

THE EXHIBITION AND MANAGEMENT OF SNOW LEOPARDS IN THE HIMALAYAN HIGHLANDS EXHIBIT IN THE BRONX ZOO

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The New York Zoological Society exhibited the first snow leopard to be seen in the U. S. in the Lion House at the Bronx Zoo in 1903. The Lion House was designed more for viewing a variety of large cats than it was for providing an opportunity to appreciate these cats in an ecological setting. Fortunately, the cages are relatively large and airy and the dens are secluded. With thoughtful management, the facilities have proven to be adequate, and as a result, there have been nearly four dozen snow leopards raised successfully in this building. But we have not been happy with this building as an appropriate exhibit for snow leopards.

In September of 1986, three exhibits for snow leopards were opened as part of the Himalayan Highlands exhibition. A successful breeding program for snow leopards at the Bronx Zoo and the knowledge that large populations of endangered species must be maintained caused us to construct an off-exhibit breeding facility for snow leopards, in addition to the new naturalistic exhibits.

1. The Site:

Before planning snow leopard exhibits or an off-exhibit breeding facility, a site had to be chosen. The area selected was preferred because:

(1.) It was a hillside with some natural rock. This made it appropriate for a high mountain cat.

(2.) The exhibits would face east. Facing in this direction, the snow leopards would have full or filtered sun in the morning and some sun in the afternoon. This exposure would keep these mountain cats from being too hot and uncomfortable, and thus too inactive for the visitors to appreciate them.

(3.) This location had an adequate amount of relatively flat space on the top of the hill above the exhibits on which to construct an off-exhibit holding and breeding area away from the public and out of the sight of the public.

(4.) It appeared that enough hillside space was available to construct two or three exhibits. One exhibit for a solitary cat seemed hardly the way to excite the zoo visitor about this endangered species - especially if the one or two cats exhibited were sleeping all the time.

## 2. The Exhibits:

The plan was to construct aviary-type cages using center poles and cables with draped wire mesh. With the assistance of our exhibits department staff, three enclosures were staked out. The first area measures approximately 75 feet wide by 69 feet deep and is a gently-sloping grassy hillside with a clump of wild cherry trees and a few other trees in it. The second is one measuring approximately 36 feet wide by 26 feet deep. This steeper hillside with its natural rock shelves and little vegetation would primarily be an exhibit for females with small cubs. The third location is a steep hillside with rock shelves, trees and grass. It measures approximately 68 feet wide by 45 feet deep.

In each case, the exhibits appeared to provide the snow leopards with enough space so as not to seem crowded without allowing the snow leopards having many places in which to hide where they can't be seen.

A 2 inch by 2 inch welded stainless steel wire mesh of wire with a diameter of .1055 inches was selected for exhibit perimeters to a height of about six feet above the ground. This was thought to be higher than most snow leopards can easily reach and chew. The type welded wire used is not recommended because we found after its installation that there was a great variation in the depth of the welds and it was possible for us to easily peel off some wires. After closely examining all of this wire mesh in place, a second layer of wire was added to the areas with poor welds. Replacing the wire would have been more time consuming to do.

Above the heavy welded mesh wire, a .047 inch diameter stainless steel chicken wire mesh was draped over and tied to posts, mesh and cables. The entire exhibit tops were covered except where the mesh was cut and collared to allow a tree to poke through the top. The light mesh was used because it would appear less visible; but it should be safe because by being cantilevered over the exhibits, it should be difficult for the snow leopards to get to it and damage it.

In each case, the wire mesh that was used was oxidized black to make it less visible to the public.

Vertical wire under tension is used to separate visitor from cat in exhibits one and three. Wires are spaced 2 inches apart. In the middle exhibit, the visitor is separated from the cats by a 3/4 inch thick laminated glass measuring 6 feet by 12 feet set at an angle to minimize reflection problems. The tension wires are checked by the keepers regularly to be certain that all are

taut. The glass needs to be cleaned everyday - on both sides. Each type of barrier has its advantages and disadvantages. As long as it is clean, the glass provides the better view; the snow leopards will come to it and sometimes lie against it. The glass becomes a barrier that really separates animal from visitor. With tension wire, visitors are able to hear these snow cats, as well as see them, and this adds to the experience. The opposite is also true - the cats hear the visitors - and it is probably for this reason that the snow leopards rarely ever come very close to the visitor.

To discourage the snow leopards from hiding behind the bushes and trees planted around the inside perimeter of the two largest exhibits, we installed low posts with two thin copper wires mounted at 9 inches and 18 inches above the ground. The wires, attached to a cattle fence charger, give off a light electrical charge and have proven to be fairly effective at keeping the snow leopards visible.

Above the sight lines of most visitors are tree guards that are intended to prevent any snow leopards from climbing out of sight. They have not yet proven to be necessary since most of the cats exhibited use the trees for little more than scratching posts.

### 3. Off-Exhibit Facilities:

Above the exhibits is a relatively flat area between off-exhibit dens for bears and exhibition department buildings. On this site, there are maternity dens and runs and holding dens and runs with a combined holding capacity of about 18 snow leopards. All snow leopard runs, chutes and keeper alleys in this complex are constructed of nine gauge black vinyl-coated chain link. The ground surface in all runs, chutes and alleys is covered with approximately three inches of well-packed screenings (fine-crushed rock). Narrow cement blocks are buried around the perimeters of each run to make it difficult for any snow leopards to dig under the chain link. A heated drinking bowl is included in each run. There is no source of heat in any of the dens.

(a.) Maternity Dens - Four dens with runs are for pregnant females, females with cubs or snow leopard pairs during the breeding season. Dens are a concrete slab with concrete block walls and a concrete slab roof with interior measurements of about 8 feet by 8 feet. A block wall partially divides each den into two chambers for increased privacy. Exhaust fans are built into each maternity den in case these areas become exceptionally hot or stuffy during the summer months. The use of concrete and concrete block has helped to keep the dens cool. Also in each of these four dens is a fluorescent light fixture, an electrical

outlet and either a sleeping board or a cubbing box. Females about to give birth or raising small cubs are observed via a corner-mounted, closed-circuit TV camera with activity inside the den being recorded for later study. Red lights and light-sensitive cameras are used.

Outside each of the four maternity dens is a run measuring 17 feet by 22 feet by 8 feet high.

(b.) Holding Dens - Twelve dens with runs are for holding any single snow leopards or compatible pairs or groups of snow leopards that might be put together or raised together. The holding dens are of similar construction as the maternity dens with each having interior dimensions of 8 feet by 3.5 feet. Each den is equipped with an exhaust fan, electrical outlet and a sleeping board.

Outside each of the twelve holding dens is a run measuring 16 feet by 17 feet by 8 feet high.

#### 4. Snow Leopards in the Himalayan Highlands:

Moving snow leopards from the rather sterile environment of the Lion House cages to new facilities was done slowly and with much patience. These were snow leopards that had never experienced live trees, bushes, grass or even screenings or soil underfoot. They came from covered cages and had not even been exposed to snow or to rain.

In every case, each snow leopard's first few nights in the new off-exhibit facilities were spent confined to the den area. During the day, each would have access to an outside run. Some cats came right out while others were quite hesitant. None were pushed and after a few weeks, each had settled in to its new home.

To maximize the use of the two larger exhibits, plans were made to introduce a female with two half-grown cubs to each of these enclosures. The smaller exhibit at first would exhibit a single breeding male to be replaced in time by a female with tiny cubs.

When given access to the two larger exhibits, the snow leopards were extremely cautious about entering these new environments. In each case, it was the younger cats that entered the exhibits first and explored each area thoroughly. Whenever any encounter within the exhibit would frighten them, they would immediately retreat to the off-exhibit run. Neither of the adult females has spent much time in the exhibits and they have not seemed very comfortable when in these areas. We do not make them move

into the exhibits if they don't care to go on their own and neither seems to mind being apart from her cubs for a few hours everyday. The cubs have never seemed to miss their mothers.

It is interesting to note that our snow leopards have appeared to make an immediate adjustment to the smaller of the three exhibits. It may be that the abundance of rock walls and ledges and the scarcity of trees and grasses provides them with a less threatening habitat and one closer in appearance to what the cats left in the Lion House. An adult male, and later a female with ten-week-old cubs, each entered this exhibit with what seemed more confidences than was seen with the snow leopards in the other enclosures.

The snow leopards exhibited only have access to the exhibits while the zoo is opened to the public. This management practice offers the animals a new or different environment for a few hours everyday. This may keep them more active than snow leopards kept in the same enclosures at all times. It also protects the exhibits, although the snow leopards do not seem to be very destructive cats. The snow leopards readily move into and out of these exhibits each day.

The exhibition of snow leopards next to tragopans as a predator/prey exhibit seemed like about the greatest test that one could give to the use of tension wire as a barrier. Between the snow leopards and the tragopans, the tension wires are 1 5/8 inches apart. To help insure the success of this exhibition technique, two copper wires attached to the same cattle fence charger that provides a low charge to wires around the exhibits are used on the snow leopards' side of the wire. A shallow narrow trough on the tragopans' side of the wire helps keep the birds away from the wire. The first birds that the two sub-adult snow leopards saw in the tragopan exhibit were blue peafowl. The cats' first reaction was not to enter the snow leopard exhibit. They sat all day in the entrance watching the peafowl, but they would not go near them. The next day, we removed the peafowl and the snow leopards entered the exhibit. We then returned the peafowl to the tragopan exhibit, and the two cats watched them from the far side of the exhibit. In time, each of the two cats made one long slow stalk of the peafowl. When they encountered the "hot wires," each retreated to their off-exhibit run. We replaced the peafowl with tragopans, and the snow leopards act as though they don't even know that the tragopans are there. The tragopans have never paid much attention to the snow leopards. Some lucky visitors see snow leopards and tragopans seemingly in the same environment and wonder how the tragopans survive.

## 5. Snow Leopard Breeding:

It has been a management policy not to maintain monogamous breeding pairs of snow leopards at the Bronx Zoo. A temporary pairing strategy reopens our concern about compatibility each year. Incompatibility has not yet been a significant problem in the Bronx Zoo's snow leopard collection. Prospective matings are decided upon in the late fall. By late January, the animals are being introduced to each other for a few minutes to an hour each day. All snow leopard pairings are watched, but animals that have not mated previously are watched more closely. Introductions are accomplished with den doors closed to discourage hiding by an animal during the introductory period. Water hoses and CO2 extinguishers are available in case of serious fighting. Slaps, growls and threatening postures are not uncommon during the early introductions (even among previously mated pairs). We have rarely had to resort to quick separation of the animals.

In New York, estrus fairly consistently occurs in mid-February. A day or two before estrus, some mounting without copulation may occur. An introduction of a half hour or so without copulation has consistently been a sign that full estrus has not yet been arrived at. Once copulations begin, the pairs are left together for up to eight hours per day during working hours.

Breeding pairs are put together everyday until copulation ceases for two full days. The copulation period lasts from four to nine days, usually averaging around five or six. Reintroductions begin three weeks later and continue for a week or more until estrus begins again or until it is clear that estrus will not occur again (indicating a probable pregnancy).

This year, two females were moved into the maternity area and males were moved into the runs next to them. The introductions and copulations were not unlike what we have observed in the past with snow leopards in the Lion House during the breeding season.

The first litter of two cubs was born on June 9th; and the second litter, also of two cubs, was born on June 10th. The births were recorded on CCTV, and with the exception of the unusual death of one cub due to what appeared to be trauma four days after birth, the rearing of the cubs to this point has been uneventful. In early December, we will begin to wean the cubs away from their mothers. In the past, this has been done to give females a short rest period before breeding introductions begin. This year, the cubs will be weaned in order to socialize the single cub with the other two cubs. Our plan right now is for the three cubs to be exhibited together.

## 6. Moving Snow Leopards:

Moving snow leopards within the Himalayan Highlands complex has been remarkably easy to accomplish. Moves have been completed easily and rapidly. Using the chutes and cages available have made it a rather simple operation to move females from one end of the facility to a maternity den or to move a breeding male or even a rather protective mother with tiny cubs just coming out of the den for the first time. The arrangement of the animal doors and the chutes and our ability to operate animal doors remotely have been a great help in these procedures.

Snow leopards that are new to the Himalayan Highlands complex can easily be uncrated directly into dens. Snow leopards to be moved out of this facility can be moved from a den to a crate or a chute to a crate. Any of these moves can be made with little or no stress.

## 7. Nutrition and Health:

All feeding of snow leopards is within the off-exhibit facilities in the afternoon. A prepared feline diet is fed after thawing on serving trays with adult cats averaging about three pounds each per day. The prepared diet for lactating females, and cubs beginning to eat solid foods, is supplemented with a liquid carnivore milk replacer. This addition to the diet is readily taken by the adult cats, and pouring it over the meat part of the diet may help get cubs onto solid food at an early age.

As yet, we have had no major or noteworthy health problems with snow leopards in the Himalayan Highlands. Although large naturalistic exhibits may be difficult to clean, the actual amount of time that the snow leopards spend in these areas is not great. In the off-exhibit area, each enclosure has a sandbox in it. Some, but not all the cats use these sandboxes. The use of sandboxes helps to keep these areas clean. Although these snow leopards spend most of the time on a soil or a screening surface, the need to treat them for internal parasites or other health problems has not been appreciably greater than when the same cats were on concrete at all times. Stray cats, dogs and wild carnivores may be attracted to the off-exhibit facilities because of the presence of meat. With them, often come deadly diseases. The arrangement of cages with keepers' alleys or secondary fences around the perimeter of these enclosures make it difficult for unwanted animals to get anywhere but on top of the runs.

## CONCLUSION:

In concluding, I must say that we had many concerns as to how sensitive animals like snow leopards would react to new exhibits and off-exhibit enclosures all very different from what they knew. Everything done for this endangered species could have been larger or more lavishly constructed, but what we have build and our management practices seem to make it all come together and work. As a result, we have attractive naturalistic exhibits that zoo visitors appreciate. For the snow leopards, we have exhibits and off-exhibit areas that the snow leopards are comfortable in and make it possible for the New York Zoological Society to maintain a sizable snow leopard population, and at the same time, exhibit them well.

Thank you.