



United States Department of the Interior

NATIONAL PARK SERVICE

SOUTHWEST REGION

P.O. Box 728

Santa Fe, New Mexico 87501

IN REPLY REFER TO:

N3615 (SWR)ONR

AUG 8 1980



Memorandum

To: Superintendent, Big Bend
Attention: Mr. Mike Warren

From: Southwest Region Air Quality Program Coordinator

Subject: Integral Vista Survey in Class I Areas

The subject survey is to be carried out in your area by the end of August 1980. The details on the procedures to be used have been finalized by the Air Quality Office in Denver. These are being sent to you directly from them. Please send your survey report to Dr. Keith Yarborough, Division of Natural Resources Management, in this office. Your report must be received and forwarded to the Denver air quality team by no later than mid-September 1980. Your cooperation will be appreciated in this important work which will help to protect the significant scenic resources at your area.

Enclosed here are excerpts from the Air Quality Related Value Inventory which was performed recently for your area by contract researcher Mr. Steve Gibbons. His complete report already has been sent to you. The excerpts here deal with your area's scenic vistas, visibility and its impairment. These are to assist you in making the integral vista survey. If you have any please contact Dr. Yarborough (Ph. No. (505) 988-6412, FTS 476-1412).

Keith A. Yarborough, Ph.D.

Enclosures

cc:
Dave Shaver, AIR/Denver, DSC
Field Assistant to the Regional Director

PROPERTY OF
Division of Natural Resources Management
Big Bend National Park, Texas

Though not overly emphasized, legislation that established Big Bend a National Park, does refer to air quality related values (AQRV'S).

Presidential Proclamation (49 Stat. 393-June 20, 1935) was the initial legislative mandate which authorized the formation of Big Bend National Park. Language of the decree states: ". . .such lands . . . as necessary for recreational park purposes within the boundaries . . . Known as the "Big Bend" area, . . . and are hereby established, dedicated, and set apart as a public park for the benefit and enjoyment of the people . . ."

As recreational resources, authorization does indirectly refer to air quality related values and their significance.

The Organic Act of August 25, 1916 (39 Stat. 535), as stipulation of the original proclamation, further defines and reiterates the overall importance of these values. The Act stipulates the purpose of the park as, ". . . to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

Step 1: Legislation

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As author of the presidential proclamation, Franklin Delano Roosevelt affirms the authenticity of the natural worth of the Big Bend landscape, as well as scenery, a visibility-related resource!

In association with its variable topographic relief, a multiple variety of scenic vistas comprise the visual resources of Big Bend National Park. Numerous scenic vistas from within and outside the park can be envisioned from the Chisos Mountains, overlooks and outlier sites. Because of their versatility and natural intrinsic worth, protection of these scenic resources with regard to significant forms of deterioration is a management priority of park service personnel.

The Chisos Basin offers a variety of trails geared for all hiking enthusiasts. For the well-conditioned hiker, the South Rim provides an outdoor laboratory site for visibility-related scenic vistas. Panoramas of foreground, intermediate and distant fields of view can be inspected from atop the South Rim of the Chisos Mountain Range. From this vantage point in all directions, significant scenic resources can be viewed.

A prominent feature toward the west of South Rim is Santa Elena Canyon. The visual pathway leading to the canyon is worthy of description. A low-set, mogul-type mountain is a predominant foreground landform. Coloration of its rocky surface is brown. Randomly dispersed clumps of dark green desert shrub vegetation invade its slopes. Cerro Castellan, with its layered reddish hue is a formidable intermediate geologic marker on this scenic path. Situated anteriorly, yet a part of Santa Elena Canyon, the Rio Grande meanders slowly toward

the southwest. The river's adjacent flood-plain is vegetatively dark green and is a distinguished contrast to the light textured mouth of Santa Elena Canyon. The cloudless blue sky imparts visual clarity and tonal contrasts to this intermediate scene. Mexico appears in the distance!

Also from South Rim and continuing in a clockwise fashion to the north, Emory Peak sits. The highest peak in Big Bend National Park at 7,835 feet, Emory Peak and its angular outline is silhouetted against the northern blue skyline. Its light brown textured and rocky slopes harbor a dark green canopy of woodland formations. Its western exposed limestone wall is cast in shadow as an influence of the early morning sun. A most significant foreground feature, Emory Peak's presence is unmistakable.

To the east, and progressing in a north-south manner, are the Sierra Del Carmen Mountains. Sierra Del Caballo Muerto, the northern extension of the mountain complex, is relatively smooth in outline and rises quietly above the surrounding landscape. Further in the distance is The Sierra Fronteriza, the southern half of the Carmen Mountain Range. In contrast to the north extension, The Sierra Fronteriza is rough in form and appears steadfast on the distant horizon. Visual clarity is impaired due to regional haze!

Full-circle to the south and in the immediate foreground is an uplifted island-type expanse of hills and peaks. The surface of this area is erosion-scarred and brown in color. A random network of sandy white streambeds infiltrate its slopes. An adjacent greenish-brown desert shrub vegetation influence the streams meandering course. Beyond this immediate field of view are distant mountains of Mexico. Because of regional haze, visual discernment of these distant formations is curtailed.

Very much similar to South Rim, Emory Peak affords a vantage point for a wide display of visual resources. From this isolated high-top perch (7,835 feet) can be seen The Basin, nestled far below. A unique mixed association of grassland and woodlands permeate its undulating slopes. A resultant yellow and green contrast is effected. More effectively, however, are the mountainous formations which surround The Basin. To the south is the High Chisos Complex. Ward Mountain and its Peaks form a mountain enclosure to the west. A dark green woodland formation impregnate its slope. The zig-zag outline of Ward Mountain is firmly etched into the dark blue sky. To the east of The Basin, appear Case Grande and Toll Mountain. Their domineering appearance elicit a reciprocal dominant reassurance to The Basin environs below. And to round out this unusual internal scenic resource is Vernon Bailey Mountain and its Peak to the north. Their rough, jagged and foreboding exterior veneer exhibit a bold and contrasting backdrop to a serene and gently carpeted Basin terrain below.

Also from Emory Peak, scenic vistas through and beyond The Window appear. Ward Mountain to the west and Vernon Bailey Mountain to the north provide the stage for this northwestern visual scene. Through The Window appear distant mesa tops and a volcanic mountain scene. The dark blue sky forms an enclosing backdrop to this Window show!

In the immediate foreground from Sotal Vista Overlook and sloping slightly toward the west is a furrowed expanse of sotol vegetation. The north and south interface of this midly inclined ravine is gravelly in nature with a base surface canopy of bunch grasses. A light brown texture is transmitted. A seemingly, evenly dispersed covering of sotol vegetation envelop the shade-tolerant north facing slope. A resultant yellow-green hue provides a vivid contrast to the surrounding desert landscape. The sotol's long golden willowy stalks add visual clarity to this scene. And perhaps of even greater importance and contrast is the adjacent, sun-resistant south facing slope. Its coarse brown surface features are without sotols and impose a much greater visual impact on its adjacent north-facing slope. In the distance appear Santa Elena Canyon and Mesa De Anguila. Their uplifted horizontal outline is embellished against the sky. This interior scenic resource not only demonstrates an example of tonal contrasts but also of internal effects within an ecosystem.

Like Sotal Vista, Mule Ears Overlook offers a look at Mule Ears Peak, a volcanic remanant of the geologic past. Its all encompassing

pedestal-type base is relatively denude of vegetation and light brown in color. Darker brown rock outcrops along with faintly defined white exposures of calcite impart visual acuity to this basal feature. Protruding sharply above this volcanic rock mass appear Mule Ears Peaks. These twin protrusions are angular in form and of a similar light brown earthen texture. Shadows cast by the late afternoon sun glide across its columns. As a backdrop, the dark blue sky enlists visual definition and tonal quality to this statuesque twin peak spectacle!

Juniper Canyon Overlook combines an aesthetically pleasing mixture of both interior and exterior scenic vistas. In the foreground is the north-facing enclosure to Juniper Canyon. The canyon's rocky slopes slowly descend to the canyon floor. A mid-slope vegetative cover consisting primarily of sotol, lechuguilla, pricklypear and grasses impart a greenish-brown hue to the slopes. Rock extrusions of a gray, reddish-brown tint is a visual highlight. The East Rim of the Chisos Mountains provide an imposing backdrop across canyon. The Chisos' dark green woodland formation is a superlative example of clear-cut tonal contrasts. Looking down, out through the canyon toward the south appear a wide lowland plain of volcanic mountain remanants. These volcanic outcrops are scoured and pot-marked in appearance and light brown in color. Resultant shadows from cloud cover embellish their sedentary mood. Beyond

this volcanic aftermath and on the distant horizon is Mariscal Mountain and Mexico. Observation of these two regional features elicit a feeling of completeness to this interior-exterior view.

The Santa Elena Canyon trail permits both a panorama of the Chisos Mountains and an interior scenic vista of the canyon itself. From atop the concrete steps of the trail, a view of the Chisos Mountains across country can be seen. Anteriorly, the Rio Grande winds slowly toward the southeast. Its sea green appearance and meandering course is highlighted by dark green lush vegetation on its adjacent floodplain. This mixed stand of mesquite, willow and cottonwoods elucidate a remarkable contrast to the glistening Rio Grande waters. Tonal contrasts are further enlivened beyond the floodplain to the east. Topographically, this intermediate zone is hilly, rocky, exposed and of a light brown color. A desert shrub formation consisting predominately of creosotebush frequent its slopes. Cerro Castellan with its red layered look is a monolith-type geologic feature amid the intermediate zone. Rising above and beyond this area is the north-south extension of the Chisos Mountain Range. Its rough impressionistic outline, most especially Emory Peak and the South Rim, is silhouetted against the blue sky. Sun angle and cloud cover effect a shadowy facade to this grandiose visual scene.

Similarly, the end of the trail provides an introspective scenic view into Santa Elena Canyon. From bottom up, a narrow beach strip of

floodplain vegetation and huge boulders influence the river's edge. A white, dark green and gray color scheme is respectively effected. A fitting contrast in tonal quality persist between this colorful remanant beach and the canyon wall across the river. Its gray sheer base all and upper vertical orange-colored extensions elicit a definitive contrast to the sparkling sea green Rio below. A wispy-cloud blue sky is an upper story backdrop for this lower interior scene. Santa Elena Canyon is a marvelous example of tonal contrasts and color gradations.

In the immediate foreground and east of the old Santa Elena road is a depression-like valley of desert shrub vegetation. Creosotebush, lechuguilla and sotol are the dominant vegetative cover. An orange-green floral hue is expressed. Burro Mesa is an obvious landform beyond this in-set valley. Its smooth, ribbon-like reddish-brown mesa top is in contrast to the light brown lowland relief. The Chisos Mountain in all its glory rise above and beyond Burro Mesa in the distance. Light brown in color, the Chisos' rugged, angular upper slopes are an imprint against the pale blue sky. Transitory white cloud puffs are a needless illustrious effect to an already perfect scenic view. This grand panorama of the north-south aligned Chisos Mountain Range include Vernon Bailey Peak, Ward Mountain, Emory Peak and The South Rim, as part of its visual showcase.

In the foreground of Panther Junction and extending eastward to the base of the Sierra Del Carmen is a lowland expanse of desert shrub vegetation. A greenish-brown color scheme is portrayed. An elevated sea of golden sotol stalks is an all inspiring visual contrast. Rising high above this desert plain in the distance is the Sierra Del Carmen.

The foothills of Sierra Del Carmen are furrowed in form and gray in color. Above this basal node is an intermediate area of layered steep cliffs. Coloration of the layers is a sequential gray and amber. Vertical striations of gray upon the amber layers cause an uncompromising contrast in tonality. In completeness, the Sierra Del Carmen with its contrasting pale blue sky, random white cloud puffs and resultant shadows present a wide array of visual motifs even to the casual observer!

The Boquillas Canyon Trail affords separate views of both Mexico to the south and Boquillas Canyon, itself. A stimulating interior scenic view of Boquillas Canyon, the Rio Grande and its adjacent floodplain unfolds up-slope at the end of the canyon trail. From this vantage point the Rio Grande's winding approach into the canyon can be visualized in full perspective. The river's ripply, sea-green water conveys a continuous melodic theme. A sandy light colored floodplain consisting of reeds, willows and cottonwoods embrace the Rio Grande shores. An effective soothing contrast is expressed. Mexico's sheer, rocky canyon walls form a massive limestone backdrop to this lowland river scene. Amber gray in color, Boquillas Canyon's upper-reach is outlined in the clear blue sky. As a

finishing visual touch, the early morning sun projects an illuminating brilliance over the Rio Grande's northeastward course.

A view incorporating the Rio Grande and Mexico to the south can be seen from a knoll at the beginning of the Boquillas Canyon Trail. In the foreground, outstretched is the Rio Grande. A clearly defined tonal contrast is exhibited between the river's light green color and the much darker green textured adjacent floodplain vegetation. Beyond the Rio Grande floodplain and extending far south into Mexico is an uplifted area of mesas and mountain tops. Coloration of this all-encompassing expanse is a medium brown shade. The dark blue sky is a warm background base for these geologic outcrops. In brevity, the unique visual theme of this panorama is massiveness in extent!

A rare and unusual blend of close, foreground and intermediate features can be viewed from a slightly elevated hill along the Hot Springs Historic Walk. In close proximity is the Rio Grande and Hot Springs Canyon. Low-set in nature, the canyon forms a stage for a foreground volcanic dome-like landform. The Sierra Del Carmen's, an intermediate landscape feature, rise above, beyond and in symmetrical relation to this foreground affair. Their layered amber gray striated cliff walls provide a remarkable contrast to the blue sky. Known for its associated springs, Hot Springs is entrusted with one of Big Bend National Park's most noteworthy visual-related scenic vistas!

Two regional scenic vistas of notoriety can be seen from Grapevine Hills. In the foreground to the south is a rock-strewn graveyard of igneous boulders. Orange-brown and gray in color, these imposing laccoliths are unusual and peculiar in shape. Rock encrusted yellow-green lichens provide a visual contrast in tonality. The picturesque "window" of rocks is a visual attraction of Grapevine Hills. A segment of the upper border of the Chisos Mountains can be seen through the window to the south. The Chisos' rugged brownish-gray angular shape is vividly defined on the southern blue skyline.

Also visible from this rock-laden perch is the Sierra Del Carmen to the east. Even though slightly impaired by low-lying regional haze, the Carmen's dark undulating contour is clear against the light textured sky. El Pico, a protruding thumb-like geologic feature is in faint detail on the distant horizon to the southeast.

A distant panorama of the Chisos Mountains to the south can be seen from Persimmon Gap, the northernmost extent of the park. A rolling, lowland expanse consisting primarily of creosotebush comprise the foreground features of this vista. An orange-green florescence is effected. Beyond this low-lying plain are the Rosillos Mountains which are actually outside the park. However, the Rosillos' brown color and erosion-ridden surface provide a contrast in topographic relief. Rising above this intermediate visual field on the horizon are the Chisos Mountains. The Chisos' dark impressionistic upper profile is silhouetted against the dark blue sky. A wave of fluffy white clouds elicit a soothing embrace to this demonstrative scenic view.

As previously mentioned, a wide array of scenic vistas can be seen from within and outside Big Bend National Park. Of equal importance, however, are "integral vistas," including those views into the park from areas outside the park boundary (out-in vistas). Such an integral vista concept can be visualized as one approaches the park on State Road 118. This south-bound route provides the park visitor with a stimulating and magnificent panorama perlude to the Chisos Mountain Complex!

Big Bend

Name of Area

6/30/80

Date

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6-103A
 SCENIC VALUE IDENTIFICATION *

(a)		(b)	(c)	(d)	
VIEW FROM (PLACE)	VIEW TO (PLACE)	APPROX. DIST. (MILES)	INSIDE PLACE TO INSIDE FEATURE	INSIDE PLACE TO OUTSIDE FEATURE	(e)
) South Rim (Chisos Mountains)	Santa Elena Canyon	25	X	X	X
) South Rim (Chisos Mountains)	Emory Peak	1	X		
) South Rim (Chisos Mountains)	Sierra Del Carmen (Dead Horse)	30			X
) South Rim (Chisos Mountains)	Southern Mts. (Mexico)	70	X		X
) Emory Peak	The Chisos Basin	3	X		
) Emory Peak	The Window (NW)	3-40	X		X
) Sotol Vista Overlook	Sotols (Santa Elena Cny. -Mesa De Ang.)	1-25	X		X
) Mule Ear Overlook	Mule Ears	4	X		
) Juniper Canyon Overlook (Lost Mine)	Juniper Canyon- Mariscal Mountain	1-20	X		X
) Santa Elena Canyon Trail	Chisos Mountains	20	X		

Scenic values outside the designated area boundary may or may not be recognized in visibility protection. This has yet to be resolved. Entries in this table are informational at this time.

*Refer to Map Reference

Big Bend

Name of Area

6/30/80

Date

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403A
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SCENIC VALUE IDENTIFICATION

(a)	(b)	(c)	(d)	(e)
VIEW FROM (PLACE)	VIEW TO (PLACE)	APPROX. DIST. (MILES)	INSIDE PLACE TO INSIDE FEATURE	INSIDE PLACE OUTSIDE FEATURE
1) Santa Elena Canyon Trail	Santa Elena Canyon	1	X	
2) Maverick	Burro Mesa-Chisos Mountains	15	X	
3) Panther Junction	Sierra Del Carmen	25		X
4) Boquillas Canyon Trail	Boquillas Canyon	1	X	
5) Boquillas Canyon Trail	Rio Grande-Mexico	1-30	X	X
6) Hot Springs Historic Walk	Hot Springs Canyon-Sierra Del Carmen	1-12	X	X
7) Grapevine Hills	"window"-Chisos Mts.	1-14	X	
8) Grapevine Hills	Sierra Del Carmen	20	X	X
9) Persimmon Gap	Chisos Mountains	17	X	

Scenic values outside the designated area boundary may or may not be recognized in visibility protection. This has yet to be resolved. Entries in this table are informational at this time.

* Refer to Map Reference

The present visibility condition of Big Bend National Park is good. However, depending largely on the season of the year, causes of visibility impairment do occur. It is surmised that man-made influences have altered the historic visibility conditions of Big Bend.

Although no verifiable evidence exists, the El Paso, Texas metropolitan area in combination with Carlsbad, New Mexico and its seven pot-ash mines are possible man-made regional sources of visibility impairment to Big Bend National Park. If so, the installation of a fine particulate sampling monitor would be vital in the identification of the chemical composition of fine particulates or other reducing aerosols from these two potential point sources. In concurrence with this potential problem, Carlsbad, New Mexico's seven pot-ash plants are being placed on a state compliance schedule to meet 90% emission control by 1982.

A man-made cause which contributes to regional air quality degradation is smoke. Slash-burning for the purpose of land clearance is a practice utilized by land owners in both the United States and Mexico. Wind is the source. In commensurate, this slash-burn practice does have an appreciable effect on visibility.

Natural causes of visibility impairment of both internal and external origin include fugitive dust, fog and smoke. Their respective sources are wind, cooling of moist air and forest fires. Wind-blown fugitive dust occurs primarily in the spring. The occurrence of fog is less

frequent and is associated with the late fall and winter months, Smoke induced forest fires are infrequent in number and would most likely take place during the dry summertime.

Regional haze is the most predominant natural cause of visual impairment to Big Bend National Park. The extent of regional haze is very significant on certain days. Though no influential source has been readily identified, terpenes, floral hydrocarbon emissions could be the main ingredient in regional haze composition. These isomeric synthesized excretions are most notably associated with Creosote bush and conifers. Because of their vast and variable floral formations, which do include conifers, studies related to this possible source should be evaluated for implementation at Big Bend National Park.

The potential for construction of geothermal powered electric generating plants to the northwest of the park could pose a threat to Big Bend's visibility-related scenic resources. If developed, these plants would release toxic gases and particulates into the immediate area. As an International Biosphere Reserve of the Man and The Biosphere Program, this potential threat would be a direct and felonious violation of Big Bend National Park's duly expressed air quality safeguard!

A prescribed burn program proposal for Big Bend National Park is the only management practice that may effect its visibility. The purpose of this management endeavor is to reduce hazardous fuel accumulations in the prevention of potential holocaustic wild-fires. If initiated, prescribed burns would meet smoke management guidelines and would, most assuredly, be short-term in duration causing minimal visibility impairment.