

Naturalized Populations of the Desert Fan Palm, *Washingtonia filifera*, in Death Valley National Monument

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Abstract

Four previously unreported populations of the Desert Fan Palm, *Washingtonia filifera*, have been located within the boundaries of Death Valley National Monument. Palm heights and absence of dead palms, beetle evidence, and historical references suggest the populations are of recent origin. Coyotes, birds, or humans undoubtedly dispersed seeds from ornamental plantings at Scottys Castle and Furnace Creek Ranch. Populations in Grapevine Canyon and at Grapevine Springs are the northernmost records of the species.

The Desert Fan Palm, *Washingtonia filifera* (Lindl.) Wendl., is reported to be confined to springs and seeps in the Sonoran Desert of southeastern California, western Arizona, and northeastern Baja California Norte [Henderson, 1951; Shreve and Wiggins, 1964; Brown *et al.*, 1976]. However, recently this species was identified as naturalized at four sites in southern Nevada [Cornett, 1987]. One of the sites, Warm Springs, located approximately 64 km northeast of the Las Vegas, is the most northerly record of the species. The locations and descriptions of the four other naturalized Desert Fan Palm populations in Death Valley National Monument are presented here with discussions regarding their origin, status, and significance.

In December of 1986 populations of *W. filifera* were located at Nevares Spring, Travertine Spring,

Grapevine Springs, and Grapevine Canyon in Death Valley National Monument (Fig. 1). Both mature (fruit-producing) and immature palms occur at each location, indicating that the trees were established and producing viable seed (Table 1). The absence of erect or prone dead palms, of individuals taller than 15 m in height, of evidence of the palm boring beetle (*Dinapate wrightii*), or historical references suggest each of the populations is of recent origin.

Nevares Springs Locality (NS)

The site lies in the foothills of the Funeral Mountains and is near, but not on, the floor of Death Valley (Fig. 2). It is a thermal spring with water temperature of from 30 to 35°C [Hershler, 1987]. Most of the flow is underground and, as indicated by the riparian vegetation, conforms to the east-west alignment of Cow Creek. The palms appear at scattered locali-

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ties near the creek where moisture approaches within 3 m of the surface. The surrounding soils are young alluvial deposits and lacustrine mudstone, the latter being tuffaceous [McAllister, 1970]. White mineral deposits on the surface along with the associated plant species shown in Table 2, suggest that the soil is alkaline [Munz, 1974]. Daily maximum temperatures in July have been known to reach 53°C, and winter minimums have dropped to -7°C (U.S. Weather Bureau, 1955). Immediately adjacent to Nevares Spring and Cow Creek are the park maintenance facilities and staff housing. Ornamental *W. filifera* are common around these structures and have been present since at least 1966 (Sonny Brunet, personal communication, 10 December 1986).

Travertine Springs Locality (TS). The springs consist of a number of seeps that also emanate from the western foothills of the Funeral Mountains (Fig. 3). Water temperature here reaches 32°C [Hershler,

1987]. The springs discharge sufficient water to form a small stream that flows down Furnace Creek Wash. Surrounding soils are alluvial deposits of varying ages and are assumed to be alkaline, as patches of white mineral deposits occur on the surface, and the associated plant species are known to occur on such soils [Munz, 1974]. The nearest weather shelter is at Furnace Creek, 3 km west and 123 m lower, where summer maximums have risen to 57°C and winter minimums have dropped to -9°C [Death Valley National Monument, 1983]. The nearest ornamental Desert Fan Palms are at Furnace Creek Ranch.

Grapevine Springs Locality (GVS). These springs lie on an elevated bench of alluvium along the western edge of the Grapevine Mountains. Numerous seeps occur in this area, but palms occur only at three of the sites (Fig. 4). Winter minimums are presumably lower than Nevares Travertine springs due to the higher

Table 1

Location, elevation, and number of *Washingtonia filifera* palms at four springs in Death Valley National Monument.

M = mature palms; I = immature palms excluding seedlings.

Spring Name	No. <i>W. filifera</i>		Latitude (N)	Longitude (W)	Elevation (in meters)
	M	I			
Grapevine Canyon*	06	54	37°01'57"	117°20'27"	974
Grapevine Springs	09	49	37°01'12"	117°23'12"	735
Nevares Spring	12	45	36°30'41"	116°51'45"	69
Travertine Springs	02	02	36°26'25"	116°50'00"	125

*Palm count includes only those individuals that are adventive

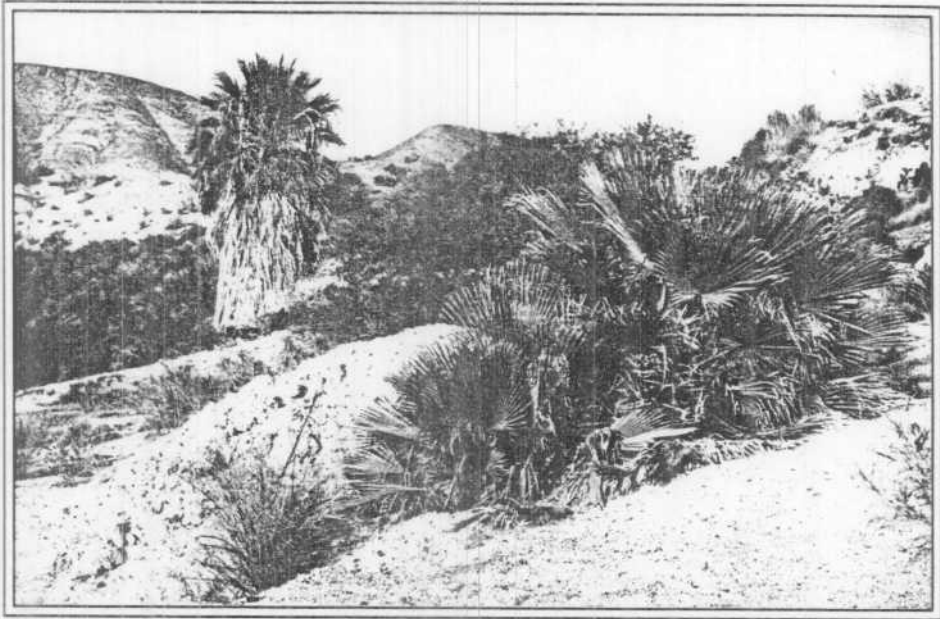


Figure 2. Desert Fan Palms at Nevares Spring, Death Valley National Monument.

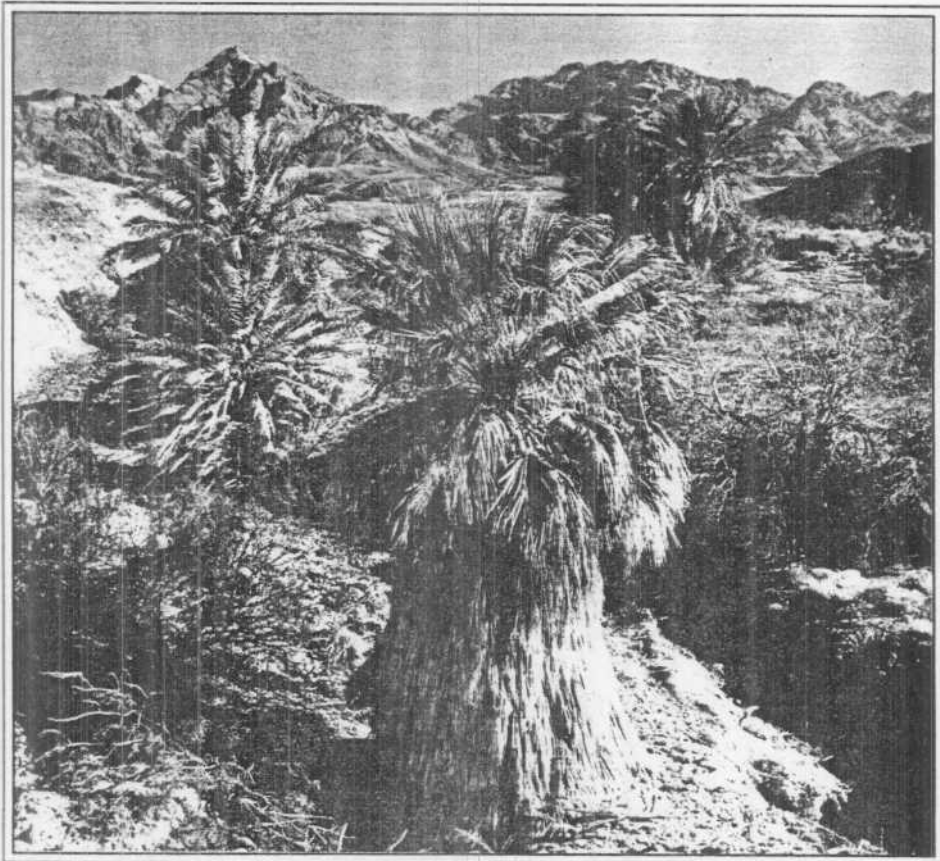


Figure 3. Desert Fan Palm at Travertine Springs, Death Valley National Monument.
Date Palms, *Phoenix dactylifera*, in background.

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Figure 4. Desert Fan Palms at Grapevine Springs, Death Valley National Monument.

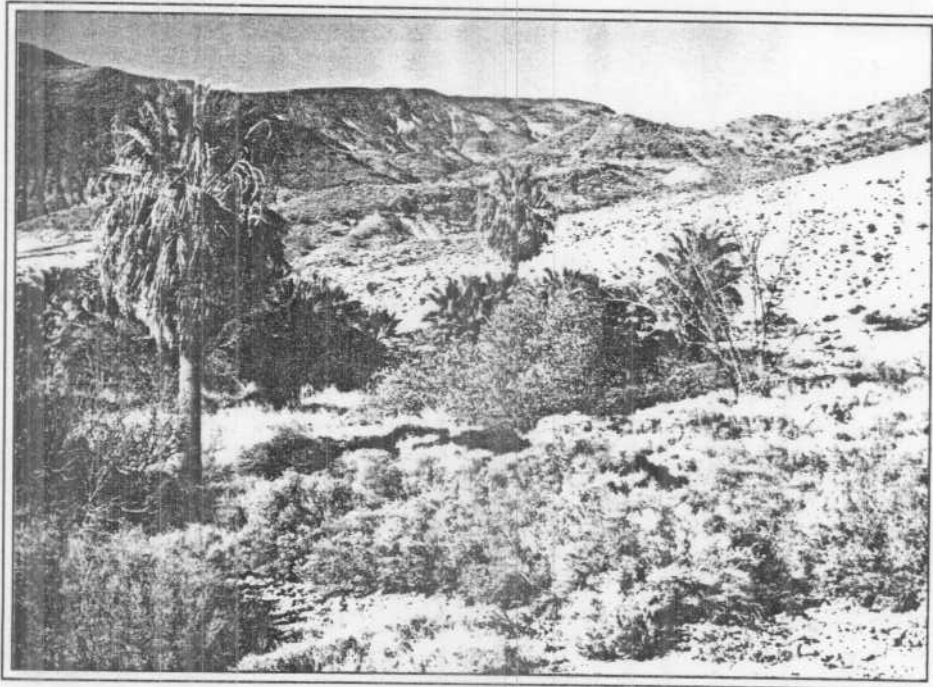


Figure 5. Desert Fan Palms in Grapevine Canyon, Death Valley National Monument.

Table 2

Five most dominant plant species (by coverage estimate) at four springs in Death Valley National Monument. Numbers refer to rank order with 1 indicating most dominant. Plant species arranged to emphasize elevational association. Springs arranged left to right by increasing elevation: NS = Nevares Spring, TS = Travertine Springs, GS = Grapevine Springs, GC = Grapevine Canyon, * = minor presence.

Species	NS	TS	GS	GS
<i>Sporobolus airoides</i>	5		*	
<i>Phoenix dactylifera</i>	4	2		
<i>Pluchea sericea</i>	1	5		
<i>Distichlis spicata</i>		3		
<i>Prosopis pubescens</i>	2	1	1	*
<i>Washingtonia filifera</i>	3	4	2	3
<i>Baccharis sergiloides</i>			4	1
<i>Typha domingensis</i>		*	3	*
<i>Juncus cooperi</i>			5	
<i>Tamarix ramosissima</i>	*	*		4
<i>Salix laevigata</i>				2
<i>Populus fremontii</i>				5

elevation (Table 1). Perhaps as a result of a colder climate, the palms are stunted and produce fruit even though trunk heights are less than 3 m. (Typically, individuals of this species do not produce fruit until at least 4 m in height.) The nearest *W. filifera* seed source is at Scottys Castle, 3 km to the east.

The palms in Grapevine Canyon (GVC) are associated with Scottys Castle, where over thirty mature palms are maintained as ornamentals (Fig. 5). Wild palms extend both up (east) and down (west) the canyon from the landscaped areas around the castle. The palms grow in the coarse alluvial deposits in the canyon bottom. The spring which provides water for both the ornamental and wild palms is considered a "thermal" spring with water emanating from the ground at a

temperature of 24°C [Waring, 1965]. Weather data recorded at Scottys Castle over a 20-year period indicate that winter minimum temperatures frequently drop below freezing, reaching lows of at least -7°C (Susan Buchel, personal communication, 1986).

No records of the occurrence of Desert Fan Palms in Death Valley National Monument are known prior to 1930. Historic photographs from Monument archives indicate that in the spring of that year three mature individuals of *W. filifera* were planted at Scottys Castle in Grapevine Canyon. Records from Scottys Castle Manuscript Collection suggest that these palms might have been purchased from a southern California nursery. Palms were also planted as ornamentals at Furnace Creek Inn around 1934 [Miller, 1977].

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It is likely that the naturalized populations of *W. filifera* within the Monument were established from seeds or seedlings originating at Furnace Creek and Scottys Castle and transported by coyotes or humans to the new localities (see Bullock [1980] and Cornett [1984] for discussions of seed dispersal). Desert Fan Palms are maintained today as ornamentals at Furnace Creek Inn, Furnace Creek Ranch, and National Park Service facilities at Cow Creek, Grapevine Residential Area, and Scottys Castle.

The vegetation at each of the four springs is similar to that of palm oases at comparable elevations in the Sonoran Desert of southeastern California. In addition to the Desert Fan Palm, mesquite (*Prosopis pubescens*), tamarisk (*Tamarix ramosissima*), and cattail (*Typha domingensis*) are associated with at least three of the four springs. Six of the twelve plant species listed in Table 2 are associated with springs at moderate elevations (GVC and GVS) and four with springs at low elevations (NS and TS). Only *W. filifera* and *P. pubescens* are present at each of the springs, suggesting that these two species have a relatively broad tolerance to various thermal regimes and perhaps soil conditions as well.

The survival of wild populations of *W. filifera* in Death Valley National Monument is significant. Grapevine Canyon and Grapevine Springs now represent the northernmost limits of the species' range; and Grapevine Canyon, at 974 m, is the fifth highest elevation at which these palms are known to occur. It would appear that, insofar as historical temperatures are concerned, warmer conditions at lower elevations and more southerly latitudes exist around springs throughout much of the great-

er Death Valley and Mojave Desert regions. Yet *W. filifera* does not occur at most of the springs in these areas even though the climate appears to be suitable. Considering the youth of the Death Valley and southern Nevada populations (<100 years) and the species' broad ecological tolerances, it would appear that the absence of *W. filifera* throughout much of the Death Valley and Mojave Desert regions is a result of dispersal failure, not intolerance to the present climatic regime.

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