The Himalayan Snowcock: North America's newest bird.

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Until recently the world's five species of snowcocks were found only in Central Asian mountain ranges having such exotic names as the Altais, Caspians, Caucasus, Pamirs, Karakoram, and Himalayas. The few who observed snowcocks in these rugged lands--servants of the Khans and Emperors, turn-of-the-century sportsmen, and a handful of zoologists--returned with only sketchy details of the biology of these high elevation partridges (Jerdon 1864, Hume and Marshall 1878). Today, however, as a result of introductions begun by game biologists in the 1950's, anyone with basic mountaineering skills can view these examples of high Himalayan bird life in the much-more accessible outback of northeastern Nevada. A new population has been established in the Ruby-East Humboldt Range of the Humboldt National Forest in Nevada, and as a result the North American avifauna has grown by one species. This new species is the Himalayan Snowcock (Tetraogallus himalayensis), though Nevadans sometimes erroneously refer to them as "snow partridges," a name properly belonging to another Central Asian partridge, Lerwa lerwa.

In the 1950's the practice of introducing exotic game was in its heyday. Game biologists went to great effort and expense to acquire wild snowcocks in Pakistan, propagate them, and release their offspring into regions said by some to have too few game birds. The introduction

of this "trophy game bird" has been a qualified success, but a close look at the program raises some questions.

The purpose of this paper is to chronicle this species' short history in America. We review the history of the introduction effort, discuss some of the costs and benefits of the program, describe the present distribution and status of snowcocks in Nevada, and present some results of our recent studies of the species.

History of snowcock introductions

The history of the Snowcock Introduction Program is an intriguing, seldom told story. In 1948 the United States Fish and Wildlife Service (USFWS) began a new program, Foreign Game Investigations (Bump 1951), whose stated objective was to seek out "new adaptable species possessing a high hunting resistance...so that...habitats thoroughly changed by man...or never fully occupied by native game...[could be stocked, and thus] provide greater hunting opportunities" (Bump 1968a). Program biologists conducted short field studies on dozens of potential game birds, in all corners of the globe. Informative leaflets were published for potential state collaborators, enabling them to match candidate species with local conditions (e.g., Bump 1973). Between 1960 and 1970 the program was responsible for the release of at least 19 species of pheasants, partridges, quail, tinamou, and sandgrouse (Banks 1981). The program was a joint venture between the USFWS and participating state agencies, with the Wildlife Management Institute providing loans for the acquisition of foreign birds. Federal aid was provided through the Pittman-Robertson Wildlife Restoration Act, which provides funds to

states on a matching basis for wildlife "restoration" work: land acquisition, research, development, and management projects. The Foreign Game Investigations program was particularly popular in the southeast, the arid southwest, and in Hawaii. In the case of Nevada, the objective was to enrich "60,000 square miles of [desert] habitats [--54% of the state--] which were not permanently inhabited by upland game birds, [or were inhabited by one of] five [native] species [for which] hunting potential...at its best is erratic" (Christensen 1963).

Snowcock introductions were attempted in five mountain ranges in Nevada and on Mauna Kea on the Island of Hawaii. Ironically, snowcocks fell far short of meeting the Federal Government's criteria of being adaptable, possessing high hunting resistance, and providing superior hunting opportunities. Furthermore, these strictly alpine birds had little chance of enriching Nevada's extensive deserts with game. But, key players in the Foreign Game Investigations Program became enamored with this "giant cousin" of the popular Chukar Partridge (Alectoris greca). Bolstered by the overwhelming success of exotic chukars--by then the favorite quarry of Great Basin bird hunters--Program participants set out to add the "king of chukars" to hunters' bags.

In 1961 a Reno trophy hunter had 6 Himalayan Snowcocks trapped near the town of Gilgit, Pakistan. The birds were transported by porter, pony, jeep, and airplane to a quarantine station in Honolulu, some 8,500 miles away. Only a single bird survived the trip, but the bird so impressed the Nevada Game Commission that they requested 35 more. Nineteen of these survived and were released directly into the Ruby Mountains in April, 1963, and disappeared soon thereafter. Nevada

Department of Wildlife (NDW) then decided to establish a captive flock at their game farm near Yerington, Nevada, from which offspring would be released over successive years. A total of 107 wild snowcocks was imported from Pakistan. Between 1963 and 1979, 2,025 of their progeny were released in Nevada, 1,717 of them in the Ruby Mountains.

During the 1970's a series of policy shifts signalled a close to the era of introducing full species of exotic game birds, though subspecies continue to be introduced even today. In 1970 the USFWS terminated its Foreign Game Introductions Program. In 1977 President Carter issued an Executive Order greatly restricting the use of Federal funds, personnel, or lands for introductions of exotics. In 1979 NDW discontinued its propagation and release of snowcocks.

Status and distribution of snowcocks

The present status and distribution of Nevada's snowcocks are not known in any great detail. The introduction was first declared a success in 1971 (Abbott and Christensen 1971), although the first substantiated observation of reproduction in the wild did not occur until 1977 (Molini 1980). Through the 70's, research efforts for the species consisted of a few short searches on foot or horseback. More recently, NDW biologists have incidentally counted snowcocks during sporadic helicopter and foot surveys of introduced mountain goats (Oreamnos americanus). In 1980 a snowcock hunting season was opened. Initially, hunters were required to report the location and results of their hunt, which was one of NDW's most effective ways of collecting data on snowcocks, but this requirement was later eliminated. As of

1985, they believed the snowcock population to number 250 to 500 individuals (Stiver 1985).

The distribution of snowcocks in the Ruby-East Humboldt Range is clearly limited to ridges which support extensive alpine habitats, typically areas above 3,150 m. Only about 33.5 km^2 (2%) of the 1,635 km^2 that lie above 670 m in the Ruby-East Humboldt Range meet this basic criterion, so the number of snowcocks there will never be very great. The scarcity of deep glacial cirques, especially those with moist meadows and sheer walls, further limits the area where sizable flocks can become established. The core of the snowcock population seems to reside in the Thomas Peak-Ruby Dome area of the Ruby Mountains, though coveys are seen occasionally in habitat patches further north and south (Figure 1). Because of the isolation of their "alpine island," the birds are unlikely to spread beyond the Ruby-East Humboldt Range.

Costs and benefits

The merits of introducing exotic game animals have long been debated. The Biologist-in-Charge of the Foreign Game Introductions Program once likened the critics of exotic game introductions to the "crowd of critics, of complainers, of commentators [that] darkened the face of learning [and brought about the fall of Rome]" (Bump 1968b). The Snowcock Introduction Program may well have 'brightened the face of learning,' with regard to snowcock biology, but the results of program, in our opinion, hardly reaffirm any wisdom in the introduction of exotics.

Since the snowcock introduction is, nonetheless, considered a success by some, an overall evaluation is warranted. On the positive side Nevada now has a trophy game bird that is a true challenge to bag, and one that provides a large meal once it reaches the table (snowcocks can weigh over 2.6 kg). In the words of one of Nevada's elite snowcock hunters, snowcocks provide "a truly unique hunting opportunity." For bird watchers and mountaineers, snowcocks can add unusual variety to an otherwise solemn mountain environment. The sight of a covey in flight, the alien cacophony of their calls echoing among the rocky cirques, and the chance drama of a high-speed chase by an eagle are truly spectacular. The presence of snowcocks in Nevada will also generate notoriety and revenue for the State. These can be important benefits for local economies that depend on tourism and a wildlife agency that depends on license sales and strives to fulfill the desires of the hunting public.

On the negative side, there is an official bill of $750,000 for the project (Stiver 1985), which would probably approach $1 million if private funds and funds not allocated directly to the project were to be included. This sum was spent in an era when two native game birds--Sage Grouse (Centrocercus urophasianus) and Sharp-tailed Grouse (Pedioecetes phasianellus)--were in serious need of "restoration" in Nevada. The utilization of snowcocks by hunters has been limited, at best. Snowcocks are difficult to bag, and the few hunters who have made the strenuous climb to snowcock habitat for a day of bird shooting have collectively bagged an average of 4 birds each year--total. The desire to posses and display a mounted snowcock is an important motivating

factor for most Nevada snowcock hunters, but since the birds are usually shot in flight, they generally need to be retrieved from the depths of a canyon, in which case they are likely to be too mangled to warrant taxidermy (Fulton 1904).

Interestingly, the fruits of Nevada's snowcock hunt had been foretold more than a century ago, when Hume and Marshall (1878), berated the species as a potential game bird in their still-authoritative book The game birds of India, Burma and Ceylon. They noted that:

> With a gun they do not, as a rule, afford any sport; ... a watch bird, when you get within 80 or 90 yards, gives the alarm and raises the whole covey. You may get them driven over you nicely at times [by coolies], and you might sometime stalk them--if it were worth the tremendous labour such stalks usually involve in the places they frequent--but as a rule, whenever I have seen them, the rifle is the only weapon with which a bag can be made. I went in regularly for it, and my camp followers seemed to relish the bird as food, though to me they seemed, after many trials, almost uneatable.

Another potentially negative aspect of the snowcock introduction is the unknown impact the birds might have on their new environment and the diverse community of herbivores already inhabiting it, which includes yellow-bellied marmots (Marmota flaviventris), golden-mantled ground squirrels (Spermophilus lateralis), pikas (Ochotona princeps), and introduced mountain goats. The small, isolated, alpine meadows on which

these herbivores congregate are not only fragile, as most alpine meadows are, but unique: no other alpine plant community in the Great Basin is so rich with plant species (Loope 1969). Unfortunately, we can only speculate on the ecological impacts of snowcocks. The introduction went virtually unmonitored, and with no prior assessment of the snowcocks' potential for harm. The condition of the environment before, during, and after the establishment of snowcocks is largely unknown.

Recent studies

In the opinion of one retired biologist, who observed the introduction program from its inception, its greatest merit may be the opportunity it has provided us for studying the ecology of snowcocks. Little was known of the ecology and life history of Nevada's wild snowcocks prior to 1981, when our field studies of this species began. Previous "research" consisted only of a 39-day follow-up study of the initial behavior of 10 released birds equipped with radio transmitters (Flock 1974), and several searches on foot or horseback to determine the birds' distribution.

Over the past 7 years our knowledge of this population has slowly grown. We have learned that snowcocks generally make an elevational traverse of their home range each day, and that this route takes them through a series of habitats which are used in different ways and to different extents (Bland 1982). Our studies show that snowcocks prefer to forage on meadows located on steeply sloping terrain, even though there may be equally good forage on more level ground.

It has become clear that the two greatest ecological challenges snowcocks face, at least on a daily basis, are their needs to gather large quantities of food and to elude predation by Golden Eagles (Aquila chrysaetos). The alpine plants on which snowcocks feed (grasses, forbs, and sedges) are not highly nutritious, so snowcocks must compensate by consuming large quantities of food. To do this, they spend up to 80% of daylight hours foraging (Bland 1982). Under these circumstances one might expect snowcocks to spend most of their time where good food is most abundant, but this is not always the case. Snowcocks are reluctant to forage where there is good food if the topographic setting leaves them vulnerable to attacks by eagles. Snowcocks can only elude eagles--their principal predators in both the Himalayas (Baker 1924, Whistler 1926) and the Ruby-East Humboldt Range--by plummeting at great speed down a steep slope and outdistancing them. On level ground the heavy snowcocks have difficulty outflying eagles.

Since 1985 our field studies have been directed at understanding this relationship between snowcocks and their habitat, food, and predators. To determine the foraging potential of various habitats, we closely observed the foraging behavior of tame, hand-reared, snowcocks on plots with different vegetative characteristics (Bland and Temple 1987). To determine where snowcocks were most nervous about attacks by eagles, we observed the vigilance--alert scanning for predators--of wild birds foraging on level versus steep ground (Bland and Temple 1988). Wild birds have learned when and where extra wariness is necessary to prevent being trapped in a compromising situation by eagles.

Our tame birds indicated that snowcocks can feed efficiently on just about any kind of meadow. We also learned that acceptable foods are equally available on steep and level terrain. But, by observing wild snowcocks we determined that they avoid level terrain, regardless of the quality of food there. Wild birds were much more alert and spent more time scanning for threats when foraging on level ground than when they foraged on steep ground. Our predation-risk explanation for the avoidance of level ground was further bolstered by the finding that, while they fed on steep ground throughout the day, snowcocks seldom ventured onto level ground during the afternoon, when eagles were most active.

In light of our findings regarding predator-induced restrictions on habitat use, we were able to describe what might be considered ideal snowcock habitat, and, more importantly, explain why and how it best suits the species. In retrospect, the unique alpine meadows of the Ruby-East Humboldt Range were the key to success for snowcocks. Those few meadows which are on or near steep cliffs or slopes, or are nestled high in glacial cirques, provide just the right combination of food and escape terrain which snowcocks require to prosper.

Our work with Himalayan Snowcocks in the Ruby Mountains has given us a unique opportunity to study this poorly-known bird of Central Asia. Ironically, we may now know more about the species in its new situation than in its native range. The story of its introduction to America provides some examples of the problems that have resulted in laws prohibiting the introduction of new exotic species. We now have a better understanding of why snowcocks are inexorably tied to the

topography and vegetation of alpine environments, and why their distribution is limited even in the Ruby-East Humboldt Range. They are generalist feeders that can make a meal out of just about any meadow, but their access to food resources is restricted by birds of prey. They must always have a quick escape route at their disposal.

For those who would like to get a glimpse of America's newest bird, our findings can serve as a guide: hike to the highest ridges of the Ruby Mountains, search out a patch of good habitat, keep in mind that snowcocks are quite wary, and prepare your eyes and ears for a very different kind of alpine adventure.

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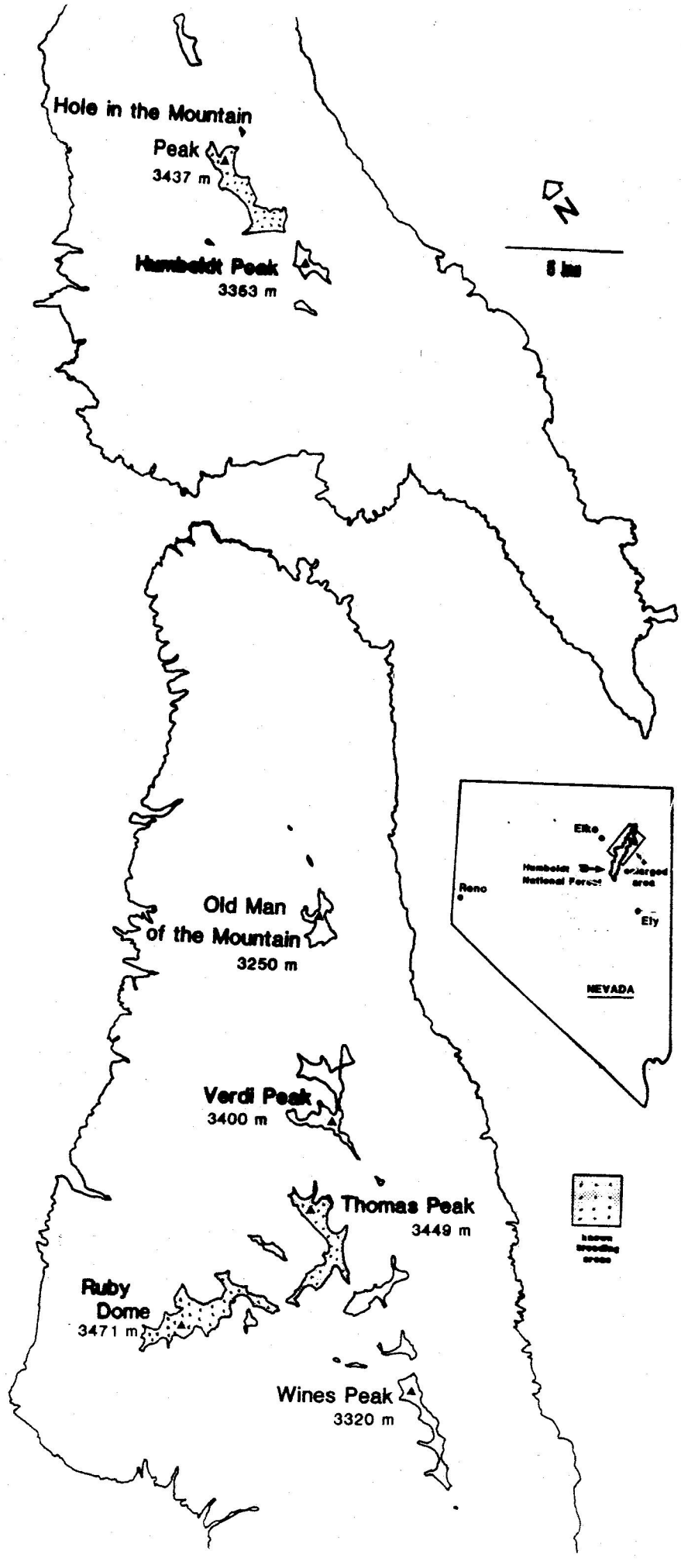
Figure 1. Distribution of snowcocks in the Ruby-East Humboldt Range, Humboldt National Forest, Nevada. Contour lines: 2000 m and 3100 m.


Hole in the Mountain
Peak
3437 m
Humboldt Peak
3353 m
N
5 km
Old Man
of the Mountain
3250 m
Verdi Peak
3400 m
Thomas Peak
3449 m
Ruby
Dome
3471 m
Wines Peak
3320 m
Elko
Reno
Ely
NEVADA