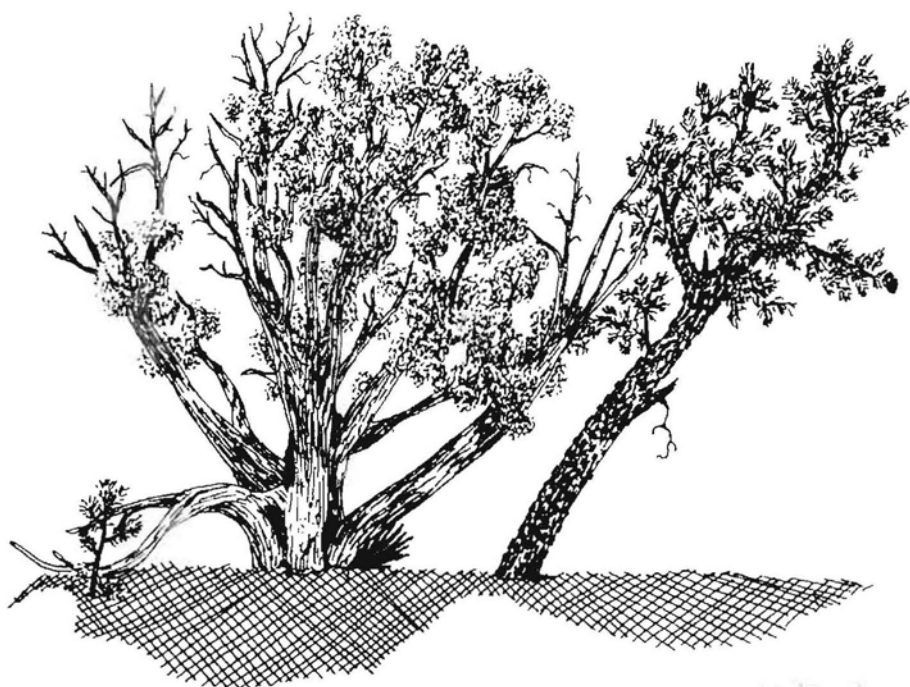


PHOTOGRAPHIC GUIDE
TO PINYON AND JUNIPER TREE
MATURITY CLASSES

featuring
Pinus edulis
&
Juniperus osteosperma



Scott E. Sink

Ecological Restoration Institute

ABSTRACT

Two series of color photographs illustrate the variation in growth habit of five maturity classes of pinyon pine (*Pinus edulis* Engelm.) and Utah juniper trees (*Juniperus osteosperma* (Torr.) Little) from a variety of sites across Northern Arizona. Information provided with each photograph includes a cross-dated age and measures of height, crown radius, and multiple diameters. Three site quality levels allow the user to calibrate the guide to their site and account for microsite variation. A pictorial summary of bark characteristics is presented for both species.

This photographic guide provides an efficient way to estimate the age of pinyon pine and juniper trees in the field for ecological restoration, as well as general research ecology, in pinyon-juniper ecosystems throughout Northern Arizona and nearby regions.

AUTHOR

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METRIC-ENGLISH CONVERSIONS

3.28 feet = 1 meter

1 foot = 0.30 meter

0.39 inch = 1 centimeter

1 inch = 2.54 centimeters

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&

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PURPOSE OF PHOTOGRAPHIC GUIDE

The spread of pinyon pine and juniper trees in the past century has been well documented (Blackburn and Tueller 1970). This increase in tree density has been attributed to many factors and has had a negative effect on understory species and erosion rates (Brockway et al. 2002). Ecologists and managers may be interested in differentiating age classes of trees or restoring historical forest structure. Thus the Photographic Guide was designed to distinguish maturity classes of pinyon pine (*Pinus edulis* Engelm.) and Utah juniper trees (*Juniperus osteosperma* (Torr.) Little).

However, since pinyon pine and juniper trees often grow inconsistently and physical characteristics vary based on site conditions, it can be difficult to assess tree age, especially of older trees (Bradshaw and Reveal 1943). This is due in part to the multiple-stemming of both *P. edulis* and *J. osteosperma*, as well as microsite conditions. To compensate for such concerns, this Photographic Guide displays a range of the physical manifestations of these trees from three diverse Northern Arizona sites (see Page 5).

The trees were categorized into five maturity classes that were applied to both *P. edulis* and *J. osteosperma* for the sake of simplicity. These five maturity classes are adapted from Blackburn and Tueller (1970) and Bradshaw and Reveal (1943):

<i>Maturity Class</i>	<i>Age</i>
Seedling	1-20
Sapling	21-80
Mature Vigorous	81-135
Mature Old	136-200

SUMMARY OF RESEARCH SITES

Data were collected from pinyon-juniper ecosystems at three sites in Northern Arizona to cover a range of elevations and soil types. The main research area was located west of Mount Trumbull on the North Rim of the Grand Canyon (Table 1). The other two sites were located west of Stoneman Lake and the Beaver Creek watershed, and northwest of Walnut Canyon National Monument (Table 1). Trees at Mount Trumbull were predominantly found on the sides and top of two small hills, whereas at Stoneman Lake they were all in a relatively flat area. At Walnut Canyon, trees were primarily found along rocky ridges with some *J. osteosperma* dispersed in open meadows.

Table 1. Site summary for three pinyon-juniper research sites in Northern Arizona; precipitation data from Waltz et al. 2003, WRCC 2003, and USFS 2002.

Site	Elevation (m)	Precipitation (mm/yr)	Site Index [*] height(m)@100-years	Bedrock
Mount Trumbull	1935	482	5.3	Basalt
Stoneman Lake	1663	460	5.8	Basalt
Walnut Canyon	2039	462	7.0	Limestone/Sandstone

* Selected site trees of *P. edulis* were used from each research area to create site index curves with a base age of 100 (Figure 1, Avery and Burkhart 2002). Site index data in Table 1 is equivalent to 17.5-, 19-, and 23-feet respectively.

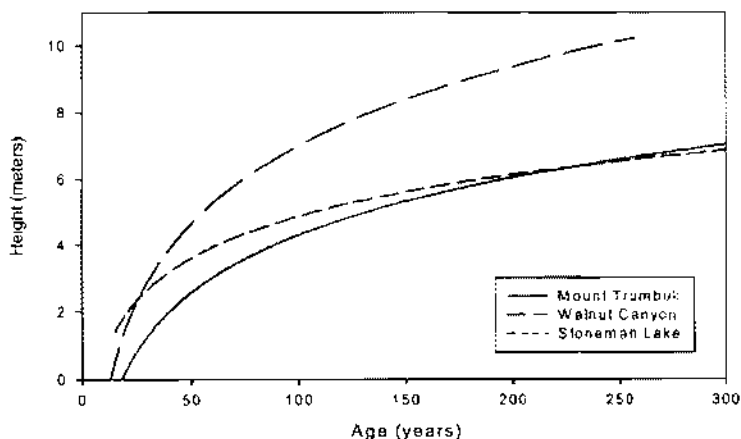


Figure 1. Site index curves for three Northern Arizona pinyon pine sites; base age of 100.

RESEARCH SUMMARY

Research was conducted at three sites during Summer 2002 and 2003. A total of 377 tree cores were taken, but only those that could be cross-dated accurately were used. All trees were measured for height and crown radius as an average of the longest and shortest side. Diameter measurements of each stem were at root collar (DRC, ground level), stump height (DSH, 0.4-meters high), and breast height (DBH, 1.3-meters high). Due to multiple stemming of trees, especially *J. osteosperma*, two or more diameter measurements often had to be taken for DSH and DBH. Photographs of all trees were taken next to a 3-meter pole, or a metric logger's tape with smaller trees, for visual reference. In addition, a close-up picture of bark at DSH was taken of trees at the Mount Trumbull site. The oldest trees cross-dated in this study were a *P. edulis* from 1675 and a *J. osteosperma* from 1648.

LAYOUT OF PHOTOGRAPHIC GUIDE

The Photographic Guide is broken down by species, beginning with *P. edulis*, and then maturity class, by increasing age. Both species have a front page with a brief summary of bark characteristics. Maturity class sections all begin with a main page showing a representative tree and a range of general characteristics. The maturity classes are further divided into groups of similarly aged trees from low-, mid-, and high-quality sites. Seedling and Overmature classes have only one page with all three quality levels displayed. Sapling, Mature Vigorous, and Mature Old classes have three pages of similarly aged trees from each of the three quality levels. Six measurements are given with each tree photograph. DSH and DBH measurements can have an "&" sign designating two stems were measured for that tree or a "-" sign designating three or more diameters with the low and high value shown.

LAYOUT OF PHOTOGRAPHIC GUIDE (cont.)

In the lower, right corner of each tree photograph is an identification number. The "SL" represents trees from Stoneman Lake, "WC" are from Walnut Canyon, and the more complex "MT" numbers designate a specific tagged tree at Mount Trumbull. In the upper corners of maturity class pages, icons and headings differentiate species and maturity class for quick reference.

USING THE PHOTOGRAPHIC GUIDE

It is important to remember that *P. edulis* and *J. osteosperma* trees have extremely variable physical manifestations. The photographs in this guide are used to present the physical form of the trees, described by the measured data. However, not every form could be shown at every maturity class. This Photographic Guide is by no means a hard and fast classification for these two species and should be used flexibly.

That said, here is one way the Photographic Guide could be useful. By conducting a pilot study in an area of interest, a user could calibrate the guide to their site, depending upon whether trees were consistent with low-, mid-, and high-quality levels. The user could also account for microsite variation by going up a level with trees in favorable growing conditions or down a level with suppressed or damaged trees. It is entirely possible that some sites may produce conditions higher than the high-quality or lower than the low-quality areas presented here.

For quick comparisons, a summary table of the general ranges of characteristics is given on the back cover (Table 2, page 48). The main ranges represent trees from a mid-quality site, with low- and high-quality sites corresponding with values in parentheses.

DISCLAIMER

The maturity classes used in this Photographic Guide may have little bearing on the actual sexual maturity of trees in the field, given it is a highly variable characteristic. All cores were taken at stump height or lower, however, no years were added to account for the time it might have taken to reach that height. Due to the extensive area covered by pinyon-juniper ecosystems, many soil type, elevation, or precipitation ranges were not measured in this project. It is not recommended to use this Photographic Guide on black or red cinder soils, such as those found around Sunset Crater National Monument, owing to several factors including the presence of stem-boring moths. The single-needle or "fallax" variety of *P. edulis* was found at the Stoneman Lake site and used in the final data set. Despite its many shortcomings, I hope the Photographic Guide will be useful in the field. Good luck.

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ACKNOWLEDGEMENTS

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Pinus edulis



Maturity Class	Page
Seedling	10
Sapling	12
Mature Vigorous	16
Mature Old	20
Overmature	24

Bark Characteristics

Seedling/Sapling

Light gray bark begins to split into plates, often exposing a red color in fissures; older Saplings resemble Mature Vigorous bark.

Mature Vigorous

As bark plates thicken two distinct types emerge; one more blocky without fissures and one more flaky with red-orange fissures.

Mature Old

Both blocky and flaky bark types continue to thicken their layers.

Overmature

The blocky bark type may develop deep fissures while the flaky type may grow over most of its fissures, increasing their similarity.





Pinus edulis SEEDLING

(1-20 years old)



Height- 0.2 - 0.6 m 0.5 - 1.0 cm -DRC

Crown Radius- 0.1 - 0.2 m 0.0 - 0.5 cm -DSH



Age- 16 1.0 cm -DRC

Height- 0.55 m 0.4 cm -DSH

Crown Radius- 0.18 m --- -DBH



Pinus edulis
SEEDLING



Low-Quality Site

10 -Age
 DRC- 0.5 cm
 0.05 m -Height
 DSH- ---
 0.02 m -Crown Radius
 DBH- ---

Mid-Quality Site

Age- 15
 0.9 cm -DRC
 Height- 0.35 m
 --- -DSH
 Crown Radius- 0.15 m
 --- -DBH



High-Quality Site

19 -Age
 DRC- 1.4 cm
 0.70 m -Height
 DSH- 0.9 cm
 0.40 m -Crown Radius
 DBH- ---



Pinus edulis
SAPLING
(21-80 years old)



Height- 0.7 - 5.5 m 2.0 - 21.0 cm -DRC

Crown Radius- 0.4 - 1.8 m 1.0 - 15.0 cm -DBH



MT1S21

Age- 73 15.5 cm -DRC

Height- 5.0 m 13.0 cm -DSH

Crown Radius- 1.8 m 11.5 cm -DBH



Pinus edulis

SAPLING



Low-Quality Site

28 -Age
 DRC- 1.5 cm
 0.7 m -Height
 DSH- 0.5 cm
 0.4 m -Crown Radius
 DBH- ---

Mid-Quality Site

Age- 23
 5.2 cm -DRC
 Height- 1.7 m
 4.0 cm -DSH
 Crown Radius- 0.4 m
 1.6 cm -DBH



High-Quality Site

31 -Age
 DRC- 13.4 cm
 3.9 m -Height
 DSH- 8.9 cm
 0.8 m -Crown Radius
 DBH- 7.6 cm





Pinus edulis
SAPLING

Low-Quality Site

Age- 36
2.0 cm -DRC
Height- 1.3 m
1.3 cm -DSH
Crown Radius- 0.4 m
--- -DBH



Mid-Quality Site

35 -Age
DRC- 19.0 cm
4.4 m -Height
DSH- 16.9 cm
1.4 m -Crown Radius
DBH- 14.8 cm

High-Quality Site

Age- 65
19.5 cm -DRC
Height- 6.1 m
17.0 cm -DSH
Crown Radius- 1.6 m
16.2 cm -DBH





Pinus edulis
SAPLING



Low-Quality Site

- 53 -Age
- DRC- 9.2 cm
- 2.8 m -Height
- DSH- 7.3 cm
- 0.9 m -Crown Radius
- DBH- 5.4 cm

Mid-Quality Site

- Age- 73
- 21.2 cm -DRC
- Height- 5.3 m
- 20.4 cm -DSH
- Crown Radius- 2.1 m
- 20.4 cm -DBH



High-Quality Site

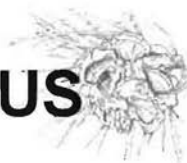
- 77 -Age
- DRC- 21.2 cm
- 6.2 m -Height
- DSH- 20.0 cm
- 2.2 m -Crown Radius
- DBH- 15.8 cm



Pinus edulis

MATURE VIGOROUS

(81-135 years old)



Height- 4.7 - 5.9 m 18.3 - 23.5 cm-DRC

Crown Radius- 1.6 - 2.1 m 13.8 - 19.7 cm -DBH



Age- 105 23.5 cm -DRC

Height- 5.9 m 22.4 cm -DSH

Crown Radius- 2.1 m 22.9 cm -DBH

Pinus edulis
**MATURE
VIGOROUS**



Low-Quality Site

94 -Age
DRC- 7.1 cm
2.9 m -Height
DSH- 4.3 & 5.1 cm
1.2 m -Crown Radius
DBH- 3.4 & 3.5 cm

Mid-Quality Site

Age- 94
18.3 cm -DRC
Height- 5.4 m
16.2 cm -DSH
Crown Radius- 1.6 m
15.1 cm -DBH



High-Quality Site

99 -Age
DRC- 22.6 cm
6.0 m -Height
DSH- 20.7 cm
1.8 m -Crown Radius
DBH- 19.1 cm



Pinus edulis
**MATURE
VIGOROUS**

Low-Quality Site

Age- 101

14.2 cm -DRC

Height- 3.8 m

12.9 cm -DSH

Crown Radius- 1.0 m

10.8 cm -DBH



Mid-Quality Site

102 -Age

DRC- 20.2 cm

5.2 m -Height

DSH- 18.0 cm

1.6 m -Crown Radius

DBH- 18.8 cm

High-Quality Site

Age- 122

23.5 cm -DRC

Height-7.5 m

20.4 cm -DSH

Crown Radius-1.6 m

18.7 cm -DBH



Pinus edulis
**MATURE
VIGOROUS**



Low-Quality Site

103 -Age

DRC- 16.3 cm

7.7 m* -Height

DSH- 14.9 cm

1.3 m -Crown Radius

DBH- 13.9 cm

* Grew under and overtopped *J. osteosperma* tree

Mid-Quality Site

Age- 106

22.9 cm -DRC

Height- 5.8 m

21.1 cm -DSH

Crown Radius- 2.7 m

19.7 cm -DBH



High-Quality Site

132 -Age

DRC- 30.5 cm

9.1 m -Height

DSH- 28.8 cm

2.1 m -Crown Radius

DBH- 21.7 cm



Pinus edulis
MATURE OLD
(136-200 years old)



Height- 5.1 - 7.4 m 21.5 - 37.2 cm -DRC

Crown Radius- 1.7 - 2.7 m 16.2 - 28.1 cm -DBH



Age- 166 34.5 cm -DRC

Height- 7.3 m 31.5 cm -DSH

Crown Radius- 3.2 m 27.0 cm -DBH



Pinus edulis
**MATURE
 OLD**



Low-Quality Site

- 140 -Age
- DRC- 14.7 cm
- 3.6 m -Height
- DSH- 13.6 cm
- 1.3 m -Crown Radius
- DBH- 11.0 cm

Mid-Quality Site

- Age- 136
- 17.7 cm -DRC
- Height- 5.9 m
- 15.1 cm -DSH
- Crown Radius- 2.2 m
- 14.1 cm -DBH



High-Quality Site

- 159 -Age
- DRC- 33.5 cm
- 8.2 m -Height
- DSH- 30.5 cm
- 1.7 m -Crown Radius
- DBH- 27.2 cm



Pinus edulis

**MATURE
OLD**

Low-Quality Site

Age- 164

19.8 cm -DRC

Height- 4.1 m

16.6 cm -DSH

Crown Radius- 1.4 m

11.7 cm -DBH



Mid-Quality Site

171 -Age

DRC- 27.4 cm

6.0 m -Height

DSH- 23.7 cm

1.8 m -Crown Radius

DBH- 20.3 cm

High-Quality Site

Age- 185

35.6 cm -DRC

Height- 8.9 m

31.1 cm -DSH

Crown Radius- 2.6 m

28.7 cm -DBH





Pinus edulis
**MATURE
OLD**



Low-Quality Site

174 -Age

DRC- 20.0 cm

6.2 m -Height

DSH- 18.5 cm

2.5 m -Crown Radius

DBH- 16.5 cm

Mid-Quality Site

Age- 187

33.9 cm -DRC

Height- 7.4 m

32.0 cm -DSH

Crown Radius- 2.7 m

28.1 cm -DBH



High-Quality Site

189 -Age

DRC- 42.0 cm

10.5 m -Height

DSH- 37.3 cm

3.1 m -Crown Radius

DBH- 35.8 cm

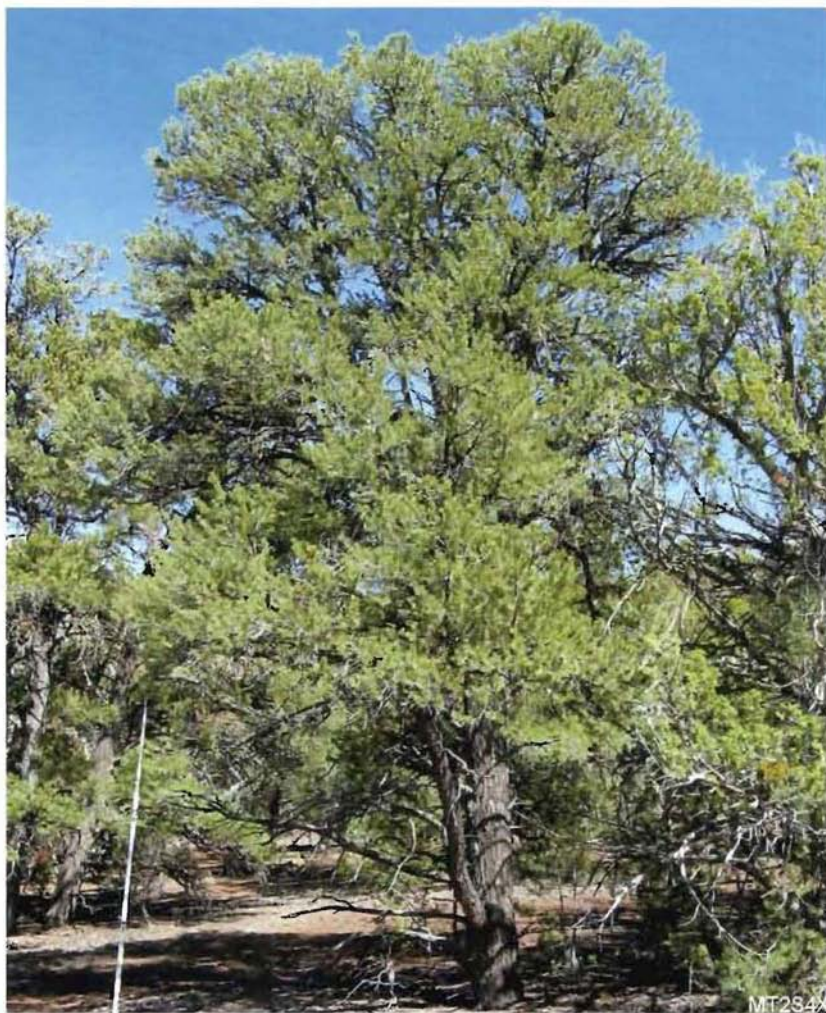


Pinus edulis
OVERMATURE
(200+ years old)



Height- 7.3 - 11.0 m 26.8 - 45.0 cm-DRC

Crown Radius- 2.3 - 3.2 m 23.3 - 40.5 cm -DBH



Age- 243 45.0 cm -DRC

Height- 8.2 m 46.2 cm -DSH

Crown Radius- 3.2 m 40.5 cm -DBH



Pinus edulis
OVERMATURE



Low-Quality Site

213 -Age
DRC- 24.8 cm
6.3 m -Height
DSH- 24.5 cm
2.1 m -Crown Radius
DBH- 19.2 cm

Mid-Quality Site

Age- 235
40.0 cm -DRC
Height- 8.4 m
36.6 cm -DSH
Crown Radius- 2.3 m
33.9 cm -DBH



High-Quality Site

223 -Age
DRC- 60.9 cm
11.0 m-Height
DSH- 56.0 cm
4.4 m -Crown Radius
DBH- 51.5 cm

Juniperus osteosperma

Maturity Class	Page
Seedling	28
Sapling	30
Mature Vigorous	34
Mature Old	38
Overmature	42

Bark Characteristics

Seedling/Sapling

The trees grow their characteristically shreddy bark from the youngest ages, typically light or dark gray in color.

Mature Vigorous

As trees mature the shreddy bark becomes thicker.

Mature Old

Bark becomes less loose as time goes on; insect bore holes are common.

Overmature

The bark is similar to the previous two maturity classes; often brown and whorled where multiple stems branch off.



Juniperus osteosperma

SEEDLING

(1-20 years old)

Height- 0.20 - 0.35 m 0.7 - 1.2 cm-DRC

Crown Radius- 0.08 - 0.12 m 0.0 - 0.2 cm-DSH



Age-	17	1.9 cm	-DRC
Height-	0.35	---	-DSH
Crown Radius-		---	-DBH
	0.10		



Juniperus osteosperma
SEEDLING



Low-Quality Site

18 -Age
 DRC- 0.5 cm
 0.18 m -Height
 DSH- ---
 0.10 m -Crown Radius
 DBH- ---

Mid-Quality Site

Age- 17
 0.5 cm -DRC
 Height- 0.17 m
 --- -DSH
 Crown Radius- 0.15 m
 --- -DBH



High-Quality Site

8 -Age
 DRC- 1.2 cm
 0.54 m -Height
 DSH- 0.5 cm
 0.15 m -Crown Radius
 DBH- ---

Juniperus osteosperma
SAPLING
 (21-80 years old)

Height- 0.5 - 4.0 m 2.0 - 25.0 cm -DRC

Crown Radius- 0.2 - 1.7 m 0.0 - 15.0 cm -DBH



Age- 70 18.3 cm -DRC
 Height- 3.1 m 16.3 cm -DSH
 Crown Radius- 1.1 m 6.4 & 9.5 cm -DBH



Juniperus osteosperma
SAPLING



Low-Quality Site

44 -Age
 DRC- 2.0 cm
 0.4 m -Height
 DSH- ---
 0.2 m -Crown Radius
 DBH- ---

Mid-Quality Site

Age- 41
 3.5 cm -DRC
 Height- 1.4 m
 2.5 cm -DSH
 Crown Radius- 0.2 m
 --- -DBH



High-Quality Site

32 -Age
 DRC- 15.8 cm
 4.1 m -Height
 DSH- 14.8 cm
 1.7 m -Crown Radius
 DBH- 11.9 cm



Juniperus osteosperma
SAPLING

Low-Quality Site

Age- 50
2.5 cm -DRC
Height- 0.8 m
1.0 cm -DSH
Crown Radius- 0.3 m
--- -DBH



Mid-Quality Site

52 -Age
DRC- 12.1 cm
2.9 m -Height
DSH- 10.3 cm
1.2 m -Crown Radius
DBH- 7.0 cm

High-Quality Site

Age- 46
20.5 cm -DRC
Height- 3.2 m
18.0 cm -DSH
Crown Radius- 1.5 m
12.0 cm -DBH





Juniperus osteosperma
SAPLING



Low-Quality Site

75 -Age

DRC- 6.7 cm

1.4 m -Height

DSH- 6.1 cm

0.5 m -Crown Radius

DBH- 0.7 cm

Mid-Quality Site

Age- 77

24.9 cm -DRC

Height- 3.6 m

20.7 cm -DSH

Crown Radius- 1.7 m

14.3 cm -DBH



High-Quality Site

51 -Age

DRC- 27.5 cm

5.3 m -Height

DSH- 17.0 cm

2.5 m -Crown Radius

DBH- 13.7 cm

Juniperus osteosperma
MATURE VIGOROUS
(81-135 years old)

Height- 4.0 - 5.6 m 22.0 - 40.0 cm-DRC

Crown Radius- 1.5 - 2.6 m 15.0 - 26.0 cm -DBH



Age- 127 26.1 cm -DRC
Height- 4.9 m 28.2 cm -DSH
Crown Radius- 1.9 m 13.9 cm -DBH



Juniperus osteosperma

**MATURE
VIGOROUS**



Low-Quality Site

83 -Age

DRC- 5.8 cm

1.9 m -Height

DSH- 4.8 cm

0.7 m -Crown Radius

DBH- 1.3 cm

Mid-Quality Site

Age- 90

30.3 cm -DRC

Height- 4.0 m

27.0 cm -DSH

Crown Radius- 2.9 m

21.6 cm -DBH



High-Quality Site

87 -Age

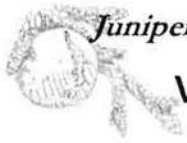
DRC- 37.5 cm

4.2 m -Height

DSH- 30.2 cm

1.9 m -Crown Radius

DBH- 15.2 cm



Juniperus osteosperma

**MATURE
VIGOROUS**

Low-Quality Site

Age- 92

10.6 cm -DRC

Height- 3.2 m

9.9 cm -DSH

Crown Radius- 1.2 m

8.4 cm -DBH



Mid-Quality Site

114 -Age

DRC- 32.7 cm

3.4 m -Height

DSH- 27.5 cm

2.0 m -Crown Radius

DBH- 20.4 cm

High-Quality Site

Age- 93

44.7 cm -DRC

Height- 6.2 m

40.8 cm -DSH

Crown Radius- 3.3 m

31.5 cm -DBH





Juniperus osteosperma
**MATURE
VIGOROUS**



Low-Quality Site

101 -Age

DRC- 21.0 cm

3.9 m -Height

DSH- 21.1 cm

2.0 m -Crown Radius

DBH- 17.5 cm

Mid-Quality Site

Age- 128

40.3 cm -DRC

Height- 4.7 m

36.9 cm -DSH

Crown Radius- 2.4 m

6.8 - 17.6 cm -DBH



High-Quality Site

125 -Age

DRC- 52.7 cm

8.5 m -Height

DSH- 49.7 cm

3.3 m -Crown Radius

DBH- 48.5 cm

Juniperus osteosperma
MATURE OLD

(136-200 years old)

Height- 4.4 - 6.7 m 37.1 - 61.3 cm -DRC

Crown Radius- 2.1 - 3.5 m 17.8 - 37.9 cm -DBH



Age- 144 37.1 cm -DRC

Height- 4.8 m 13.9 - 32.7 cm -DSH

Crown Radius- 2.3 m 8.9 - 19.0 cm -DBH



Juniperus osteosperma

**MATURE
OLD**



Low-Quality Site

144 -Age

DRC- 19.1 cm

3.9 m -Height

DSH- 18.7 cm

1.7 m -Crown Radius

DBH- 16.5 cm

Mid-Quality Site

Age- 134

45.5 cm -DRC

Height-4.9 m

57.0 cm -DSH

Crown Radius-3.2 m

11.0 - 22.8 cm-DBH



High-Quality Site

142 -Age

DRC- 61.8 cm

10.2 m-Height

DSH- 60.1 cm

3.7 m -Crown Radius

DBH-19.9 & 46.0 cm



Low-Quality Site

Age- 165

23.7 cm -DRC

Height- 3.8 m

23.4 cm -DSH

Crown Radius- 1.2 m

7.9 - 12.7 cm-DBH



Mid-Quality Site

162 -Age

DRC- 48.5 cm

4.4 m -Height

DSH- 43.0 cm

2.1 m -Crown Radius

DBH- 11.5 & 17.8 cm

High-Quality Site

Age- 155

79.0 cm -DRC

Height- 11.5 m

72.4 cm -DSH

Crown Radius- 5.0 m

43.7 & 57.0 cm-DBH





Juniperus osteosperma

**MATURE
OLD**



Low-Quality Site

- 191 -Age
- DRC- 31.7 cm
- 3.6 m -Height
- DSH- 27.3 cm
- 1.8 m -Crown Radius
- DBH- 18.1 cm

Mid-Quality Site

- Age- 185
- 61.3 cm -DRC
- Height- 6.7 m
- 54.2 cm -DSH
- Crown Radius- 3.9 m
- 52.5 cm -DBH



High-Quality Site

- 199 -Age
- DRC- 80.7 cm
- 7.2 m -Height
- DSH- 25.5 - 58.2 cm
- 2.7 m -Crown Radius
- DBH- 22.0 - 34.2 cm

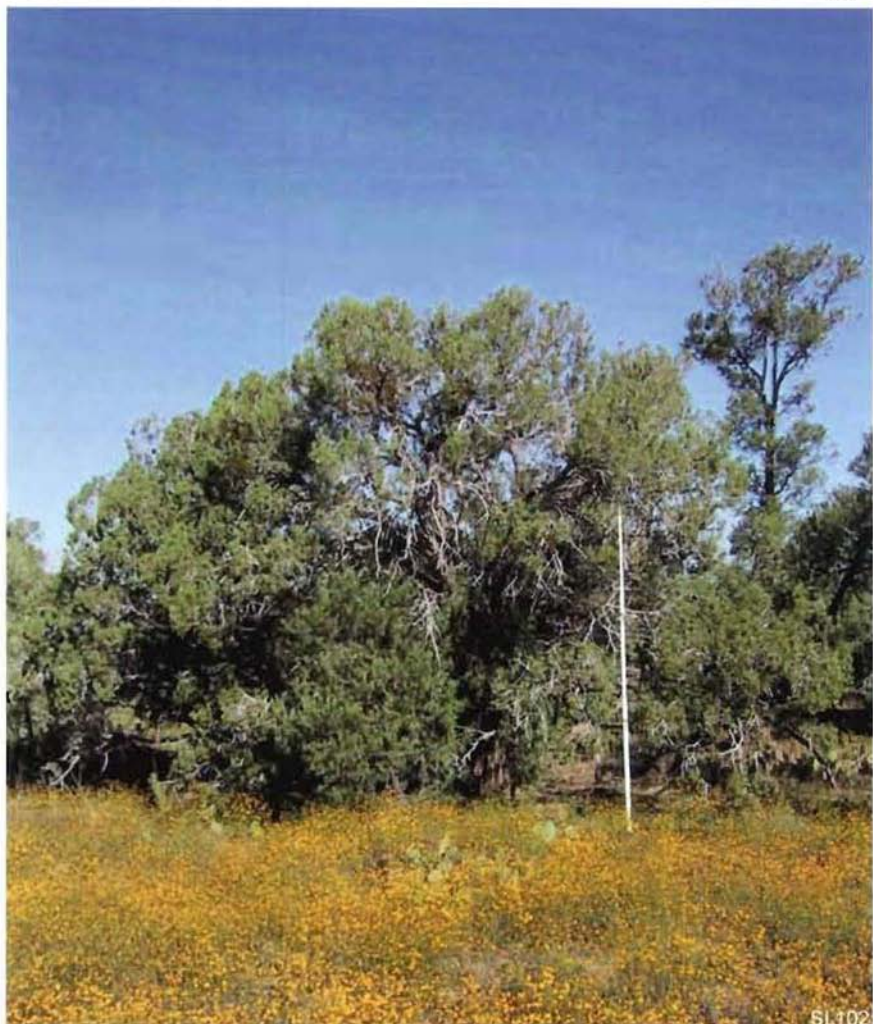


Juniperus osteosperma
OVERMATURE

(200+ years old)

Height- 5.4 - 6.8 m 47.8 - 66.6 cm -DRC

Crown Radius- 2.7 - 4.0 m 24.4 - 41.2 cm -DBH



SI 102

Age- 235 47.8 cm -DRC

Height- 5.5 m 43.2 cm -DSH

Crown Radius- 3.1 m 37.4 cm -DBH

Juniperus osteosperma
OVERMATURE



Low-Quality Site

219 -Age
DRC- 37.5 cm
1.9 m -Height
DSH- 34.9 cm
1.9 m -Crown Radius
DBH- 25.3 cm

Mid-Quality Site

Age- 210
66.6 cm -DRC
Height- 6.0 m
22.5 - 53.0 cm-DSH
Crown Radius- 3.7 m
12.1 - 31.0 cm -DBH



High-Quality Site

228 -Age
DRC- 84.4 cm
7.8 m -Height
DSH- 29.3 & 69.6 cm
2.3 m -Crown Radius
DBH- 19.2 - 34.8 cm



Table 2. Range of physical characteristics typical of the five maturity classes of pinyon pine and Utah juniper trees on a mid-quality site.

<i>Pinus edulis</i>	Height (m)	Crown Radius (m)	DRC (cm)	DSH/DBH*(cm)
Seedling	0.20 - 0.60	0.10 - 0.20	0.5 - 1.0	0.0 - 0.5
Sapling	0.7 - 5.5	0.4 - 1.8	2.0 - 21.0	1.0 - 15.0
Mature Vigorous	4.7 - 5.9	1.6 - 2.1	18.3 - 23.5	13.8 - 19.7
Mature Old	5.1 - 7.4	1.7 - 2.7	21.5 - 37.2	16.2 - 28.1
Overmature	7.3 - 11.0	2.3 - 3.2	26.8 - 45.0	23.3 - 40.5
<i>Juniperus osteosperma</i>				
Seedling	0.20 - 0.35	0.08 - 0.12	0.7 - 1.2	0.0 - 0.2
Sapling	0.5 - 4.0	0.2 - 1.7	2.0 - 25.0	0.0 - 15.0
Mature Vigorous	4.0 - 5.6	1.5 - 2.6	22.0 - 40.0	15.0 - 26.0
Mature Old	4.4 - 6.7	2.7 - 3.5	37.1 - 61.3	17.8 - 37.9
Overmature	5.4 - 6.8	2.1 - 4.0	47.8 - 66.6	24.4 - 41.2

* DSH is shown for Seedlings and DBH for all other maturity classes; ranges are indicative of the largest stem only