AN ECOLOGICAL VIEW OF BIGHORN HABITAT ON MT. SAN ANTONIO

by

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ABSTRACT

The Mt. San Antonio bighorn range came under an environmental impact analysis resulting from a request to expand the Mt. Baldy Ski Resort. A team of Forest Service and California Department of Fish and Game Wildlife biologists and students spent approximately 12 months in the survey area observing bighorn and surveying their habitat. A resultant graphic analysis of interpretive base maps and valued overlays of the habitat component, the bighorn use component and the human use component leads to some inescapable conclusions.

1. Bighorn use does not occur in significant amounts where vegetation and terrain features are of low value.

2. Bighorn use does not occur where human use is heavy.

3. High-value habitat used heavily by humans is excluding bighorn use.

There still remains the job of gaining more data on bighorn behavior. Such data will provide the basis for improving Forest Service Management directives relative to maintaining to bighorn habitat.

REVIEW

The ecological analysis of the San Antonio bighorn range began as an impact survey for a proposed extension of the Mt. Baldy ski development on National Forest land in the San Gabriel Mountains in Southern California. This particular bighorn range was inventoried in 1965 and a habitat management plan now provides general recommendations for maintenance of the bighorn habitat.

The San Gabriel Mountains overlooks 9 million people in the Los Angeles - San Bernardino Basin. Approximately 100,000 are skiers, and at least as many others, have other recreational use desires, but all express concern for the bighorn.

In response to the ski area proposal, the San Bernardino National Forest prepared a preliminary impact survey (12/31/69) recommending an environmental impact survey. Part of which includes an intensive study of the bighorn and its habitat.

The objective of this report is to describe the first year's results of using interpretive base maps and valued overlays to show bighorn key

areas, their habitat, past impact on bighorn by human use and summarize bighorn behavior observed while in their range on San Antonio Mountain.

THE STUDY AREA

The study area includes eight square miles of the East fork of San Gabriel River to the West and the North fork of Lytle Creek watershed to the east. The study area embraces Mt. San Antonio (Mt. Baldy) the highest of the San Gabriel Mountains. Elevation of the study area ranged from 2500 feet to over 10,000 feet. The San Gabriel Mountains consists primarily of the Pelona Schist, a geologically young rock type.

METHODS

The bighorn impact survey team under the direction of the Cajon District Ranger consisted of two Forest Service Wildlife Biologists, two California Department of Fish and Game biologists, and three students from local universities.

The survey team mapped and recorded all bighorn, their behavior, travel routes and concentration areas each month during a 12-month period in the study area. The team members strived to spend as much consecutive time as possible in the field with bighorn during the spring, summer, and fall months. Except for the winter months all travel in the study area was on foot. During the winter, approximately 24 hours were spent in helicopter observing the winter range and more inaccessible areas.

Quantitative data was recorded on (1) a Habitat Analysis form and (2) a Bighorn Observation form. Each form was tested in the field for completeness relative to obtaining all obvious habitat factors and to obtain all obvious facts relative to bighorn behavior in various habitat and environmental situations. The quantitative data is presently being transferred to a medium that will provide systems analysis to isolate significant (1) habitat factors relative to bighorn use and (2) bighorn behavior situations relative to human activity.

The Forest Service involved numerous interested groups as observers which included local Sierra Club Chapters, Colleges and the local Wildlife Society Chapter.

THE BIGHORN HABITAT

The following describes the graphic study process in which base maps and three-valued overlays were used to arrive at a single three-valued overlay model of Bighorn Habitat in the study area.

TERRAIN

The three-valued overlay on Terrain is a slope study based on importance to bighorn. It was generally found throughout the study that bighorn

favored narrow promentories in or adjacent to cliffs or escarpments. Bighorn concentrations were encountered only under these circumstances.

The rating criteria for terrain is as follows:

Low - Slopes from 0 - 30 percent usually not adjacent to or more than 150 yards from escarpment or steep slopes.

Moderate - Slopes from 0 - 60 percent usually adjacent to or surrounded by escarpments which are within 50-150 yards.

High - Slopes 60 percent or more with promentories in or within 50 yards of escarpment.

The three-valued overlay for Terrain now describes its influence on bighorn use in the study area.

VEGETATION

Vegetative types in the study area were delineated on a vegetation base map. The vegetative types were then described in three values relative to their importance to bighorn.

High Bighorn Value

Escarpment Chaparral

This type is characterized by cliffs, narrow promontory ridges and slide areas. The vegetative composition includes primarily mountain mahogany (Cerococarpus sp), scrub oak (Quercus dumosa) and numerous annual grass species.

The chaparral escarpment type is influenced by the terrain characteristic and includes plants favored by bighorn and for this reason is rated High.

Timberland Chaparral

This type has a 5-10 percent overstory of Jeffrey pine and 30-60 percent understory of mountain whitethorn (Ceanothus cordulatus), chinquapin (Castenopsis spp), scrub oak, coffeeberry (Rhamnus californica), elderberry (Sambucus spp) and numerous forbs and grass including the buckwheats. Because of the high density and composition of desirable forage plants this type is of High value to bighorn.

Escarpment

This type is generally steep and barren in appearance. In the major draws are many small "mini-meadows" or wet meadows at water seeps.

The greater area contains sparse but highly preferred vegetation such as mint (*Monardella* spp), heuchera (*Heuchera* spp), oceanspray (*Holodiscus* spp), narrowleaf mahogany (*Cercocarpus* spp), and a variety of buckwheats (*Eriogonum* spp). The type is High value to bighorn.

Moderate Bighorn Value

Alpine Conifer

This type includes limber pine and lodgepole pine with an understory with 5 to 10 percent vegetation with chinquapin and barren rock rubble. The type is of Moderate value to bighorn.

Alpine Barren

This type includes 80-95 percent rock rubble with vegetation which includes the buckwheats, mint, heuchera, oceanspray and perennial grass species. This type contains preferred forage and is of Moderate value to bighorn.

Conifer

This type is usually on north- and east-facing slopes with a 40-60 percent overstory consisting of Jeffrey pine, sugar pine, incense cedar, liveoak, white fir and bigcone Douglas fir. The understory (5-10 percent) consists of narrowleaf mahogany, mountain whitethorn (*Ceanothus cordulatus*), perennial grass and eriogonum species. Vegetative composition is of Moderate value to bighorn.

Low Bighorn Value

Wash

A rock rubble and debris filled channel which changes annually with each hydrologic wash. The type is usually void of vegetation and for this reason is of Low forage value for bighorn.

Chaparral

This type is found in the lower elevation. Vegetation consists primarily of shrubs such as chamise (*Adenostoma fasiculatum*) chaparral whitethorn (*Ceanothus leucodermis*), scrub oak (*Quercus dumosa*), and birchleaf mahogany (*Cercocarpas betuloides*). Vegetation is usually quite dense (70-90 percent) and a natural barrier to bighorn, and for this reason it is rated Low.

The three-valued overlay for vegetation now shows a vegetative influence on bighorn use in the study area.

WATER

Water drainage patterns in the study area are indicated on the Drainage Base Map. This information cannot be interpreted in the three-valued overlay system. All yearlong water sources are rated High for bighorn.

TERRAIN - VEGETATION - WATER

By combining the valued overlays and map of terrain, vegetation and water we now have a bighorn habitat component overlay for the study area. The three-valued overlay model of the bighorn habitat was prepared by laying the terrain, vegetation and water valued overlays over a light table to delineate (1) combinations of only high valued areas as High, (2) any combinations of low, moderate or high valued areas as Moderate and (3) combinations of only low valued areas as Low. Later this combined three-valued overlay will be combined with bighorn occurrences.

BIGHORN OCCURRENCE IN THE STUDY AREA

Bighorn observed by helicopter and while on foot were recorded and mapped along with their concentrations and routes.

The Bighorn Occurrence Base Map shows the extent of the concentrations in the study area. The travel routes indicate direction of travel from winter range and on into the summer.

Bighorn Use was then delineated on a three-value overlay which shows the current use as light, moderate and heavy.

Light - Bighorn trailing may be found but they do not regularly trail through or concentrate in the area.

Moderate - Bighorn travel through regularly with small concentrated use areas with 10-20 sheep-days per acre along trails between heavy use areas.

Heavy - Bighorn concentrations are extensive and are linked together along routes. Bighorn use is over 20 sheep-days per acre. During the proper season bighorn can usually be found in these areas.

Bighorn observations were recorded and mapped by seasons as follows:

"Winter" (Winter - Early Spring)	12/16 - 4/15
"Spring" (Late Spring)	4/16 - 6/15
"Summer" (Late Spring - Summer)	6/16 - 9/15
Fall	9/16 - 12/15

Winter use was generally below 6000 feet. Spring use remained in the lower rugged canyons for the ewes in lambing while the rams and other barren and young ewes picked the south-facing slopes up to the 9000 foot elevation. Lambing generally occurred in May. By June and July the ewes with young head for and occupy the top of their range on San Antonio Mountain. Rams were small bands throughout the range. During the fall months bighorn rams gathered to rut on Pine Mtn. Ridge, in Cattle Canyon, North Fork of Lytle Creek, Middle Fork of Lytle Creek and West Fork of San Antonio Canyon.

The survey was temporarily halted in late Fall of 1970, and for this reason it is assumed that after the first heavy winter snows the bighorn return along the same routes back to the winter range. To what extent this assumption is valid will be determined this coming winter (1971).

By combining the three-valued overlay of bighorn habitat (terrain - vegetation - water) with the overlay of Bighorn Use we found that there were many similarities which basically indicated that the high valued habitat coincided with the heavy bighorn occurrence in most of the areas.

Those areas of high bighorn habitat value that registered light in bighorn occurrence were then studied to find out why bighorn use was light. In most cases we found that the past bighorn use, shown on the Historic Bighorn Use Overlay, coincided closely with the high valued areas shown in the Bighorn Habitat Overlay. An example is the Baldy Notch area where a ski area complex now exists. Gardner (1918) wrote that bighorn were once quite common in the area between Telegraph Peak and Mt. San Antonio. During the ski area's development which began in 1955, many bighorn were observed. Now on rare occasions bighorn rams appear on the line of sight perimeter from the center of this extensively cleared and developed winter and summer recreation area. A human influence on bighorn use of its habitat is now becoming apparent.

HUMAN INFLUENCES IN THE STUDY AREA

Man's influences on bighorn behavior has only partially been evaluated in the study area. We know where bighorn were and are now.

Throughout the study, the observers encountered numerous bighorns and took notes of their behavior responses. A general consensus of these responses were that bighorn ewes with lambs would not tolerate human advances to within 100 yards as would the individual ewes and rams. The individual ewes and rams could be approached to within 20 yards before they moved away. Bighorn out of cover retreated to cover at a quick pace. Ewes with lambs were by far the most intolerant especially when the observer was within or over their cover element.

A Human Influence overlay was developed to describe the intensity of human use along trails and centers of activity in the study area. This overlay has three values of human use which are as follows:

Light - 0-100 visitor days per year.

Moderate - 100-500 visitor days per year.

High - 500+ visitor days per year.

Much of the human influence had its beginning in 1955, when the public's attention was drawn to the Baldy Notch ski resort and later the Sierra Club cabin as a summer retreat. Human use which followed occurred during April to October. Approximately 1900 visitor days were registered from Baldy Notch and approximately 900 visitor days from the Sierra Club cabin in 1970. These two areas direct summer visitors to the top of Mt. San Antonio.

Comparative analysis of the valued overlays of present bighorn occurrence, human influence and historic bighorn use indicates a change in bighorn use patterns which was apparently molded through the years by human influences. Large areas of bighorn habitat which are suitable for bighorn occupancy have been vacated by the bighorn.

DISCUSSION

A graphic analysis of the habitat component, the bighorn use component and the human use component leads to some inescapable conclusions:

1. Bighorn use does not occur in significant amounts where vegetation and terrain features both are of low value.

2. Bighorn use does not occur where human use is heavy.

3. High-value habitat used heavily by humans is excluding bighorn use.

It would appear that the many documented cases of bighorn tolerance to human influence occur primarily in those areas where human visitation is relatively infrequent. There are many recorded instances of single visitors and small groups passing through bighorn country where the bighorn show little stress. On the other hand, there are noted instances when one or more human visitors cause the bighorn to flee the area. Apparently, occasional human visitors are tolerated but continual human visitation creates stress conditions and the bighorn begin to avoid these areas of heavy human visitation (habitation).

The best example of this is the San Antonio Canyon, Baldy Notch, Sierra Club Cabin bowl complex where high habitat components exist but bighorn use is light. In double checking this finding the study showed (from historic records in the area taken before the Baldy Notch development and in times when visitor days were appreciably less) that this was in fact a heavy bighorn use area. Because the bighorn have only gradually disappeared from the area as human use increased, the change was not too noticeable, and reports have painted a more optimistic picture than is now warranted.

The actual degree of tolerance as measured in human visitor days may never be known and will probably vary from place to place. Norman Simmons of the Canadian Wildlife Service, formerly with the Desert National Wildlife Range and the Kofa Game Range in Nevada, feels that the stress shown by mountain sheep is in direct relationship to the abundance of other habitat components. That is, where there are abundant food and water supplies in close juxtaposition with high value escape terrain a great deal more human disturbance will be tolerated.

The Mt. San Antonio area, while comparing favorably with other ranges in Southern California, nowhere near approximates the food abundance seen in places like the Sandia Mountain Tramway on the Cibola National Forest. The Rocky Mountain bighorn (a different sub-species), which has been noted as quite tolerant of man, generally occurs in ranges at northern latitudes where rainfall is more abundant and heavy stands of grass clothe the steep escape terrain which they inhabit.

CONCLUSION

The findings of the Bighorn Environmental Analysis indicate that bighorn can tolerate only limited amounts of human disturbance before they are driven from their home ranges. There are still gaps in our information which we hope to fill this summer, fall, and winter. This data will be refined and more bighorn behavior data will be analyzed. With this data we will have a better basis for recommending management directives where the maintenance of bighorn in their habitat is of primary concern.