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2640 - Stocking and Harvesting
Functional Designation

MULTIPLE USE SURVEY REPORT
KAIBAB SQUIRREL INTRODUCTION
TO MT. TRUMBULL DIVISION
(Name of Project)

Jacob Lake RANGER DISTRICT

KAIBAB NATIONAL FOREST, REGION THREE
STAGE 2
(1 or 2)

Prepared by Don Mackelprang Date 3-30-71
Title Forestry Technician

And: F. T. Arbogast Date 3-30-71
District Ranger

Approval Recommended by F. T. Arbogast Date 3-30-71
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Title _____

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MULTIPLE USE SURVEY REPORT

Proposed Planting of Kaibab Squirrels on Mt. Trumbull Division, Kaibab National Forest

I. INTRODUCTION AND DESCRIPTION

A. Purpose

The Arizona Game and Fish Department has made a proposal to trap 20 to 40 Kaibab Squirrels, also known as the White tailed squirrel, (Sciurus Aberti Kaibabensis) on the North Kaibab (Kaibab Plateau) and plant the animals on the Mt. Trumbull Division, Kaibab National Forest.

The letter from the Arizona Game and Fish Dept. 1/12/71, initiating the proposal states, "We believe this is an important move to extend the range of this so-called "Unique Species".

The Kaibab squirrel has existed for eons on the Kaibab Plateau with an apparent fairly stable population. However, in the event a disease or other calamity occurs, wiping out the entire population on the kaibab plateau, a successful transplant on the Mt. Trumbull division would give some assurance that the species would be perpetuated.

The Kaibab squirrel is classified as a rare species in the Red Book of Rare and Endangered Fish and Wildlife of the United States. If one considers only the Kaibab Plateau then the squirrel is certainly not rare. If one considers the entire state, the nation, or other larger areas, then the white tailed squirrel is indeed a rare animal.

This little animal is found only on the Kaibab Plateau, with the majority of the animals residing within the boundaries of the Kaibab National Forest and a lesser population located within the confines of the North Rim area, Grand Canyon National Park.

The importance of the existence of the squirrel is illustrated by the reaction which took place several (1964) years ago when the Arizona Game and Fish Commission proposed a hunt on the Kaibab squirrel. "Across the nation sentiment rose against the proposed hunt..." (1964, Willis Peterson, Arizona Highways). "...It is a commentary of quality of humankind that men derive pleasure from killing anything so charming and harmless as a Kaibab squirrel..." (Washington Post, July 5, 1964).

The subject of hunting the Kaibab squirrel still comes up from time to time, and though this writer is opposed to such a hunt, the establishment of a squirrel population at Mt. Trumbull might permit hunting on a limited basis. The question of hunting the squirrel on the Kaibab Plateau should be considered a closed case.

B. Objective and Scope of the Survey

The objective of the survey is to determine the feasibility of planting Kaibab squirrels on the Mt. Trumbull division, Kaibab National Forest: The survey included a review of the evaluation submitted with the Arizona Game and Fish Dept. proposal, a review of several publications and unpublished data, discussions with local Arizona Game and Fish Dept. personnel and Bureau of land Management personnel, discussions with several local individuals, an analysis of habitat requirements, and a comparison of squirrel habitat on the Kaibab Plateau with the habitat on the Mt. Trumbull division.

C. Multiple Use Management Zone and Management Unit Involved

The "planting" is proposed for the Intermediate Management Zone.

D. Location and Description

Areas containing ponderosa pine and considered in this report as possible Kaibab squirrel habitat include:

1. National Forest Land including parts or all of sections 1, 2, 3, 10, 11, 12, and 13 of T.34 N., R.9W.; section 36 of T.35 N., R.9W.; sections 4, 5, 6, 7, 8, 9, 17, 18, and 20 of T.34 N., R.8W.; and sections 21, 26, 27, 28, 32, 33, 34, and 35 of T.35 N., R.8W. containing approximately 7,600 acres more or less of some density of ponderosa pine.
2. Land owned by the State of Arizona in Section 16 of T.34 N., R.8W. containing approximately 400 acres of ponderosa pine.
3. Public Domain located in sections 26, 34, and 35 of T. 35 N., R.8W.; and sections 3, 4, and 9 of T.34 N., R.8W. containing an estimated 420 acres of ponderosa pine.
4. A very small, undetermined acreage south of the Mt. Trumbull division on Grand Canyon National Monument.

The above described land contains ponderosa pine, but all cannot be considered as suitable habitat for the Kaibab squirrel as the paragraph entitled "Wildlife" will show.

E. Names and addresses of Persons and Organizations Responsible for Out-Service Use or Activity

1. Arizona Game and Fish Dept., Phoenix, Arizona.
2. Bureau of Sport Fisheries and Wildlife, Tucson, Arizona.
3. Bureau of Land Management St. George, Utah.
4. National Park Service, Grand Canyon, Arizona.
5. The American public, United States of America.

F. Physiography

Soil parent material on the Mt. Trumbull division is basalt cinders, and lava. Soils are loam, silt-loam or clay-loam.

Elevation of the Intermediate Zone ranges from 6,700 feet near the Woodland Zone to 7,900 feet atop Mt. Trumbull. The mountains of the Mt. Trumbull division are an extension of the Uinkaret Mountains (Pine Mountains), so named by John Wesley Powell.

Mt. Logan and Mt. Trumbull are the dominant topographical features for many miles.

The high country on the Mt. Trumbull division can be considered an island of ponderosa pine in a sea of woodland, grassland and barren ground. The Kaibab Plateau is much the same except on a larger scale. The significance of this is that if an animal such as the Kaibab squirrel is introduced to the Mt. Trumbull division, it would be restricted to the ponderosa pine island since it is dependant on this vegetative type and does not have the capacity for travel over great distances or across the topographical-vegetative barriers surrounding the island of ponderosa pine.

The entire area is within the Colorado River drainage. The south portion of the area drains into the Colorado by means of Whitmore Wash and the northern portion via several drainages which flow into the Virgin River.

Average annual precipitation at 7,000 feet is approximately 20 inches. Several springs and seeps are present on the Mt. Trumbull division. Dry periods on an annual average basis at Mt. Trumbull appear to be of longer duration than on the Kaibab Plateau. This is based on fire weather observations in both areas. "Spring" comes earlier at Mt. Trumbull than it does on the Kaibab Plateau and the fall dry season is also longer at Trumbull.

II. SUMMARY

The Arizona Game and Fish Department proposes to trap 20 to 40 Kaibab Squirrels on the North Kaibab (Kaibab Plateau) and transplant the animals on the Mt. Trumbull division, Kaibab National Forest. Their (AG&F Dept.) stated purpose is to extend the range of the species. In addition, some Department employees indicate an interest in opening a hunting season on the Kaibab Squirrel.

In the event the Kaibab Squirrel population on the Kaibab Plateau were wiped out due to disease, etc., a successful transplant on "Trumbull" would give some assurance of perpetuating the species.

The Kaibab Squirrel is classified as a rare species and is a definite asset to natural beauty and the recreation resource. A number of biologists, nature lovers, and others have an active interest in preserving the members of the species. The question of hunting the Kaibab Squirrel on the Kaibab Plateau should be considered a closed case.

The proposal is compatible with National Forest system management objectives, and all applicable coordinating requirements and management decisions in the Jacob Lake Ranger District multiple use plan have been followed.

Even though several interested individuals and agencies have already been involved in the development of the material in this report, any additional individuals or organizations interested in this proposal should be allowed to have their "say" prior to approving or disapproving the transplant.

If the Kaibab Squirrel is planted at "Trumbull", leaving most trees under 26 inches DBH and "mistletoe" trees must be seriously considered in marking timber sales.

No Kaibab Squirrels should be trapped within a two-mile radius of the junction of State Highway 67 and U.S. Highway 89A.

A legal interpretation of the 1932 "Agreement" should be obtained.

III. RESOURCE, USE, AND ACTIVITY EVALUATION

A. Air

No negative impacts nor coordinating opportunities involving the air resource are foreseen.

B. Minerals

No conflicts nor coordinating opportunities involving the minerals resource are envisioned.

C. Natural Beauty

There is no question that the presence of the Kaibab Squirrel on the Kaibab Plateau is a decided asset to Natural Beauty. The many favorable comments by Forest visitors attest to this as do the efforts by many wildlife photographers, both professional and amateur. During the summer months, it is an unusual day when one or more Forest visitors do not request assistance in locating Kaibab Squirrels for the purpose of viewing them or photographing them. Many visitors express their disappointment when they are unable to see the animal after attempting to locate a squirrel for several hours. Only this week I received a letter from a man from Colorado who is planning a week's trip to the Kaibab National Forest for the sole purpose of photographing the Kaibab Squirrel.

According to Willis Peterson, Dr. Clarence Cottam, Director of Research for the Welder Wildlife Foundation, describes the Kaibab Squirrel as being..." not only the most beautiful squirrel in the world but the rarest in regards to its divergent evolutionary development"... (Arizona Highways, May, 1965).

If the Kaibab Squirrel were to become successfully established on the Mt. Trumbull division, the natural beauty of the area would certainly be enhanced. (2)

D. Outdoor Recreation

Recreational enjoyment of the Mt. Trumbull area would be enhanced if visitors were able to view Kaibab Squirrels in the area.

However, here is a point to ponder: The Mt. Trumbull division has its own inherent qualities, ie., landforms, vegetation, wildlife, etc. If "exotic" species are introduced, the area would no longer be "pure". This point was brought out by the Arizona Game and Fish Dept. Unit Manager of the Unit containing Mt. Trumbull. In addition, if the Kaibab Squirrel is successfully established at Mt. Trumbull, the Kaibab Plateau will no longer be "the only place in the world where the Kaibab Squirrel is found". (1)

E. Range

On the poorer ponderosa pine sites, a good percentage of the growing space is occupied by big sage and Utah juniper.

The range resource on the Mt. Trumbull division has been greatly overused in the past. Native grasses are scarce. Increaser species such as big sage and invader species such as beeweed, Mellein, and cheatgrass occupy a large percentage of the growing space not occupied by trees. Much bare ground is evident. The ground beneath the crown canopy on the poorer ponderosa pine sites exhibits much the same condition.

Only beneath the crown canopy of the better timber sites is the ground occupied by a needle mat, and low-growing sparse vege-

tation. While a dense cover of forage species is desirable from a "range" standpoint, this is not necessarily true when the habitat requirements of the squirrel are considered.

The significance of the density, composition and height of the ground vegetation will be discussed in the section on Wildlife. Modified range revegetation practices may have to be initiated if it is deemed advisable to favor the squirrel at Mt. Trumbull. Much more is to be learned about this subject, however.

In areas with a dense undergrowth of undesirable increaser or invador plants, controlled burns to remove the dense growth, and followed by seeding of low-growing, or widely spaced desirable plants may improve the squirrel habitat. (5)

F. Soils

The soils at Mt. Trumbull are volcanic in origin whereas the soils on the Kaibab Plateau are mostly sedimentary in origin (Refer also to "physiography"). The soils at Trumbull are more erodible than those on the "Plateau". The Trumbull soils and underlying strata resemble the major soil groups and formations in the vicinity of Flagstaff, Williams, and South Rim of the Grand Canyon National Park. The Abert Squirrel is common in these areas. But the Abert is also found in areas having soils almost identical to that found on the Kaibab Plateau. One such area is located adjacent to the Mogollon Rim on the southern portion of the Coconino National Forest (Personal observation, and knowledge of soil studies made in the two areas).

G. Timber

Overstory

In the ponderosa pine type, about 80% of the area has an overstory of yellow pine about 200 - 350 plus years of age. Yellow pine diameters range from 16" to 60" DBH with an average of 30" DBH. Log eights range from 2 - 5½ logs with an average of 3½ logs.

The remaining 20% of the area has an overstory of blackjacks approximately 80 to 140 years of age. Diameters range from 11 to 22 inches DBH. Average blackjack height is 3 logs.

Understory

The understory throughout the area is composed of varying age classes of saplings, poles, and small sawtimber although only two age classes are well represented, ie., 20 - 40 year age

class and 60 - 80 year age class groups.

The younger stands are generally healthy and vigorous. While the mature and over-mature trees contain a high percentage of rot, insect activity has been light. A small amount of paint-brush blister rust has been observed, and only a very small amount of dwarfmistletoe is present. (6)

DISCUSSION

Most of the pine type in the Trumbull area was logged one to three times from 1868 to 1950. Most of the sawmills during this period were unable to handle the large, yellow pine, and as a result most of the yellow pine overstory remains. The trees removed were of a size and age preferred by the Kaibab Squirrel for feed and nest trees. Observation on the ground of the areas cut over indicated that the trees removed were approximately 12" - 28" DBH.

Timber cutting again took place during the period of 1964 through 1968 during which time 1,200 acres were cut over. Marking guides called for removal of most mature and over-mature yellow pine and removal of sawtimber sized trees topping sapling or pole stands. Although most of the sizes of trees preferred by the Kaibab Squirrel were left, many were cut.

In a study on the Abert Squirrel on the Castle Creek Watershed in the White Mountains, "Squirrel nests made from leaves and branches were found in 10 ponderosa pines that averaged 17" DBH. The smallest tree with a leaf nest was 10"; the largest, 24" DBH. Of 538 ponderosa pines with squirrel cuttings underneath, the smallest tree was 4 inches, the largest was 36 inches, and the average of all trees with clippings was 19 inches DBH." A grouping in the 11 to 30 inch DBH range accounted for 89 percent of the total trees used by the squirrels, and a grouping in the 16 to 25 inch DBH range accounted for 61.2% of the total trees used (Patton, D.R. and Green, Win, 1970).

During 1970, a study which was conducted on the Kaibab Plateau to determine the size and characteristics of trees used by the Kaibab Squirrel for feeding and nesting included visits to 87 timber inventory plots consisting of 10 prism points each. All trees that were inventoried during the forest inventory of 1965 were observed for Kaibab Squirrel feeding and nesting activity. Although this study has not yet been compiled and summarized, an inspection of the data gathered indicates the trees utilized by the Kaibab Squirrel are similar in size and characteristics to those utilized by the Abert Squirrel. (7)

The timber cuts (prior to 1950 and 1964-1969) removed a great many trees of the sizes apparently favored by the Kaibab Squirrel.

Marking guides used in the 1964 through 1969 timber sales at Mt. Trumbull called for removal of many trees of the sizes preferred by the squirrel. If these marking guides are continued on future timber sales in the area, the quality of the Kaibab Squirrel habitat at Mt. Trumbull will be seriously decreased.

During a field session conducted by D.I. Rasmussen during early 1970, the following was brought out: Trees adjacent to the nest trees are just as important as the nest tree itself. The squirrel will apparently not build a nest in an isolated tree. Rather, it builds its nest in a tree having several trees close enough to the nest tree to permit movement from the nest tree to one of the adjacent "jump" trees. Only one nest tree was observed with a single "jump" tree. All others had several. (8) Therefore, if Kaibab Squirrels are to be favored, groups of suitable trees must remain rather than single "suitable" trees.

The Kaibab Squirrel also apparently considers a dwarfmistletoe broom as an appropriate nest location. "If mistletoe brooms were available, the squirrels made use of them" (for nests) (Neff. L., 1970). Just how important mistletoe brooms are to the squirrel remains to be seen.

H. Water

No detrimental impacts nor coordinating opportunities are foreseen

I. Wilderness

No wilderness is involved.

J. Wildlife

While a great deal remains to be learned about the habitat requirements of the Kaibab Squirrel, we have at hand a fair amount of information on the subject.

Studies conducted during 1969 and 1970 indicate that Kaibab Squirrels frequent ponderosa pine stands of varying degrees of density with size and age classes ranging from large poles to overmature yellow pines, with a minimum of ground cover, or growth low enough for the squirrel to "look over" when he is on the ground. (Rasmussen, D.I., 1969, personal communication). The majority of squirrels observed during several "squirrel count" trips had the following results: The large majority of squirrels were observed in ponderosa pine stands where mature (Thompson's age class III) or blackjacks of sawtimber size (Thompson's age class II) predominated; the ground surface was mostly barren, had few plants over 1 foot in height, had a fairly dense ground cover of plants under 1 foot in height, or had a pine-needle-mat ground cover. Few or no squirrels were observed in sapling or

young pole stands or in areas having dense ground vegetation over 1 foot high. (5)

Areas which "fit" the above description are found on the Mt. Trumbull division, although no tabulation of acreages of such areas has been made. The discussion under "range" indicates that some proportion of the area is suitable from the (lack of) ground cover standpoint. Ocular estimates at Mt. Trumbull and observation of range analysis photographs indicate that no more than 33% of the area in the Ponderosa pine type meets the prescribed conditions. The total ponderosa pine type (all ownerships) totals approximately 8,400 acres. About 2,800 acres (one-third of total) can then be considered as meeting the ground conditions apparently favored by the Kaibab Squirrel. This compares with Brown's estimate of 2,500 acres of "quality squirrel habitat" on National Forest Land only. (Brown, David E. 1970)

The foods utilized by the squirrel from ponderosa pine (seeds, phloem of terminal twigs, and male cones) are of course available at Trumbull. Certain types of mushrooms are a food source for the squirrel (Hall, J.G., 1967). A long-time resident of the Mt. Trumbull area (Al Craig) reports that mushrooms are sometimes found in the area. All other parties questioned about this subject gave negative reports.

Until such time as the squirrel studies conducted on the Kaibab Plateau (Rasmussen's study and Neff's inventory) are completed, any further discussion on whether or not optimum Kaibab Squirrel Habitat exists at Trumbull would be rather subjective. The evidence indicated that potential Kaibab Squirrel habitat does exist on the Mt. Trumbull Division. The best estimate available at this time is 2,800 acres (all ownerships). Whether or not competition for food between the squirrel and other animals will be a problem is not known. There will probably be competition for mushrooms as cattle and deer also relish them. The only sure way of determining if the Mt. Trumbull division will sustain a population of Kaibab Squirrels would be to plant them in the area and await the results. (2)

If 40 Kaibab Squirrels were trapped, planted at Trumbull, and all were lost, what would be the effect on the population? Assuming a population of 3,000 animals (Hall's "reasonable" estimate of population in 1966 was "between 3,000 and 4,000"):

$$40 \div 3,000 \times 100 = 1.3\%$$

If all 40 transplanted squirrels were lost, the total estimated population would be decimated by only slightly in excess of 1%. If 40 squirrels were trapped from a small area, or from an area frequented by Forest visitors, the result could be very un-

desirable. The public is extremely interested in viewing the Kaibab Squirrel, and trapping animals near heavy people-use areas would decrease the chance of observation for a period of time at least. (3)

K. Fire and Air Operations

No negative impacts involving fire or air operations are foreseen. It is known that fire readily kills big sage (Stoddart, L.A. 1959), and if the squirrel is planted at Trumbull, controlled burns might be a means of improving the squirrel habitat in areas where big sage dominates. (5)

L. Insects and Disease

Kaibab Squirrels have been observed utilizing dwarfmistletoe (Arcuethobium vaginatum) as food (Moran, E.C., 1969, personal communication). Dwarfmistletoe on ponderosa pine exists in only limited amounts at Trumbull. The squirrel also utilizes mistletoe brooms as nest sites (see paragraph on Timber). (9) No other coordinating requirements nor detrimental impacts involving insects and disease are anticipated.

M. Landownership Adjustments

A small amount of potential Kaibab Squirrel habitat exists on Arizona state land and other small portion on public domain. The state is apparently in favor of the transplant (Arizona Game and Fish Dept.). The proposed transplant was discussed with the local Resource Area Manager for the Vermillion Resource Area which includes the BLM land adjacent to Trumbull. No objections were voiced, but a formal letter concerning this proposal is being sent to the local BLM office as well as to the local offices of all other agencies which might be affected. (1 and 2)

There is a remote chance that a small amount of suitable squirrel habitat exists on Mt. Emma on Grand Canyon National Monument, and the National Park Service is being contacted so that they can contribute their thoughts on the matter. (1 and 2)

N. Land Uses

Special Use Permits in effect within the ponderosa pine type at Trumbull are:

1. Arizona Game and Fish Dept., water supply for wildlife, 5/25/62 and trail seeding plot located in SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 7, T.34 N., R.8W.
2. Arizona Game and Fish Dept., road (hunter access), 3/19/63. The road runs from the north Forest boundary to Death Valley Lake.

3. Bundy, Chester, water supply, 10/18/67, located in SW $\frac{1}{4}$ SE $\frac{1}{4}$ SW $\frac{1}{4}$ Section 1, T.34 N., R.9 W.

No problems or coordinating opportunities involving land uses are anticipated.

O. Transportation

No detrimental impacts nor coordinating opportunities involving transportation are foreseen.

P. Information and Education

Many people are not aware of the existence of the Kaibab Squirrel, nor are some aware the animal is "protected" from hunting. This is evidenced by our discussions with many people and the fact that on occasion Kaibab Squirrels are taken mistakenly for game. This problem would perhaps be compounded if squirrels are planted at Trumbull owing to a low population level and a high proportion of out-of-state hunters and sightseers. It wouldn't take long for a few hunters to completely eliminate a small population of Kaibab Squirrels at Mt. Trumbull.

As time goes on, it becomes more and more apparent that it is important for people to "have a say" in activities on the National Forests. The more opportunities interested individuals and agencies have to make their contribution to National Forest Programs, the more likely they are to be convinced that our programs are sound, and the more likely we are to have their support when the going gets tough.

The newspapers and popular magazines are effective means of distributing information on our activities as are formal letters and bulletins. (10) If the squirrel is planted at Trumbull, road-side signs (with pictures of the Kaibab Squirrel) warning Forest users that the animal is protected might well prevent them from being killed. (11)

Q. Other

The "agreement" establishing a "...uniform policy...for...handling the Kaibab Squirrel..." made in 1932 with the Arizona Game and Fish Commission, the U.S. Forest Service and the National Park Service as parties thereto states that "Removal of live specimens of the Kaibab Squirrel (*Sciurus Kaibabensis*) from the Grand Canyon National Park and Kaibab National Forest will not be permitted." The agreement also states that "This agreement may be revised in the event the agencies involved should determine that the changed conditions justify modification".

The trapping of live squirrels on the Kaibab Plateau (Kaibab National Forest) and planting them at Mt. Trumbull does not in my mind constitute "removal" from the Kaibab National Forest. Since the Mt. Trumbull division is, in fact, part of the Kaibab National Forest.

(Though, perhaps a legal interpretation should be sought). (12)
In any event, if the transplant is deemed advisable, the agreement could be amended to permit the trapping and planting.

IV. RECOMMENDATIONS

1. Prior to giving final approval or disapproval of this proposal, I recommend we obtain a "pulse reading" of interested individuals and organizations.
2. If no unresolvable problems arise as a result of recommendation, I recommend that up to 40 Kaibab Squirrels be trapped on the North Kaibab (Kaibab Plateau) and planted on the Mt. Trumbull division, Kaibab National Forest.
3. Trapping of Kaibab Squirrels should not be permitted within a two mile radius of the junction of Highway 89A and Highway 67.
4. The squirrels should be trapped from throughout the pine type. Concentrating trapping in any small area should not be permitted.
5. The possibility of improving the quality of squirrel habitat through controlled burning of sagebrush and planting low growing species should be studied.
6. Dwarfmistletoe fruiting bodies may be an important food source for the squirrel, and consideration should be given to leaving "mistletoe" trees when timber sale marking guides are developed.
7. Until better information about desirable tree size and characteristics is available from the 1969 and 1970 studies conducted on the Kaibab Plateau, timber sale marking guides for Trumbull should specify that no trees below 26 inches DBH will be removed unless the tree under consideration is definitely a "poor risk."
8. Potential "jump" trees or "escape" trees should be left.
9. Consider leaving "mistletoe" trees until more is known about the importance of these trees to the squirrel.
10. The results of this proposal should be given wide publicity through the written media.
11. Roadside signs (with a picture of the Kaibab Squirrel should be erected at Mt. Trumbull and on the Kaibab Plateau explaining the status of the animal.
12. Consider seeking the advice of the General Counsel as to the legal interpretation of the 1932 Agreement concerning the "handling of the Kaibab Squirrel."

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LEGEND

- Intermediate
(Possible Squirrel Habitat)
- Woodland Zone
- Travel Influence
- State Lands
(Possible Squirrel Habitat)
- Private Lands
- BLM Lands
(Possible Squirrel Habitat)



