00	7	2.96	86	3.90	2	2	4.30	4fr	2+2A	4.70	3	3	4.52	3+1fr		3 good 3/96, 3/98, 5/98 & 3/99; green, good 4/99, 2/00; a few tan tubercle tips, otherwise green, good 5/00; small chunk eaten out, green, good 2/01; green, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
240.00	7	3.47	82	4.60	2	2	4.70	4fr	3+1A	4.50	2	2	3.44	1+2fr	3	OK 3/96; good 5/97; a little reddish, OK 3/98 & 5/98; green, good 4/99, 2 & 5/00, 2 & 5/01
241.00	7	1.09	82	2.20	0	0	2.50	1fr	1	2.70	1	1	1.56	0	0	good 3/96; getting a little reddish, OK 5/97, 3/98; pulling into soil, OK 5/98 & 3/99; green, good 4/99; slightly buried, green, OK 2 & 5/00; out, purplish-green, good 2/01; green, OK 5/01
242.00	7	1.00	69	3.30	1	1	4.30	4fr	3+1A	4.00	3	1+2A	3.47	3fr	3	good 3/96; getting orange tips on tubercles, OK 5/97, 3/98; smashed, OK 5/98; OK, purplish 3/99; goldish 4/99; probably dead 2/00; looks like just spines, Dead? 5/00; just spines left, COD trampling 2/01
243.00	7	0.98	69	2.20	1	0	2.60	3fr	1	3.10	1	1A	2.90	3fr	2	good 3/96; getting orange tips on tubercles, OK 5/97, 3/98; smashed, OK 5/98; OK, purplish 3/99; some orange tubercle tips, OK 4/99 & 2/00; covered with ant litter, probably dead 5/00; tag and plant mia 2 & 5/01
244.00	7	0.97	64	2.30	1	0	2.90	1fr	1A	2.90	0	0	2.54	1fr	1	OK 3/96, 3/98, 5/98, 3/99; some tan tubercle tips, OK 4/99 & 2/00; pale green, OK 5/00; green, good 2 & 5/01
245.00	7	1.35	68	3.80	2	1	4.10	4fr	4	4.10	3	3	3.58	1+4fr	5	OK 3/96; good 3/98; OK 5/98; good 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
245.01	7	1.31	65													not tagged, in front of 245 tag, discovered 5/01; green, good 5/01
246.00	7	2.25	68	2.30	0	0	3.10	1fr	1	mia			mia			good 3/96; mia 3/98 & 5/98; a few old spine clusters in vicinity 3/99; no trace 4/99, 2 & 5/00
247.00	7	2.27	68	3.20	1+1fr	2	3.70	3fr	3	Dead						old fire scars, good 3/96; fungus inside 3/98

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
248.00	7	2.93	66	2.60	1+1fr	2	3.10	3fr	2	3.30	2	1	2.45	2fr	2	OK 3/96, 3/98 & 5/98; hunkered, tag pulled off nail, digging in vicinity, OK 3/99; a few orange tubercle tips, OK 4/99; green, good 2 & 5/00, 2 & 5/01
248.10	7	3.15	73				2.00	0	0	1.90	0	0	1.30	0	0	OK 3/98, 5/98 & 3/99; hunkered, maroonish 4/99; hunkered, green, OK 2 & 5/00; maroonish-green, OK 2 & 5/01
248.20	7	2.58	80							1.70	0	0	1.11	0	0	discovered 3/98; good 3/98 & 5/98; totally buried, poor 3/99; coming out, green, good 4/99, 2/00; hunkering, green, OK 5/00; coming out, green, OK 2/01; green, good 5/01
248.30	7	2.10	75							5.70	6	5+1A	6.27	7	7	discovered 3/98; great 3/98, 5/98, 3 & 4/99; tag mia, replaced 2/00; great, green 2 & 5/00, 2 & 5/01
249.00	7	3.15	65	3.00	0	0	3.50	3fr	2+1A	3.70	2	2	3.36	2fr	2	OK 3/96; blackish-green, good 5/97; tag moved, replaced, purplish, OK 3/98; yellow tubercle tips, OK 5/98; very purple, OK 3/99; orangish 4/99; purplish, OK 2/00; orangish, OK 5/00; blue-green, OK 2/01; reddish-green, OK 5/01
249.10	7	3.22	67													discovered 2/01; green, OK 2 & 5/01
250.00	7	3.02	63	1.60	0	0	2.00	1fr	1	2.00	0	0	1.59	0	0	OK 3/96, 3/98 & 5/98, 3/99; olive, OK 4/99; purplish, OK 2/00; dull green, OK 5/00; green OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
251.00	7	3.01	63	2.90	0	0	3.60	2fr	2	3.60	0	0	3.02	1fr		1 reddish 3/96; greening up, OK 5/96; maroon 3/97; getting orangish 5/97; maroon, OK 3/98, 5/98 & 3/99; green with few orange tubercle tips 4/99; purplish, OK 2/00; yellowish-purplish- green, OK 5/00; purplish-green, good 2 & 5/01
252.00	7	2.99	56	2.20	0	0	2.70	3fr	3	Dead						good 3/96; old fire scars; light green, OK 5/97; only a few spines left, COD unknown 3/98
253.00	7	3.49	73	2.50	0	0	3.00	2fr	2	3.00	1	1	2.99	1+1fr		2 OK 3/96; a few red tubercle tips, OK 3/98 & 5/98; goldish, OK 3/99 & 4/99; dull green with a few tan tubercle tips, OK 2 & 5/00; green, good 2 & 5/01
253.01	7	3.51	73	1.30	0	0	1.80	0	0	1.70	0	0	1.90	0		0 old fire scars, OK 3/96; originally tagged as 355; OK 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
254.00	7	3.64	66	2.10	0	0	2.60	0	0	2.70	0	0	2.43	0		0 good, dead plant nearby 3/96, 3 & 5/97; dead plant gone, live plant looks good 3/98; OK 5/98; green, good 3/99, 4/99, 2 & 5/00, 2 & 5/01
255.00	7	3.72	67	2.40	0	0	2.90	0	0	3.00	1	1	2.66	0		0 good 3/96 & 3/98; good, edge of fire ant mound 3/99; mound gone, plant green, good 4/99; slightly reddish, good 2/00; green, good 5/00; slightly purplish, good 2 & 5/01
256.00	7	3.80	67	2.00	0	0	1.80	0	0	2.10	0	0	1.65	0		0 OK 3/96; sort of buried, good 5/97, 3/98; OK 5/98; good, buried in edge of fire ant mound 3/99; on left, mostly out, green, good 4/99, 2 & 5/00, 2 & 5/01
256.01	7	3.83	69													discovered 2/00; green, good 2 & 5/00; partly buried, green, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
257.00	7	3.80	67	2.30	0	0	2.60	0	0	2.30	0	0	2.26	0	0	OK 3/96, 3/98; good 5/98; good, buried in edge of fire ant mound, tag mia, replaced, small 2mm seedling between 256 and 257 tags 3/99; seedling mia, mostly out, on right, green, good 4/99; pale green, OK 2/00; green, good 5/00, 2 & 5/01
258.00	7	3.75	62	3.70	0	0	3.70	2fr	2	3.90	0	0	3.23	0	0	OK 3/96; red tips 3 & 5/97, 3/98 & 5/98; OK 3/99; goldish at base, OK 4/99; green, good 2 & 5/00, 2 & 5/01
259.00	7	3.52	46	2.40	1	0	2.70	0	0	2.60	0	0	2.22	2fr	2	OK 3/96; getting dull reddish 5/97; reddish tubercle tips, OK 3/98 & 5/98; almost buried, OK 3/99; coming out, olive, OK 4/99 & 2/00; green with a few orangish tubercle tips, OK 5/00; green, good 2 & 5/01
260.00	7	3.87	45	2.30	0	0	2.90	2fr	2	2.90	2	2	3.08	0	0	good 3/96; a few orangish tubercle tips, OK 3/98 & 5/98; almost buried in soil & litter, OK 3/99; popped out, green, good 4/99, 2 & 5/00; yellowish green, OK 2/01; green with some reddish tubercle tips, OK 5/01
261.00	7	3.73	44	2.80	2	2	2.90	3fr	3	3.20	2	2	2.70	2fr	2	reddish 3/96; turning green, OK 5/96; reddish-green 3 & 5/97; reddish, flowers & one tubercle tip stepped on (deer or dogs?), poor 3/98 & 5/98; puplish green, in ant bed, OK 3/99; out of ant mound, maroonish, OK 4/99 & 2/00; orangish basally, green above, OK 5/00; purplish-green, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
262.00	7	3.60	40	2.10	1	1	2.40	1fr	1	2.70	0	0	2.17	0	0	reddish, OK 5/96; light green 5/97; a few reddish tubercle tips, OK 3/98 & 5/98; green, good, almost buried in ant bed 3/99; ant bed gone, popped out, green, good 4/99; green with some tan tubercles, OK 2 & 5/00; green, good 2/01; partly covered with ant dirt, green, good 5/01
263.00	7	4.78	41	3.30	2	2	3.90	1	1	4.20	1	1	4.04	0	0	good 3/96; shaded, good 5/97, 3/98 & 5/98; OK, almost buried, only spines above soil 3/99; coming out, green, good 4/99, 2 & 5/00, 2 & 5/01
264.00	7	4.39	42	3.40	1+1fr	1	3.70	1	1	3.60	2	2	3.59	2fr	1+1A	OK 3/96, 3/98, 5/98 & 3/99; olive, OK 4/99; green, good 2 & 5/00, 2 & 5/01
265.00	7	4.51	41	4.00	0	0	4.40	2fr	2	3.90	0	0	3.54	1fr	1	OK 3/96, 3/98, 5/98, 3/99; olive, OK 4/99; green, good 2 & 5/00, 2/01; getting misshapen, green, good 5/01
265.10	7	4.19	33				1.60	0	0	1.50	0	0	1.79	0	0	good 5/97, 3/98; almost buried 5/98; almost buried, good 3/99; popping out, green 4/99; popping out, green, good 2/00; hunkering, green, good 5/00; green, OK 5/01
265.20	7	4.41	31				2.00	0	0	1.70	0	0	1.73	0	0	good 5/97, 3/98; getting buried, good 5/98, 3/99; green, good 4/99; getting buried, green, good 2 & 5/00, 2 & 5/01
266.00	7	3.05	44	2.20	1	1	3.10	2fr	2	3.60	1	1	3.75	4fr	4	good 3/96; getting a few orange tubercles, OK 5/97; good 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
267.00	7	3.30	44	2.60	1	1	3.10	3fr	3	3.30	2	2	2.18	0	0	OK 3/96, 3/98 & 5/98; olive green, OK 3/99 & 4/99; green, good 2 & 5/00, 2/01; covered with deer shit, green, good 5/01
268.00	7	3.31	44	2.00	0	0	2.70	2fr	2	2.90	2	2	1.97	0	0	OK 3/96; good 3/98 & 5/98; olive green, OK 3/99 & 4/99; green, good 2 & 5/00, 2/01; getting covered with ant dirt, green, good 5/01
269.00	7	2.97	48	2.40	0	0	mia	mia	Dead							OK 3/96; COD unknown, loose spine clusters in vicinity, tag removed 5/97
270.00	7	3.18	40	1.60	0	0	2.20	1fr	1	2.70	1	1	1.98	2fr	2	good 3/96, 3/98, 5/98; measured in one direction only, good 3/99; green, good 4/99; pale green, OK 2/00; green with some orange tubercle tips, OK 5/00, 2 & 5/01
271.00	7	3.28	38	3.10	0	0	3.20	2fr	2	3.10	2	1+1A	2.92	1fr	1	OK 3/96, 3/98, 5/98 & 3/99; olive, OK 4/99; pale green, OK 2/00; green with some orange tubercle tips; OK 5/00; dry, powdery inside, COD unknown 2/01
272.00	7	3.26	38	2.00	0	0	2.60	1fr	1	2.30	0	0	1.99	0	0	OK 3/96, 3/98, 5/98 & 3/99; OK, maroonish 4/99 & 2/00; olive, OK 5/00; purplish-green, OK 2 & 5/01
273.00	7	3.45	35	1.70	0	0	2.50	1fr	1	2.70	2	2	2.40	0	0	good 3/96; getting a little orangish 5/97; good & green 3/98 & 5/98; buried in ant mound & grass clump, OK 3/99; coming out, green, good 4/99, 2 & 5/00, 2 & 5/01
273.10	7	3.73	32				4.40	5fr+1A	5	4.40	4	3+1A	3.89	4fr	4	purplish, OK 3/98, 5/98, 3/99, 4/99, 2/00; orangish, OK 5/00; maroonish-green good 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
273.11	7	3.65	37													discovered 5/01; green, good 5/01
273.12	7	3.83	32													discovered 5/01; green, good 5/01
274.00	7	3.39	33	1.90	0	0	2.40	0	0	2.50	0	0	2.31	1fr		1 OK 3/96; good 5/97, 3/98, 5/98; OK, 3/99; hunkered, green 4/99; hunkered, green, good 2 & 5/00; flowers partly eaten, plant green with some tan tubercle tips, OK 2 & 5/01
274.10	7	3.36	32				1.20	0	0	1.60	0	0	1.43	0	mia	OK 5/97; good 3/98 & 5/98; practically buried, OK 3/99; tag and plant gone without a trace 4/99, 2 & 5/00; plant slightly covered with ant gravel, green, OK 2 & 5/01
275.00	7	5.27	39	2.40	0	0	2.20	0	0	2.40	0	0	2.83	0		0 good 3/96; shaded, dull green, OK 5/97; good 3/98, 5/98 & 3/99; olive, OK 4/99; green, OK 2/00; getting buried in juniper needles, green, OK 5/00; new apex coming out, green, OK 2 & 5/01
276.00	7	4.96	36	1.70	0	0	1.70	0	0	2.00	0	0	1.62	0	0/dead	OK 3/96, 3/98, 5/98, 3/99; olive, OK 4/99; poor, shrunken, missing spines, orangish at base, removed by WHC 5/6/99; no weevil damage, COD unknown
276.01	7	4.96	36	1.30	0	0	1.20	0	0	1.20	0	0	1.06	0	0/dead	OK 3/96; almost buried, OK 5/97, 3/98, 5/98, 3/99 & 4/99; removed at same time as 276.00 by WHC 5/6/99; no weevil damage, COD unknown
276.02	7	5.11	35							1.40		0	1.17	0		0 discovered 5/98, good; OK, almost buried 3/99; coming out, maroonish, OK 4/99; green, OK 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
277.00	7	5.03	34	2.80	1	0	3.40	3fr	3	3.40	0	0	2.86	0	0	0 good 3/96, 3/98 & 5/98; OK, hunkered 3/99; popped out, green, good 4/99, 2 & 5/00, 2/01; green with red spots, OK 5/01
278.00	7	5.01	30	2.90	1	1	3.40	1fr	1A	3.10	0	0	2.19	0	0	0 good 3/96; shaded, good 5/97; partially buried, good 3/98; OK 5/98, 3 & 4/99; green, good, partially buried 2 & 5/00, 2 & 5/01
278.10	7	5.31	31				1.90	0	0	1.70	0	0	1.48	0	0	0 OK 5/97; almost buried, OK 3/98, 5/98 & 3/99; coming out, green, good 4/99; almost buried, green, OK 2 & 5/00, 2 & 5/01
278.20	7	5.44	31							1.00		0	1.03	0	0	0 discovered 5/98, buried, good 5/98 & 3/99; totally buried in juniper litter, green, OK 4/99 & 2/00; almost totally buried, green, OK 5/00; plant mia 2 & 5/01
279.00	7	3.86	28	1.00	0	0	1.70	0	0	1.90	0	0	1.52	0	0	0 OK 3/96; good 5/97, 3/98; partially buried, OK 5/98 & 3/99; popped out, green, good 4/99, 2 & 5/00; partly buried, green, OK 2 & 5/01
280.00	7	4.17	28	1.90	0	0	2.00	0	0	2.10	0	0	2.24	0	0	0 in fire ant mound 3/96 & 5/97; OK 5/96; good 5/97; totally covered by fire ant mound, tag mia, replaced, good 3/98, 5/98 & 3/99; coming out green, good 4/99, 2 & 5/00, 2 & 5/01
281.00	7	5.00	20	2.20	0	0	2.10	0	0	2.20	0	0	1.87	0	0	0 OK 3/96; almost buried, OK 3/98; coming out, OK 5/98; under edge of rock, OK 3/99; green, good 4/99; mia 2/00; totally buried, only spines visible, may be dead, no diameter taken, poor 5/00; plant mia 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
282.00	7	5.19	21	2.20	0	0	1.70	0	0	2.40	0	0	1.71	0		mia good 3/96; buried 3/97; almost buried, OK 5/97, 3/98; buried 5/98 & 3/99; gone without a trace 4/99, 2 & 5/00, 2 & 5/01
282.10	7	7.73	11							2.50	0	0	1.62	0		0 in rock crack, almost buried in juniper needles, OK 3/98, 5/98, 3/99, 4/99, 2 & 5/00; only spines showing, green, OK 2/01; coming out, green, OK 5/01
282.20	7	7.69	10													discovered 5/00; almost buried in juniper litter, green, OK 5/00; only spines showing, green, OK 2/01; buried, green, OK 5/01
283.00	7	4.98	20	2.30	0	0	2.70	0	0	2.40	0	0	1.57	0		0 good 3/96; completely beneath rock 3/97; very pale green, OK 5/97, 3/98 & 5/98; almost buried, OK 3/99; coming out, olive 4/99; green, OK 2 & 5/00; buried, green, OK 2 & 5/01
284.00	7	4.67	21	2.10	0	0	2.00	0	0	Dead						poor, shriveling 5/96; old fire scars at base, shrunk & very bad 3 & 5/97; fungus inside 3/98
285.00	7	4.61	21	2.10	0	0	3.00	0	0	2.90	0	0	2.19	0		0 OK 3/96, 3 & 5/98; almost buried, OK 3/99; coming out, OK 4/99; tag mia, replaced 2/00; partially buried, green, OK 2 & 5/00; only spines showing, yellow-green, OK 2/01; coming out, green, OK 5/01
286.00	7	4.49	20	2.90	0	0	3.10	0	0	3.20	0	0	2.48	0		0 OK 3/96; getting buried 5/97, 3/98, 5/98; getting buried, OK 3/99; getting buried, green, good 4/99, 2 & 5/00; partly buried, olive, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
287.00	7	4.01	24	2.00	0	0	2.30	1A	0	2.30	0	0	2.16	0	0	good 3/96, 3/98 & 5/98; measured in one direction only, OK 3/99; green, good 4/99; pale green, OK, 2/00; almost buried in litter, green, OK 5/00; coming out, yellowish-green, OK 2/01; covered by dirt and litter 5/01
288.00	7	4.04	24	2.00	0	0	2.60	0	0	2.70	1	1	2.12	0	0	OK 3/96, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2/01; mostly covered by juniper litter, green, OK 5/01
289.00	7	2.78	18	2.90	3	3	3.30	3fr+1A	3	3.40	3	2+1A	2.92	3fr	1	good 3/96; tag removed or lost in ant mound, replaced, a few orange tubercle tips, OK 3/98 & 5/98; tag mia, replaced, green, good 3/99, 4/99, 2 & 5/00; flowers partly eaten, green, good 2 & 5/01
289.10	7	3.20	18				1.70	0	0	2.10	1	1	2.11	0	0	good 5/97, 3/98; getting buried, good 5/98, 3/99; good, green, getting buried 4/99, 2 & 5/00; partly covered with ant gravel, OK 2/01; out, green, OK 5/01
290.00	7	2.99	33	1.00	0	0	1.20	0	0	1.30	0	0	1.49	0	0	OK 3/96; good 3/98 & 5/98; buried, misshapen, OK 3/99; almost buried, green, OK 4/99; coming out, green, good 2 & 5/00, 2/01; almost spineless, green, OK 5/01
291.00	7	1.96	28	2.40	1	1	3.20	3fr	3	3.20	2	2A	2.86	3fr	3	OK 3/96; reddish 3 & 5/97, 3/98 & 5/98; poor, pulling into soil, shrinking, yellow-green 3/99; popping out, yellowish, OK 4/99; olive, OK 2/00; green, good 5/00; green with purplish and reddish tubercle tips, OK 2/01; green with a few yellow tubercle tips, good 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
292.00	7	2.07	29	2.20	2	1	3.20	1A+1fr	1+1A	3.10	1	1	2.34	2fr	1	good 3/96, 3/98; OK 5/98; green, good 3/99, 4/99, 2 & 5/00, 2 & 5/01
293.00	7	2.08	29	1.70	0	0	2.70	2fr	2	2.50	1	1	2.70	2fr	1	good 3/96, 3/98; OK 5/98, & 3/99; olive, OK 4/99; green with a few tan tubercle tips, OK 2 & 5/00; flower partly eaten, plant green, good 2 & 5/01
293.10	7	2.16	42							4.20	3	3	4.04	3	4	great, discovered 3/98; grayish, poor 5/98; green, great 3/99, 4/99, 2 & 5/00; flowers partly eaten, plant green, good 2 & 5/01
293.11	7	1.94	50													discovered 5/01; green, OK 5/01
293.20	7	2.31	33													discovered 5/00; green, OK 5/00, 2/01; green, good 5/01
293.30	7	2.59	34													discovered 5/00; green, good 5/00, 2 & 5/01
293.40	7	2.65	33													discovered 5/00; green, good 5/00, 2 & 5/01
293.50	7	2.66	34													right of 293.60; discovered 5/00; green, good 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
293.60	7	2.67	35													left of 293.50; discovered 5/00, OK 5/00, 2 & 5/01
293.70	7	2.96	37													discovered 2/01; green, good 2 & 5/01
294.00	7	0.82	2	2.70	1+1fr	1	3.40	2fr	2	3.30	2	2	3.27	3fr	1+2A	reddish, OK 3/96 & 5/97, 3/98, 5/98 & 3/99; green, good 4/99; slightly reddish, OK 2/00; olive green, OK 5/00; green, good 2 & 5/01
294.01	7	1.17	7													discovered 5/01; green, good 5/01
294.10	7	1.12	-26	1.20		0	1.60	0	0	2.30	2	2	2.12	2fr	1	discovered 5/96, good, 3/98, 5/98 & 3/99; goldish at base, OK 4/99, green, good 2 & 5/00; two flowers partly eaten, plant green with gold tubercle tips, OK 2 & 5/01
294.20	7	2.00	7				1.20		0	1.50	0	0	1.52	0	0	good, discovered 5/97; measured in one direction only, good 3/98; OK 5/98; maroon, OK 3/99; dull green, OK 4/99; green with slightly purple tubercle tips, OK 2/00; pale green, OK 5/00; purplish green, good 2 & 5/01
294.30	7	1.86	9							2.00	1	0	1.92	1fr	0	discovered 3/98, originally tagged as 294.1, retagged, good 5/98 & 3/99; green, good 4/99, 2/00; dull green, OK 5/00; green, good 2 & 5/01
295.00	7	3.61	343	2.30	0	0	3.00	2fr	2	2.80	0	0	2.37	0	0	good 3/96; dull green, OK 3/98, 5/98, 3/99, 4/99, 2/00; green, good 5/00; getting buried in juniper litter, green, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
296.00	7	3.19	336	2.30	0	0	2.80	nd	1	2.90	0	0	1.73	0	0	OK 3/96; totally shaded by grass, OK 3/98; 5/98 & 3/99; grass dying, popping out; dull green, OK 4/99; body solid, COD unknown 2/00
296.10	7	3.19	356				2.70	2fr	1	2.90	1	1	2.46	0	0	good 3/98, 5/98 & 3/99; good, green 4/99, 2 & 5/00; pale green, OK 2/01; partly covered by juniper litter, green, OK 5/01
296.20	7	2.60	7													discovered 2/00; green, good 2 & 5/00, 2 & 5/01
297.00	7	3.12	321	2.10	0	0	2.60	0	0	2.30	1	1A	1.60	0	0	OK 3/96; good 5/97, 3/98; OK 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
298.00	7	2.24	299	3.60	1	0	3.90	3A+1fr	1A	4.60	3	1+2A	Dead			OK 3/96; under rock 3/97, 3/98 & 5/98; solid, dry, COD unknown 3/99
298.10	7	1.92	283				3.10		3	3.10	1	1	3.44	2fr	2	a little yellowish, OK, discovered 5/97; tag mia, replaced, plant purplish, OK 3/98 & 5/98; goldish, OK 3/99; body green, orangish tubercle tips, OK 4/99; slightly purple, OK 2/00; green with some orange tubercle tips, OK 5/00; just spines left; COD unknown 2/01
299.00	7	4.23	261	2.20	1	1	2.70	2fr	2	2.90	1	1	2.78	1fr	1	OK 3/96, 3/98, 5/98 & 3/99; dull green at base, OK 4/99; edge of ant bed, green, good 2 & 5/00; flower peaking out of ant gravel, plant covered, green, OK 2/01; ant gravel almost gone, apex sunken, plant green, OK 5/01
299.10	7	4.21	~266	1.70	na	0	2.00	1fr	1	1.70	0	0	1.60	0	0	discovered 5/96, old fire scars, good; dull green, OK 5/97, 3/98, 5/98, 3/99, 4/99; green, good 2 & 5/00; only spines showing thru ant gravel 2/01; ant gravel almost gone, apex shifted and sunken, plant green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
299.20	7	3.91	253										2.30			0 discovered 5/99; green, good 5/99; pale green, OK 2/00; olive, OK 5/00; covered with ant gravel, green, OK 2/01; uncovered, apex sunken but with new growth, tubercles reddish, OK 5/01
299.30	7	3.75	249													discovered 2/00; green, good 2/00; olive, OK 5/00, 2/01; misshapen, olive, OK 5/01
300.00	7	0.40	265	3.60	4	0	5.10	1+5fr	5	5.00	5	5	5.26	2		2 smashed 3/96; good 5/96, 3 & 5/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00; flowers partly eaten, plant green, good 2/01; covered with ant dirt, green, OK 5/01
301.00	7	3.52	211	3.70	4	4	4.40	3fr	1+2A	4.20	2	2	3.78	0		0 good 3/96, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2/01; mostly covered with ant gravel, green OK 5/01
302.00	7	3.13	204	2.50	0	0	3.30	1+1fr	1+1A	3.40	2	2	2.10	0	Dead	to the left of 303; OK 3/96; purplish, OK 3/98, 5/98 & 3/99; dead 4/99; removed by WHC 5/6/99; no weevil damage, COD unknown
302.10	7	1.94	236							3.70	3	3	3.19	3fr		2 discovered 3/98; OK 5/98 & 3/99; green, good 4/99, 2 & 5/00; one flower eaten, plant green, good 2 & 5/01
303.00	7	3.13	204	2.20	0	0	2.60	0	0	2.60	0	0	1.44	0	Dead	to the right of 302; OK 3/96; purplish, OK 3/98, 5/98 & 3/99; Dead 4/99; removed by WHC 5/6/99; no weevil damage, COD unknown
303.10	7	2.02	205										2.87			0 discovered 4/99; green, good 4/99, 2 & 5/00, 2 & 5/01
304.00	7	9.00	220	2.40	0	0	2.30	1fr	1A	2.30	0	0	Dead			OK 3/96, 3/98 & 5/98; hard, dry, solid, COD unknown 3/99

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
304.10	7	9.34	251	2.10		0	2.60	1fr	1	2.50	0	0	2.52	0		1 discovered 5/96, good, 3/98, 5/98, & 3/99; green, good 4/99; reddish green, OK 2/00; green, OK 5/00; olive, OK 2 & 5/01
304.20	7	9.55	247	2.50		1	3.10	1fr	1A	3.00	1	1A	2.84	0		0 discovered 5/96, old fire scar at base, good; purplish, OK 3/98 & 5/98; dull green, OK 3/99 & 4/99; yellowish-green with some red tubercle tips, poor 2/00; purplish, OK 5/00; light olive, OK 2 & 5/01
304.30	7	8.95	~248	2.80		0	2.80	0	0	2.70	0	0	2.60	0		0 discovered 5/96; poor, shriveling; very bad 3/97; old fire scars, OK 5/97, 3/98 & 5/98; poor 3/99; OK, new green growth 4/99; a little new growth, otherwise gray, poor 2 & 5/00; gray, poor 2 & 5/01
305.00	7	8.44	279	2.50	0	0	Dead									good 3/96; dead, 3/97, COD unknown
305.01	7	8.53	282				1.30		0	mia			mia			edge of fire ant mound, good 5/97; no mound, no plant 3/98, 5/98, 3/99, 4/99, 2 & 5/00
306.00	7	8.36	280	2.80	1	0	2.90	1	0	3.00	2	2	2.68	0		0 OK 3/96; becoming ayssmetrical 5/97, 5/98; OK 3/99 & 4/99; reddish green, OK 2 & 5/00; partly eaten, green, OK 2/01; green, good 5/01
306.10	7	3.52	280	1.30		0	mia			mia			mia			discovered 5/96, OK; originally tagged as 360; plant & tag mia 3/97, 5/97, 3/98, 5/98, 3/99 & 4/99
306.20	7	8.25	~276	2.70		0	3.30	1+2fr	3	3.40	0	0	3.71	0		0 discovered 5/96, good, 3/98, 5/98, & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
307.00	7	8.50	283	2.80	0	0	Dead									reddish, poor 3/96; COD unknown, just spines left, tag removed 3/97

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
308.00	7	9.42	286	3.60	1	2	4.00	4fr	4	3.50	1	1	3.50	0	0	reddish, poor 3/96; reddish, OK 5/97, 3/98; orange, sinking in the center, poor 5/98; olive green with a few orange tubercles, OK 3/99; orange, OK 4/99, 2 & 5/00; olive with pale red tubercles, OK 2/01; green with reddish tubercles, OK 5/01
309.00	7	8.61	282	2.50	0	0	2.90	1fr	1	Dead						good 3/96; dead, fungus inside 3/98
310.00	7	11.70	293	2.10	0	0	mia			2.60	1	1	2.21	0	0	through juniper; good 3/96; plant & tag mia 3 & 5/97; relocated, good 3/98; OK 5/98; green, good 3/99 & 4/99; pale green with a few gold and red tubercle tips, OK 2/00; olive, OK 5/00; green, good 2 & 5/01
311.00	7	9.55	262	2.60	0	0	2.40	0	0	2.40	0	0	1.88	0	0	OK 3/96, 3/98 & 5/98; poor, almost buried 3/99; coming out, green, OK 4/99 & 2/00; purplish, OK 5/00; green, OK 2 & 5/01
311.10	7	10.80	267				2.80	0	0	2.80	0	0	2.85	0	0	good 3/98, 5/98 & 3/99; green, good 4/99; olive, OK 2 & 5/00; pale green, OK 2/01; green, OK 5/01
312.00	7	11.92	276	2.70	0	0	3.30	0	0	2.70	0	0	2.79	0	0	OK 3/96; shaded in the afternoon; reddish, poor 3/98 & 5/98; goldish, OK 3/99 & 4/99; reddish-yellowish green, OK 2/00; maroonish, OK 5/00; green with maroonish tubercle tips, OK 2/01; maroonish, OK 5/01
313.00	7	7.09	305	2.70	0	0	3.20	0	0	2.90	0	0	2.52	0	0	OK 3/96, 3/98; grayish, poor 5/98 & 3/99; green, OK 4/99; green, good 2 & 5/00, 2 & 5/01
314.00	7	7.12	305	2.50	0	0	2.90	0	0	2.70	0	0	2.48	0	0	OK 3/96; grayish, poor 3/97, 5/97 & 3/99; green, few orange tubercle tips, OK 4/99; green, OK 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
315.00	7	9.93	304	3.10	1	1	3.30	3fr	3	3.00	0	0	Dead			reddish, OK 3/96, 3 & 5/97; reddish, poor 3/98; OK 5/98; solid, dry, COD unknown 3/99
316.00	7	10.06	306	2.70		1	4.20	4fr	4	4.40	3	3	3.63	0	0	discovered 5/96; good 5/96 & 5/97, 3/98; OK 5/98; green, good 3/99 & 4/99, 2 & 5/00; partly covered with ant dirt, green, good 2 & 5/01
316.01	7	9.98	306	1.40	0	0	2.00	0	0	2.20	0	0	2.34	0	0	good 3/96, 3/98; OK 5/98 & 3/99; green, good 4/99, 2 & 5/00; partly covered with ant dirt, green, good 2/01; out, green, OK 5/01
317.00	7	10.22	308	3.70	1	0	4.40	5fr	4+1A	4.60	4	4	4.58	1+2fr	3	good 3/96, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00, flowers partly eaten, plant green, good 2/01; partly covered with ant dirt, green, good 5/01
317.01	7	10.07	308				0.60	0	0	0.70	0	0	mia			good 5/97, 3/98 & 5/98; plant mia 3/99, 4/99, 2 & 5/00, 2 & 5/01
318.00	7	9.79	309	2.70	0	0	3.10	2fr	1+1A	3.30	1	1	3.02	0	0	OK 3/96, 3/98, 5/98 & 3/99; tubercle tips goldish, OK 4/99; reddish green, OK 2/00; yellowish green, OK 5/00; partly covered with ant dirt, yellow-green, OK 2/01; out, green, OK 5/01
319.00	7	10.02	311	2.60	0	0	mia	mia	3fr	3.70	0	0	3.29	0	0	OK 3/96; plant & tag mia 3/97; relocated in shade 5/97; good 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00; covered with juniper litter, green, OK 2/01; covered with juniper litter, only spines visible 5/01
320.00	7	7.96	197	2.40	0	0	3.00	1A+1fr	1	2.80	0	0	1.71	0	Dead	OK 3/96, 3/98 & 5/98; poor, hunkered 3/99; dead 4/99; removed by WHC 5/6/99, no evidence of weevils, COD unknown
321.00	7	3.60	333	2.80	1	1	3.00	2fr	2	Dead						good 3/96; fungus inside 3/98

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
321.10	7	3.50	332	2.30		0	2.50	0	0	2.50	0	0	2.02	0	0	discovered 5/96, OK 5/96; good 3/98 & 5/98; OK, loose spines in vicinity & new apical meristem forming 3/99; green, good 4/99; dull green, OK 2/00; green, good 5/00, 2 & 5/01
321.20	7	2.82	332	2.00		1	2.50	2fr	2	2.70	2	1+1A	2.74	3fr	1	discovered 5/96, good, 3/98; OK 5/98 & 3/99; maroonish 4/99; maroonish, OK 2/00; green with some orangish tubercles, OK 5/00; flowers peaking out of ant gravel, one flower partly eaten, plant green, OK 2/01; plant out of ant gravel, green, good 5/01
321.30	7	3.79	331										2.02	0	0	discovered 3/99, dull green, OK 3/99, 4/99, 2/00; olive, OK 5/00; maroonish, green, OK 2/01; green, OK 5/01
321.40	7	3.96	291													discovered 2/00; green, good 2 & 5/00; partly covered with ant gravel, green, good 2/01; out, green, OK 5/01
<b>Reference point 8 - between 6 &amp; 7, and park manager's residence; Stake 8 = GPS8; R030321A</b>																
322.00	8	7.76	233	2.40	0	0	Dead									OK 3/96; COD unknown
323.00	8	7.30	224	3.00	0	0	2.90	0	0	3.30	0	0	2.24	0	0	OK 3/96 & 3/97, shaded; OK 3/98 & 5/98; tag loose, 3/99; goldish at base, OK 4/99; totally buried, almost spineless, green, OK 2 & 5/00; popping out, a few spines, green, OK 2/01; buried in juniper litter, almost spineless, orangish-green, poor 5/01
323.10	8	7.53	230							3.50	0	0	2.46	0	0	discovered 3/98; almost buried, shaded, OK 3/98, 5/98, 3/99 & 4/99; mia 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
324.00	8	7.22	238	3.20	1	1	3.10	0	0	3.20	0	0	3.18	0	0	OK 3/96; almost buried, shaded, OK 3 & 5/98, 3/99 & 4/99; above green, green, good 2 & 5/00; olive, OK 2 & 5/01
324.10	8	7.30	234										3.80	0	0	discovered 3/99, dull green, OK 3/99, 4/99, 2/00; green, good 5/00; olive, OK 2 & 5/01
325.00	8	7.67	243	2.70	0	0	2.90	1	1	3.30	1	1	2.97	0	0	good 3/96 & 3/97, 3/98; OK 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2/01; green, OK 5/01
325.10	8	6.97	250													discovered 2/00; green, good 2/00; getting buried in juniper needles, green, good 5/00; tag mia, replaced 2/01; plant green, good 2 & 5/01
326.00	8	7.91	239	3.50	0	0	3.30	0	0	3.50	0	0	3.29	0	0	good 3/96; shaded, OK 3/97, 3/98, 5/98 & 3/99; OK, dull green 4/99, 2 & 5/00; green, good 2 & 5/01
327.00	8	8.09	239	2.20	0	0	2.50	0	0	2.60	0	0	1.92	0	0	good 3/96; shaded, good 3/97; OK 3/98, 5/98 & 3/99; green, good 4/99; slightly reddish, OK 2/00; green, OK 5/00; green, good 2 & 5/01
328.00	8	4.00	244	3.60	1	1	3.70	1	1	3.90	1	1	3.74	0	0	good 3/96 & 3/97, 3/98; OK 5/98; green, good 3/99, 4/99, 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
328.10	8	4.87	245				3.30	1+1A	0	3.40	1	0	2.74	1	0	stepped on 3/97; dirt from nearby hole slightly covering plant, OK 5/97; reddish, OK 3/98; yellowish, OK 5/98; dull green, OK 3/99 & 4/99; reddish green, OK 2/00; slightly reddish green, good 5/00; green with some reddish tubercle tips, OK 2/01; green, good 5/01
328.20	8	4.82	243				2.40	2	0	2.20	0	0	2.11	0	0	stepped on 3/97; OK 5/97, 3/98, 5/98 & 3/99; dull green, misshapen 4/99; green, good 2 & 5/00; green with some red and purple tubercle tips, OK 2 & 5/01
328.30	8	8.40	257							3.80	0	0	4.20	0	0	discovered 3/98; some tan tubercle tips, OK 3/98 & 5/98; very poor, all gray 3/99; dull green, OK 4/99 & 2/00; green with a few tan tubercles, good 5/00, 2/01; some tubercle damage, green, OK 5/01
328.40	8	8.71	255							4.00	2	2	Dead			discovered 3/98; some purplish tubercle tips, OK 3/98 & 5/98; large hollow in center, COD Moneilema 3/99
328.50	8	9.63	258							1.40	0	0	1.42	0	0	discovered 3/98; in little bluestem clump, good 3/98; almost buried, OK 5/98, 3/99, 4/99, 2/00; olive, OK 5/00; body solid, COD unknown 2/01
328.60	8	9.35	260							4.00	2	2	3.20	0	0	discovered 3/98; sort of misshapen, OK 3/98 & 5/98; hunkered, almost buried 3/99; popped up, dull green, OK 4/99; green, good 2 & 5/00, 2 & 5/01
328.90	8	8.99	261													discovered 2/01; green, good 2/01; green, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
329.00	8	3.23	226	2.50	0	0	2.80	0	0	3.10	1	1	3.01	3	2	poor, reddish 3/96; greener, OK 5/97, 3/98; grayish, shrinking, poor 5/98; dull green, OK 3/99; purplish, OK 4/99 & 2/00; purplish, green, OK 5/00; some tubercle damage, green with some purplish tubercle tips 2 & 5/01
330.00	8	2.98	226	3.20	2	2	3.60	1+2fr	3	3.80	2	2	3.07	3	3	OK 3/96, 3/97, 5/97, 3/98, 5/98 & 3/99; OK, maroonish 4/99, 2 & 5/00; some tubercle damage, plant green with some orange tubercle tips, OK 2/01; purplish-green, OK 5/01
331.00	8	3.02	218	5.60	4+1fr	5	5.70	2+3fr	5	6.20	4	5	5.69	3+1fr	4	OK 3/96; good 3/97, 3/98; OK 5/98; green, good 3/99, 4/99, 2 & 5/00, 2/01; dark green, good 5/01
332.00	8	2.75	202	2.70	1	1	3.10	2fr	2	3.20	1	1	2.85	1	1	good 3/96; getting maroonish, OK 5/97, 3/98 & 5/98; dull green, OK 3/99 & 4/99; green, good 2 & 5/00, 2/01; dark green, good 5/01
333.00	8	3.55	192	4.60	3+2fr	5	4.90	1+3fr	2+3A	5.60	4	5	5.17	4	2+1A	good 3/96, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
334.00	8	3.63	191	2.30	1	1	3.10	3fr	3	3.20	1	1	2.84	1	1	OK 3/96; good 3/98, 5/98 & 3/99; green, good 4/99; reddish, OK 2 & 5/00, 2 & 5/01
335.00	8	4.92	188	4.20	3	4	4.50	2+1fr	3	4.30	2	2	3.62	2	2	one flower slightly eaten 3/96; good 5/96 & 3/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
336.00	8	5.79	187	3.00	2	0	3.40	2+1fr	3	3.50	2	2	3.38	1		0 good 3/96 & 3/97, 5/98; getting buried, OK 3/99; popping out, green, good 4/99, 2 & 5/00, 2 & 5/01
337.00	8	6.58	187	2.80	0	0	3.40	2	1+1A	3.30	1	1	4.28	1		1 good 3/96 & 3/97, 3/98, 5/98 & 3/99; good, green, fruit mostly eaten 4/99; green, good 2 & 5/00, 2/01; green with orange-red spots, OK 5/01
337.10	8	7.52	191				3.20	0	0	3.00	0	0	3.10	0		0 in shade; in sunlight at 3 PM CST, OK 3/98, 5/98 & 3/99; green, good 4/99; purplish, OK 2/00; goldish and damaged basally, green, good above 5/00; maroonish-green, OK 2/01; green with red-orange tubercle tips, poor 5/01
337.20	8	7.28	187				1.10	0	0	1.40	0	0	1.16	0		0 in grass clump & shade 3/97; OK 3/98 & 5/98; poor 3/99 & 4/99; plant mia 2 & 5/00, 2 & 5/01
338.00	8	6.63	186	2.40	0	0	2.60	1	1	2.80	0	0	Dead			good 3/96 & 3/97, 3/98 & 5/98; COD Moneilema (collected & accidentally killed) 3/99
338.10	8	8.05	186										1.80	0		0 OK, dull green, discovered 3/99; dull green, OK 4/99, 2/00; green, OK 5/00, 2/01; green with orange tubercle tips, OK 5/01
339.00	8	5.45	184	3.30	0	0	3.60	1+1fr	2	3.70	1	1	3.64	0		0 good 3/96 & 3/97, 3/98 & 5/98; OK 3/99; green, good 4/99, 2 & 5/00, 2 & 5/01
339.10	8	5.38	186				3.60		0	4.20	3	3	4.12	2+1fr	2+1disp	good, discovered 5/97, 3/98, 5/98 & 3/99; green, good 4/99, 2 & 5/00; green with maroonish and yellow tubercles, OK 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
340.00	8	5.28	183	4.90	2	2	4.90	2fr	2	5.20	3	3	3.97	0	Dead	good 3/96, 3/98 & 5/98; dead 3/99; dead 4/99; collected by WHC 5/6/99, no evidence of weevils, COD unknown
341.00	8	5.82	181	3.50	2	2	3.60	2	2	3.40	1	1	3.12	0	1	OK 3/96; reddish 3/97, 5/97, 3/98 & 5/98; OK 3/99; goldish at base, OK 4/99; greenish-red, OK 2 & 5/00, 2/01; orange with green apex, OK 5/01
342.00	8	6.55	165	3.50	0	1	3.80	3	2+1A	4.00	2	2	3.67	1	0	good 3/96, 3/97, 3/98, 5/98; OK, a few orange tubercle tips 3 & 4/99, 2/00; dull green, OK 5/00; olive with some orange tubercle tips, poor 2/01; mostly orangish, OK-poor 5/01
<b>Reference point 9 - 33 JMP paces west from the middle post in the west chain link fence surrounding the water treatment plant; Stake 9 = GPS9; R030415A</b>																
366.00	9	4.37	243	1.40		0	2.00	0	0	2.40	2	2	nd	0	0	good, discovered 5/96, good 3/97, 3/98 & 5/98; eaten down below soil surface, root still alive 3/99; tubercle nub sprouting 5/99; green, good 2 & 4/00; green, OK 2/01; green, good 5/01
367.00	9	4.45	248	2.70		0	3.30	4fr	4	3.50	3	3	2.85	0	0	discovered 5/96, OK; dull green, OK 3/97 & 5/97; reddish, OK 3/98 & 5/98; measured in one direction only, green, OK 3/99 & 5/99; purple, OK 2 & 4/00, 2 & 5/01
367.01	9	4.38	249													discovered 5/01; green, good 5/01
368.00	9	4.58	252	1.30		0	1.40	0	0	1.40	0	0	1.20	0	0	OK, discovered 5/96; OK 3/97, 3/98, 5/98 & 3/99; green, good 5/99; pale green, OK 2/00; green, OK 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
368.10	9	4.62	252													discovered 2/01; hunkered, green, OK 2/01; green, good 5/01
369.00	9	4.26	~258	0.50		0	0.60	0	0	0.40	0	mia	mia			good, discovered 5/96; good 3/97; OK 5/97, 3/98; mia 5/98; tag & plant mia 3/99; tag relocated, plant mia 5/99, 2 & 4/00, 2 & 5/01
370.00	9	4.24	~250	0.60		0	mia			mia			mia			good, discovered 5/96; mia 3/97, 5/97, 3/98, 5/98, 3/99 & 5/99
371.00	9	4.32	~258	2.40		0	2.70	2fr	2	3.00	1	1	mia			OK, discovered 5/96; slightly reddish green 3/97; slightly reddish green, OK 3/98 & 5/98; tag & plant mia 3/99; tag buried, relocated, plant mia 5/99; tag and plant mia 2 & 5/00, 2 & 5/01
371.01	9	4.29	249				0.50		0	mia			mia		Removed, dead	OK, discovered 5/97; mia 3/98, 5/98 & 3/99; relocated, accidentally dug up, collected by WHC 5/6/99; COD unknown
372.00	9	4.33	249	2.30		0	2.70	3fr	3	mia			mia			OK, discovered 5/96; OK 3/97; mia 3/98 & 5/98; divot left, loose spines 3/99; mia 5/99, 2 & 4/00
373.00	9	4.35	249	1.90		0	2.00	0	0	1.80	0	0	1.65	0	0	good, discovered 5/96; totally maroon, OK 3/98 & 5/98; green, almost buried, OK 3/99; popped out, green, good 5/99, 2 & 4/00, 2 & 5/01
374.00	9	4.40	351	1.40		0	1.30	0	0	1.30	0	0	1.11	0		good, discovered 5/96; buried, good 3/97, 3/98, 5/98, 3/99 & 5/99; green, good, tag mia, replaced 2 & 4/00; hunkered, pale green, OK 2/01; green, good 5/01
375.00	9	4.39	251	1.80		0	1.60	0	0	2.20	0	0	1.68	0		good, discovered 5/96; partially buried, good 3/97 & 3/98; reddish, OK 5/98; almost buried, green, OK 3/99; green, good 5/99, 2 & 4/00, 2 & 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
376.00	9	4.43	249	1.50		0	1.90	0	0	1.80	0	0	1.29	0	0	good, discovered 5/96; good 3/97; covered by rock, good 3/98, 5/98, 3/99 & 5/99; hunkered, green, good 2 & 4/00, 2 & 5/01
377.00	9	4.12	251	3.30		1	3.90	2fr	2	4.00	3	2+1A	nd	0	0	OK, discovered 5/96; OK 3/97; reddish, OK 3/98 & 5/98; eaten, nub or seedling left 3/99; green, good 5/99; plant mia 2 & 4/00, 2 & 5/01
377.10	9	3.79	254				0.80	0	0	Dead						under rain lily 3/97; COD unknown 3/98
377.20	9	3.96	248							0.70		0	0.51	0	0	discovered 5/98; measured in one direction only, between rocks, OK 5/98; poor, totally buried, chlorotic 3/99; green, good 5/99, 2/00; totally buried in ant dirt, but green, good 4/00; out, green, good 2 & 5/01
378.00	9	4.71	250	2.40		0	2.60	2fr	2	3.00	2	2	2.47	0	0	OK, discovered 5/96; OK 3/97, 3/98 & 5/98; dark green, OK 5/99; green, good 2 & 4/00, 2 & 5/01
378.01	9	4.77	257													discovered 5/01; green, good 5/01
378.02	9	4.72	255													at 5 o'clock on 378; not tagged, discovered 5/01; green, good 5/01
378.03	9	4.71	255													at 4 o'clock on 378, left of 378.04; not tagged, discovered 5/01; red, OK 5/01
378.04	9	4.71	255													at 4 o'clock on 378, right of 378.03; not tagged, discovered 5/01; red, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
378.05	9	4.82	257													discovered 5/01; reddish-green, OK 5/01
378.06	9	4.80	257													discovered 5/01; green, good 5/01
378.07	9	4.71	252													discovered 5/01; green, OK 5/01
378.10	9	4.84	250							3.90	1	2	3.39	3fr	0	a little reddish, OK, discovered 3/98; a little reddish, OK 5/98; green, good 5/99; reddish, OK 2 & 4/00; one flower eaten, plant purplish-green, good 2 & 5/01
378.20	9	5.13	250							1.20	0	0	1.23	0	0	good, discovered 3/98; good 5/98; OK 3/99; green, good 5/99, 2 & 4/00, 2 & 5/01
379.00	9	4.44	251	2.10		0	2.60	0	0	2.50	2	2	2.04	0	0	good, discovered 5/96; good 3/97; almost buried, good 3/98, 5/98, 3/99, 5/99, 2 & 4/00, 2 & 5/01
380.00	9	4.25	252	0.90		0	1.20	0	0	1.50	0	0	0.98	0	0	good, discovered 5/96; good 3/97, 3/98; OK 5/98; green, good 3/99; plant mia 2 & 4/00; green, good 2 & 5/01
381.00	9	4.44	252	2.70		1	3.30	2fr	2	3.10	2	2	mia			good, discovered 5/96; good 3/97, 3/98 & 5/98; divot left, plant gone 3/99, 2 & 4/00, 2 & 5/01
381.10	9	4.41	252													seedling or pup, green, OK 2/00; green, good 4/00, 2 & 5/01
382.00	9	4.28	252	1.50		0	1.80	0	0	1.90	0	0	mia			OK, discovered 5/96; OK 3/97, 3 & 5/98; plant mia 99, 2 & 4/00, 2 & 5/01

**Ancistrocactus tobuschii Data for  
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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
383.00	9	4.30	252	1.70		0	1.80	1fr	1	2.00	1	1	mia			OK, discovered 5/96; OK 3/97, 3 & 5/98; plant mia 99, 2 & 4/00, 2 & 5/01
384.00	9	4.33	252	0.50		0	0.30	mia	0	0.30	mia	0	mia			OK, discovered 5/96; rediscovered under stick; OK 5/97; mia 3/98; small seedling rediscovered, OK 5/98; plant mia 99, 2 & 4/00, 2 & 5/01
385.00	9	4.43	254	2.40		0	2.50	1fr	1	mia			mia			OK, discovered 5/96; reddish green 3/97; greener 5/97; mia 3 & 5/98, 3/99, 2 & 4/00
385.10	9	4.98	254				1.00	0	0	Dead						close to reference point; body solid, COD unknown, may have been tubercle of buried plant 3/98
385.20	9	4.99	254				1.10	0	0	Dead						to right of 385.3; body solid, COD unknown, may have been tubercle of buried plant 3/98
385.30	9	5.00	254				1.40	0	0	Dead						to left of 385.2; body solid, COD unknown, may have been tubercle of buried plant 3/98
385.40	9	5.01	254				0.40	0	0	0.60	0	Dead				below 385.1-3 & 385.5; OK 3/98; just spines & tubercles left 5/98
385.50	9	4.97	254				0.80	0	0	Dead						above 385.1-4; just spines left, COD unknown 5/98
386.00	9	4.39	255	2.30		0	2.30	1fr	1	2.60	1	1	mia			good, discovered 5/96; reddish 3/97 & 5/97; OK 3/98 & 5/98; divot left, plant gone 3/99, 2 & 4/00, 2 & 5/01
386.10	9	4.77	261				1.40		0	1.60	0	0	1.43	0	0	OK, discovered 5/97; OK 3/98 & 5/98; green, good 3/99 & 5/99; green, good, hunkered 2/00; coming out, green, good 4/00, 2 & 5/01
387.00	9	3.60	~258	2.10		0	2.10	1fr	1	2.20	1	1A	1.65	0	0	OK, discovered 5/96; OK 3/97, 3/98, 5/98 & 3/99; green, good 5/99; green, good, hunkered 2/00; coming OK, green, OK 4/00, 2/01; green, good 5/01
387.01	9	3.61	~256				0.50	0	0	0.60	0	0	0.60	0	0	under rock; OK 3/98, 5/98 & 3/99; green, good 5/99; OK, green 2 & 4/00, 2/01; hunkered, OK 5/01

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
387.10	9	3.26	252													discovered 2/01; green, good 2 & 5/01
388.00	9	3.81	~270	1.90		0	2.30	1A	0	mia			mia			good, discovered 5/96; reddish green, OK 3/97 & 5/97; mia 3/98, 5/98, 3/99, 5/99, 2 & 4/00
389.00	9	4.52	~270	3.60		2	4.20	5fr	5	4.10	1	0	nd	0	mia	OK, discovered 5/96; very reddish, squishy 3 & 5/97; maroon, lopsided, very shaded, OK 3/98 & 5/98; eaten below soil surface, root alive 3/99; seedling at 4.48m, main plant gone 5/99; seedling and plant mia 2 & 4/00, 2/01; tag and plant mia 5/01
389.10	9	4.29	266							1.10	0	0	0.58	0		0 in rock crevice, good, discovered 3/98; good 5/98; measured in one direction only 3/99 & 2/00; poor 3/99; green, good 5/99, 2 & 4/00; tag mia, replaced, plant green, good 2/01; tag loose, plant green, good 5/01
389.20	9	4.25	266							1.20	0	0	1.37	0		0 discovered 3/98; good 3/98, 5/98; good, under rock 3/99; good, green 5/99, 2 & 4/00, 2 & 5/01
389.30	9	4.25	264													discovered 2/01; green, good 2 & 5/01
389.40	9	4.33	264													discovered 2/01; green, good 2 & 5/01
390.00	9	8.26	248				1.50		0	mia	mia		mia			to left of 391; animal rooting in area, tag & plant mia 5/97, 3/98, 5/98, 3/99 & 5/99
391.00	9	8.26	248				1.40		0	mia	mia		mia			to right of 390; animal rooting in area, tag & plant mia 5/97, 3/98, 5/98, 3/99 & 5/99

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PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
392.00	9	7.39	232				3.20	3	3	3.30	3	2+1A	2.63	0		0 reddish 3/97; reddish, OK 3/98 & 5/98; bad; totally gray, hard, may be dead 3/99; green, OK 5/99; hard, dry, solid, COD unknown 2/00
392.01	9	7.41	232				1.20	0	0	1.40	0	0	mia			seedling of 392.00; OK 3/98 & 5/98; mia 3/99 & 5/99, 2 & 4/00, 2 & 5/01
393.00	9	7.45	230				3.40	3fr	3	3.30	2	2	2.69	0		0 a little reddish, OK 3/98 & 5/98; only spines sticking out of ant mound 3/99; still partially buried, green, good 5/99; mound gone, green, good 2 & 4/00; purplish-green, good 2 & 5/01
394.00	9	7.48	230				3.10	3fr	3	3.10	3	3	2.71	0		0 one fruit partially eaten, remainder on ground 5/97; a little reddish, OK 3/98 & 5/98; only spines sticking out of ant mound 3/99; plant out, green, good 5/99, 2 & 4/00, 2 & 5/01
395.00	9	7.85	235				2.90		1	3.10	3	disp	3.11	3fr	disp?	good, discovered 5/97; tag mia, retagged, good 3/98; fruits dispersed, seeds on and below plant, plant good 5/98; good 3/99; green, good 5/99, 2 & 4/00, 2 & 5/01
396.00	9	3.49	281							1.70		0	mia			discovered 5/98; OK 5/98; mia 99, 2 & 4/00, 2 & 5/01
397.00	9	3.52	281							2.30		0	mia			discovered 5/98; good 5/98; mia 99, 2 & 4/00, 2 & 5/01
398.00	9	3.44	243													discovered 2/00; olive, OK 2 & 4/00; purplish, OK 2 & 5/01
399.00	9	2.55	193													discovered 2/00; green, good 2 & 4/00, 2 & 5/01

Lost Maples State Natural Area															NOTES	
PL#	STAKE	DIST	ANG	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	
400.00	9	4.02	266													discovered 4/00; green, good 2 & 5/01
401.00	9	6.07	256													discovered 2/01; purple, OK 2 & 5/01
402.00	9	0.95	75													discovered under rocks 5/01; green, OK 5/01
Data taken and recorded by Jackie Poole 4/29/96, 5/1/96, 3/13/97, 3/17/97, 3/29/97, 5/8/97, 5/10/97, 3/5-6/98, 3/9/98, 2/21-23/00 (with Dana Price), 4/20-21/00, 5/2/00																
5/6-8/98, 3/4/99, 5/6/99 with WHC, 2/22/00 with Dana Price, 4/21/00, 5/2/00, 2/20-22/01, 5/3,8-10/01																
Data taken by Gena Janssen and recorded by Jackie Poole 3/26/97																
Data taken & recorded by Jackie Poole with assistance from Paul Cottman & Lloyd Steiner 3/6-8/96																

**Ancistrocactus tobuschii Data for  
Pole Hollow, Junction**

PL#	STAKE	DIST.	ANGLE	95 DM	95FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
Stake 1 is in an opening at the top of a hill behind some redbuds; ID #10R032422A																		
1.00	1	3.38	55	sm-med	2	2.10	0	0	2.60	1	1	2.80	2fr	2	2.66	2fr	1+1disp	part of plant dead, but regenerating 3/96; green, OK 3/99; green, good 5/99 & 3/00; green, hunkering, OK 5/00; popped out, red at base, dull olive above, OK 3 & 5/01
2.00	1	3.85	50	sm-med	2	dead												cause of death unknown 3/96
3.00	1	4.28	42	medium	2	3.30	0	0	3.70	3fr	3	3.70	3fr	2	4.25	2fr	disp?	reddish 3/97; green 5/97; reddish, mushy, gray spines 3/98; dull maroonish green, OK 3 & 5/99; dull green, OK 3/00; orangish, OK 5/00; one large cavity, COD Moneilema 3/01
4.00	1	7.29	75	small	0	1.80	0	0	2.60	2fr	2	3.10	2fr	2	3.09	1A+2fr	2	army green - red 3/98; maroon, OK 3/99; orangish, OK 5/99; maroonish, OK 3/00; orangish, OK 5/00; reddish-green, OK 3/01; maroonish-green, good 5/01
5.00	1	7.29	75	small	0	1.80	0	0	2.20	1fr	1	2.40	2fr	3	2.54	1fr	1	measured in one direction only 3/98; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
5.10	1	5.95	77						1.80	1fr	1	2.20	1fr	1	2.36	2fr	2	measured in one direction only 3/98; green, good 5/99, 3 & 5/00, 3 & 5/01
5.20	1	6.15	75						2.40	2fr	2	2.90	2	2	2.88	2A+1fr	1	green, good 5/99, 3 & 5/00; just spines left, COD unknown 3/01
5.30	1	6.41	75						1.70	1fr	0	2.10	2fr	2	2.20	1A+1fr	1	measured in one direction only 3/98; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01

**Ancistrocactus tobuschii Data for  
Pole Hollow, Junction**

PL#	STAKE	DIST.	ANGLE	95 DM	95FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
5.40	1	6.42	75						1.50	0	0	1.90	0	0	2.50	1fr	1	measured in one direction only 3/98; green, good 3 & 5/99, 3 & 5/00, 3/01; maroonish-green, good 5/01
5.50	1	6.48	73						2.40	3fr	2+1A	3.10	2fr	2	3.51	2A+3fr	2+1A	green, good 3 & 5/99, 3 & 5/00, 3/01; misshapen, green, OK 5/01
6.00	1	7.32	75	small	0	1.20	0	0	1.20	0	0	1.80	0	0	1.68	0	0	measured in one direction only 3/98; green, good 3 & 5/99, 3 & 5/00; green with some red tubercle tips, OK 3/01; green, good 5/01
7.00	1	7.58	72	large	4	4.60	2+3 fr	2	6.20	2+7fr	9	6.70	1+7fr	8	6.60	3A+5fr	6	reddish green 3/98; maroonish, OK 3/99; orangish, OK 5/99; maroonish, OK 3/00; orangish, OK 5/00; misshapen tubercles, spines gray, plant reddish-green, OK 3/01; pale green with tan tubercle tips, OK 5/01
7.01	1	7.34	77												1.26		0	discovered 5/99; olive, OK 5/99; green, good 3 & 5/00; damaged, orange, poor 3/01; COD root rot 5/01
8.00	1	1.14	105	small	1	2.40	1 fr	0	3.00	0	0	3.60	1fr	1	3.38	3A	0	green, good 3 & 5/99, 3/00; green with a few tan tubercles, otherwise green, hunkering, OK 5/00; purplish-green, good 3 & 5/01
8.10	1	0.74	117									2.00	0	0	2.15	1A	0	discovered 3/98; green, good 3 & 5/99, 3 & 5/00; dry and fluffy inside, COD unknown 3/01

**Ancistrocactus tobuschii Data for  
Pole Hollow, Junction**

PL#	STAKE	DIST.	ANGLE	95 DM	95FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
9.00	1	5.07	62	nd	nd	3.60	2	0	3.70	1+3fr	3	4.20	2fr	2+1A	4.74	4fr	4	partially buried in grass clump 3 & 5/98 & 3/99; maroonish-green, OK 3 & 5/99; yellowish 3/00; orangish, OK 5/00; reddish-purplish-orangish, poor 3/01; orangish, OK 5/01
9.10	1	4.54	70						2.00	0	0	2.40	1fr	1	2.50	2fr	1disp	dull green, OK 3 & 5/99; dry, solid, COD unknown 3/00
9.20	1	4.77	67												2.12	0	0	edge of grass clump; green, good, 3 & 5/99, 3/00; green with some reddish tubercles, ants swarming fruit, OK 5/00; olive with some reddish tubercles, OK 3 & 5/01
10.00	1	5.20	72	nd	nd	1.60	0	0	1.70	0	0	2.20	0	0	2.70	2fr	1	maroonish, OK 3/99; retagged 5/99; maroonish, OK 5/99, 3/00; olive, OK 5/00; just spines left, COD unknown 3/01
10.01	1	5.15	73												1.40	0	0	green, good, hunkered 3 & 5/99, 3 & 5/00; misshapen, blue-green, OK 3/01; green, good 5/01
11.00	1	7.13	74			1.60	0	0	2.30	1fr	1	2.30	0	0	2.57	0	0	discovered 3/96; being covered by rock 3/97; green, good 3 & 5/99, 3 & 5/00, 3 & 5/01
11.10	1	7.34	67									1.70	0	0	2.44	2fr	2	discovered 3/98; dull green, OK 3 & 5/99; mostly red, poor 3 & 5/00, 3/01; collected for weevil study 5/01

**Ancistrocactus tobuschii Data for  
Pole Hollow, Junction**

PL#	STAKE	DIST.	ANGLE	95 DM	95FL/FR	96DM 4.50	96FL 3+2fr	96FR 4	97DM 5.60	97FL 1+8fr	97FR 9	98DM 5.80	98FL 1+5fr	98FR 6	99DM 5.31	99FL 3fr	99FR	NOTES
12.00	1	8.32	48															3 discovered 3/96; army green and red, gray spines 3/98; most tubercles orange, spines dull gray, poor 3 & 5/99; mostly reddish, OK 3 & 5/00, 3/01; pale green with reddish tubercles, OK 5/01
13.00	1	8.82	54			4.00	1+2fr	2	5.00	3fr	3	5.70	1+4fr	5	5.26	4fr		4 discovered 3/96, 1 flower partially eaten, tag mia 3/98; now 2 tags, a few reddish tubercle tips, OK 3 & 5/99; dead, collected for weevil study 3/00; cod unknown
14.00	1	7.80	46			3.30		1	Dead									discovered 5/96; COD unknown, just spines left 3/97
15.00	1	3.88	87						3.60	3fr	3	2.30	2fr	2	3.27	2fr		5 new growth on top of old stem 3/98; green, good 3 & 5/99; olive, OK 3 & 5/00, 3 & 5/01
16.00	1	3.79	79						0.90	0	0	1.30	0	0	1.00	0	0	0 measured in one direction only 3/98; green, good, hunkered 3 & 5/99; green, good 3 & 5/00; green with some red tubercles, OK 3/01; green, good 5/01
17.00	1	8.79	72						2.80	2fr	2	3.20	1+1fr	2	3.59	1A+2fr		1A army green and red, spines gray 3/98; maroonish 3 & 5/99, 3/00; dull green, OK 5/00; purple, OK 3 & 5/01
17.01	1	9.51	71												3.30			1fr discovered 5/99; olive, OK 5/99 & 3/00; green, good 5/00; pale green, OK 3/01; green, good 5/01

**Ancistrocactus tobuschii Data for  
Pole Hollow, Junction**

PL#	STAKE	DIST.	ANGLE	95 DM	95FL/FR	96DM	96FL	96FR	97DM	97FL	97FR	98DM	98FL	98FR	99DM	99FL	99FR	NOTES
18.00	1	9.69	77						2.70	1fr	1	3.00	2	1+1A	3.24	2fr	2	green, good 5/99, 3/00; slightly purplish-green, good 5/00; purple, OK 3 & 5/01
18.10	1	1.95	62						2.80	2fr	2	2.80	A+1fr	1	2.62	3fr	1	probably stepped on 3/98; green, good 5/99, 3 & 5/00; spines gray, plant green, OK 3/01; olive, OK 5/01
19.00	1	9.85	78						2.90	1+1fr	2	3.20	2	1+1A	3.06	3fr	2+1A	green, good, hunkered 3 & 5/99; green, good 3 & 5/00, 3 & 5/01
20.00	1	5.21	34															discovered 3/00; green, good 3 & 5/00; dull green with some red tubercle tips, OK 3 & 5/01
21.00	1	5.10	88															discovered 5/00; under rock; green, good 5/00; purple, OK 3/01; olive, OK 5/01
22.00	1	2.92	21															discovered 3/01; green, with maroonish tubercle tips, OK 3 & 5/01
23.00	1	~29.77	268															measured around juniper, discovered 3/01; green, good 3 & 5/01
1.00	2	9.10	31	med-large		4	2.40	0	0	Dead								Stake 2 is in an opening reached from I-10 W; look for flagging before "Caution Crosswinds" sign looks dead 3/96; bad but not dead 5/96; COD unknown, just spines left 3/97



<b>Devils River SNA, Val Verde County</b>	<b>1998</b>	<b>1999</b>
Live - Reproductive	6	5
Live - Non-reproductive	1	0
Live - Seedling (<1 cm in diam.)	1	1
<b>Total Live</b>	<b>8</b>	<b>6</b>
New - Reproductive	0	1
New - Non-reproductive	0	0
New - Seedling	1	0
<b>Total New</b>	<b>1</b>	<b>1</b>
New stake - Reproductive	4	11
New stake - Non-reproductive	0	5
New stake - Seedling	0	3
<b>Total New Stake</b>	<b>4</b>	<b>19</b>
<b>Total Live at end of year</b>	<b>13</b>	<b>26</b>
MIA - Reproductive	0	0
MIA - Non-reproductive	0	0
MIA - Seedling	5	1
<b>Total MIA</b>	<b>5</b>	<b>1</b>
Dead - Reproductive	4	6
Dead - Non-reproductive	3	0
Dead - Seedling	1	0
<b>Total Dead</b>	<b>7</b>	<b>6</b>
COD* - weevils	5	3
COD* - hollow	0	3
COD* - soil disturbance	1	0
COD* - unknown	2	0
<b>Total mia, dead, not A. tobuschii</b>		<b>7</b>
Of the total of 13 live plants at the end of 1998, 6 died (all reproductive size class) and 1 seedling class individual went missing, for a total loss of 54%. 50% of the deaths were directly attributable to weevils, while 50% of the dead plants were hollow, probably the result of insect herbivory. No size class changes were observed. One new mature individual was found in the established plots, and three new plots were established with a total of 19 individuals. Thus there was no recruitment within the established plots in 1998. Total number of plants within the Devils River SNA study area is now 26 (65% reproductive, 19% non-reproductive, and 15% seedling class).		

Garner State Park, Uvalde County		1998	1999
Live - Reproductive		2	1
Live - Non-reproductive		0	0
Live - Seedling (<1 cm in diam.)		0	0
<b>Total Live</b>		<b>2</b>	<b>1</b>
New - Reproductive		0	0
New - Non-reproductive		0	0
New - Seedling		0	0
<b>Total New</b>		<b>0</b>	<b>0</b>
<b>Total Live at end of year</b>		<b>2</b>	<b>1</b>
MIA - Reproductive		0	0
MIA - Non-reproductive		0	0
MIA - Seedling		0	0
<b>Total MIA</b>		<b>0</b>	<b>0</b>
Dead - Reproductive		0	1
Dead - Non-reproductive		0	0
Dead - Seedling		0	0
<b>Total Dead</b>		<b>0</b>	<b>1</b>
COD* - weevils		0	0
COD* - hollow		0	0
COD* - soil disturbance		0	0
COD* - unknown		0	1
<b>Total mia, dead, not A. tobuschii</b>			<b>1</b>

There was 50% mortality at Garner SP in 1999, and no new plants were added to the population. The dead plant was collected by Bill Calvert, weevil researcher, who will perhaps be able to ascertain cause of death.





Devil's Sinkhole SNA		1998	1999	
Live - Reproductive		7	6	
Live - Non-reproductive		24	9	
Live - Seedling (<1 cm in diam.)		3	2	
<b>Total Live</b>		<b>34</b>	<b>17</b>	
New - Reproductive		0	2	
New - Non-reproductive		0	0	
New - Seedling		0	2	
<b>Total New</b>		<b>0</b>	<b>4</b>	
New stake - Reproductive		0	1	
New stake - Non-reproductive		0	1	
New stake - Seedling		0	0	
<b>Total New Stake</b>		<b>0</b>	<b>2</b>	
Refound MIA - Reproductive		0	0	
Refound MIA - Non-reproductive		0	1	
Refound MIA - Seedling		0	0	
<b>Total Refound MIA</b>		<b>0</b>	<b>1</b>	
<b>Total Live at end of year</b>		<b>34</b>	<b>24</b>	
MIA - Reproductive		3	0	
MIA - Non-reproductive		6	3	
MIA - Seedling		1	0	
<b>Total MIA</b>		<b>10</b>	<b>3</b>	
Dead - Reproductive		7	3	
Dead - Non-reproductive		29	10	
Dead - Seedling		12	1	
<b>Total Dead</b>		<b>48</b>	<b>14</b>	
COD* - weevils		16	4	Of the total of 34 live plants at the end of 1998, 14 died (21% reproductive, 71% non-reproductive, and 7% seedling classes) and 3 non-reproductive individuals went missing, for a loss of 54%. The cause of most of the deaths was unknown (50%) while weevils, hollow stems (probably caused by insect herbivory), and mammal herbivory accounted for 29%, 14%, and 7%, respectively. Two new seedlings were found, for 6% recruitment.
COD* - hollow		3	2	
COD* - soil disturbance		3	0	
COD* - unknown		25	7	
COD* - herbivory		1	1	
<b>Total mia, dead, not <i>A. tobuschii</i></b>			<b>17</b>	
Two non-reproductive plants became reproductive. Additionally two new reproductive and two new non-reproductive individuals were found in the established plots. Two new plots were established with a total of 2 individuals (one reproductive and one non-reproductive). Also one non-reproductive individual that was considered missing in 1998 was relocated. Total number of live plants at the end of the 1999 field season stands at 24 (38% reproductive, 46% non-reproductive, and 17% seedling size class).				

Pole Hollow, Kimble County		1998	1999
Live - Reproductive		20	24
Live - Non-reproductive		4	2
Live - Seedling (<1 cm in diam.)		0	0
<b>Total Live</b>		<b>24</b>	<b>26</b>
New - Reproductive		0	1
New - Non-reproductive		2	3
New - Seedling		0	0
<b>Total New</b>		<b>2</b>	<b>4</b>
<b>Total Live at end of year</b>		<b>26</b>	<b>30</b>
MIA - Reproductive		0	0
MIA - Non-reproductive		0	0
MIA - Seedling		0	0
<b>Total MIA</b>		<b>0</b>	<b>0</b>
Dead - Reproductive		0	0
Dead - Non-reproductive		0	0
Dead - Seedling		0	0
<b>Total Dead</b>		<b>0</b>	<b>0</b>
COD* - weevils		0	0
COD* - hollow		0	0
COD* - soil disturbance		0	0
COD* - unknown		0	0
<b>Total mia, dead, not <i>A. tobuschii</i></b>			<b>0</b>
Of the 26 plants alive at the end of 1998, none died or went missing. No new seedlings were found. Four non-reproductive plants became reproductive. Additionally three non-reproductive individuals and 1 reproductive individual were discovered. Thus the total number of live plants at the end of the 1999 field season was 30 (83% reproductive and 17% non-reproductive).			



Junction, Kimble County		1998	1999						
	Live - Reproductive	62	64						
	Live - Non-reproductive	23	21						
	Live - Seedling (<1 cm in diam.)	1	1						
	<b>Total Live</b>	<b>86</b>	<b>86</b>						
	New - Reproductive	0	10						
	New - Non-reproductive	6	19						
	New - Seedling	3	2						
	<b>Total New</b>	<b>9</b>	<b>31</b>						
	New stake - Reproductive	0	3						
	New stake - Non-reproductive	0	3						
	New stake - Seedling	0	0						
	<b>Total New Stake</b>	<b>0</b>	<b>6</b>						
	Refound MIA - Reproductive	0	1						
	Refound MIA - Non-reproductive	0	0						
	Refound MIA - Seedling	0	0						
	<b>Total Refound MIA</b>	<b>0</b>	<b>1</b>						
	<b>Total Live at end of year</b>	<b>95</b>	<b>124</b>						
	MIA - Reproductive	1	0						
	MIA - Non-reproductive	0	1						
	MIA - Seedling	4	1						
	<b>Total MIA</b>	<b>5</b>	<b>2</b>						
	Dead - Reproductive	10	6						
	Dead - Non-reproductive	11	1						
	Dead - Seedling	0	0						
	<b>Total Dead</b>	<b>21</b>	<b>7</b>						
	COD* - weevils	1	1						
	COD* - hollow	5	0						
	COD* - soil disturbance	0	0						
	COD* - unknown	15	6						
	<b>Total mia, dead, not <i>A. tobuschii</i></b>		<b>9</b>						
				Of the total of 95 plants alive at the end of 1998, 7 died (86% reproductive and 14% non-reproductive) and 2 individuals (one non-reproductive and one seedling) went missing, for a 9% loss.					
				While the cause of most of the deaths was unknown (86%), 14% of the mortality was attributable to weevils. Two seedlings					
				increased to non-reproductive size, and eight juveniles produced flowers or fruits becoming part of the reproductive class. Also a reproductive individual which had been recorded as missing was relocated. Two new seedlings were found in established plots for a 2% recruitment rate. An additional 29 individuals (32% reproductive and 61% non-reproductive) were found in established plots. One new plot was established with a total of 6 individuals (half reproductive and half non-reproductive). Total number of plants now stands at 124 (63% reproductive, 35% non-reproductive, and 2% seedling).					

Lost Maples SNA, Bandera/Real Cos.		1998	1999						
	Live - Reproductive	317	316						
	Live - Non-reproductive	149	154						
	Live - Seedling (<1 cm in diam.)	10	9						
	<b>Total Live</b>	<b>476</b>	<b>479</b>						
	New - Reproductive	13	2						
	New - Non-reproductive	27	19						
	New - Seedling	5	1						
	<b>Total New</b>	<b>45</b>	<b>22</b>						
	Refound MIA - Reproductive	1	0						
	Refound MIA - Non-reproductive	1	1						
	Refound MIA - Seedling	0	0						
	<b>Total Refound MIA</b>	<b>2</b>	<b>1</b>						
	<b>Total Live at end of year</b>	<b>523</b>	<b>502</b>						
	MIA - Reproductive	4	10						
	MIA - Non-reproductive	3	8						
	MIA - Seedling	4	3						
	<b>Total MIA</b>	<b>11</b>	<b>21</b>						
	Dead - Reproductive	10	16						
	Dead - Non-reproductive	8	2						
	Dead - Seedling	3	0						
	<b>Total Dead</b>	<b>21</b>	<b>18</b>						
	Removed - Reproductive		1						
	Removed - Non-reproductive		4						
	Removed - Seedling		0						
	<b>Total Removed</b>		<b>5</b>						
	COD* - insect larvae	0	2						
	COD* - hollow	0	0						
	COD* - soil disturbance	0	0						
	COD* - unknown	16	14						
	COD* - herbivory	0	0						
	COD* - fungus	5	1						
	<b>Total mia, dead, removed</b>	<b>32</b>	<b>44</b>						
				Of the total 523 live plants at the end of 1998, 18 died (89% reproductive and 11% non-reproductive) and 21 went missing (48% reproductive, 38% non-reproductive, and 14% seedling class) for a total 7% loss. The cause of most of the deaths was unknown (78%) while mammal herbivory and insect larvae each accounted for 11%. Also 5 sickly individuals were removed for weevil research (20% reproductive and 80% non-reproductive). One new seedling was found, for 0.2% recruitment. Eleven non-reproductive plants became reproductive, and one seedling obtained non-reproductive size. Additionally 22 new plants (9% reproductive, 86% non-reproductive, and 5% seedling class) were found in the established plots. Also one non-reproductive individual that was considered missing in 1998 was relocated. Total number of live plants at the end of the 1999 field season stands at 502 (63% reproductive, 35% non-reproductive, and 2% seedling size class).					

Kickapoo Caverns SP, Kinney/Edwards Cos. 1998			1999	Of the total of 230 plants alive at the end of 1998, 19 died (79% reproductive, and 11% each non-reproductive and seedling class) and 8 individuals (25% reproductive, 12% non-reproductive, and 62% seedling class) went missing, for a 12% loss. While the cause of most of the deaths was unknown (53%), 11% of the mortality was directly attributable to weevils and 37% of the plants had hollow stems, an indication of insect activity. Also 4 sickly reproductive plants were removed for weevil research. Six seedlings increased to non-reproductive size, and six juveniles produced flowers or fruits becoming part of the reproductive class. Also 5 individuals (40% reproductive and 60% seedling class) that had been recorded as missing were relocated. 45 new seedlings were found in established plots for a 20% recruitment rate. An additional 102 individuals (23% reproductive, 38% non-reproductive, and 39% of unknown, non-seedling class) were found in established plots. Nine new plots were established with a total of 98 individuals (34% reproductive, 20% non-reproductive, 31% unknown, non-seedling class, and 15% seedling class). Total number of plants now stands at 449 (41% reproductive, 27% non-reproductive, 16% unknown, non-seedling class, and 16% seedling class).
Live - Reproductive	125	128		
Live - Non-reproductive	56	60		
Live - Seedling (<1 cm in diam.)	22	11		
<b>Total Live</b>	<b>203</b>	<b>199</b>		
New - Reproductive	16	23		
New - Non-reproductive	7	39		
New - Reproductive/non-reproductive	0	40		
New - Seedling	1	45		
<b>Total New</b>	<b>24</b>	<b>147</b>		
New plot - Reproductive	1	33		
New plot - Non-reproductive	2	20		
New plot - Reproductive/non-reproductive	0	30		
New plot - Seedling	0	15		
<b>Total New Plot</b>	<b>3</b>	<b>98</b>		
Refound MIA - Reproductive	0	2		
Refound MIA - Non-reproductive	0	0		
Refound MIA - Seedling	0	3		
<b>Total Refound MIA</b>	<b>0</b>	<b>5</b>		
<b>Total Live at end of year</b>	<b>230</b>	<b>449</b>		
MIA - Reproductive	3	2		
MIA - Non-reproductive	0	1		
MIA - Seedling	8	5		
<b>Total MIA</b>	<b>11</b>	<b>8</b>		
Removed - Reproductive	0	4		
Removed - Non-reproductive	0	0		
Removed - Seedling	0	0		
<b>Total Removed</b>	<b>0</b>	<b>4</b>		
Dead - Reproductive	13	15		
Dead - Non-reproductive	2	2		
Dead - Seedling	2	2		
<b>Total Dead</b>	<b>17</b>	<b>19</b>		
COD* - weevils	5	2		
COD* - hollow	0	7		
COD* - soil disturbance	2	0		
COD* - unknown	10	10		
<b>Total mia, dead, removed</b>	<b>28</b>	<b>31</b>		