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SPECIAL REPORT

AREAS VISITED IN MEXICO, NEW MEXICO AND ARIZONA

DURING OCTOBER, 1935

Submitted November 9, 1935

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SPECIAL REPORT

AREAS VISITED IN MEXICO, NEW MEXICO AND ARIZONA

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I. Itinerary and Personnel:

In accordance with telegraphic instructions from Mr. Herbert Maier, Regional Officer, the writers left Big Bend Camp at 2:00 PM on October 10, 1935, and proceeded to El Paso, Texas, where they arrived shortly after noon on October 11th. The afternoon of that day was spent in conference with Dr. Brown W. Randel, U. S. Biol. Surv., Mr. Daniel F. Galicia, Ass't. Chief of the Mexican Forestry, Fish and Game Department and Mr. Juan A. Thacker, Forest, Fish and Game Inspector for Chihuahua State, Mexico.

The next morning we left El Paso at 4:00 A. M. accompanied by the three men mentioned above and at noon we crossed the international boundary at El Berrendo, near Antelope Wells, New Mexico. The afternoon of the 12th, all of the 13th, and the forenoon of the 14th were spent in investigating the Espuelas Mountains and vicinity in Mexico and we returned to El Paso the evening of the 14th.

October 15th and 16th were spent in El Paso in accordance with further telegraphic instructions directing us to make arrangements for accompanying a party into New Mexico and Arizona for the purpose of investigating certain areas there. On October 17th we drove to Deming, New Mexico, and attended an afternoon conference at the Park Hotel.

The following men, in addition to the writers, were present at this conference: Dr. Brown W. Randel, U. S. Biol. Survey; Gordon White, President of the New Mexico GPA; John C. Gatlin, U. S. Biol. Survey; Dr. Walter F. Taylor, U. S. Biol. Survey; J. Stokley Ligon, State Game Department, New Mexico; D. A. Brownfield, Chairman Advisory Board, Div. of Grazing, District 3; Daniel F. Galicia, Assistant Chief of Mexican Forestry, Fish and Game Department; Juan A. Thacker, Forest, Fish and Game Inspector for Chihuahua State, Mexico; Fred Sherman, Conservation League and President of the Border GPA; J. E. Stablein, Div. of Grazing; D. A. Gilchrist, Regional Director, U. S. Biol. Survey; Region 3,; and Henry Raithel, State Game Commissioner of New Mexico. At this conference the Lake Playas and Hatchet Mountain areas in southern New Mexico were discussed and plans were made for visiting them.

October 18th and 19th were spent in examining the Lake Playas and Hatchet Mountain areas. The route followed on this and subsequent parts of a rather extensive trip is shown on Map No. 3. On October 18th the party consisted of Mr. Gatlin, Dr. Taylor, Mr. Ligon, Mr. Galicia, Mr. Stablein, Mr. Gilchrist, and the writers. On the 19th the party was joined by Mr. Chas. E. Gilham, U. S. Biol. Survey, who remained through the remainder of the trip.

On the evening of October 19th, Mr. Ligon and Mr. Stablein left the party and the next day the remainder proceeded westward through the Animas Mountains and Animas Valley to Cloverdale. We obtained a considerable amount of information through a conference with Mr. W. C. Echols of Cloverdale and then drove on through the Peloncillo Mountains.

and over the Geronimo Trail to Douglas, Arizona, after losing Mr. Gatlin who left the party at Cloverdale. From Douglas we drove over route 80 to Tucson where we arrived at 9:30 P. M.

On October 21 we held a brief conference with Dr. Homer L. Shantz, President of the University of Arizona. Later our party was joined by Dr. Chas. T. Vorhies, of the University of Arizona and we then proceeded to Ajo, Arizona. On October 22nd and 23rd we investigated the desert areas south and west of Ajo, Arizona, and arrived in Yuma on the evening of October 23rd.

The next two days, October 24 and 25, were spent in an investigation of the Kofa Mountains and vicinity but especially of Palm Canyon in Signal Peak of the Kofa Mountains. Dr. Vorhies then left the party and the remainder drove to Flagstaff. We arrived in Flagstaff late in the evening of October 25th.

On October 26th the party was delayed nearly all day at Cameron, Arizona, because of necessary repairs to one of the cars but October 27 was spent in an examination of Houserock Valley.

On October 28th we drove to the south rim of the Grand Canyon in Grand Canyon National Park and held a conference with Mr. Russell Grader, Wildlife Technician, concerning the Kofa Mountains and the southwestern desert area. We then proceeded to Flagstaff and held another conference that lasted until 1:30 A. M. Partaking in this conference were Dr. Taylor, Mr. Galicia, Mr. Gilchrist, Mr. S. L. Lewis of the State Game Department of Arizona, and the writers.

The next morning, October 29th, the party broke up and Dr. Taylor and the writers drove to Tucson, stopping on the way at Casa Grande

National Monument for a brief consultation with Mr. Frank Pinkley, Superintendent of the Southwestern National Monuments. On October 30 we spent the morning obtaining such information as we could from various offices at the University of Arizona and then drove to El Paso and the following day we returned to the Big Bend of Texas.

II. The Espuelas Mountains of Mexico and Adjacent Areas in Southern New Mexico and Southeastern Arizona

The general area considered under this heading includes the rectangular southwest projection of New Mexico between Mexico and Arizona and adjacent parts of Mexico and Arizona. The boundary separating the Mexican states of Chihuahua and Sonora extends southward along the Espuelas Mountains from a point on the international boundary about eighteen miles east of the Arizona-New Mexico lines. Thus the area under consideration extends through contiguous parts of two nations and four states.

Topographically, the region is a flat plains country from which isolated mountain ridges arise abruptly. These mountain ridges tend to be more or less parallel and extend approximately in a north-south direction.

The principal access into this area from the north and east is through Hachita, New Mexico. A number of ranches with windmills and ranch buildings are found within the area considered but the only store or aggregation of buildings is the tiny village of Cloverdale, New Mexico.

The better roads in the region are dirt roads which are serviceable though dusty in dry weather, which is most of the time. The minor roads are chiefly wheel-tracks which tend to become ruts. Washes are frequent, as are detours made necessary to avoid gullies.

We have been unable to locate any map showing with reasonable accuracy on the same map or on the same scale features lying in the two countries and four states contributing to the present area. In the absence of any good published maps of the Mexican area visited we are submitting a sketch map prepared by Dr. Brown W. Randel of the U. S. Biological Survey, El Paso (Map No. 2). The Boca Grande Mountains shown on this map are essentially a continuation of both the Hatchet and Boca Grande Mountains farther north. Middle Mountain is isolated and not a part of any chain. The Espuelas Mountains, a spur of the Sierra Madre Range, are practically continuous with the Animas Mountains in New Mexico. We are able to see only the east side of the Espuelas Mountains, time not permitting a visit to the west side. The most characteristic feature of the east side of these mountains is a series of long approximately parallel canyons, gentle slope of canyon floor but rugged to varying degrees in abrupt ascent of canyon sides. Along the lower course of the canyons tree growth is sparse and shows a striking difference on north and south slopes with difference in exposure. At higher elevations tree growth seems more prosperous and is less influenced by differences in exposure. (photo 3-34). There are no permanent streams in any of the canyons on the east side of the Espuelas Mountains though permanent springs are present in Fresno, Arco and probably other canyons.

A road extends to the south end of the Espuelas Mountains and crosses over Pulpita Pass into Sonora. While the canyons on the east side of the mountains are long and have gradual slopes, those opening west are said to be short and steep. We were informed that Devil's Canyon, on the west side nearly opposite Oso Canyon, is very rough. We were told, also, by Mr. Thacker and others, that there is more rain and more timber on the western than on the eastern side of these mountains. Furthermore, the west slope is reported to have permanent streams which contain fish.

No topographic surveys of the Espuelas Mountains are available and we have no information as to maximum elevation other than such inferences as may be drawn from the changing character of the vegetation between the lower and upper parts.

The plains east of these mountains are covered with rather sparse grass and in places with scattered mesquite and yucca. Near the foothills one may see also an occasional Nolina. The area is being grazed by cattle but has not been so severely over-grazed as must places on the United States side of the boundary line have. Live oaks are the most abundant woody plants of the foothills but in moist places there are some walnuts and sycamores. Farther up in the mountains the vegetation shows affinities with the north, south and west. As indicated above, the north-facing slopes support mostly bunch grasses and scattered, shrubby oaks. Time did not permit any extensive botanizing but the following brief list of plants observed will serve to give an idea of the character of the vegetation.

Black, white and willow oaks (Quercus sp.), one-seeded juniper, (Juniperus Monosperma), alligator-bark juniper (Juniperus pachyphloea), pinyon pine (Pinus cembroides), yellow pine (P. ponderosa), black pine (Pinus sp.), chihuahua pine (P. leiophylla), Arizona sypress (Cupressus arizonica), mountain maple (Acer grandidentata), walnut (Juglans), sycamore (Platanus), squaw-bush (Rhus trilobata), manzanita (Arctostaphylos sp.), sotol (Dasylirion), ash (Fraxinus), Yucca sp., Nolina, sp. grama grass (Bouteloua sp.), spear grass (Stipa sp.) several other grasses that we did not recognize, a cylindrical-stemmed Opuntia, hop-tree (Ptelea).

Mr. Galicia stated that he believes there are some sugar pines in the higher places in these mountains but we did not see any.

Probably the most abundant of the larger mammals in the Espuelas Mountain region is the white-tailed deer. Our party saw one deer in Oso Canyon and four in Fresno Canyon and there are records of numbers of deer being shot in these mountains in successive autumns. According to Urbana Marquez, a resident with whom we talked, there are no deer in the upper parts of the canyons and the higher elevations of the mountains. We were told that no mule deer occur in the Espuelas Mountains but that there are both mule deer and white-tailed deer on Middle Mountain. Middle Mountain appears barren and with but little tree growth but we did not examine it at close range.

Antelope are said to occur anywhere on flats where there is grass and the flats here are mostly grass covered and not severely over-grazed. These animals also sometimes come to the foothills and canyon mouths but do not go higher. We saw no wild antelope but did see a pet antelope fawn at Coyote Ranch (Photo No. 35). Mr. Galicia informs us that antelope

are now protected in Mexico by a five-year closed season.

There are no mountain sheep in the Espuelas Mountains.

Peccaries, or javelinas, occur on the lower slopes of the mountains but are said not to go to the higher parts. Both Mr. Thacker and Mr. Marques reported capturing young javelinas in the foothills. Mr. Thacker said, "You seldom see javelinas but can see where they have worked all over a hill."

Black bears are abundant in the Espuelas Mountains. We saw quantities of fresh bear droppings in Fresno and Arco Canyons. Urbana Marquez and two companions had heard a bear in Arco Canyon the night before we were there. Marquez and ranchers on the west side of the mountains have trapped numbers of black bears. On July 4, 1935, Mr. Thacker saw a cinnamon bear, a color form of the black bear, in a trap, still alive, in Devil's Canyon on the west side of the mountains. Mr. Marquez did not know of any grizzly bears in these mountains. Mr. Marquez did not know of any grizzly bears in these mountains but Mr. Randel told us that an American Trapper, Philip Flint, had caught grizzly bears and a considerable number of black bears in Devil's Canyon.

Coyotes are reported to be abundant, occurring on the hills to some extent as well as on the plains. Lobo wolves occur also but are less easily seen. They may be anywhere either on hills or flats. In January, 1934, Dr. Randel heard wolves howling near his camp in Arco Canyon. We saw a partly grown and partly tamed wolf at the El Berrendo gate.

Mountain lions occur and perhaps are not uncommon. Last February, the last time he was in the mountains, Mr. Marquez heard one and also.

saw tracks of a lioness and two cubs. He has no knowledge of recent livestock damage by lions and believes they probably live mostly on deer. Four or five years ago Mr. Thacker and party killed a wildcat on the flat a few hundred yards from the mouth of Arco Canyon. He believes there are plenty of wildcats in the region.

Jackrabbits and cottontails occur on the flats. In the mountains there is a "mountain cottontail" which is much larger than the cottontail of the flats. Conspicuous on the flats were mounds of kangaroo rats. Mr. Marques stated that ground squirrels live in these mounds. Presumably they are shared by other rodents as well. No doubt a longer stay in the region and further study and inquiry would have revealed numbers of other mammals. In addition to wild mammals, horses and cattle, or evidence of them, were noted on the flats and in the canyons. Grass is fairly abundant and not excessively reduced by grazing.

Wild turkeys occur and are probably not uncommon in these mountains. When Mr. Marques was in Arco Canyon last February turkeys were plentiful there. A big turkey gobbler alighted on a yellow pine close to where he was camped. Mr. Thacker has killed wild turkeys in Devil's Canyon. Dr. Randel, in August of this year, saw turkey tracks in the head of Oso Canyon and in Devil's Canyon. We saw none during our brief visit to the mountains.

We saw two Mearns quail in Oso Canyon. Dr. Randel says band-tailed pigeons occur by the thousands all through these mountains during the time when acorns are ripening.

Red-tailed hawks and jays were seen in Fresno Canyon.

The New Mexico portion of the international area visited includes the Playas Lake and its broad valley lying between the Hatchet Mountains to the east and the Animas Mountains to the west. South of the Hatchet Mountains and appearing essentially as a continuation of them are the less lofty Alamo Huecos. East of the Hatchet Mountains a plain extends across the international boundary to the Boca Grande Mountains in Mexico. As shown by the map (Map No. 3), the Hatchet and Boca Grande Mountains are not parallel but converge southward toward the international line until they are separated by only about ten miles of plain. We were told by Mr. James Roberson, who has a ranch near the west base of the Hatchet Mountains, that Big Hatchet is about 9000 feet above sea level while the plain is about 4200 feet. The mountains are not wooded. Snow falls on them occasionally but it does not last. There is no permanent water, either in streams or springs, on the Hatchet Mountains. All water in the vicinity of the mountains is from wells with windmills and is privately owned.

West of the Playas Valley are the Animas Mountains, included as the easternmost block of the Coronado National Forest. We did not visit the Animas Mountains but were told that they have some small tree growth, though almost no merchantable timber, and some permanent springs. West of the Animas Mountains is the Animas Valley, a part of which is a dry lake-bed bordered by gravel "dikes". One such dike is traversed by the road leading to Cloverdale, New Mexico, from the east. This old lake-bed of the Animas Valley extends across the international border into

Mexico. The origin of the dikes is a subject of controversy. By some they are thought to be remnants of a far-reaching irrigation project of some prehistoric culture. Possibly, though, they have a geological rather than a human origin.

West of the Animas Valley is a second unit of the Coronado National Forest, the Peloncillo Mountains, which bridges the Arizona-New Mexico state line. We drove through this block of forest on our way to Arizona. Scenically, both in topography and in forest growth, it considerably excels any other portion which we saw, on the United States side of the four-state international area examined.

Playas Lake is surrounded by a border of grass but most of the surrounding terrain is occupied by desert scrub dominated by mesquite and Zizaphus. There is a single large willow tree near the northern end of the lake which, although it is standing in water at present, shows considerable evidence of having suffered for lack of water.

The plain surrounding Hatchet Mountain is largely creosote desert or, in some places, mesquite, often with a considerable admixture of yucca. The open places have been so severely over-grazed that but little grass remains. On the mountain itself the ravines support a few junipers and occasionally sumacs and mountain mahoganies. But this is a typical desert mountain with the desert vegetation, typified by such plants as ocotillo (Fouquieria splendens) and Agave, extending nearly to the summit. The vegetation gives no indication that the mountain receives any more rain than the surrounding plain.

As stated above, the Animas Mountains are said to be largely wooded but with no very large trees on the United States side of the international boundary. Animas Valley is largely grassland which has been very severely over-grazed. Some parts of the Peloncillo Mountains are well wooded, especially with chihuahua pine and oaks, some of considerable size, but we made no extensive examination of these mountains.

The most significant fact about the animal population of this region is the occurrence of mountain sheep on the Hatchet Mountains. The sheep on these Mountains are Mexican bighorns and probably the only sheep of this subspecies in the United States. Two members of our party, Mr. Nigon and Dr. Taylor, had previously seen mountain sheep on Big Hatchet Mountain, as of course, have numbers of other people. Our party saw no mountain sheep, either here or elsewhere on our trip. We did, however, see convincing evidence of the presence of mountain sheep in droppings, tracks and freshly disturbed soil where the animals had bedded down. We saw sheep dropping as low on the mountain as where we left our cars as well as higher. There is thus some overlapping of territory used by cattle and by mountain sheep. There are no domestic sheep in the vicinity. We are told that mountain sheep do not go into the Alamo Hueco Mountains which adjoin the Hatchet Mountains on the south. There are reports, based on observations of tracks, that mountain sheep occasionally migrate several miles across the plains between the Boca Grande Mountains on the east and the Hatchet Mountains. In one instance, at

least ten years ago, Mr. Ben Robinson estimated "400" mountain sheep crossed from Mexico to the United States. In all other instances reported only small groups crossed over. We know of no way of estimating either the present number of mountain sheep in the Hatchet Mountains or the frequency and significance of the reported migrations across the international line.

We found no evidence to indicate whether the mountain sheep in the Hatchet Mountains are increasing or decreasing; nor how much or in what direction their numbers are affected by migrations. The Hatchet Mountain area is at present a state game refuge, on federal land, and is posted but without any regular attendant. The friendly attitude of the nearest ranchers, Jim Roberson on the west side and the Hatchet Cattle Company on the east, tends to protect the sheep somewhat as the most direct approaches to the mountain are across their holdings. It is the expressed opinion of Mr. W. C. Echols of Cloverdale, New Mexico, a Biological Survey trapper familiar with the region, that neither the ranchers nor predatory animals bother the mountain sheep and the chief factor limiting the increase of these rare animals is illegal hunting by people coming from cities.

Playas Lake, because of its seasonal nature or mineral content, or both, has no aquatic vegetation nor other duck food and seems not especially suited to ducks. When we visited it a few ducks were present and also several mud-hens but no large numbers. It is not used for duck nesting as it is usually dry in spring.

Formerly there were antelope in Playas Valley but it is said that they were all killed by the soldiers who came to the border in 1912. Mr. Echols, of Cloverdale, told us that the antelope in Animas Valley had been reduced from 58 to about a dozen in the past two years and he believed this was done by hunting rather than by drought or predatory animals.

There are said to be practically no deer in the flat country of this region. Mr. Echols stated that there are large numbers of white-tailed deer in the Coronado National Forest and that there are a very few mule deer in the Animas Mountains but none in the Peloncillo Mountains. He further stated that there are "quite a few" javelinas in the Animas section of the Coronado Forest and "worlds of them" in the Peloncillo section. Lobo wolves are now caught in only rough country while coyotes are more partial to the plains.

Two mammals that are essentially Mexican range into valleys of this part of New Mexico. These are the coati (Nasua narica pallida), a racoon-like animal, and a white-sided jackrabbit (Lepus gallardi).

When we were first sent to examine the Espuelas Mountains in Mexico we were confronted with a proposal, originating, we understand, with Mr. Galicia of Mexico City, to establish an international park to include, probably, the Playas Lake and Hatchet Mountain area of New Mexico, the Animas Mountains and Peloncillo Mountains of New Mexico, certain adjacent areas in southeastern Arizona and the Espuelas Mountains and Boca Grande Mountains and intervening territory in Mexico. Thus an international park would be set up that would include within its boundaries some of the territory of four states; New Mexico and Arizona in the United States

and Chihuahua and Sonora in Mexico. The idea was most alluring. Such a park would be fairly accessible both for Americans and Mexicans and should serve to bring about a better understanding and an increase of goodwill between the two peoples.

The recreational values in such a proposed park would not be outstanding. There are said to be some permanent streams containing fish on the western slopes of the Espuelas Mountains but certainly not enough to satisfy any large numbers of fishermen. However, there are places in the Peloncillo Mountains and perhaps elsewhere on the United States side, and in many places in the Espuelas Mountains on the Mexican side, that would make excellent camping or picnic sites provided water were developed. From this point of view the region might become popular as a winter playground.

From the scenic viewpoint, also, this region cannot be said to be outstanding. There are beautiful places in the mountains on both sides of the international boundary but they are no more beautiful than dozens of other places in both countries. If a park were to be made here, therefore, its only outstanding feature would be its international character.

At the conference in Deming, New Mexico, on October 17th, there were assembled representatives of several groups, both state and federal, interested from one standpoint or another in any action that might be taken affecting the Playas Valley-Hatchet Mountain area. It seems that an executive order had been drawn up, but not yet signed and made effective, setting aside the Playas Valley and the area south and east from there to the Mexican border, including the Hatchet and Alamo Hueco

Mountains, as a federal wildlife refuge. The New Mexico representatives at this meeting were unanimous in opposition to such a federal refuge. They had had no previous information as to proposed international park to include all of the proposed refuge area and more.

The point of view of the New Mexico State Game Department, as stated by Mr. Ligon, is that the Department has given much attention to preservation of this group of mountain sheep, and to enlisting cooperation of ranchmen in their safeguarding. The state prizes these sheep, has reason to be proud of its handling of them, and is unwilling to turn their management over to a federal agency. These Hatcher Mountain sheep have been protected from contact with domestic sheep and exposure to diseases acquired from domestic sheep. If the federal government wants mountain sheep to experiment with, or do research on, or try to preserve, it is the recommendation of the New Mexico Game Department that it take some other group of sheep (perhaps in the Guadalupe Mountains). The fundamental objection here was to what seemed to the State Game Department arbitrary federal action. We gathered from conversation with Mr. Ligon afterward that if an international preserve were to be made, either as a park or wildlife refuge, he (and possibly the State Game Department), would withdraw objection to federal control.

The point of view of the State Game Protective Association (a sportsmen's organization), as stated by Mr. White, is that the Association is on record as favoring state handling as opposed to federal

control of the Hatchet Mountain group of mountain sheep, and, in any case, opposed to setting aside so large an area for a game refuge as contemplated in the executive order. Mr. White told us personally that he favored fencing to prevent mountain sheep from wandering away into Mexico. The same idea was expressed by others. Presumably, however, any international park or wildlife preserve would be featured by absence of any barriers to mountain sheep migration across the international border.

Mr. Brownfield said the stockmen would agree to a "neutral zone" ten miles wide, around the base of Hatchet Mountain, to be kept free of domestic sheep, to safeguard mountain sheep against sheep-borne diseases. He stated that the cattlemen are on record as favoring state (rather than federal) management of the Hatchet Mountain-Playas region; that they probably would not object greatly to any arrangement that would permit continuance of grazing; but that they would oppose to the limit any arrangement that would terminate grazing in the area--one of the finest grazing lands in the state.

A plat map was shown at this meeting, prepared (we understand) by the State Game Department, showing land ownership status (federal, as compared with state and private holdings) in the proposed refuge. The non-federal lands are widely distributed throughout the proposed refuge area, and total about half or slightly more than half of the entire area. This is a natural consequence of locating private acquisitions to control the surrounding public domain shown marked the position of the Hatchet

Mountains themselves, which are too steep for use by cattle. Even here are a few patches of private land, held by the Alamo Hueco Company, which, we are told, considers bringing domestic sheep onto the mountain.

It seems that the distribution of federal, state, and private land, the attitude of the local people, and the absence of noteworthy game (other than mountain sheep) in the area, combine to make impracticable and undesirable the federal refuge contemplated in the executive order mentioned above. From a park standpoint, this portion of the proposed international park has practically nothing to attract visitors. On the other hand, the mountain sheep should have all possible protection. They are subject to an undetermined amount of illegal hunting at present. It would be possible to establish a Hatchet Mountain preserve excluding the Playas Valley and the Alamo Hueco Region south of the Hatchet Mountains. This would serve almost every useful function of the larger refuge proposed in the executive order, and would remove most of the conflict and opposition certain to result from that. We understand that Mr. Calicia is prepared to recommend to his chief that the Mexican government set aside a similar refuge in the Boca Grande Mountains, east of the Hatchets. An international refuge, including the Hatchet Mountains and the portion of the Boca Grande frequented by sheep, together with the intervening flat land, would, in our opinion, serve to protect these sheep more adequately than a refuge on the United States side only, would remove the most serious of New Mexico's objections to federal control of this group of sheep, and would be a step in international cooperation for the pro-

tection of wildlife which might with advantage be followed up elsewhere. We understand that the Biological Survey members of our party are making definite recommendations, with indicated boundaries, for establishment of such a refuge.

The grazing land in the Animas Valley, as in the Playas Valley, is controlled in large measure by the Victoria Land and Cattle Company. We have no information on the proportion and distribution of public domain and privately owned land in the Animas Valley.

As indicated previously, the Animas-Peloncillo region is superior scenically, and in abundance and variety of wildlife, to the Playas Valley-Hatchet Mountain region. Even so, it seems not sufficiently outstanding to warrant its inclusion in a national park or even a national monument. However, the prospect of an international reservation in this border region of four states is so attractive from many standpoints that we feel it should not be abandoned entirely. We believe that consideration should be given to the possibility of resolving whatever conflicts there may be, and establishing the Animas and Peloncillo blocks of the Coronado National Forest, the land between the National Forest and the international boundary, and the intervening Animas Valley, as the United States part of an international wildlife reservation. We understand that Mr. Calicla is prepared to propose to his government the setting aside of an adjacent area including the Espuelas Mountains and portions of Sonora and Chihuahua. We are of the opinion that it would probably be impracticable, on the United States side, to attempt to consolidate the four-state wildlife reservation proposed here, with the Hatchet Mountain-Boca Grande Mountain sheep reservation proposed east of the Playas Valley.

III. The Deserts of Southwestern Arizona

The region considered here is best identified by reference to the map. It is unsurveyed and almost wholly uninhabited land, bordering the Mexican border for a hundred miles and extending from the Ajo Mountains and the Papago Indian Reservation west to the Yuma Desert. It is rather flat country with elevation of the plain approximately 300 to 500 feet, decreasing gradually toward the west. Topographically it is characterized by a series of ridge-life mountains rising abruptly from the nearly level plain, in some cases as much as 1000 feet. These mountain ridges, for the most part, extend in a northwest-southeast direction. One of the most striking characteristics of some of them is the contrasting dark and light-colored rocks which compose them. The map shows the location of the Pinacate Lava Flow extending across the international boundary west of the Playa. Just across the boundary on the Mexican side here are the Pinacate Craters.

The southwestern Arizona area is distinguished as one of the most arid in the United States. The rainfall is unpredictable. A single storm may amount to more than the normal rainfall of a year. It is recorded that the Tale Tanks the total rainfall for two years was less than two inches. There are no permanent streams and, so far as we could learn, no permanent springs in the entire area of possibly 3000 square miles. The only dependable water supplies of which we learned are a few "tanks", hollows in the rocks of certain mountain-sides where rain water accumulates, and a few wells. The more important tanks and wells are

shown on the map. The area is characterized by extremely high summer temperatures, by a very mild and pleasant winter climate and by vegetation and animal life adapted to the extremes of temperatures and dryness encountered there.

The eastern end of this desert area is traversed by the Ajo-Sonora road which continues in Mexico to Rocky Point on the Gulf of California. There is a certain amount of regular traffic over this road. East and west the area is traversed by the Camino del Diablo, Devil's Road, which follows near the international boundary to Tinajas Altas, High Tanks, and then forks north and northwest to Wellton and the Imm Highway. It is believed that several hundred people died of thirst along this route during the first gold rush to California. There are fifty or more graves of such ill-fated travelers at Tinajas Altas. This "camino" is not a well defined road but is marked by wheel-tracks across the desert. Travel over this route is irregular and infrequent, consisting mostly of customs and immigration officers, prospectors, and poachers hunting mountain sheep.

The regions immediately west of the Ajo Mountains supports a unique type of vegetation the most important constituent of which is the organ-pipe cactus (Lemaireocereus thurberi). This most interesting plant is limited, so far as the United States is concerned, to a relatively small area in this vicinity though it extends southward into Mexico. It is accompanied by magnificent specimens of the giant cactus (Carnegiea gigantea) which is another plant that is typical of Arizona and adjacent

parts of Mexico, though of wider distribution than the organ-pipe cactus. Also accompanying these unique plants are many splendid chollas (Opuntia sp.), ironwoods (Olneya tesota), palo verde (Parkinsonia microphylla), cat-claw (Acacia greggii), goat-nut (Simmondsia chinensis), a diocious shrub that produces edible nuts, insienso (Encelia farinosa), shrubby burro-weed (Franseria sp.), and creosote bush (Larrea divaricata). West of this area and extending from the Growler Mountains all the way to Yuma, Arizona, the vegetation is of an extreme desert type but not of the unique character found here. Because of aridity and lack of grass, but especially the former, there is no settlement and no grazing in the entire region from the Growler Mountains nearly to Yuma.

Gaillard mountain sheep, a variety distinct from the mexicana in the Hatcher Mountains, occur in this region. The type locality of this variety of sheep is near Tinajas Atlas. Dr. Vorhies stated that mountain sheep are or have been on every one of the mountain ranges in this southwestern Arizona desert area. As photographs 67 and 68 show, the mountains in this region are typically rather lacking in vegetation. It seems probable that the mountain sheep here obtain at least part of their food on the flat lands. In this dry country it seems obvious that mountain sheep can exist for a long time without water to drink, yet probably they cannot do without water indefinitely. There are occasional reports of mountain sheep drowned in an attempt to reach the water in a well or tank. Customs men told us that a few had drowned at Tule Well in the spring of this year. We observed no sheep

On our trip through this region but at Tinajas Altas we saw mountain sheep trails and caves and also fresh tracks and droppings. The sheep had undoubtedly been attracted there by the availability of water. It is certain that many and probably most of the mountain sheep shot by lawless hunters are killed at tanks. We were informed by E. D. Wilson of the Arizona Bureau of Mines, that he found a large number of mountain sheep horns at Heart Tank, Sierra Pinta Mountains, in 1931.

Antelope formerly occurred in Growler Valley according to Dr. Vorhies and Dr. Taylor. They were most often reported from the neighborhood of Playa near the Mexican border. We saw none on our trip but there are supposed to be a few still existing.

We saw antlers of mule deer at Alamo Well in a canyon on the west side of the Ajo Mountains. Dr. Vorhies reports the occurrence of mule deer and two white-tailed deer in the Bates Well region, though that is outside the ordinary range of white-tailed deer. He states that javelinas occur in the Bates Well region also. We saw bats flying at night about our camp at Tule Tank but were unable to catch them for identification. The type locality of the Mearns coyote is Quitovaquito; the type localities of desert varieties of antelope, squirrel, wood rat, and pocket mouse are at Tinajas Altas.

Two observations of birds seem noteworthy; Drs. Vorhies and Taylor, in the leading car of our expedition, flushed quail in Growler Valley, 18 miles from the nearest water east and 40 miles from the nearest water west. On the same stretch of "camino" they observed other quail just as impossibly remote from water. At Bates Well and again at Tinajas Altas

we observed a Clark nutcracker, juvenile, a species reputed to be distinctly a high mountain resident.

This region west of the Ajo Mountains of Arizona that we are discussing is one that we are not specifically asked to visit but we examined it briefly in passing because the Biological Survey party that we were accompanying decided to go that way. It is our understanding that a national monument for the preservation of the organ-pipe cacti has already been approved by certain officials of the National Park Service. Just where the limits of such a national monument should be, we are not in position to say, but we believe it should include practically all of the territory within which the organ-pipe cacti are abundant. The best that we saw were between the Ajo Mountains and the Ajo-Sonora road and we saw none west of the Growler Mountains, but we did not have opportunity to reconnoiter for other locations.

Our chief reason for discussing this area at the present time, however, is because of the international aspect that developed through the presence of Mr. Galicia in our party. Mr. Galicia suggested that such a national monument might well be extended southward into Mexico as an international monument as far as Rocky Point on the Gulf of California. He also proposes that west of this international monument there should be a rather extensive international wildlife refuge especially for the preservation of the big-horn sheep that occur on both sides of the international line.

There is said to be excellent fishing at Rocky Point on the Gulf of California and if such an international monument as that proposed by

Mr. Galicia should be established it is fairly certain that Rocky Point would become an increasingly popular playground for Americans, especially during the winter months. Furthermore, for those who have come to love the desert, whether American or Mexican, there could be no more delightful a place to spend a winter vacation than among the organ-pipe and giant cacti. And the opportunities for the development of goodwill and understanding between the two countries would be as potent here as they could possibly be anywhere. Indeed, the fact that we have in this region, in addition to the uniqueness of its international character, outstanding features on both sides of the international boundary, namely, the unique vegetation on the American side and the unexcelled opportunity for the development of a winter recreational area on the Mexican side, might well be a sufficient reason for giving consideration to the area as an international park instead of an international monument.

There would be but few conflicts in acquiring land in this region. This is true both in the area of the proposed international monument and in the much more extensive area proposed as a wildlife refuge. A cattle ranching enterprise, mentioned as "Gray's outfit", has a well and windmill at Alamo Well in a canyon on the west side of the Ajo Mountains and two at Mates Well in Growler Pass. We saw only a few cattle and less grass and believe that cattle raising here is on a very small scale and not very successful. In the entire area west of Growler Pass, we neither saw nor heard of cattle raising.

There are occasional prospectors in most of the mountains but the Arizona Bureau of Mines reports that only one mine in the whole region,

the Fortuna Mine in the Uila Mountains, ever produced a preciable amounts of commercial ore--and that mine closed in 1904. There are now no operating mines in the region. Mr. G. M. Butler, Director of the Arizona Bureau of Mines, told us there would be vigorous protest if so large a region were closed to prospecting. He thought, however, if the area were set aside as a refuge, there would be no objection to a system of permits which would allow a check and some supervision of the people entering the area.

The State Game Warden, S. L. Lewis, told us he saw no objection to the proposal of establishing a national monument in the eastern part of the area where there are organ-pipe cacti and of making the remainder of the area as well as the monument, a federal refuge closed to hunting. He, as well as other people, with whom we talked, recognized that the mountain sheep are being steadily depleted by illegal hunting but he stated that he already has more wardens than he can pay and that he is unable to give additional protection to the sheep. His department funds come from hunting licenses and the major effort of the wardens is necessarily directed to protection of game for which licenses are issued. There is no reason for legal hunters to go into the region proposed as a refuge and the only people likely to be inconvenienced by the proposed refuge and the would be the poachers who are after mountain sheep. There are thought to be as many or more mountain sheep on the Mexican side of the proposed international refuge as on the United States side. Sheep hunting on both sides has been chiefly by Americans. Mr. Lewis told Mr. Galicia that he could report to his government that the Arizona Game Department is in favor of the proposed international refuge.

Throughout the entire area of the proposed monument, or park, and refuge the land on both sides of the international boundary is practically all federal land. This fact would undoubtedly facilitate and expedite the establishment of such an international area. We believe the proposals for establishing in this region, in collaboration with the Mexican Government, an international park or monument and an international wildlife refuge should be given serious consideration.

IV. The Kofa Mountains of Arizona

This area of interspersed mountains and plains is accessible from Tuma to the south and from Quartzsite to the north. Our schedule did not permit of anything like a comprehensive study of the region. Photographs 69 and 81 indicate the general appearance and characteristics of those parts of the area that we saw.

The vegetation surrounding the Kofa Mountains consist of such desert plants as palo verde, ironwood, chollas, giant cacti, cat-claw, ocotillo, goat-nut, creosote bush, etc. The unique feature of the Kofa Mountains, however, is the Arizona Palm (Washingtonia). This is a fan-leaf palm similar to the native California fan-leaf palm but believed to be a distinct species and extremely rare. So far as definitely known it is limited to the side branches of a single canyon, called Palm Canyon, on the southwestern side of Signal Peak. It is reported, however, that there are other canyons in these mountains that contain palms and further investigation is needed on this point. Fifty-five of these

rare palms were counted in the main palm-containing branch of Palm Canyon and scattered individuals were found in other side branches of the main canyon sufficient to total about sixty-five plants. These may be the only individuals of this species in existence.

In the Kofa area, as in the desert area south of the Gila River, the most noteworthy feature of the animal population is the occurrence of mountain sheep. We made three stops in the area: at Ladder Tank on the west side of the Castle Dome Mountains; at the inactive North Star Mine near the also inactive Kofa Mine; and at Palm Canyon. At Ladder Tank and in Palm Canyon we saw evidence of Mountain Sheep though we did not see the animals. At North Star Mine the caretaker, Mr. E. F. Smith, told us he had seen ten or twelve mountain sheep near the mine last year but none this year.

The Kofa Mountains offer but little in the way of recreation values. The chief and almost the sole reason for establishing a national monument here is for the preservation of the Arizona palm. For this reason such a monument would not necessarily be very large. If, however, the boundaries of this monument could be made to include the entire Kofa Range it would serve to protect the bighorn sheep that are known to occur here, as well as the palms. In any case, the boundaries should not be definitely fixed until the area has been thoroughly examined to determine whether there are any other palms than those found in Palm Canyon. Moreover, it is believed that there are mountain sheep on practically all the ranges in this part of the state as well as on the Kofa Mountains.

and for this reason it is believed that the entire area outlined on map No. 5 should be set aside in some manner as a wildlife refuge. We prefer to say wildlife refuge rather than game refuge for the reason that there is but little game in the region other than mountain sheep, and we believe it would be to the advantage of the sheep to have all animal and plant life thoroughly protected.

Conflicts in acquiring the necessary lands in this region would be nearly as negligible as in the areas west of the Ajo Mountains. The boundaries could easily be fixed in such a way as to include practically no lands that are not of the public domain, and in such a case there would probably be no conflicts other than a few mining claims. In fact, the boundaries shown in map No. 5 were drawn in conference with Superintendent Frank Pinkley of Casa Grande National Monument, and are believed to exclude practically all private lands.

Attention should be called to the fact that, while this report is recommending three distinct areas for the preservation of mountain sheep, they are not the same kind of sheep but are different in each case. Those occupying Hatcher Mountain in New Mexico are Ovis canadensis mexicana; those found in the desert mountains of extreme southwestern Arizona are O. canadensis gaillardi, and the type locality for this variety is found here; while the sheep found in the Kofa Mountains and vicinity are possibly O. c. canadensis, or intermediate between canadensis and Gaillardi.

Houserock Valley is essentially a large, open grassland all of which has been so severely over-grazed that it is only a matter of a short time before there will be no food there at all for grazing animals unless the large numbers of cattle now feeding there are removed. We made no study of the specific composition of the flora.

There has been for some years in the Houserock Valley a herd of buffalo, maintained by the State of Arizona. The herd has increased until it now numbers about 125 but present conditions are not satisfactory. The valley is heavily overgrazed by cattle and all the water is privately owned. We understand that the principal springs are owned by the Grand Canyon Cattle Company which has no cattle of its own in the valley but leases to various cattle men water for about 2000 cattle and 50 horses. The state is paying a custodian, and is also paying the company water rent, for the buffalo. The water is all enclosed. The buffalo are wilder and less ready than cattle to enter the enclosures for water. We are told that the old buffalo get a little water but that the buffalo calves stay outside and several of them have choked to death for lack of water. At present the buffalo are within the Kaibah National Forest and have sufficient food and water temporarily. However, their present water supply will last only a few weeks more.

The Vermillion Cliffs that form a large part of the northern boundary of the Houserock Valley are very brilliantly colored and very beautiful and the Houserock Valley in its own right is a very beautiful valley. We

do not consider the region of sufficiently outstanding quality for favorable consideration as a national park or monument, however, and do not recommend it as such. We understand, too, that Superintendent Tillotson of Grand Canyon National Park has recommended against the establishment of a national monument in this area. In view of the fact that this valley is west of the recorded range of buffalo, a national monument for the preservation of buffalo here would be out of place.

On the other hand, the valley seems admirably suited for a buffalo and antelope refuge. We believe that if the cattle were removed from the valley the forage would rather rapidly recover to the extent that it would adequately support a considerable number of grazing animals. There are about 125 buffalo in the valley at the present time and under proper management this number could be safely increased to several hundred and could be accompanied by a similar number of antelope. There are no antelope in the valley now but it is a natural habitat for this interesting animal and antelope could readily be introduced.

The road extending through the northern end of the valley is the most direct route between Arizona and Utah; or, speaking in terms of national parks, between the southern part of Grand Canyon National Park and the North Rim, and Bryce and Zion National Parks. For this reason it is quite extensively traveled and likely to be more traveled as time goes on. It would seem, therefore, that Houserock Valley could readily be developed into one of the best places in the United States for tourists to see bison and antelope in their natural habitat. The area is already fenced on the west and south by the boundary fence of the Kaibab National Forest; the Colorado River forms a natural boundary on the east;

and the Vermillion Cliffs form a natural boundary on the north. The only additional fencing needed would be for a short distance in the northwestern corner and this could be built where it would not be seen from the road. Thus the animals would be confined to the valley yet visitors to the area would seldom see any fence. Topographic features alone would be almost sufficient to keep bison and antelope from straying out of the valley. The most important function of the small amount of fence needed would be to keep cattle from coming in.

At a conference in Flagstaff, Arizona, on October 28, Mr. S. L. Lewis of the State Game Department of Arizona expressed the hope that the U. S. Biological Survey or some other federal agency would take the Houserock Valley over and the Buffalo in it because, he said, the State Game Department is unable to do so on account of lack of funds. It would seem, therefore, that there is not likely to be any serious local objection to such a move except on the part of the Utah cattlemen who are at present rapidly destroying the grazing values through excessive over-grazing. It has been said that the most serious objection of the cattlemen to having this area taken over as a wildlife refuge is that the Houserock Valley is the most available winter range for stock that is summered in the Kaibab Forest and adjacent areas. It must be pointed out, however, that under present conditions the valley is not available as a suitable winter range, because the forage is all used up by excessive summer grazing. So far as the State of Arizona is concerned no great value comes from grazing of this area at any time because it is cut off by natural barriers from the rest of the state

and so is inaccessible to the cattle interests of Arizona.

It is our understanding that the Houserock Valley is all public domain with the exception of small holdings where water has been developed but that the water supply is all privately controlled. Some further development of the water supply, or purchase of some of the springs or wells now privately owned, would probably be necessary if the area were set aside as a game refuge. We do not believe this to be a serious obstacle, however, and we believe grazing by livestock should be terminated on the public domain within the area outlined on map No. 6, and the area should be under the control of either the state or federal government to be developed as a wildlife refuge especially for bison and antelope.

If such a refuge is to be established--and there seems to us ample justification for it--it is essential that action be taken before more or less permanent allotments of grazing rights are made under the Taylor Grazing Act.

VI.

Conclusions and Recommendations

1. The Espuelas Mountains of Mexico and adjacent areas in southern New Mexico and southeastern Arizona.

(a) We understand it to be the unanimous opinion of the entire field party that this area, especially most of that on the United States side, is not of such outstanding quality as to recommend it as a park or monument, national or international.

(b) There is a need, and an opportunity, for the creation of an international mountain sheep refuge to include the Hatchet Mountains, the portion of the Boca Grande Mountains east of the Hatchets in Mexico which is frequented by mountain sheep, and the intervening flat lands.

(c) Further consideration should be given to the possibility of establishing an international wildlife refuge, with possible encouragement also of international recreational use, to include adjacent portions of Arizona, New Mexico, Sonora, and Chihuahua. Such a refuge should include on the United States side the Peloncillo and Animas Mountains blocks of the Coronado National Forest, the land between the National Forest and the international border, and the intervening Animas Valley. On the Mexican side the refuge should include the Espuelas Mountains and adjacent portions of Sonora and Chihuahua.

2. The deserts of Southwestern Arizona.

(a) This entire area is unsurveyed and practically unoccupied land characterized by extreme aridity, hot summers, mild winters, and characteristically desert vegetation and animals.

(b) Of the desert vegetation the most exceptional is the organ-pipe cactus which occurs in the United States only in this area.

(c) The most important animal in the region is the characteristically desert variety of mountain sheep which is being depleted by illegal hunting on both sides of the international border.

(d) We recommend that the entire area be set aside for the preservation of its native plant and animal life and that steps be taken in cooperation with the Mexican Government for the establishment of an international park or monument and wildlife refuge.

(e) The eastern portion of the area, because of its profusion of organ-pipe cacti and other spectacular desert plants and because of its relation to the Ajo-Sonoita-Rocky Point road, seems admirably suited to be a part of an international park or monument.

(f) The western part of the area has little to attract visitors and is probably better adapted for a wildlife refuge, preferably part of an international wildlife refuge, than for a park or monument.

(g) We are not prepared to recommend where the line should be drawn between the proposed park or monument and the proposed wildlife refuge.

5. The Kofa Mountain region of Arizona.

(a) Practically all of the area outlined on map No. 5 for the Kofa Mountain region is federal land. Its acquisition for park, monument or wildlife refuge purposes would not involve serious conflicts.

(b) The Arizona palms that occur in the Kofa Mountains are extremely rare. There are not known to be more than 65 individuals in existence. These plants are of national interest and should have the pro-

tection of the federal government. The need of protecting them from vandalism is evidenced by the fact that a fire scar was noted on the base of one plant.

(c) It is believed that most, if not all, of the mountain ranges in this part of the state are occupied by mountain sheep. These mountain sheep are in urgent need of protection from illegal hunting.

(d) We recommend that a national monument be established in the Kofa Mountains for the protection and preservation of the Arizona palms and that all of the remainder of the area be set aside either as a state or a federal wildlife refuge especially for the protection of the mountain sheep.

(e) We further recommend that the boundaries of the proposed Arizona Palm National Monument should be fixed only after a thorough study of the region has been made to determine the number and extent of these rare plants.

4. Houserock Valley in Arizona.

(a) This broad valley is completely enclosed, except for a narrow opening at the northwest, by natural or existing barriers; the Colorado River, Vermillion Cliffs, and Kaibab National Forest. The topography greatly simplifies the control of animals entering or leaving the valley and, with other natural advantages, makes the valley especially favorable as a big-game refuge.

(b) The valley is practically all public domain except for a few scattered sections, privately owned, which include all the permanent water in the valley.

(c) Houserock Valley contains a herd of about 125 buffalo which is unfavorably affected by the presence of large numbers, probably 2000 or more, of domestic cattle.

1. The forage producing capacity of the once productive valley is being destroyed by overgrazing.

2. The buffalo get insufficient water through most of the year and buffalo calves die of thirst for this reason. Buffalo do not readily enter fenced enclosures and unfenced water on the public domain is impossible under present conditions.

3. The purity of the buffalo stock is threatened by hybridization with cattle.

(d) If grazing of domestic stock on the public domain were terminated and water developed or bought, this valley could be made an unsurpassed refuge where herds of bison and antelope in a natural state could be seen by tourists.

(e) We recommend that grazing of domestic stock be terminated on the public domain of the area approximately as indicated on the map and that this area be established as a refuge especially for buffalo and antelope.

5. General Observations.

(a) In all these areas the most immediately important consideration is that the public domain within the approximate boundaries indicated be set aside for the protection of native plant and animal life, and for the benefit of the general public, before it is allotted to various private interests under the terms of the Taylor Grazing Act.

(b) In the opinion of both Biological Survey and Park Service members of the field party the questions of whether the control of the

areas should be state or federal or what bureau or agency should control the lands are secondary to the consideration that these areas should be reserved.

(c) It is important that mountain sheep should not be depleted by illegal hunting, rare plants by livestock and vandalism, and the forage of antelope and bison by excessive overgrazing by domestic stock, during a long period of indecision as to what is to be done.

(d) We earnestly recommend that these areas be reserved promptly from private apportionment; that whatever portions of them further studies and reports show worthy of establishment as national monuments or parks be so established; and that the portions not desired as monuments or parks be made wildlife refuges.

(e) We especially commend for favorable consideration steps of international cooperation in the creation of an international monument, or, possibly, an international park, in connection with the proposed Organ-pipe Cactus National Monument in Arizona and international wildlife refuges along both Arizona and New Mexico portions of the international border.