



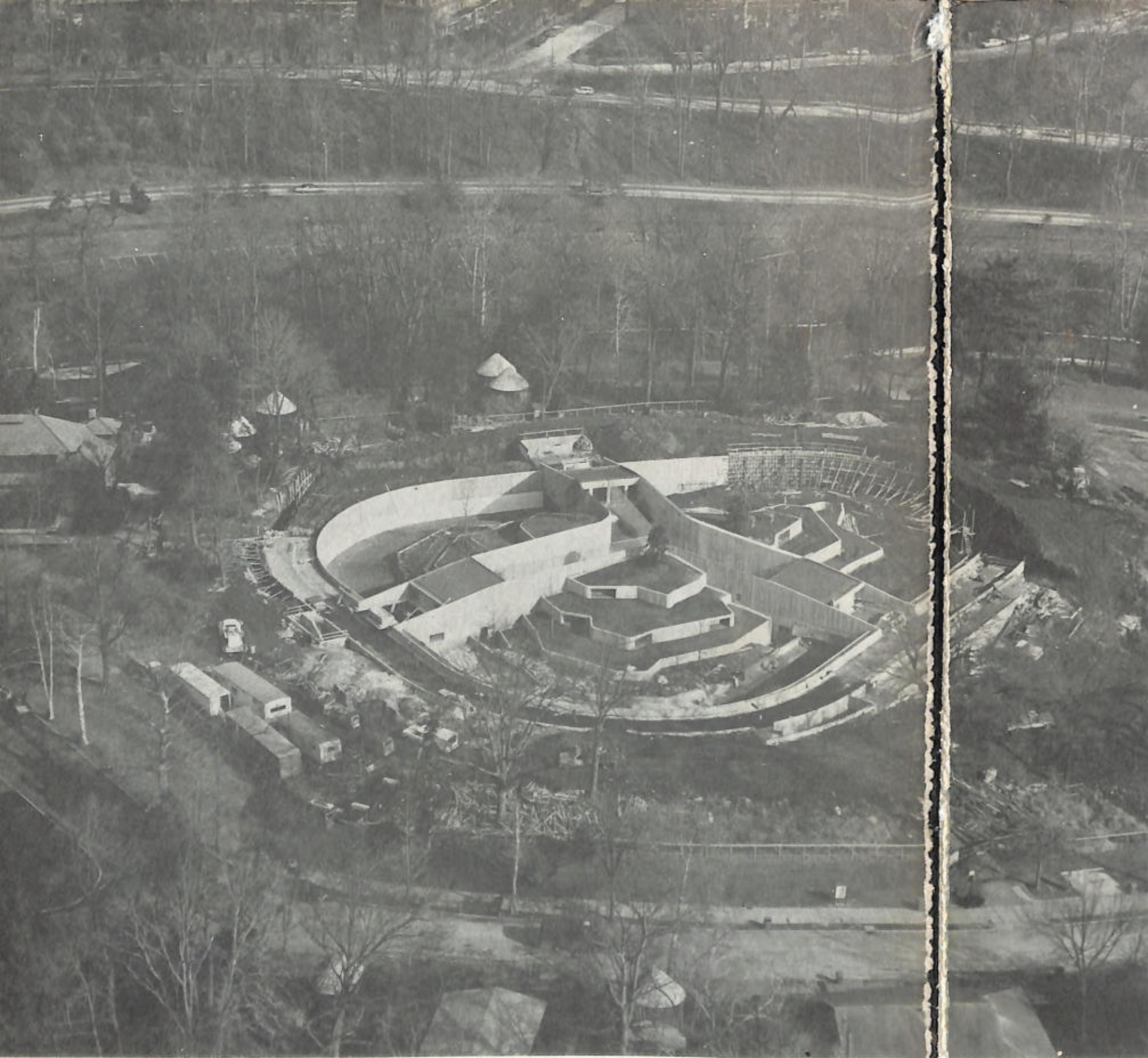
# Three-Year Report

January 1, 1973–December 31, 1975

SMITHSONIAN INSTITUTION



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61



# National Zoological Park Three-Year Report

January 1, 1973–December 31, 1975

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The adult bald eagle feeding its chick, representing the continuation and renewal of species, is the new symbol of the National Zoo.

## Statement of the Director

Theodore H. Reed, D.V.M.



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This report covers the three calendar years of 1973, 1974, and 1975; years of rapid change and development. The National Zoological Park is responding to the changing conditions in the world as it affects animals and particularly public exhibitions. The heightened awareness in recent years of the public's knowledge and concern for environment and preservation of species, coupled with the political and environmental changes in many foreign lands, compounded by the plethora of laws, rules, and regulations concerning the importation and exportation of animals, have served to increase emphasis on breeding, education, and conservation activities. While the Zoo has always had an enviable and proud record of breeding animals in the past, there is now an increased importance on breeding and rearing. This results in breeding groups of select species in larger enclosures. The selection of animals to be exhibited and maintained is critical and is only arrived at after a thorough evaluation by the professional staff. Factors considered include:

- Visitor appeal and value as a "show," including the animals' showmanship and activity.
- Educational value in interpreting the wonderful kaleidoscope of nature in all its diversity and evolutionary selection.
- Adaptability to captive management and exhibition, concerning the present "state of the art" of zookeeping and animal health.
- Availability in relation to captive adaptation, transport, and status of endangerment in the wild.
- Breeding potential for multigeneration breeding.
- Value of general scientific interest and zoological research, which feeds back to captive-animal management or to increased knowledge useful to field wildlife management and conservation.

These changed conditions have affected all areas of Zoo operation not only in animal management, breeding, and reproduction, but also in the educational presentation to the general public. It is not enough merely to maintain and exhibit the animals. We must explain to the visiting public not only the zoological facts about our animal guests, but also their relationship to each other, man, and their environment. With the new emphasis on sustained breeding of animals, more cages and exhibits are being devoted to a single species of animal, rather than to a multiplicity of forms. As an example, the successful lesser panda breeding program now has five

cages devoted to these animals. Formerly, there would have been five species of animals exhibited in this space. They would have been replaced, when necessary, by acquisition from other zoos or importation from the wild, rather than from breeding within the Zoo.

Subsequent parts of this report will deal in detail with activities of the separate departments, divisions, and their many programs. I am sure each department proudly and justifiably believes that the changes and progress it has made in this triannual period are of the utmost significance. As director, however, it is my opinion that the most significant action during these three years has been the acquisition of our breeding and research center at Front Royal, Virginia. Since 1961, the National Zoological Park has been involved in a program to redevelop and modernize its physical plant and broaden and intensify its programs of science, education, conservation, and animal exhibition. At that time, we recognized that the Zoo in the valley of Rock Creek would have to devote the majority of its space and energy toward exhibitions for the public and thereby support conservation through public education. Looking into the future, we perceived that what was really needed was a breeding farm where animals could be kept in large spacious paddocks and pens in sufficient numbers to establish the proper age pyramids for a continuous multigeneration breeding program, while permitting scientists to conduct long-term studies with minimum disruption from visitors. All of us had long been envious of the London Zoological Society's breeding establishment at Whipsnade and had recognized the necessity of the National Zoological Park establishing a similar operation. Once the need was established and recognized, there followed many years of trying to acquire a suitable site.

In July 1973, we learned that the United States Department of Agriculture was deactivating the Beef Cattle Research Station at Front Royal, Virginia. This 4,200-acre tract of land in the foothills of the Blue Ridge Mountains, seventy-five miles west of Washington, had formerly been the United States Army's remount depot, established for the breeding and training of horses and mules to supply the Cavalry. Since 1948, it had been used for the experimental improvement of certain breeds of beef cattle by the Department of Agriculture. The Zoo took immediate steps to apply for the transfer of this land from the General Services Administration (GSA), which handles all such government land transactions. We received from GSA a permit to use the facility during the time GSA was evaluating the requests of various federal agencies. The Zoo immediately took steps to occupy and preserve the land and facilities, although there were no appropriated funds for a breeding-farm operation. Our congressional committees had previously been made aware of our desire to establish a breeding farm and had given tentative approval of this goal, although no appropriate funds had been granted since we did not possess working property. With the receipt of the use permit, positions and money were transferred from the basic Zoo appropriations to establish a minimal presence at Front Royal. Thus, by establishing our presence, we started developing our long-cherished dream of a conservation and breeding farm. During the ensuing 18 months, there were many meetings with other agencies concerning land use, as well as appropriation justifications and financial support from Congress. The result was that on July 25, 1975, the Zoo received the official transfer of 3,150 acres and some 61 buildings



1. A Bactrian camel at the Conservation and Research Center exchanges glances with (from left) Don Bridgwater, director of the Minnesota State Zoo; David Challinor, assistant secretary for science; Wendell Anderson, governor of Minnesota; and Theodore Reed, NZP director. A herd of camels at the Center is owned jointly by NZP and the Minnesota Zoo.

and became, in effect, the owner of what is probably one of the most interesting and potentially useful establishments in the country. Dr. Christen Wemmer will report subsequently on the activities and development of what is now called the Front Royal Conservation and Research Center of the Smithsonian Institution's National Zoological Park. It is sufficient to say here that I consider this one of the most important steps on the national level for the continuous breeding, scientific study, and conservation of exotic animals in the United States. It is my personal belief that this new facility, under the auspices of the Smithsonian Institution, will develop and eventually achieve worldwide influence in the breeding, scientific research, and conservation of exotic animal species.

In the overall development and progress of the National Zoological Park, the second most important occurrence during these three years has been the continuation of the reconstruction and modernization program of the entire National Zoo. Certainly this construction has been the most highly visible aspect of this three-year period. As mentioned in the previous annual report, the modernization program of the National Zoological Park started in 1961. Previous reports detailed the various plans and construc-

tion that have taken place. During the hostilities in Southeast Asia, there was a hiatus of construction. A new Master Plan was presented in early 1973, designed by Faulkner, Fryer & Vanderpool with the assistance of the staff and various consultants. These plans were accepted by the Secretary and Regents of the Smithsonian Institution, as well as approved by the Fine Arts Commission and the National Capital Planning Commission. Funds were requested and granted via the regular appropriation route. During this period, there has been an almost unending disruption of the Zoo by various major pieces of contract work. Details will be given later in this report, but it is sufficient to say that at times over one-third of the Zoo has been usurped by the construction program. Animals have had to be relocated, either within the Zoo or at other zoos throughout the country; traffic has been rerouted; but the Zoo has always been open to visitors. Our visitors seem to be remarkably tolerant, cheerfully accepting detours, discomforts, and disruptions of the normal Zoo patterns caused by the construction. It is said that during this period, the National Zoological Park had an active breeding program of bulldozers; certainly there were times when it seemed that the most prominent species at the Zoo was caterpillars—tractors, that is.

We are happy and pleased with the work that has been accomplished during this three-year period, but as the old saying goes, "it is only the beginning." Development will continue in the immediate future. We are now working on the bear exhibits and a service and garage facility, and plans will be drawn up for seals, sea lions, otters, and beavers in what is commonly called "Beaver Valley." Plans will be made for a great-ape exhibit and the remodeling of the Small Mammal and Reptile houses.

Probably the most significant birth to occur in this triannual period was that of Patrick—named for Daniel Patrick Moynihan, then United States Ambassador to India—on January 30, 1974. He is the first Indian rhinoceros to be born in the Western Hemisphere. The little 170-pound bundle of joy has grown rapidly and has now been sent on a breeding loan to the New York Zoological Society (Bronx Zoo), where he will be raised with two females approximately his own age in a cooperative breeding effort.

In the bird division, January 22, 1975, saw the hatching of a kiwi chick. This is the first kiwi hatched outside New Zealand and Australia. The chick, a female, has grown quite well.

In the areas of developing and expanding organization and personnel, details will be given later in this report. I must mention, however, that we were joined in May 1973 by Edward Kohn as deputy director. He brings with him extensive experience in the administration of scientific programs and general administrative duties from other bureaus of the Smithsonian Institution. John Perry, assistant director, has devoted more and more of his time and effort to international conservation duties, particularly those of the Survival Service Commission of the International Union for the Conservation of Nature (IUCN).

With deep regret, I must report the untimely death from cancer of Dr. Helmut K. Buechner in October 1975. His gentle manner, kindly advice, and extensive knowledge will be missed.

While personnel matters will be mentioned elsewhere, mention should be made that "Smokey Bear" retired on May 2, 1975, after 25 years of faithful service to the forest-fire-prevention program of the United States

Forest Service and the National Zoological Park. He has been replaced by a young Smokey, who was his understudy here at the Zoo for several years. The transition and change of responsibility has been smoothly accomplished; the emeritus Smokey is enjoying his retirement,\* while the new Smokey is vigorously pursuing his responsibilities as the official living symbol of forest-fire prevention.

The staff of the National Zoological Park has changed and developed in a marvelous fashion. The enthusiasm, willingness, and dedication in all areas of activity have increased the usefulness, and indeed enhanced the fulfillment, of the Zoo's mission to advance science, education, recreation, and conservation. It is through efforts in all phases of the Zoo's operation that we have grown. To the staff and the animals belong all credit and glory, and on subsequent pages their story will be told.

### National Zoological Park

#### Status of the Collection 31 December 1973

	<i>Amphibians</i>	<i>Reptiles</i>	<i>Birds</i>	<i>Mammals</i>	<i>Total</i>
ORDERS	2	4	20	12	38
FAMILIES	10	30	73	47	160
SPECIES	17	111	335	142	605
SPECIMENS	73	341	1,365	633	2,412

#### Changes in the Collection 1973

	<i>OAM Amphibians &amp; Reptiles</i>	<i>OAM Birds</i>	<i>OAM Mammals</i>	<i>CRC Mammals</i>	<i>OZR Mammals</i>	<i>Total</i>
Status 31 Dec. 1972 *	396	928	489	0	104	1,917
Born/hatched †	50	400	115	0	132	697
Other acquisition	215	437	19	0	55	726
Total in	661	1,765	623	0	291	3,340
Died	146	326	78	0	37	587
Other disposition	85	53	95	0	65	298
Adjustment	16	21	6	0	0	43
Status 31 Dec. 1973 *	414	1,365	444	0	189	2,412
Loans to NZP	0	28	8	0	5	41

\* Includes loans from NZP.

† Includes stillbirths.

\* Smokey died in his sleep on November 9, 1976, and is buried in his native New Mexico in Smokey Bear National Park.

# The Organization of the National Zoological Park

Edward Kohn, Deputy Director

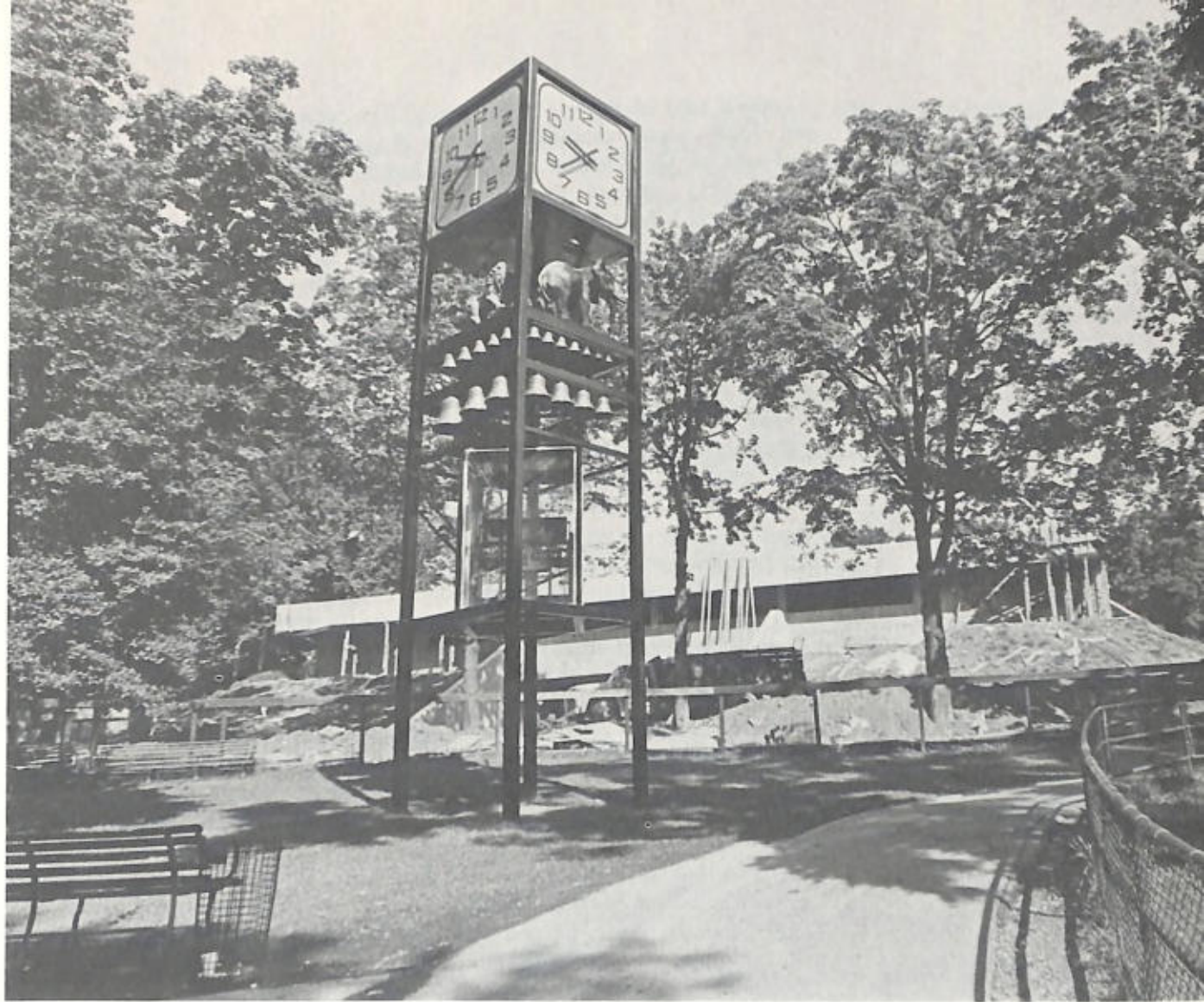
The organizational plan for the National Zoological Park is quite simple. Responsibility for all Zoo operations is shared with an alliance of 11 heads of offices, 8 of them new to their assignments in the past 3 years. During the 3-year reporting period, the Zoo's organization has been adapted to the needs of vibrant growth and development throughout the Zoo. We practiced putting our heads together in thoughtful analysis for responsible group actions serving our goals and objectives. Because this is a long reporting period, a brief record of the changed organizational assignments that have taken place is in order.

Some of the challenges the Zoo faced were a considerable increase in workload with an increase in staff only from 286 to 294; an increase in budget from \$4,074,000 to \$5,095,000, due almost entirely to noncontrollable increases, such as inflated utility and feed costs and congressionally authorized pay raises to keep up with inflation; and a broad range of new and expanded activities in animal health and pathology, in zoological research, in conservation, education, exhibition, and visitor services; a greatly accelerated construction program, and the acquisition of the 3,150-acre Conservation and Research Center at Front Royal, 75 miles west of Washington.

The position of deputy director was filled in May 1973. Responsibility was assumed for overall planning, budgetary and management guidance, as well as for aiding the joint development and conduct of program activities through the various offices of the Zoo.

John Perry, assistant director, became free to devote all of his time and effort to institutional and international conservation activities.

Warren Iliff, who had been executive director of the FONZ for two years, following a period of three years as special assistant to the Zoo director, returned to the staff as assistant director for visitor services. This unit included the Office of Protective Services and the newly established Offices of Graphics and Exhibits and of Education and Information. Saul Schiffman, who had been on loan to the Zoo from the Department of the Interior to establish the Graphics and Exhibits department, returned to his original post at Interior in February 1974. Robert Mulcahy joined the staff as head of the Office of Graphics and Exhibits in June 1974, and launched the full professionalization of the design and presentation of audio-visual content throughout the Zoo. Judith White was appointed head of the Office of Education and Information in September 1974, and built with her



2. The Zoo's new glockenspiel, which stands next to the Education-Administration Building, was a gift of Dr. Ivy A. Pelzman and was dedicated in May 1976. It features a 35-bell carillon and four large fiber-glass animals that move at regular intervals.

staff a systematic assembly of intelligence from throughout the Zoo's ranks to enrich all of our education and interpretation activities. In November 1975, Mr. Iliff resigned as assistant director to become director of the Portland (Oregon) Zoo. Following his resignation, the three offices, which had reported directly to him, became line offices reporting directly to the Office of the Director.

With the establishment of the Conservation and Research Center at Front Royal, Virginia, Dr. Christen Wemmer was appointed curator-in-charge in October 1974. Growth and plans of the Center are described later. Organizationally, it has been developed by a joint undertaking of all of the offices of the Zoo, gradually achieving over two years its present total supervision of all assigned personnel. All program development at the Center leads from joint consultations of the Zoo's offices and, thus, the objective is retained of the Center as a fully integrated unit of the Zoo rather than an entity apart.

During part of the reporting period, the offices of the veterinarian and pathologist were combined into the Animal Health Program, under the direction of Dr. Clinton Gray. In August 1974, Dr. Robert Sauer, our pathologist, resigned to enter private industry. He was replaced by Dr. Richard J. Montali in February 1975, and the health activities resumed the form of two independent but closely collaborating units, with Dr. R. Mitchell Bush as veterinarian-in-charge of the Office of Animal Health, and the Office of Pathology under Dr. Montali. Dr. Gray assumed the position of senior veterinarian and has been devoting his time and effort primarily to developing a strong teaching program in exotic animal medicine.

The Office of Animal Management has continued to develop under the general curator, Jaren Horsley, toward the objectives of increased degree and kinds of participation by all of its personnel in improved animal management and education. Its progress will be described later in this report.

The Office of Zoological Research, now completing its tenth year under Dr. John Eisenberg, has expanded its programs as will be described.

The Office of Facilities Management, under Emanuel Petrella, has undergone strong internal development and change. Staff development, skill increases, and expanded workload have been managed very effectively by this office.

The Office of Construction Management was established in the interest of economy and efficiency so that the Zoo could conduct its own management of design and construction rather than remaining dependent on the use of the organizationally distant General Services Administration. Robert C. Engle became construction manager in April 1974. Mr. Engle has had long experience with the National Zoological Park's construction program, having been involved in 1961 at the beginning of the modernization program, when he was with the District of Columbia's Department of Buildings and Grounds, and later when he was associated with the Office of the Assistant Secretary of the Smithsonian Institution.

To develop our capacity for contract administration, Fred G. Barwick, formerly head of what is now the Smithsonian's Office of Supply Services, joined the National Zoological Park in March 1974. Without the able assistance and guidance of these two men, goals of the construction program during the past three years, in all likelihood, would not have been accomplished.

The Office of Management Services, which deals mainly with personnel, budget, and fiscal matters, was established under Joe Reed, who joined us in March 1974. Previously, this area of activity had been incorporated in the Office of the Director. Rather than enlarging central budget and accounting control, this small team has trained the operating departments to establish very effective budgeting and accountability. Each office now can make responsible decisions on the management of the resources for which it is responsible. Operating responsibility, budgeting, and accountability have now been joined throughout the Zoo.

At the close of this period, the Office of the Director consisted only of the director, the deputy director, and two very able and talented secretaries.

An increasingly productive alliance has developed through this period with our partner organization, the Friends of the National Zoo, which will

be reported on later. At the present time, Sabin Robbins is the executive director of the FONZ. This organization has grown in membership, staff, functions, responsibilities, and service to the public. The Board of the Friends of the National Zoo has actively and constructively participated in many areas of the Zoo's activities, particularly those of education and service to the public. In 1973, Peter C. Andrews was president of the Board; and from 1974 to 1975, Arthur W. Arundel, an old friend of the Zoo from the days of Dr. William Mann, has been president. As a boy, "Nicky" knew and admired Bill Mann. In 1938, as an 11-year-old journalist, he campaigned vigorously for new restaurant facilities at the Zoo, and in 1975 helped lead our celebration of improved food services managed by FONZ.

Several notes point out the progress made by the people of the Zoo and their organizations during these three years.

- Average employee tenure was considerable—nearly one-half have served the Zoo for ten years. While leadership was young, collectively we tallied over 2,000 years of zoo experience.
- Skill levels increased in all NZP staffs. In three years, we achieved a five-fold increase in employee training and an excellent crafts training program.
- In 1975, one out of every two employees participated in 193 training events at the Zoo or elsewhere in local or national institutions.
- Professional contributions, as reflected in research publications, doubled. In 1973, 21 articles were published by Zoo staff and full-time research fellows. In 1975, 45 articles were published, and at year's end an additional 23 articles were in press.
- People and offices within the Zoo collaborated with more than 40 other zoos, universities, and organizations throughout the country and the world, in more than 100 projects.
- Group planning by the Zoo's several offices characterized all design stages leading toward construction of each of the 41 projects comprising the Zoo's master redevelopment plan.
- A survey of 1,000 visitors was conducted at the Zoo from the fall of 1974 through the summer of 1975, producing insights of definite value in understanding who the National Zoo visitor is, what he or she brings to the Zoo in terms of experiences and expectations, and reactions to the place once they were here. Among other findings:  
Fifty percent come from every state in the union, nearly proportional to the regional population.
- We began to discover how to achieve, with our associates at FONZ, enjoyable learning experiences for our varied audience.

The single goal of seeking excellence in all areas of public service, by and at the Zoo, governed all pursuits.

What follows are the progress and achievements attained by the 300 dedicated men and women who make this place work.

## Office of Animal Management

Jaren Horsley, General Curator

Once an animal species is selected for the Zoo, the Office of Animal Management (OAM) must keep it alive, breeding, and available for study. To do this well, we get help from the Office of Animal Health, the Office of Pathology, and the Office of Zoological Research, as well as the other offices at NZP. Since the showing of animals to the public is the primary reason most of us work for the Zoo, it is difficult to discuss the goals and accomplishments of one department as separate from another. OAM did a great number of things over the last three years that were combined with the efforts of others. We participated in programs that ranged from building restaurants to studying birds in Venezuela. In this report, it makes sense to concentrate on those things that occupied most of our own human and fiscal resources. Most of all, we are concerned with what happened to animals that arrived at the Zoo and settled in for their stay in captivity.

The years 1973 through 1975 were ones in which reconstruction was our highest priority. The moving and relocating of a collection of animals was a mammoth task that had a definite effect on the kinds of things we could accomplish. We kept our goals modest, tried to go about the business of running a zoo on a day-to-day basis, and still tried to react as best we could to the demands of the new Zoo. Our objectives were further influenced by the change in the management of OAM. The general curator was new. Three out of four curators were new, as were almost all office support staff. This made us long on ideas, but short on continuity.

The major task was to look at our health and care efforts. We tried to evaluate the deaths in each unit. We found that in 1972 our mammals lost 15 percent of their numbers by death. The same period showed a loss of 16 percent of the bird collection and 29 percent of the reptile and amphibian collection. Much of our effort since then has been spent trying to find out if these percentages are normal for a zoo, whether they could be influenced to a downward trend, and whether they could be more finely analyzed to show specific, treatable problems. We tried to decrease the deaths by increasing the amount of professional attention given to each animal. We set out on a program of hiring more highly trained people and training those already on the staff. We also felt that fewer species, thoughtfully selected, would help. We took steps to eliminate many so-called community exhibits that were really just catch-all cages to maintain a large inventory of animals. Many of our small animal deaths were coming from cages where a large group of unrelated species were being caged

together. By making all animals equal and trying to give the best possible care to each, we felt the Zoo deaths could drop significantly. In the large animal areas, the deaths seemed to stay down. It was only in the exhibits that focused on smaller species that we found the high death rates.

Many of the animals breed in the Zoo, and we wanted to apply the same evaluation to them. We found that 24 percent of the mammal species bred in 1972, compared to 11 percent of the birds and 3 percent of the reptiles and amphibians. As you would expect, the larger mammals were the most successful, with 77 percent of the ungulates breeding. Again, this appeared to be a reflection of the numbers of animals that needed to be housed and cared for. Without getting into the complexities and pitfalls of a large-scale breeding program in a zoo, it is sufficient to say that we felt we could do better. Basically, we wanted to establish clearly what was possible, given the limitations of space, people, and money. We wanted to find out how we could get a breeding group to keep breeding, and where and how it was not practical. Our major concern was to preserve the species that would breed both in this Zoo and with species in other zoos. We tried to study them, so that even if a breeding group was lost, we would at least have obtained information that could be used elsewhere.

The natural result of hiring more professionals and working hard on care, breeding, and study programs was the increase in publications. During the three years covered here, the need to publish suddenly began to emerge. The "art" of zoo husbandry began to become a topic for systematic study and reporting. In addition, the need to use the collection as a source of more general study became more obvious. A greater amount of publishable information has started to come from OAM than in previous years, as can be seen in the bibliography. During this year, and in future years, the amount will increase immensely. It is toward these goals that our resources have been applied, and it is with these ideals in mind that our yearly objectives in the Office of Animal Management are set.

During 1973, the names of the operational units changed slightly. The Animal Management operation became the Office of Animal Management; however, the three mammal divisions were combined into one unit and separated into three working areas. The Large Carnivore Division became the South Area; the Small Mammal Division became the Central Area; and the Large Mammal Division became the North Area. The bird and reptile units remained unaltered.

Throughout the entire collection, we tried very hard to stabilize the numbers of species and their placement in order to concentrate on keeping groups alive and breeding. This effort was made difficult by the relocation of animals necessitated by remodeling at the Monkey House, Lion House, and Bird House. In addition, the Bird House breeding program got into full swing again as a result of hiring a new curator in that unit. Despite these pressures that complicated our trying to minimize changes, every attempt was made to determine what species should be selected and maintained on a long-term basis. By determining what species would be kept and by not changing that commitment, we felt we could begin to concentrate on the problems presented in trying to care for and breed an animal.

In the North Area, the high visibility of fences and buildings was being aggravated by having large bovids on exhibit. Their physical impact on each small enclosure tended to make for unattractive settings. An animal

as attractive as a kudu was made less so by the barn and the mud wallow produced by the animal's daily activity. We had very few pens of suitable size to house larger bovids, and a careful decision would have to be made on the maximum herd size possible before the cage would deteriorate.

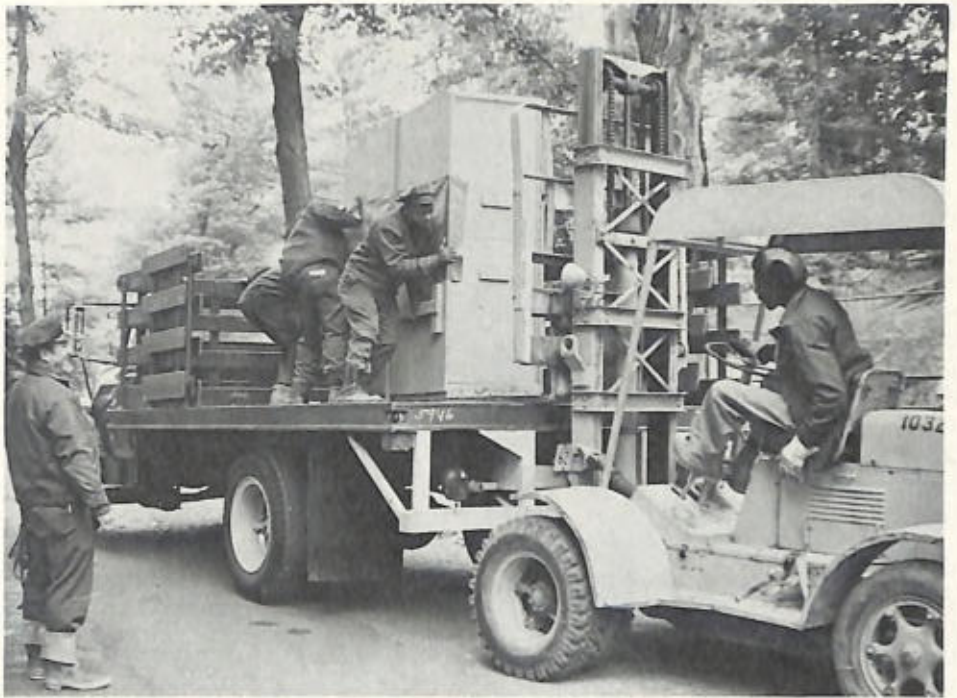
The result of our thinking was a decision to eliminate the Cape buffalo and greater kudu from the collection, as well as to reduce the number of wildebeest. Since many of the herd animals were being sent to our Conservation and Research Center, our medium-sized animals could be reduced to small herds of "show" animals. By reducing herd size and getting rid of the very large species, we hoped to be able to plant heavily and decorate the paddocks so they could appear as more natural settings. Then smaller species of bovids and cervids could be brought in that would live in some balanced relationship with the cage plantings. In some areas, the pens were large enough that such a balance already existed. Such was the case with the bongo and the sable antelope. We felt, however, that only 1.2 or 1.3 of each group could be maintained; any additional animals would have to be moved to other quarters. The cages were then landscaped and planted in an attempt to draw the visitor's attention away from the buildings and toward the greenery and wildlife in the cage. This practice has worked well, and several cages that housed very large ungulates now contain small deer such as muntjac and brocket. This emphasis has been continued in the North Area by attempting to bring to the Zoo some of the smaller, colorful, and valuable antelope. During 1976, two or three new species will be brought into the hoofed-mammal collection.

A new exhibit was built next to the giant panda yards which now contains one of our pair of red pandas. This glass-fronted cage allows the visitor to see both kinds of pandas in adjacent enclosures.

In the Central Area, we tried to dress up what is now a badly outdated Small Mammal House filled with small, bar-fronted cages. Over the last few years, attempts have been made to replace some of the bar-fronts with glass, but the majority have remained the same. An effort was made to use natural vegetation inside the cage wherever possible, even if it meant frequent plant replacement. Rocks, stumps, tree limbs, and other decorative materials were used wherever possible to rid these cages of much of their sterile appearance. The badly deteriorated nocturnal room was redesigned and, as 1975 ends, is being remodeled with updated cages. The collection in the building has purposely been kept at about 40 species occupying 72 cages. Since the cages are small and do not offer the space needed for breeding and care, many animals are allowed access to more than one cage. In addition, this building is scheduled for renovation in the immediate future and it is not desirable to bring in many species that might then have to be relocated to temporary facilities. The full potential of small mammal exhibition will be realized after our construction program is finished.

The South Area has undergone the greatest change during the three years. The Lion House is gone and replaced by a new exhibit. The Puma House and dog line were razed and not replaced. These were very old and outdated quarters and all are being considered in the construction plan.

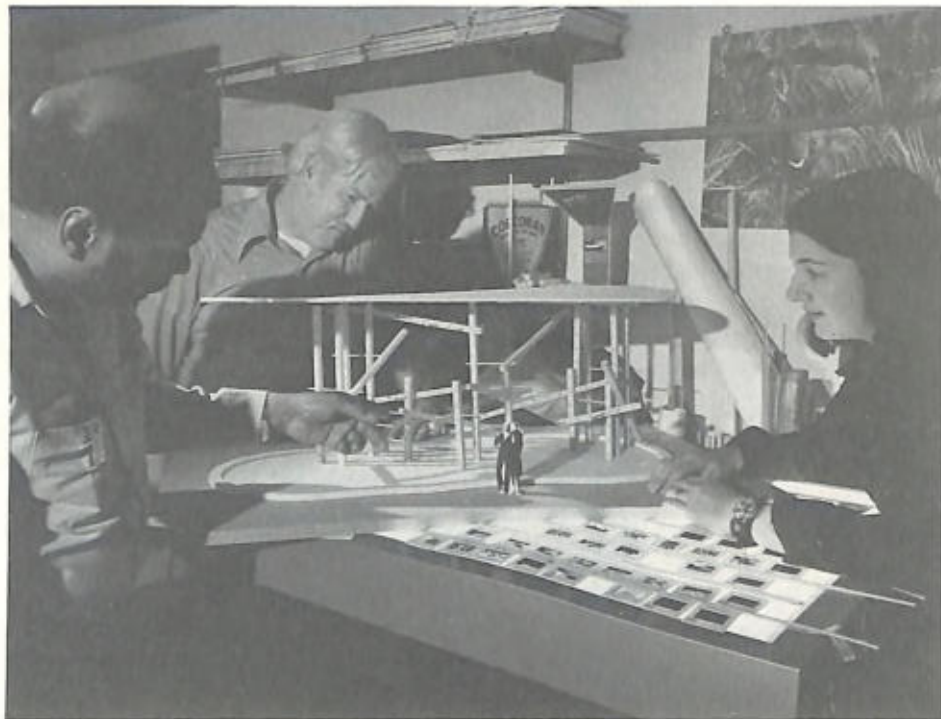
During this same period, many of our animals were surplused, loaned out, or relocated in the Zoo. The white tigers were placed at the Cincinnati and Chicago zoological parks for the duration. The Monkey House reopened



3. Workers unload a crate containing a scimitar-horned oryx into a hoofstock enclosure.



4. A large vacuum pipe is lowered into a trough in the kudu yards to remove excess water. This is one of many activities performed for the constant maintenance of the Zoo's animal exhibits.



5. A model of the proposed outdoor spider-monkey enclosure receives careful inspection by (from left) Tony Olds, Monkey House headkeeper; Robert Mulcahy, Graphics and Exhibits chief; and Emily Rudin, education specialist.



6. Spider monkeys explore their new enclosure in the renovated Monkey House opened in May 1975. This enclosure is glass-fronted, with rope swings, wooden beams, resting platforms, and a door to an outside cage.

in 1975, with nine species in cages designed to show the fullest possible repertoire of monkey behavior. There was no attempt to reproduce a natural habitat in a visual sense. Instead, a decision was made to use stylized "forests" made of wooden playground materials that gave the monkeys vertical and horizontal areas in which to move and feed. The reproductive success in this building has already been excellent.

In the South Area, new, secluded cubbing dens were added to our bear line. Although this area is being replaced by a new bear exhibit, we felt that the breeding potential offered by our bear population should not be lost. Although Kodiak bears and a sloth bear were reared, the real success of the cubbing dens will be determined if we can manage to raise a polar bear or a spectacled bear.

In the Reptile Unit, very few major changes took place. In this exhibit, we have been trying very hard to maintain large groups of the same species to see whether a significant success in reproduction and a reduced death rate could be attained. During this period, there have been several notable births that are breakthroughs, but we hope that 1976 will provide the desired broad results that have thus far eluded us. One of the objectives is to keep the number of deaths of the smaller animals—reptiles, birds, mammals—in the Zoo more on a par with some of the large mammals, taking into consideration the obvious possible differences in lifespan. We would also like to see an increase in propagation of the smaller animals. So far, it has not really happened to our satisfaction.

Birds presented a major problem in these years since the Newcastle's disease ban on bird importation pressed us into trying to acquire almost any available bird. Thus the collection grew, but with no real direction. This trend was out of necessity. In the meantime, our breeding program began to grow and the numbers of individual birds increased rapidly. During this period, several limitations in the physical plant were identified, such as heat and ventilation problems in the indoor flight room and the lack of adequate lighting in the Bird House cages. Since the outside pens were being remodeled, we decided that all necessary construction should be done simultaneously. This meant that the large number of birds we had been acquiring must now be relocated to our Conservation and Research Center which is 75 miles away. By the end of 1975, the major part of the collection and one-third of the keepers had been moved to that locale while the building was under repair. This construction should be completed by the summer of 1976.

The following indicates what we consider to be the Zoo's notable animal events for these three years.

## Mammals

In 1973 through 1975, 351 mammals were born under the National Zoo's Office of Animal Management.

The red kangaroo group had a total of 10 joeys born and was increased further by a trio of animals brought in from a university research station. The tree-kangaroo group increased from an original trio of animals to a size at which it was possible to split the group into two; captive-born males were exchanged with another zoo to introduce a new bloodline.

Among the primates, the brown-headed spider-monkey troop continued

to breed. Most of the young have been reared in the family, but the successful reintroduction to the group of a hand-reared female was encouraging. In 1975, the birth of a douroucouli to a fifteen-year-old male and a female over eleven years old came as a surprise for the pair had last bred in 1968. A captive-born lion-tailed macaque gave birth to a female and reared it with no problem. Among the apes, a male white-cheeked gibbon was born and mother-reared, and a female orangutan was born and sent to another zoo for hand-rearing with other young apes. A captive-born orangutan female was obtained from a primate research station as a mate for our NZP-born male and prospects for a second-generation orangutan birth are bright.

Several "firsts" occurred among the carnivores. The sloth bear gave birth to the first second-generation captive birth of the species at the Zoo and the second recorded second-generation birth in captivity. The Kodiak bears reproduced for the first time at the National Zoo. Raccoon dog pups—a litter of seven—born at the Zoo in 1975 represented the first time this species has bred in captivity in the United States. The first recorded second-generation red panda birth took place in 1974. The mating of our young female tiger carrying genes for white coat color to a male on loan from the Chicago Zoological Park resulted in six cubs in 1973, perhaps the largest first litter ever to a Bengal tiger. This female bred with her sibling at the Cincinnati Zoological Park and gave birth to four cubs, of which three were white, a significant increase to our white-tiger breeding program and especially meaningful to the program since the sire died that same year.

Most—over 75 percent—of the hoofed mammals reproduced in all three years. Among the more notable births were two bongo (one to a NZP-born female); twin Burmese brow-antlered deer, which were stillborn; a yellow-backed duiker; and the fourteenth Nile hippopotamus calf to our steadily producing pair. The pygmy hippo calves, named after the Greek alphabet, reached "Omega" and proceeded on to a Liberian alphabet.

The most important birth was that of an Indian rhinoceros to a captive-born female and a wild-caught male.

A male tamandua, which was received April 21, 1964, died on October 24, 1973; its nine-and-one-half years in captivity establish a longevity record for the species. Another longevity was reached by a female reindeer born April 19, 1959, and euthanized January 12, 1973, at age thirteen-and-one-half. Also in 1973, our female fanaloka (*Fossa fossa*) gave birth, but both she and the cub died shortly thereafter, thus ending the breeding of the species outside Madagascar. Another rare Madagascan viverrid, a fossa (*Cryptoprocta ferox*), was euthanized for senility in 1975. Both the fanaloka and fossa had come to the Zoo in 1966. The hybrid polar X Kodiak bear born in the Zoo in 1936 was euthanized in 1974; the only survivor of this breeding which demonstrated hybrid fertility is at the Philadelphia Zoological Garden. A young Zoo-born male bongo died at the Conservation and Research Center with problems in the central nervous system of an unexplained origin, and the first-born female bongo died at the Zoo of a broken neck from an equally inexplicable accident. A total of five dik-dik (most less than a year old) died during the cold months of 1975; the deaths appear to be climate-related and changes in housing and nutrition have been instigated to remedy the high death rate.



7-8. *Left:* Watching visitors from their new exhibit are some of the Zoo's white Bengal tigers, Priya (foreground) and Ranjit and Bharat (background). *Right:* Ranjit plays in the moat with his aluminum beer keg.

Breeding projects, meaning special attention to data collection and publication and a high priority in the allocation of space and manpower, are an important part of the Office program. They involve the participation of all Zoo offices and cooperation with other zoos, and aim to build up captive-breeding groups. Major projects begun by Animal Management during 1973 through 1975 included red panda, binturong, cheetah, and Indian rhinoceros. All of these projects were accomplished while the animals were on exhibit.

The red pandas produced second-generation captive-born young twice during the period; a total of eleven cubs were born and two specimens were exchanged with another zoo. By the end of 1975, we had two pairs and one trio capable of breeding plus a trio of young-of-the-year, along with several publications on growth and behavior. The first binturongs born at the National Zoo came in 1973; that litter and the one born in 1975 did not survive, but the three cubs in 1974 did. One paper was written about this breeding, and it was followed by intensive data collection on a programmed series of encounters. The cheetah project was undertaken with five older animals which had been in captivity for some time. A 2 $\frac{1}{2}$ -acre enclosure, divided into two parts, was constructed, and the animals were rotated through cycles of different pairings in an effort to determine estrous periods. The use of hormone injections resulted in a copulation, but the female failed to conceive.

The whole of 1973 was spent monitoring the condition of the pregnant Indian rhinoceros. A male calf was born on January 30, 1974, after a gestation period of 487 days; it weighed 125 $\frac{1}{2}$  pounds and measured 47



9. Patrick (right), an Indian rhinoceros, was born to Rajkumari at NZP on January 30, 1974. This was the first live birth of an Indian rhino in the Western Hemisphere.

inches from nose to base of tail on Day 1. The birth and development of the calf were documented by notes and videotape, in cooperation with the Office of Zoological Research. The calf was weaned in 1975. Plans for reintroducing the adult pair must await the completion of the remodeling of the yards, since earlier reintroduction attempts in the inside enclosures had resulted in too much stress on the animals.

The National Zoological Park was designated as a breeding center for the endangered golden-lion marmoset. As a result of an intensive commitment of manpower and facilities by the Zoo, we were able in 1973 to begin moving golden-lion marmosets born at the Zoo's Small Mammal House to a new building designed especially to encourage reproduction in this severely endangered primate. By the end of 1975, a total of twelve animals had been moved, leaving two breeding family units on exhibit.

Our first attempt at breeding the giant panda occurred in 1973, when the female was two-and-one-half and the male two years old. In the spring of 1973, the female began to show the behavioral signs of coming into heat such as pacing, frequent vocalizing and marking, and loss of appetite. When the male began showing intense interest through the door, the animals were put together. These first brief introductions, over a period of two days, resulted mostly in play behavior; however, the female did exhibit the lordotic posture and the male made some attempts at mounting. In the spring of 1974, encounters were run over a period of seven days, with somewhat better results. In the spring of 1975, the female came into her strongest estrus to date. During the encounters, the female would

solicit the male and he would mount. Unfortunately, although improvement had occurred over the past years, it appeared that both animals lacked sufficient experience to achieve complete copulation. Based on the behavioral changes so far, it is felt that the 1976 spring breeding season should have some very interesting results.

In 1973, the Barbary ape population was reduced from 22 to 8 animals: 7 juveniles and 1 adult female. The remaining animals were carefully selected to give us a young group for display while a monkey island was in the planning stage, with the potential for reproducing when the space becomes available. Three infants were born in 1975 but, due to the youth of their mothers, two did not survive.

Plans for herd management—to make each group as self-sustaining as possible—were drawn up and implemented for dorcas gazelle, Burmese brow-antlered deer, and Père David's deer. Such plans call for the control of the population structure of the herds by judicious movement and addition of individuals. For example, the brow-antlered deer were separated into two main groups. The second group, which is not on exhibit, allows us to utilize our back-up imported male with females sired by the other imported male. A third group, a trio of young animals, was placed at the Conservation and Research Center with plans to send all future excess females there also.

The National Zoo's tradition of cooperating with other zoos in the loan of specimens for breeding purposes has expanded significantly. Among the important breeding loans were cheetahs from the Baltimore and Colorado Springs zoos, a male pampas cat to the Rotterdam Zoo, the Indian rhinoceros calf to the Bronx Zoo, and a twin orangutan to the Seattle Zoo for placement with their twins. By the end of 1975, we had seventeen mammals on loan to Animal Management, and fifty-six on loan to other institutions.

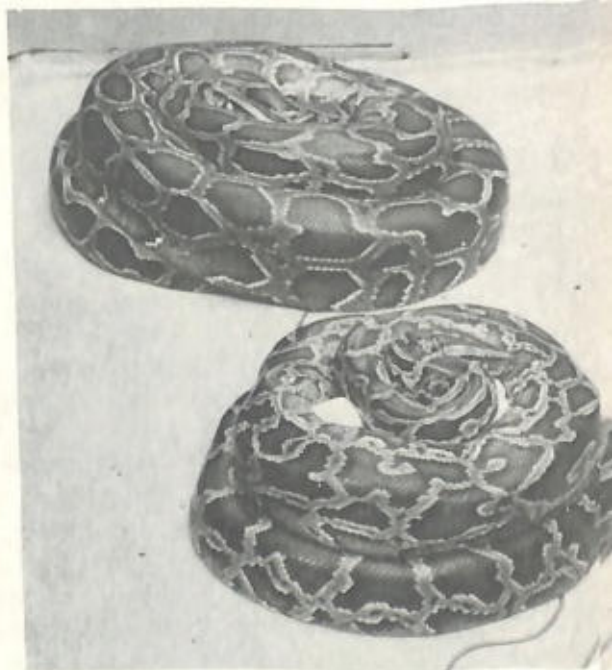
## Reptiles

Perhaps the most interesting breeding record has been among the geckos. Our male and 3 female *Phelsuma madagascariensis* produced 8 fertile eggs, all of which hatched. It was assumed that all 3 females laid eggs, even though the eggs were laid at different times. In 1974, 6 eggs were laid and only 3 hatched. By 1975, there were 2 males (1 born at NZP) and several captive-born females in various breeding groups. Females were being introduced to the males in a series of encounters, rather than kept together as 2 groups. A total of 10 eggs were laid, but none of them hatched. Due to what was believed to be a calcium deficiency, 2 of the earliest young died, as did all of the original females. By using a new diet borrowed from a number of our colleagues in other zoos and by keeping females out of constant egg production, we hope to start producing this species again in 1976. In 1973, our *Eublepharis macularis* (leopard gecko) laid 16 eggs, with none hatching. In 1974, they laid 23 eggs, of which 15 hatched. In 1975, 7 of 26 eggs hatched. In both of these cases, it was impossible to identify which female was laying eggs or which males were the breeders. One of our efforts in 1976 is to gain some kind of observation control over these groups to determine which specimens are producing, which are not, and how we may effect change.

Burmese python reproduction was also successful. In 1973, 4 females laid eggs; of more than 51 eggs in that year, only 6 were hatched and these artificially. In 1974, 4 clutches of eggs were laid. Two of these were left with the laying females to be incubated in the exhibit enclosure and the other two were removed for artificial incubation by the Reptile House staff. A total of 47 young were hatched from both the incubator and the females. In 1975, one of three clutches was left on exhibit to be incubated by the female and the others were removed for artificial incubation. No young were hatched during this year. The female left her clutch, which subsequently spoiled; the remaining eggs, which were being incubated in new but untried incubators, also spoiled.

One unusual note on reproduction: an unpaired broad-nosed crocodile laid 16 eggs in 1974, the first recorded egg-laying for this specimen since her arrival at the Zoo in 1933.

Three animals of great importance died during 1973 through 1975. The salt-water crocodile, which was received July 2, 1932, died on March 22, 1974, of hepatic lipidosis; at death, the animal was 14 feet, 7 inches long. He was sincerely mourned, even by those who had had close calls with his slashing teeth. Both komodo monitors died during this period. On May 13, 1973, the female died of severe peritonitis resulting from a rupture in the oviduct. When she arrived on June 1, 1964, as a gift from then-President Sukarno of Indonesia, she was approximately 7 feet long and weighed 60 pounds; she did not increase significantly in length or weight and was an active animal to the day of her death. She normally ate 3 to 6



10-11. Two methods of hatching Burmese pythons' eggs. Artificial incubation is achieved by placing eggs on a damp substrate—such as peat moss—or in plastic bags, in a sealed aquarium. Humid environment aids hatching success. A natural method is shown at right: two female Burmese pythons incubate their eggs, the only snake known to do so. They increase their body temperature with spasmodic muscle contractions that emit heat.

pounds of horsemeat, liver, or rabbits every third day during the summer and every 10 days during the winter months, when she was kept indoors. During her life in the Zoo, she laid several clutches of infertile eggs; although the male made several attempts to copulate, none was successful. The male was received as a gift from President Suharto of Indonesia on May 28, 1970; he was 8 feet, 4 inches long and weighed 238 pounds. In October 1973, he began to regurgitate and refuse food periodically. After a progressively downhill course, he died on April 26, 1975. An autopsy revealed the primary cause to be a failing circulatory system.

Crocodylians were made a major project of the Reptile Unit. Thirteen American alligators were sent to Florida, and rarer species were placed on loan to other zoos with captive breeding programs (a pair of broad-nosed crocodiles went to Busch Gardens in Florida, and one of the few remaining gavials and a pair of Chinese alligators went to the New York Zoological Society). With the space made available by these moves, smaller endangered crocodylians were brought in: smooth-fronted caiman, black caiman, and Cuban crocodiles. Some breeding activity has already been recorded in the latter group.

## Birds

Bird reproduction has been for many years a main goal of the unit, along with improved display.

In 1973 through 1975, the rarest hatch of all was that of a North Island brown kiwi on January 22, 1975, the first ever to be hatched outside Australasia. The precocial chick was not very shy at first and was quite visible to the public as it probed for food; however, after two months this fast-growing youngster, which gained nearly 100 grams between February 22 and March 17, had become as timid as its parents.

A bald eagle chick was hatched and reared by the parents in 1973, after a series of changes that resulted in one adult pair in a 90 x 45 x 50-foot enclosure that had previously housed up to 25 specimens. This is only the fifth bald eagle bred in a zoo.

The first second-generation Rothschild's mynahs were hatched and reared in 1973 from two different sets of Zoo-born parents. We learned through hard experience that this species cannot be housed in a close area. Not only will breeding cease, but individual birds will preen each other to the point that the neck becomes bare and unsightly and the animals become stressed.

The Bornean great argus pheasants, a rare subspecies, were only the second pair to breed in the Western hemisphere. A total of 26 eggs (16 hatched) were laid in 1973, 10 eggs (8 hatched) in 1974, and 20 eggs (13 hatched) in 1975.

Crested green wood partridges (roulrouls) continued to reproduce. Thirty of this nervous, delicate species were reared in 1973 (an increase of 50 percent over the previous year), 46 in 1974, and 48 in 1975.

In 1974, we began to breed the Hawaiian goose (nene); there were 10 eggs, of which 7 hatched and 3 young survived. In 1975, we did even better: 34 eggs, of which 22 hatched and 21 young survived. For this breeding record, we received an award from the International Wild Waterfowl Association.

The breeding success experienced with the above species and others led to the establishment of these species in other zoos at a time when national bans due to Newcastle's disease made bird importation virtually impossible.

The success of the breeding program depended largely upon artificial incubation. Most eggs were taken to the incubator, by which process predation is eliminated and birds are stimulated to lay more than one clutch.

Simple management changes in some enclosures resulted in breeding success. Installation of a wire-mesh platform induced immediate nesting by a pair of white-headed piping guan (6 young were reared in 1975). Transfer to a warm, dry environment resulted in success with vulturine guineafowl (67 hatched in 1975). The sun bitterns hatched two young after the lights near their nest, which were causing overheating, were turned off.

Improvement in diet was accomplished on several fronts. A thin film of a powdered vitamin/mineral additive and oyster-shell flour sprinkled on all feed pans by a perforated-lid shaker enabled us to fortify diets without expending additional labor. Vitamin D<sub>3</sub>, injected into feed items, was used with the bald eagles and boat-billed herons. The herons had hatched three chicks in early 1973, but all died with broken bones and bowed legs; addition of the calcium and D<sub>3</sub> supplements was probably the edge which enabled the subsequent brood of two to fledge successfully. A complex nectar, containing predigested protein and honey, was substituted for a simple nectar; it seems particularly palatable to passerines and has resulted in improved plumage and a lessened dependence upon mealworms as a source of protein. Possibly the successful hatching of a red lory in 1975 was a consequence of this new formula. Feeding times were shifted to three hours earlier each morning (8:00 A.M.), creating a more natural time for the birds and, since feed pans are not left overnight, a reduction in pest attraction.

### Status of the Collection Office of Animal Management

1.1.1 = males, females, undetermined sex

-1.1 = specimens on loan from National Zoological Park

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(1) = stillbirth; not included in adjacent figure

\* = not conceived at National Zoological Park

<i>Amphibia</i>	<i>Status</i> 31 Dec. 73	<i>Status</i> 31 Dec. 74	<i>Inventory Changes during 1975</i>				<i>Status</i> 31 Dec. 75
			<i>Born</i>	<i>Other</i> <i>Acquisition</i>	<i>Died</i>	<i>Other</i> <i>Disposition</i>	
<b>CAUDATA</b>							
<i>Amphiumidae</i>							
<i>Amphiuma means</i>							
<i>Amphiuma</i>	0.0.2	0.0.1	0	0.0.2	0.0.1	0	0.0.2
<i>Cryptobranchidae</i>							
<i>Andrias davidianus</i>							
Chinese giant salamander	0.0.4	0.0.3	0	0	0.0.2	0	0.0.1
<i>Andrias japonicus</i>							
Japanese giant salamander	0.0.1	0.0.1	0	0	0.0.1	0	0

Amphibia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
Proteidae							
<i>Necturus maculosus</i> Mudpuppy	0.0.6	0.0.3	0	0	0.0.3	0	0
Salamandridae							
<i>Notophthalmus</i> <i>viridescens</i> Red-spotted newt	0.0.6	0	0	0	0	0	0
<i>Taricha torosa</i> California newt	0	0.0.2	0	0	0.0.2	0	0
Sirenidae							
<i>Siren lacertina</i> Greater siren	0	0	0	0.0.2	0.0.1	0	0.0.1
SALIENTIA							
Bufonidae							
<i>Bufo alvarius</i> Colorado River toad	0.0.3	0.0.3	0	0	0	0	0.0.3
<i>Bufo cognatus</i> Great Plains toad	0.0.2	0.0.2	0	0	0	0	0.0.2
<i>Bufo marinus</i> Marine toad	0.0.9	0.0.1	0	0	0	0	0.0.1
Dendrobatidae							
<i>Dendrobates auratus</i> Green and black arrow frog	0	0.0.2	0	0	0.0.2	0	0
<i>Dendrobates granuliferus</i> Orange and green arrow frog	0	0.0.3	0	0	0.0.3	0	0
<i>Phyllobates lugubris</i> Orange-striped arrow frog	0	0.0.3	0	0	0.0.3	0	0
Discoglossidae							
<i>Bombina bombina</i> Fire-bellied toad	0.0.10	0.0.2	0	0	0	0	0.0.2
Hylidae							
<i>Hyla septentrionalis</i> Cuban tree frog	0.0.5	0.0.5	0	0.0.1	0.0.2	0	0.0.4
<i>Litoria caerulea</i> White's tree frog	0.0.1	0.0.1	0	+0.0.1	0	0	0.0.1+0.0.1
<i>Pachymedusa dacnicolor</i> Mexican tree frog	0	0	0	4.0	0	0	4.0
Leptodactylidae							
<i>Leptodactylus</i> <i>pentadactylus</i> Smokey jungle frog	2.2	2.0	0	0	0	0	2.0
Pipidae							
<i>Pipa pipa</i> Surinam toad	1.1.4	0.4	0	+1.0	0.1+1.0	0	0.5
<i>Xenopus laevis</i> African clawed frog	0.0.2	0	0	0.0.16	0	0	0.0.16
Rhacophoridae							
<i>Hyperolius</i> sp. African reed frog	0	0	0	0.0.5	0.0.2	0	0.0.3
Ranidae							
<i>Pyxicephalus adspersa</i>							

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Amphibia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
CAUDATA							
Amphiumidae							
<i>Amphiuma means</i>	0.0.2	0.0.1	0	0.0.2	0.0.1	0	0.0.2
Cryptobranchidae							
<i>Andrias davidianus</i>							
Chinese giant salamander	0.0.4	0.0.3	0	0	0.0.2	0	0.0.1
<i>Andrias japonicus</i>							
Japanese giant salamander	0.0.1	0.0.1	0	0	0.0.1	0	0

<i>Amphibia</i>	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
Proteidae							
<i>Necturus maculosus</i> Mudpuppy	0.0.6	0.0.3	0	0	0.0.3	0	0
Salamandridae							
<i>Notophthalmus</i> <i>viridescens</i> Red-spotted newt	0.0.6	0	0	0	0	0	0
<i>Taricha torosa</i> California newt	0	0.0.2	0	0	0.0.2	0	0
Sirenidae							
<i>Siren lacertina</i> Greater siren	0	0	0	0.0.2	0.0.1	0	0.0.1
SALIENTIA							
Bufonidae							
<i>Bufo alvarius</i> Colorado River toad	0.0.3	0.0.3	0	0	0	0	0.0.3
<i>Bufo cognatus</i> Great Plains toad	0.0.2	0.0.2	0	0	0	0	0.0.2
<i>Bufo marinus</i> Marine toad	0.0.9	0.0.1	0	0	0	0	0.0.1
Dendrobatidae							
<i>Dendrobates auratus</i> Green and black arrow frog	0	0.0.2	0	0	0.0.2	0	0
<i>Dendrobates granuliferus</i> Orange and green arrow frog	0	0.0.3	0	0	0.0.3	0	0
<i>Phyllobates lugubris</i> Orange-striped arrow frog	0	0.0.3	0	0	0.0.3	0	0
Discoglossidae							
<i>Bombina bombina</i> Fire-bellied toad	0.0.10	0.0.2	0	0	0	0	0.0.2
Hylidae							
<i>Hyla septentrionalis</i> Cuban tree frog	0.0.5	0.0.5	0	0.0.1	0.0.2	0	0.0.4
<i>Litoria caerulea</i> White's tree frog	0.0.1	0.0.1	0	+0.0.1	0	0	0.0.1+0.0.1
<i>Pachymedusa dacnicolor</i> Mexican tree frog	0	0	0	4.0	0	0	4.0
Leptodactylidae							
<i>Leptodactylus</i> <i>pentadactylus</i> Smokey jungle frog	2.2	2.0	0	0	0	0	2.0
Pipidae							
<i>Pipa pipa</i> Surinam toad	1.1.4	0.4	0	+1.0	0.1+1.0	0	0.3
<i>Xenopus laevis</i> African clawed frog	0.0.2	0	0	0.0.16	0	0	0.0.16
Rhacophoridae							
<i>Hyperolius</i> sp. African reed frog	0	0	0	0.0.5	0.0.2	0	0.0.3
Ranidae							
<i>Pyxicephalus adspersa</i>							

<i>Amphibia</i>	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
African bullfrog <i>Rana catesbeiana</i>	1.1	0.0.1	0	0.0.1	0	0	0.0.2
American bullfrog <i>Rana pipiens</i>	0.0.4	0.0.4	0	0.0.1	0.0.2	0	0.0.3
Leopard frog	0.0.6	0	0	0	0	0	0

<i>Reptilia</i>	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
<b>CHELONIA</b>							
<b>Chelidae</b>							
<i>Chelys fimbriata</i>							
Mata mata turtle	1.3	1.2.1	0	2.0	0	0	3.2.1
<i>Platemys platycephala</i>							
Twist-neck turtle	1.0	2.1+0.1-1.0	0	0	0	0	2.1+0.1-1.0
<b>Chelydridae</b>							
<i>Chelydra serpentina</i>							
Common snapping turtle	0.0.4	0.0.1	0	0	0	0.0.1	0
<i>Macrolemys temmincki</i>							
Alligator snapping turtle	2.2	2.2.1	0	0	0	1.2.1	1.0
<b>Dermatemydidae</b>							
<i>Dermatemys mawii</i>							
Central American river turtle	0.0.1	0.0.1	0	0	0.0.1	0	0
<b>Emydidae</b>							
<i>Chrysemys concinna</i>							
River cooter	0.2.7	0.0.1	0	0	0	0	0.0.1
<i>Chrysemys floridana</i>							
Cooter	0	0	0	0.1	0	0	0.1
<i>Chrysemys felis</i>							
Cat Island turtle	1.0	1.0	0	0	0	1.0	0
<i>Chrysemys picta picta</i>							
Eastern painted turtle	0.5	1.2.1	0	1.1	0	0	2.3.1
<i>Chrysemys rubriventris</i>							
Red-bellied turtle	1.2	0.2.4	0	0.0.1	0.0.2	0.0.3	0.2
<i>Chrysemys scripta elegans</i>							
Red-eared turtle	0.0.9	1.2.3	0	2.0.1	0	0.0.4	3.2
<i>Chrysemys scripta ornata</i>							
Ornate slider	0.1	0.1	0	0	0	0.1	0
<i>Clemmys guttata</i>							
Spotted turtle	1.2.2-1	1.4.1	0.0.1	0	0.0.1	1.1	0.3.1
<i>Clemmys insculpta</i>							
Wood turtle	2.3.	1.3	0	1.0	0	0	2.3
<i>Geomyda grandis</i>							
Asiatic land turtle	0.0.1	0	0	0.0.1	0	0.0.1	0
<i>Graptemys flavimaculata</i>							
Yellow-blotched sawback turtle	1.1	1.1	0	0	0	0	1.1

Reptilia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
<i>Graptemys pseudogeographica</i>							
False map turtle	1.1	2.2	0	0	0	0	2.2
<i>Malaclemys terrapin</i>							
Diamondback terrapin	1.4	0	0	0.0.3	0.0.2	0.0.1	0
<i>Mauremys caspica</i>							
Caspian pond turtle	0.1	0.1	0	0	0	0.1	0
<i>Siebenrockiella crassicollis</i>							
Siedenrock's turtle	0	0	0	0.0.1	0	0.0.1	0
<i>Terrapene carolina carolina</i>							
Eastern box turtle	1.0	0.0.1	0	0.0.2	0	0.0.3	0
<i>Terrapene carolina triunguis</i>							
Three-toed box turtle	2.3	2.3	0	0	0	1.0	1.3
Kinosternidae							
<i>Kinosternon leucostomum</i>							
White-lipped mud turtle	1.3.1	1.2.2	0	0	0	0	1.2.2
<i>Kinosternon subrubrum</i>							
Eastern mud turtle	0	0.0.1	0	0	0	0.0.1	0
<i>Staurotypus salvini</i>							
Central American mud turtle	1.1	1.1	0	0	0	0	1.1
Pelomedusidae							
<i>Pelomedusa subrufa</i>							
African helmeted turtle	1.5	1.3.1.3	0	0	0.0.4	0.0.2	1.3.7
<i>Podocnemis expansa</i>							
Arrau turtle	0.0.1	0.0.1	0	0	0	0	0.0.1
<i>Podocnemis unifilis</i>							
Amazon spotted turtle	2.3	1.3	0	0	0	0	1.3
Platysternidae							
<i>Platysternon megacephalum</i>							
Big-headed turtle	1.2	0.0.2	0	0	0.0.1	0	0.0.1
Testudinidae							
<i>Geochelone carbonaria</i>							
Red-footed tortoise	2.1.3	0.0.9	0	0.0.4	0.0.2	0.0.1	0.0.10
<i>Geochelone elegans</i>							
Starred tortoise	0.0.2	0.0.2	0	0	0	0	0.0.2
<i>Geochelone elephantopus</i>							
Galápagos tortoise	0.0.1—0.0.4	1.0—0.3	0	0	0	0	1.0—0.3
<i>Geochelone gigantea</i>							
Aldabra tortoise	2.1	2.1	0	0	0	0	2.1
<i>Geochelone pardalis</i>							
Leopard tortoise	0	0	0	0.0.2	0	0	0.0.2
<i>Gopherus berlandieri</i>							
Texas tortoise	0	0	0	0.0.1	0	0.0.1	0
<i>Gopherus polyphemus</i>							
Gopher tortoise	—0.0.3	0.0.1—0.0.3	0	0	—0.0.3	0.0.1	0
<i>Kinixys belliana</i>							
Bell's hinged-back tortoise	0	0	0	0.0.2	0	0	0.0.2
<i>Kinixys homeana</i>							
Home's hinged-back tortoise	1.0	1.0	0	0	0	0	1.0

Reptilia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
<i>Malacochersus tornieri</i>							
Pancake tortoise	1.2.1	1.3	0	0.4	0.1	0	1.6
<i>Testudo graeca</i>							
Greek tortoise	0	0	0	0.0.1	0	0.0.1	0
<i>Testudo hermanni</i>							
Herman's tortoise	0.0.3	1.2	0	0	0	1.2	0
Trionychidae							
<i>Trionyx triunguis</i>							
African softshell turtle	1.0	1.0	0	0	0	0	1.0
CROCODYLIA							
Alligatoridae							
<i>Alligator mississippiensis</i>							
American alligator	3.0.1	2.0.1	0	0.0.1	0	2.0.2	0
<i>Alligator sinensis</i>							
Chinese alligator	1.1	1.1	0	0	0	-1.1	-1.1
<i>Caiman crocodilus</i>							
Spectacled caiman	1.0.2	0	0	0	0	0	0
<i>Melanosuchus niger</i>							
Black caiman	0	0.0.4	0	0	0.0.1	0	0.0.3
<i>Paleosuchus trigonatus</i>							
Smooth-fronted caiman	1.2	0.0.7	0	0	0.0.1	0	0.0.6
Crocodylidae							
<i>Crocodylus cataphractus</i>							
Slender-snouted crocodile	-0.1	-0.1	0	0	0	0	-0.1
<i>Crocodylus moreletii</i>							
Morelet's crocodile	-1.0	-1.0	0	0	0	0	-1.0
<i>Crocodylus porosus</i>							
Salt-water crocodile	1.0	1.0	0	0	1.0	0	0
<i>Crocodylus rhombifer</i>							
Cuban crocodile	0	0	0	+1.3	0	0	+1.3
<i>Osteolaemus tetraspis</i>							
Broad-nosed crocodile	1.0.1	1.1	0	0	0	-1.1	-1.1
Gavialidae							
<i>Gavialis gangeticus</i>							
Indian gavial	-0.1	-0.1	0	0	-0.1	0	0
SQUAMATA							
SAURIA							
Agamidae							
<i>Amphibolurus barbatus</i>							
Bearded lizard	0.0.1	1.0	0	0.0.3	0.0.3	0	1.0
<i>Calotes mystaceus</i>							
Blood sucker lizard	0	0	0	0.0.3	0.0.3	0	0
<i>Physignathus cocincinus</i>							
Water dragon	0.0.1	1.1	0	0	0	0	1.1
<i>Uromastix microlepis</i>							
Spiny-tailed lizard	0.0.1	0	0	0	0	0	0
Amphisbaenidae							
<i>Amphisbaena alba</i>							
Red worm lizard	0.0.1	0	0	0	0	0	0
Anguillidae							
<i>Ophisaurus apodus</i>							
European glass lizard	1.1.5	0.0.7	0	0	0.0.2	0	0.0.5

Reptilia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
<b>Cordylidae</b>							
<i>Cordylus giganteus</i>							
Sungazer lizard	0.0.5	0.0.5	0	0.0.1	0.0.3	0	0.0.1
<i>Gerrhosaurus validus</i>							
Plated lizard	0	0.0.4	0	0.0.1	0	0	0.0.5
<i>Platysaurus guttatus</i>							
Flat rock lizard	0.0.3	0.0.2	0	0	0.0.1	0.0.1	0
<b>Gekkonidae</b>							
<i>Eublepharis macularis</i>							
Leopard gecko	1.1.4	2.5.14	0.0.7	0	0.0.1	0.0.10	2.5.10
<i>Gekko gekko</i>							
Tokay gecko	1.1.4	2.2.16	0.0.2	0.0.5	0.0.4	0	2.2.19
<i>Gonatodes annularis</i>							
Gecko	0	0	0	0.0.4	0.0.2	0	0.0.2
<i>Hemidactylus brookii</i>							
Gecko	0	0	0.0.2*	0.0.2	0.0.3	0	0.0.1
<i>Phelsuma lineata</i>							
Day gecko	0	0	0	0.0.1	0.0.1	0	0
<i>Phelsuma</i>							
<i>madagascariensis</i>							
Giant day gecko	1.1.6	3.4	0	+0.1	0	0	3.4+0.1
<i>Phelsuma</i> sp.							
Day gecko	0	0	0	0.0.5	0.0.5	0	0
<i>Ptychozoon lionotum</i>							
Gliding gecko	0	0	0.0.2*	4.9	3.4.2	0	1.5
<i>Thecadactylus rapicaudus</i>							
Turnip-tailed gecko	0	0	0.0.2*	1.1	0.0.2	0	1.1
<b>Helodermatidae</b>							
<i>Heloderma horridum</i>							
Mexican beaded lizard	0.0.1	0.0.1	0	0	0	0	0.0.1
<i>Heloderma suspectum</i>							
Gila monster	1.1	1.1	0	0	0	0	1.1
<b>Iguanidae</b>							
<i>Anolis equestris</i>							
Cuban anole	0.0.1	0.1	0	0	0.1	0	0
<i>Anolis garmani</i>							
Jamaican anole	2.0	2.0	0	5.3.1	3.0.1	1.0	3.5
<i>Anolis grahami</i>							
Jamaican anole	0	0	0	0.0.12	0.0.5	0	0.0.7
<i>Anolis lineatopus</i>							
Bush lizard	0	0	0	0.0.3	0.0.1	0	0.0.2
<i>Anolis valenciennesii</i>							
Croaking lizard	0	0	0	0.0.1	0	0.0.1	0
<i>Basiliscus plumifrons</i>							
Green basilisk lizard	0	1.0	0	0.2	0.2	0	1.0
<i>Brachylophus fasciatus</i>							
Fiji Island iguana	0.0.3	0.3	0	0	0.1	0	0.2
<i>Cyclura stejnegeri</i>							
Rock iguana	0	0	0	0.0.2	0	0	0.0.2
<i>Iguana iguana</i>							
Common iguana	0.0.3	0.0.3	0	0.0.2	0.0.1	0.0.1	0.0.3
<i>Polychrus marmoratus</i>							
Polychrus	0	0	0	0.0.1	0.0.1	0	0
<i>Sceloporus clarki</i>							
Clark's spiny lizard	0	0	0	1.1	0	0	1.1

Reptilia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
<i>Tropidurus torquatus</i> Spiny tree lizard	0	0	0	0.0.6	0	0	0.0.6
Lacertidae							
<i>Lacerta lepida</i> Jeweled lizard	1.1.6	5.3	0	0	0.1	0	5.2
Scincidae							
<i>Corucia zebrata</i> Prehensile-tailed skink	0.0.4	0.0.4	0	0	0	0	0.0.4
<i>Egernia cunninghami</i> Cunningham's skink	0.0.3	0.0.3	0	0	0	0	0.0.3
<i>Tiliqua gigas</i> Blue-tongue skink	0.0.6	0.0.6	0	0	0	0	0.0.6
<i>Tiliqua scincoides</i> Australian blue-tongue skink	0.0.1	0.0.1	0	0	0	0	0.0.1
Teiidae							
<i>Ameiva undulata</i> Ameiva lizard	0.0.2	0.0.2	0	0.0.1	0.0.2	0	0.0.1
<i>Cnemidophorus lemniscatus</i> Rainbow lizard	0	0	0	0.0.1	0.0.1	0	0
<i>Tupinambis teguixin</i> Black tegu lizard	0.0.7	3.2.3	0	0.0.1	0	0.0.3	3.2.1
Varanidae							
<i>Varanus bengalensis</i> Bengal monitor	0	0.0.3	0	0	0.0.1	0.0.2	0
<i>Varanus dumerili</i> Dumeril's monitor	0	2.1.1	0	0	0	0	2.1.1
<i>Varanus exanthematicus</i> Savanna monitor	2.0	1.1.1	0	0	0	-0.0.1	1.1-0.0.1
<i>Varanus gilleni</i> Pygmy monitor	0.0.3	0	0	0	0	0	0
<i>Varanus komodoensis</i> Komodo dragon	1.0	1.0	0	0	1.0	0	0
<i>Varanus niloticus</i> Nile monitor	0.0.1	0.0.1	0	0	0	0	0.0.1
<i>Varanus prasinus</i> Green tree monitor	1.2	1.2	0	0	0	0	1.2
<i>Varanus salvadorii</i> Salvador's monitor	0.0.1	0.0.1	0	0	0	0	0.0.1
<i>Varanus salvator</i> Malayan water monitor	0	0	0	2.1.1	0	0	2.1.1
<i>Varanus varius</i> Lace monitor	1.0	0.0.1	0	0	0	0.0.1	0
Xantusidae							
<i>Lepidophyma smithii</i> <i>occulor</i> Night lizard	0.1	0	0	0	0	0	0
SERPENTES							
Boidae							
<i>Boa constrictor</i> Boa constrictor	0.0.7	0.1.2	0	1.1.5+1.0	0	0.0.6+1.0	1.2.1
<i>Corallus enydris cooki</i> Cook's tree boa	0.0.3	0.0.4	0	0.0.1	0.0.1	0	0.0.4

Reptilia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
<i>Epicrates cenchria</i>							
Rainbow boa	0.1	1.0	0	0.0.1	0	0.0.1	1.0
<i>Epicrates striatus striatus</i>							
Haitian boa	0.0.2	0.0.2	0	0	0	0	0.0.2
<i>Epicrates subflavus</i>							
Jamaican boa	-1.0	-1.0	0	0	0	0	-1.0
<i>Eunectes notaeus</i>							
Yellow anaconda	1.1	0.0.2	0	0.0.1+0.0.1	0	0	0.0.3+0.0.1
<i>Lichanura roseofusca</i>							
Rosy boa	0	0	0	0.0.1	0	0.0.1	0
<i>Python curtus</i>							
Blood python	2.0.2	0.0.5	0	0.0.1	0.0.1	0	0.0.5
<i>Python molurus bivittatus</i>							
Burmese python	1.1.6	3.5.23	0	0.1	1.0.1	0.1.11-0.0.9	2.5.2-0.0.9
<i>Python molurus molurus</i>							
Indian python	0	0	0	+2.2.1	0	0	+2.2.1
<i>Python regius</i>							
Ball python	0.0.2	0.0.2	0	0	0	0.0.2	0
<i>Python reticulatus</i>							
Reticulated python	0.0.4	0.0.4	0	0.0.1+0.0.1	0.0.1	0	0.0.4+0.0.1
Colubridae							
<i>Alsophis cantherigeras</i>							
Gray racer	0.0.1	0.0.1	0	0	0	0	0.0.1
<i>Boaedon fuliginosus</i>							
African house snake	0	0	0.0.4*	1.1.2	0.0.3	0	1.1.3
<i>Carphophis amoenus</i>							
Worm snake	0	0	0	0.0.1	0	0.0.1	0
<i>Coluber constrictor</i>							
Black racer	0.0.3	0.0.2	0	0.0.4	0	0	0.0.6
<i>Conopsis pulcher</i>							
Guardo camino	0	0.0.1	0	0	0.0.1	0	0
<i>Dinodon rufozonatum</i>							
Banded red snake	0.0.3	1.1	0	0	0.1	0	1.0
<i>Drymarchon corais</i>							
Indigo snake	1.1	1.1.1	0	0	1.0	0	0.1.1
<i>Dryophis nasuta</i>							
Long-nosed vine snake	0.0.2	0.0.1	0	0	0	0.0.1	0
<i>Elaphe carinata</i>							
Keeled rat snake	0	-0.0.1	0	0	0	0	-0.0.1
<i>Elaphe guttata</i>							
Corn snake	0.0.6	2.3.5	0.0.12	0.0.1	0.0.9	0	2.3.9
<i>Elaphe obsoleta obsoleta</i>							
Black ratsnake	0.0.6	0.0.4	0	0.0.2	0	0.0.3	0.0.3
<i>Elaphe obsoleta quadrivittata</i>							
Yellow ratsnake	1.1.2	1.1.4	0	0.0.1	0.0.1	1.1.4	0
<i>Elaphe obsoleta spiloides</i>							
Gray ratsnake	0.0.1	0	0	0	0	0	0
<i>Elaphe taeniura</i>							
Beauty snake	0	1.1.1	0	0	0	0	1.1.1
<i>Enhydris</i> sp.							
Asiatic water snake	0.0.2	0	0	0	0	0	0
<i>Gonoyosoma oxycephala</i>							
Red-tailed ratsnake	0.0.2	0.1	0	0.0.2	0.0.1	0	0.1.1
<i>Lampropeltis calligaster</i>							

Reptilia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975				Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition	
<i>rhombomaculata</i>							
Mole snake	0.0.1	0.0.3	0	0.0.3	0.0.1	0	0.0.5
<i>Lampropeltis getulus</i> <i>brooksi</i>							
South Florida kingsnake	0	0.0.1	0	0	0	0.0.1	0
<i>Lampropeltis getulus</i> <i>floridana</i>							
Florida kingsnake	0	0.0.1	0	0	0	0.0.1	0
<i>Lampropeltis getulus</i> <i>getulus</i>							
Common kingsnake	0.0.5	0	0	0	0	0	0
<i>Lampropeltis triangulum</i> <i>gentilis</i>							
Western milksnake	0.0.1	0.0.1	0	0	0	0.0.1	0
<i>Lampropeltis triangulum</i> <i>triangulum</i>							
Eastern milksnake	1.1	0.0.1	0	0.0.4	0.0.2	—0.0.1	0.0.2—0.0.1
<i>Leptophis ahaetulla</i> Parrot snake	0	0.0.1	0	0	0.0.1	0	0
<i>Lygophis lineatus</i> Venezuelan lined snake	0	0	0	0.0.1	0.0.1	0	0
<i>Oxybelis fulgidus</i> Green vine snake	0	0	0	1.1	0	0	1.1
<i>Pituophis melanoleucus</i> <i>melanoleucus</i>							
Pine snake	0.0.1	0.0.1	0	0	0	—0.0.1	—0.0.1
<i>Pituophis melanoleucus</i> <i>sayi</i>							
Bullsnake	0.0.3	1.2.3	0	0	0	1.2.2—0.0.1	—0.0.1
<i>Rhamphiophis oxyrhynchus</i> Rufous-beaked snake	0.0.1	0.0.1	0	0.0.1	0	0	0.0.2
<i>Thamnophis terrestris</i> <i>elegans</i>							
Coast garter snake	0	1.1.4	0	0	0	0.0.1	1.1.3
Elapidae							
<i>Micrurus</i> sp. Coral snake	0	0	0	0.0.1	0	0.0.1	0
<i>Naja melanoleuca</i> Forest cobra	0	0	0	0.0.1	0	0.0.1	0
<i>Naja naja</i> Indian cobra	1.1	1.3.1	0	0.0.1	0.0.1	0	1.3.1
<i>Ophiophagus hannah</i> King cobra	1.0	1.0	0	0	0	0	1.0
Viperidae							
<i>Agkistrodon contortrix</i> Copperhead	1.1.3	0.0.5	0	0	0	0	0.0.5
<i>Agkistrodon piscivorus</i> Cottonmouth	0	0	0	0.0.9	0.0.3	0	0.0.6
<i>Bitis arietans</i> Puff adder	0	0	0	1.4	0	0	1.4
<i>Bitis caudalis</i> Horned viper	0	0	0	0.0.1	0.0.1	0	0
<i>Bitis nasicornis</i> Rhinoceros viper	0.0.4	2.1	0	0	1.1	1.0	0

Reptilia	Status 31 Dec. 73	Status 31 Dec. 74	Inventory Changes during 1975					Status 31 Dec. 75
			Born	Other Acquisition	Died	Other Disposition		
<i>Crotalus durissus</i> South American rattlesnake	0	0	0	0.0.4	0	0	0.0.4	
<i>Crotalus horridus</i> Timber rattlesnake	0.0.3	1.1.7—0.0.2	0	0	0	0.0.5—0.0.2	1.1.2	
<i>Crotalus horridus atricaudatus</i> Canebrake rattler	0.0.1	0	0	0	0	0	0	
<i>Crotalus viridis oregonus</i> Northern Pacific rattlesnake	1.1.2	0.0.4	0	0	0	0.0.4	0	
<i>Trimeresurus popeorum</i> Pope's pit viper	0	0	0	0.0.5	0	0	0.0.5	
<i>Trimeresurus purpureomaculatus</i> Purple-spotted pit viper	1.1.6	2.2.3	0	0	0.0.1	0.0.1	2.2.1	

Aves	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<b>STRUTHIONIFORMES</b>								
Struthionidae								
<i>Struthio camelus</i> Ostrich	1.1	1.1	0.0.2*	0	0	0.0.2*	0	1.1
<b>RHEIFORMES</b>								
Rheidae								
<i>Rhea americana</i> Common rhea	0	0.0.7	0	0	0.0.1	0	0	0.0.6
<i>Pterocnemia pennata</i> Darwin's rhea	1.0.3	0.0.2	0	0	0.0.2	0	0	0
<b>CASUARIIFORMES</b>								
Casuariidae								
<i>Casuaris bicarunculatus</i> Double-wattled cassowary	1.2	1.2	0	0	0	0	0	1.2
Dromiceidae								
<i>Dromiceius novaehollandiae</i> Emu	1.1	1.1.4	0	0	0	0.0.2	0	1.1.2
<b>APTERYGIFORMES</b>								
Apterygidae								
<i>Apteryx australis mantelli</i> North Island brown kiwi	1.1—0.0.1	1.1—1.0	0.0.1	0	0.1	0	0	1.0.1—1.0
<b>TINAMIFORMES</b>								
Tinamidae								
<i>Nothoprocta pentlandii</i> Andean tinamou	1.1.4	0.0.5	0	0	0.0.3	0	0	0.0.2
<i>Nothoprocta perdicaria</i> Chilean tinamou	—0.0.1	0	0	0	0	0	0	0

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>Nothoprocta rufescens</i> Red-winged tinamou	-0.0.3	0	0	0	0	0	0	0
PELECANIFORMES								
Pelecanidae								
<i>Pelecanus onocrotalus</i> Old World white pelican	1.1	1.1	0	0	0	0	0	1.1
<i>Pelecanus erythrorhynchos</i> American white pelican	2.1	0.0.3	0	0	0.0.1	0	0	0.0.2
Phalacrocoracidae								
<i>Phalacrocorax</i> <i>bougainvillii</i> Guanay cormorant	0.0.2	0.0.2	0	0	0.0.1	0	0	0.0.1
CICONIIFORMES								
Ardeidae								
<i>Leucophoyx thula</i> Snowy egret	0.1	0.1	0	0	0	0.1	0	0
<i>Bubulcus ibis</i> Cattle egret	1.0	1.0	0	0	0	1.0	0	0
<i>Nycticorax nycticorax</i> Black-crowned night heron	0.0.1	0.0.1	0	0.0.3	0.0.1	0	0	0.0.3
Cochleariidae								
<i>Cochlearius cochlearius</i> Boat-billed heron	1.1.1	0	0	0	0	0	0	0
Scopidae								
<i>Scopus umbretta</i> Hammerhead	1.1	0	0	0	0	0	0	0
Ciconiidae								
<i>Ciconia nigra</i> Black stork	1.1	1.0	0	0	0	0	0	1.0
Threskiornithidae								
<i>Threskiornis aethiopica</i> Sacred ibis	0.0.5	1.1.4	0.0.2	0	0.0.2	0.0.2	0	1.1.2
<i>Threskiornis</i> <i>melanocephala</i> Black-headed ibis	0.0.1	0.1	0	0	0	0	0	0.1
<i>Eudocimus ruber</i> Scarlet ibis	3.3	3.3	0.0.2	0	1.0	0	0	2.3.2
<i>Plegadis chihi</i> White-faced glossy ibis	0.0.6	0.0.6	0	0	0.0.1	0	0	0.0.5
<i>Ajaia ajaja</i> Roseate spoonbill	1.1	1.1	0	0	0	0	0	1.1
Phoenicopteridae								
<i>Phoenicopterus ruber</i> <i>chilensis</i> Chilean flamingo	3.2	3.2	0	0	0	0	0	3.2
<i>Phoenicopterus r. ruber</i> American greater flamingo	4.1	4.1	0	0	0	0	0	4.1
<i>Phoenicopterus r. roseus</i> Old World greater flamingo	1.1	1.1+0.1	0	0	0	0	0	1.1+0.1
ANSERIFORMES								

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<b>Anatidae</b>								
<b>DENDROCYGNINI</b>								
<i>Dendrocygna viduata</i> White-faced whistling duck	2.2	2.2	0	0	0	0	0	2.2
<i>Dendrocygna autumnalis</i> <i>discolor</i> Southern red billed whistling duck	2.3	2.2	0	0	0	0	0	2.3
<b>ANSERINI</b>								
<i>Coscoroba coscoroba</i> Coscoroba swan	1.1	1.1	0	0	0	0	0	1.1
<i>Cygnus atratus</i> Black swan	3.4	3.2.14	0.0.9	0	0.0.12	0.0.7	0	3.3.3
<i>Cygnus melanocoryphus</i> Black-necked swan	1.1.5	9.5	0.0.5	0.1	0.0.3	0.0.10	0.0.1	2.4
<i>Cygnus cygnus buccinator</i> Trumpeter swan	—0.0.1	—0.0.1	0	0	0	0	0	—0.0.1
<i>Cygnus c. columbianus</i> Whistling swan	2.2	2.1	0	0	0	0	0	2.1
<i>Anser albifrons frontalis</i> Pacific white-fronted goose	1.1	1.1	0	0	0	0	0	1.1
<i>Anser erythropus</i> Lesser white-fronted goose	2.2	2.1	0	0	0	0	0	2.1
<i>Anser fabalis brachyrhynchus</i> Pink-footed goose	0.1	0.1	0	0	0	0	0	0.1
<i>Anser c. caerulescens</i> Lesser snow goose, white phase	1.1	1.1	0	0	0	0	0	1.1
<i>Anser c. caerulescens</i> Lesser snow goose, blue phase	1.0	1.0	0	0	0	1.0	0	0
<i>Anser rossii</i> Ross's goose	4.4	2.4	0	0	0.1	0	0	2.3
<i>Anser indicus</i> Bar-headed goose	0	2.3	0	0	0	0.1	0	2.2
<i>Anser indicus</i> x <i>Anser</i> <i>albifrons</i> Bar-headed goose x white-fronted goose, hybrid	0	0.1	0	0	0	0	0	0.1
<i>Branta sandvicensis</i> Hawaiian goose or nene	3.3+2.0	4.5	0.0.22	0	0.0.4	0	0	15.12
<i>Branta canadensis</i> Common Canada goose	2.1	1.1	0	0	0	0	0	1.1
<i>Branta c. canadensis</i> Atlantic Canada goose	2.2	2.1	2.1	0	0	0	0	4.2
<i>Branta canadensis maxima</i> Giant Canada goose	0	0	0	3.3	1.0	0	0	2.3
<i>Branta canadensis occiden-</i> <i>talis</i> Dusky Canada goose	2.2	2.2	0	0	1.0	0	0	1.2
<i>Branta canadensis</i>								

Aves	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>hutchinsii</i>								
Richardson's Canada goose	1.1	1.1	0	0	0	0	0	1.1
<i>Branta leucopsis</i>								
Barnacle goose	1.0	1.0	0	0	0	1.0	0	0
<i>Branta ruficollis</i>								
Red-breasted goose	2.0	2.0	0	1.1	1.0	1.0	0	1.1
<i>Branta bernicla hrota</i>								
Atlantic brant	1.1	1.0	0	0	0	0	0	1.0
<i>Branta bernicla orientalis</i>								
Pacific or black brant	2.2	2.2	0	0	0	0	0	2.2
TADORNINI								
<i>Cereopsis novaehollandiae</i>								
Cereopsis or Cape Barren goose	1.1	1.1	0	0	0	0	0	1.1
<i>Chloephaga poliocephala</i>								
Ashy-headed goose	1.1	-1.1	0.0.3	+0.1	0.1.2	0	0	2.0+0.1
<i>Chloephaga picta picta</i>								
Lesser Magellan goose	1.0	-1.0	0	0	0	0	0	-1.0
<i>Neochen jubatus</i>								
Orinoco goose	1.1	1.1	0	0	1.0	0	0	0.1
<i>Tadorna variegata</i>								
Paradise shelduck	0.1	0.1	0	0	0	0	0	0.1
<i>Tadorna variegata x</i>								
<i>Tadorna cana</i>								
Paradise shelduck x Cape shelduck, hybrid	0	0	0	1.1	0	0	0	1.1
<i>Tadorna cana</i>								
Cape shelduck	2.2	1.2	0.0.6	0	0.0.1	0.2	0	3.3
<i>Tadorna ferruginea</i>								
Ruddy shelduck	1.1	4.2	0	0	0	2.0	0	2.2
<i>Tadorna r. radjah</i>								
Moluccan radjah shelduck	6.7	4.8	0.0.11	0	0.0.2	0.0.3	0	8.10
<i>Tadorna tadorna</i>								
European shelduck	3.3	6.3	0.0.1	0	0.0.2	0	0	6.2
<i>Lophonetta s.</i>								
<i>specularioides</i>								
Patagonian crested duck	0	1.1	1.0	0	0	0	0	2.1
ANATINI								
<i>Anas p. platyrhynchos</i>								
Mallard	10.8	3.2	0	0	0	3.2	0	0
<i>Anas platyrhynchos</i>								
<i>wywilliana</i>								
Hawaiian duck	16.12	20.11	0.0.23	0	0.0.4	0.0.2	0	33.15
<i>Anas platyrhynchos</i>								
<i>laysanensis</i>								
Laysan teal	2.3	2.3	0	0	0.1	0	0	2.2
<i>Anas rubripes</i>								
North American black duck	9.9	4.6	0	0	3.6	0	0	1.0
<i>Anas p. poecilorhyncha</i>								
Indian spotbill	8.4	14.12	0	0	0	5.2	0	9.10
<i>Anas luzonica</i>								
Philippine duck	0.2	0.2	0	0	0	0	0	0.2

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>Anas u. undulata</i>								
South African yellowbill	1.1	5.3	0.0.9	0	0.0.2	2.2	0	6.5
<i>Anas gibberifrons gracilis</i>								
Australian gray teal	2.3	8.9	0.0.22	0	0.0.9	0.0.2	0	14.14
<i>Anas castanea</i>								
Chestnut teal	0.1	0	0	1.1	0	0	0	1.1
<i>Anas f. flavirostris</i>								
Chilean teal	1.1	1.1	0	0	0	0	0	1.1
<i>Anas flavirostris oxyptera</i>								
Sharp-winged teal	1.1	0.1	0	0	0	0	0	0.1
<i>Anas crecca carolinensis</i>								
American green-winged teal	1.1	1.1	0	0	1.0	0	0	0.1
<i>Anas s. strepera</i>								
Gadwall	0.2	3.6	0	0	0	0	0	3.6
<i>Anas penelope</i>								
European wigeon	1.1	1.1	0	0	0.1	0	0	1.0
<i>Anas americana</i>								
American wigeon	7.4	5.1	0	0	1.0	1.0	0	3.1
<i>Anas georgica spinicauda</i>								
Chilean pintail	2.2	1.2	0	0	0	0	0	1.2
<i>Anas a. acuta</i>								
Northern pintail	5.4	3.5	0.0.2	0	0.0.2	0	0	3.5
<i>Anas erythrorhyncha</i>								
Red-billed pintail	1.1	1.1	0.1	0	0	0	0	1.2
<i>Anas angustirostris</i>								
Marbled teal	1.1	0.1	0	0	0	0	0	0.1
<i>Anas capensis</i>								
Cape teal	1.1	1.1	0	1.0	0	0	1.0	1.1
<i>Anas discors</i>								
Blue-winged teal	4.5	10.12	0.0.8	0	0.0.4	0.0.5	0	8.13
<i>Anas cyanoptera septentrionalium</i>								
Northern cinnamon teal	5.5	12.11	0.0.7	0.2	0.0.2	0.0.8	0	10.12
<i>Anas p. platyrhynchos x Anas luzonica</i>								
Mallard x Phillipine duck, hybrid	1.0	0	0	0	0	0	0	0
<i>Anas falcata x Anas penelope</i>								
Falcated teal x European wigeon, hybrid	2.0	2.0	0	0	0	0	0	2.0
<i>Anas leucophrys</i>								
Ringed teal	20.13	23.10	0	0	0.0.3	0.0.3	0.0.1	19.7
SOMATERIINI								
<i>Somateria mollissima</i>								
American eider	1.0	0	0	1.1	0	0	0	1.1
<i>Somateria mollissima v-nigra</i>								
Pacific eider	0	0	0.0.8*	0	0.0.1	0	0	4.3
AYTHYINI								
<i>Netta rufina</i>								
Red-crested pochard	1.2	2.1	0.0.4	0	0.0.1	0	0	4.2
<i>Netta peposaca</i>								
Rosybill	2.2	2.1	0	0	0	0	0	2.1

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>Aythya valisineria</i>								
Canvasback	3.3.1	3.3	0	0	1.2	0	0	2.1
<i>Aythya americana</i>								
Redhead	12.8	11.3	0	0	0.0.1	0.0.4	0	6.3
<i>Aythya a. australis</i>								
Australian white-eye	1.1	1.1	0	0	0	0	0	1.1
<i>Aythya nyroca</i>								
Ferruginous white-eye	1.1	2.1	0	0	0	0	0	2.1
<i>Aythya collaris</i>								
Ring-necked duck	5.5	5.3	0	0	1.1	0	0	4.2
<i>Aythya fuligula</i>								
Tufted duck	2.4	2.2	0	0	0.1	0	0	2.1
<i>Aythya novae-zeelandiae</i>								
New Zealand scaup	1.1	1.1	0	0	0	0	0	1.1
<i>Aythya affinis</i>								
Lesser scaup	3.5	2.4	0	0	1.0	0	0	1.4
<i>Aythya m. marila</i>								
European or greater scaup	6.7	4.7	0	0	1.5	0	0	3.2
CAIRININI								
<i>Amazonetta b. brasiliensis</i>								
Lesser Brazilian teal	2.1	2.1	0	0	0	0	0	2.1
<i>Amazonetta brasiliensis   ipecutiri</i>								
Greater Brazilian teal	1.1	1.3	0.0.3	3.3	0.0.1	0.0.1	0	5.6
<i>Chenonetta jubata</i>								
Australian wood duck	1.1	1.1	0	0	0	0	0	1.1
<i>Aix sponsa</i>								
North American wood duck	19.18	17.33	0.0.35	0	0.0.18	0.0.16	0	21.30
<i>Aix galericulata</i>								
Mandarin	7.6	13.22	0.0.25	0	0.0.8	0.0.9	0.0.1	23.19
<i>Sarkidiornis m. melanotos</i>								
Old World comb duck	1.2	1.1	0	0	0	0	0	1.1
<i>Cairina scutulata</i>								
White-winged wood duck	0	0.1	0	2.2	0	-2.2	0	0.1-2.2
<i>Plectropterus gambensis   niger</i>								
Black spur-winged goose	+1.1	+1.0	0	0	0	0	0	+1.0
MERGINI								
<i>Melanitta fusca deglandi</i>								
White-winged scoter	0.2	0.2	0	0	0	0	0	0.2
<i>Bucephala clangula   americana</i>								
American goldeneye	3.1	3.2	0.0.2	0	0.0.3	0	0	2.2
<i>Bucephala islandica</i>								
Barrow's goldeneye	3.1	3.1	0.0.6	0	0.0.3	0	0	5.2
<i>Bucephala albeola</i>								
Bufflehead	3.3	3.2	0	0	3.2	0	0	0
<i>Mergus cucullatus</i>								
Hooded merganser	2.2	1.1	0	0	0	0	0	1.1
<i>Mergus merganser   americanus</i>								
American merganser	0.3	1.5	0.0.7 0.0.15*	0	0.0.17	0	0	3.8

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<b>OXYURINI</b>								
<i>Oxyura j. jamaicensis</i> North American ruddy duck	6.3	6.7	0.018	0	0.015	0	0	7.9
<i>Oxyura jamaicensis fer- ruginea</i> x <i>Oxyura j. jamaicensis</i> Peruvian ruddy duck x North American, hybrid	0.01	0	0	0	0	0	0	0
<b>FALCONIFORMES</b>								
<b>Cathartidae</b>								
<i>Coragyps atratus</i> Black vulture	0	0.04	0	0	0	0.03	0	0.01
<i>Sarcorhamphus papa</i> King vulture	2	0.02	0	0	0	0	0	0.02
<b>Accipitridae</b>								
<i>Haliaeetus leucogaster</i> White-bellied sea eagle	0.01	0.01	0	0	0	0.01	0	0.01
<i>Haliaeetus leucocephalus</i> Bald or American eagle	1.2-0.01	1.2-0.01	0	0	0	0	0	1.2-0.01
<i>Necrosyrtes monachus</i> Hooded vulture	0.01	0.01	0	0	0.01	0	0	0
<i>Spilornis cheela</i> Crested serpent eagle	0.01	0.01	0	0	0	0	0	0.01
<i>Heterospizias meridionalis</i> Savannah hawk	0.01	0.01	0	0	0	0	0	0.01
<i>Parabuteo unicinctus harrisi</i> Harris's hawk	0	+1.0	0	0.1	0	0	0	0.1+1.0
<i>Buteo magnirostris</i> Roadside hawk	0	0.01	0	0	0	0	0	0.01
<i>Spizaetur ornatus</i> Ornate hawk eagle	0.01	0	0	0	0	0	0	0
<i>Aquila heliaca</i> Imperial eagle	0	1.0+0.1	0	0	0	0	0	1.0+0.1
<i>Aquila chrysaetos canadensis</i> American golden eagle	1.2	1.1-0.1	0	0	0	0	0	1.1-0.1
<i>Lophaetus occipitalis</i> Long-crested hawk eagle	0.01	0.01	0	0	0	0	0	0.01
<b>Sagittariidae</b>								
<i>Sagittarius serpentarius</i> Secretary bird	0.02	0.02	0	0	0	0	0	0.02
<b>Falconidae</b>								
<i>Polyborus plancus</i> Common caracara	0.02	0.02	0	0.01	0	0	0	0.03
<i>Micrastur semitorquatus</i> Collared forest falcon	0.01	0.1	0	0	0	0	0	0.1
<b>GALLIFORMES</b>								
<b>Megapodiidae</b>								
<i>Alectura lathami</i> Brush turkey	3.1	3.1	0	0	0	0	0	3.1

Aves	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
Cracidae								
<i>Crax globulosa</i>								
Wattled curassow	2.1	2.1	0	0	0	1.0	0	1.1
<i>Aburria pipile cumanensis</i>								
White-headed piping guan	1.1	1.1	0.0.9	0	0.0.4	0.0.2—0.0.2	0	1.1.1—0.0.2
Phasianidae								
<i>Lophortyx gambelii</i>								
Gambel's quail	0	0	0.0.6*	0	0.0.1	0	0	0.0.5
<i>Lophortyx californicus</i>								
California quail	0	0	0.0.1*	0	0	0	0	0.0.1
<i>Colinus v. virginianus</i>								
Eastern bobwhite quail	1.0	6.4	0	0	0.0.2	0.0.8	0	0
<i>Alectoris graeca</i>								
Chukar	1.0	1.0	0	0	1.0	0	0	0
<i>Francolinus francolinus</i>								
Chinese francolin	0	1.0	0	0	0	0	0	1.0
<i>Corturnix chinensis</i>								
Blue-breasted quail	5.1	11.5.2	0.0.35	0	0.0.29	1.0	4.0	10.9
<i>Arborophila brunneopectus</i>								
Bare-throated tree partridge	2.2.9	0.0.3	0	0.0.1	0.0.1	0	0	0.0.3
<i>Rollulus roulroul</i>								
Crested green wood partridge	29.25.6	34.21.8	0.0.95	0	0.0.93	0.0.35	0	17.11.2
<i>Tragopan temmincki</i>								
Temminck's tragopan	1.1	1.1	0	0	1.1	0	0	0
<i>Lophophorus impeyanus</i>								
Impeyan pheasant	0	1.1	0	0	1.0	0	0	0.1
<i>Gallus gallus spadiceus</i>								
Burmese red junglefowl	0	7.16.6	0.0.73	0	0	7.16.79	0	0
<i>Gallus lafayetteii</i>								
Ceylon junglefowl	0	1.2	0.0.9	0	0.0.4	0	0	2.6
<i>Lophura leucomelana hamiltoni</i>								
White-crested kalij pheasant	3.4	1.1	1.2	0	0	0	0	2.3
<i>Lophura swinhoei</i>								
Swinhoe's pheasant	2.5	5.8	0.0.29	0	0.0.19	0.0.9	0	2.12
<i>Crossoptilon crossoptilon</i>								
White-eared pheasant	0.2	0.1	0	1.0	0	0	0	1.1
<i>Syrnaticus ellioti</i>								
Elliot's pheasant	0	1.1	0	0	0.1	0	1.0	0
<i>Syrnaticus humiae</i>								
Hume's bar-tailed pheasant	1.0	1.1	0.0.6	0	0.0.3	0	0	3.2
<i>Syrnaticus mikado</i>								
Mikado pheasant	0	1.0	0	0	1.0	0	0	0
<i>Chrysolophus pictus</i>								
Golden pheasant	4.9	6.7	0.0.3	0	0.0.6	0.0.2	0	3.5
<i>Chrysolophus amherstiae</i>								
Lady Amherst pheasant	1.3	5.4	0.0.16	0	0.0.8	0.0.3	0	8.6
<i>Polyplectron germaini</i>								
Germain's peacock								

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
pheasant	0	1.1	0	0	0.1	0	0	1.0
<i>Argusianus argus argus</i>								
Malayan argus pheasant	—0.0.1	0.0.1	0	0	0	0.0.1	0	0
<i>Argusianus argus grayi</i>								
Bornean great argus pheasant	1.1.13	1.1.17	0.0.13	0	0.0.10	0.0.9	0	2.5.6
<i>Pavo cristatus</i>								
Indian blue peafowl	13.14	15.16±	0.0.18	0	0.0.10	0.0.9	0.0.6	12.12±
<i>Pavo m. muticus</i>								
Japanese green peafowl	1.1	1.2	0	1.0	1.1	0	0	1.1
Numididae								
<i>Acryllium vulturinum</i>								
Vulturine guineafowl	0	2.2.13	0.0.67	0	0.0.14	0.0.29	0	2.2.37
Meleagrididae								
<i>Meleagris gallopavo sylvestris</i>								
Wild turkey	3.4	4.5	0	0	1.3	0	0	3.2
<i>Meleagris ocellata</i>								
Ocellated turkey	0.1	1.1+1.1	0	0	0	0	0	1.1+1.1
GRUIFORMES								
Turnicidae								
<i>Turnix sylvatica</i>								
Kurrichane hemipode	0.0.9	0.0.1	0	0	0.0.1	0	0	0
Gruidae								
<i>Grus grus</i>								
European crane	1.1	1.1	0	0	0	1.1	0	0
<i>Grus canadensis canadensis</i>								
Lesser sandhill crane	0.0.2	0.0.2	0	0	0	0	0	0.0.2
<i>Grus canadensis tabida</i>								
Greater sandhill crane	1.0	1.0+0.1	0	0	0	0	0	1.0+0.1
<i>Grus canadensis pratensis</i>								
Florida sandhill crane	0	0	0	0.0.1	0	0	0	0.0.1
<i>Grus antigone</i>								
Sarus crane	1.1.1	2.3	0.0.5	0	0.0.1	0	0	2.3.4
<i>Anthropoides virgo</i>								
Demoiselle crane	1.1	1.1	0	0	0	0	0	1.1
<i>Anthropoides paradisea</i>								
Blue or Stanley's crane	2.2.2	2.3	0.0.1	0	0.0.1	0	0	2.3
<i>Balearica regulorum gibbericeps</i>								
Eastern crowned crane	0.1.4	1.2.1—0.1	0	0	0	0	0	1.2.1—0.1
Psophiidae								
<i>Psophia leucoptera</i>								
White-winged trumpeter	0.1	0.1	0	0.0.1	0.1	0	0	0.0.1
Rallidae								
<i>Rallus longirostris</i>								
Clapper rail	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Aramides cajanea</i>								
Gray-necked wood rail	0	0.0.3	0	0.0.2	0.0.1	0	0.0.1	0.0.3
<i>Limnocolax flavirostra</i>								
African black crane	0.0.5—0.0.2	1.1.8	0.0.3	0	0.0.4	0	0.0.7	0.0.2
<i>Coturnicops noveboracensis</i>								
Yellow rail	1.1.1	1.1.1	0	0	0.0.1	0	0	1.1

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>Gallinula chloropus</i>								
Common gallinule	0.0.4	0.0.2	0	0	0.0.1	0	0	0.0.1
<i>Porphyryla martinica</i>								
Purple gallinule	0	0	0	0.0.1	0.0.1	0	0	0
<i>Porphyrio melanotus</i>								
Pukeko	0.1	0.1	0	0	0	0	0	0.1
<i>Fulica americana</i>								
North American coot	0.0.2	0.0.2	0	0	0	0	0	0.0.2
<i>Fulica gigantea</i>								
Giant Peruvian coot	1.0	1.0	0	0	0	0	0	1.0
Eurypygidae								
<i>Eurypyga helias</i>								
Sunbittern	1.1	1.1	0.0.3	0	0.0.1	0	0	1.1.2
Cariamidae								
<i>Cariama cristata</i>								
Crested seriema	1.1	1.1	0	0	0	0	0	1.1
Otididae								
<i>Ardeotis kori</i>								
Kori bustard	0.1	0.1	0	0	0	0	0	0.1
<i>Afrotis atra afraoides</i>								
White-quilled black bustard	+1.1	+1.1	0	0	1.0	0	0	+0.1
CHARADRIIFORMES								
Recurvirostridae								
<i>Recurvirostra americana</i>								
American avocet	0.0.6	0.0.5	0	0	0.0.2	0	0	0.0.3
<i>Himantopus mexicanus</i>								
Black-necked stilt	0.0.3	0.0.3	0	0	0	0	0	0.0.3
Charadriidae								
<i>Hoplopterus spinosus</i>								
Spur-winged plover	0.0.3 + 0.0.2	0.0.4 + 0.0.2	0.0.1	0	0.0.1	0.0.1	0	0.0.3 + 0.0.2
<i>Charadrius vociferus</i>								
Kildeer	0	0.0.2	0	0	0.0.2	0	0	0
Scolopacidae								
<i>Catoptrophorus semipalmatus</i>								
Willet	0.0.1	0.0.3	0	0	0	0	0	0.0.3
<i>Calidris minutilla</i>								
Least sandpiper	0.0.1	0	0	0	0	0	0	0
<i>Calidris mauri</i>								
Western sandpiper	0.0.1	0	0	0	0	0	0	0
<i>Calidris alpina</i>								
Dunlin	0.0.1	0	0	0	0	0	0	0
<i>Calidris canutus</i>								
Knot	0.0.2	0.0.2	0	0	0	0	0	0.0.2
<i>Limnodromus griseus</i>								
Short-billed dowitcher	0.0.2	0.0.1	0	0	0	0	0	0.0.1
<i>Scolopax minor</i>								
American woodcock	1.1	0	0	0	0	0	0	0
<i>Arenaria interpres</i>								
Ruddy turnstone	0	0.0.2	0	0	0.0.1	0	0	0.0.1
Glareolidae								
<i>Pluvianus aegyptius</i>								
Egyptian plover	0.0.1	0	0	0	0	0	0	0
<i>Glareola pratincola</i>								

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
Pratincole	0.0.4	+0.0.4	0	0	0.0.3	0	0	+0.0.1
Laridae								
<i>Larus heermanni</i>								
Heerman's gull	0.1	0.1	0	0	0	0	0	0.1
<i>Larus atricilla</i>								
Laughing gull	0.0.9	0.0.9	0	0.0.1	0.0.1	0	0	0.0.9
<i>Larus novaehollandiae</i>								
Silver gull	4.4.7	4.4.4	0	0	0	0	0	4.4.4
<i>Larus atricilla</i> x <i>Larus novaehollandiae</i>								
Laughing gull x Silver gull, hybrid	0.0.6	0.0.6	0	0	0	0	0	0.0.6
<i>Chlidonias leucoptera</i>								
White-winged black tern	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Larosterna inca</i>								
Inca tern	0.0.4	1.1.4	0.0.2	0	0.0.2	0	0	1.1.4
COLUMBIFORMES								
Pteroclididae								
<i>Pterocles lichtensteini</i>								
Lichtenstein's sandgrouse	0.2	0	0	0	0	0	0	0
Columbidae								
<i>Treron phoenicoptera</i>								
Yellow-legged green pigeon	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Ptilinopus occipitalis</i>								
Yellow-breasted fruit dove	1.1	1.1	0	0	0	0	0	1.1
<i>Ducula aenea</i>								
Green imperial pigeon	0.0.1	0.0.4	0	0	0.0.1	0	0	0.0.3
<i>Columba livia palestinae</i>								
Palestinian rock pigeon	0	0.0.5	0	0	0.0.3	0	0.0.2	0
<i>Columba leucocephala</i>								
White-crowned pigeon	2.0+0.2	1.0	0	0	0	0	0	1.0
<i>Columba fasciata</i>								
Band-tailed pigeon	2.2+0.0.4	0.0.3	0	0	0	0	0	0.0.3
<i>Zenaida asiatica</i>								
White-winged dove	1.0+1.1	0	0	0	0	0	0	0
<i>Zenaidura macroura</i>								
Mourning dove	0.0.14	0.0.4	0	0	0	0	0	0.0.4
<i>Nesopelia galapagoensis</i>								
Galápagos dove	1.1	1.0	0	0	0	0	0	1.0
<i>Streptopelia roseogriseus decaocto</i>								
Ring-necked dove	1.1.1	0.0.7	0	0	0	0	0	0.0.7
<i>Streptopelia chinensis</i>								
Chinese necklace dove	0.0.72	27.27±	0	0	0.0.1	0.0.2	0	25.25±
<i>Geopelia cuneata</i>								
Diamond dove	1.1.2	1.3	0	0	0.1	1.0	0	0.2
<i>Scardafella inca</i>								
Inca dove	2.1	0.0.3	0	0	0.0.1	0	0	0.0.2
<i>Oena capensis</i>								
Cape dove	1.0	0	0	0	0	0	0	0

Aves	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>Chalcophaps indica</i>								
Emerald dove	2.1	1.1	0	0	1.0	0	0	0.1
<i>Caloenas nicobarica</i>								
Nicobar pigeon	4.3.2	2.2.4	0.0.1	0	0.0.2	0	0	2.2.3
<i>Goura cristata</i>								
Common crowned pigeon	3.1	3.1	0	0	0	0	0	3.1
PSITTACIFORMES								
Psittacidae								
<i>Eos hornea</i>								
Red lory	1.1	1.1	0.0.1	0	0	0	0	1.1.1
<i>Trichoglossus ornatus</i>								
Ornate lorikeet	0	1.1	0	0	0	0	0	1.1
<i>Trichoglossus haematodus rubritorquis</i>								
Red-collared lorikeet	0	1.1	0	0	0	0	0	1.1
<i>Trichoglossus j. johnstoniae</i>								
Mt. Apo lorikeet	0	1.0	0	0	1.0	0	0	0
<i>Cacatua galerita galerita</i>								
Sulphur-crested cockatoo	0.1	0	0	0	0	0	0	0
<i>Cacatua galerita triton</i>								
Sulphur-crested cockatoo	0.1	0.1	0	0	0	0	0	0.1
<i>Cacatua moluccensis</i>								
Salmon-crested cockatoo	3.1	1.1	0	0	0	0	0	1.1
<i>Cacatua tenuirostris</i>								
Long-billed corella	0.1	0.1	0	+2.0	1.0	0	0	0.1+1.0
<i>Polytelis alexandrae</i>								
Princess parrot	1.1.2	1.3.1	2.0.2	0	0.0.2	-0.1	0.1	3.1.1-0.1
<i>Neophema pulchella</i>								
Turquoise parrot	4.4.3	5.1	0	0	0	0	0	5.1
<i>Neophema splendida</i>								
Scarlet-crested parrot	0.1	1.0	0	+0.1	1.1	0	0	0
<i>Neophema pulchella x Neophema splendida</i>								
Turquoise parrot x scarlet-chested parrot, hybrid	-0.0.4	0	0	0	0	0	0	0
<i>Psittacus erithacus</i>								
African gray parrot	1.0	0.0.2	0	0	0	0	0	0.0.2
<i>Agapornis roseicollis</i>								
Peach-faced lovebird	0.0.38	0.0.46	0	0	0.0.5	0.0.38	0	0.0.3
<i>Loriculus vernalis</i>								
Vernal hanging parakeet	0.0.2	0.0.2	0	0	0.0.1	0	0	0.0.1
<i>Psittacula krameri</i>								
Rose-ringed parakeet	1.0	1.0	0	0	0	0	0	1.0
<i>Psittacula cyanocephala</i>								
Plum-headed parakeet	1.0	1.0	0	0.0.2	0.0.1	0	0	1.0.1
<i>Ara ararauna</i>								
Blue and yellow macaw	1.1	1.2	0	0.1	0	0	0	1.3
<i>Ara militaris</i>								

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
Military macaw <i>Ara macao</i>	1.2	1.2	0	0	0	0.1	0	1.1
Scarlet macaw <i>Ara chloroptera</i>	1.2	1.1—0.1	0	1.1	0	0	0	2.2—0.1
Green-winged macaw <i>Aratinga jandaya</i>	2.1	1.1	0	0	0	0	0	1.1
Jandaya conure <i>Aratinga canicularis</i>	0	1.1	0.0.1	0	0	0	0	1.1.1
Orange-fronted conure <i>Aratinga aurea</i>	2.1	1.1	0	0	0	0	0	1.1
Peach-fronted conure <i>Nandayus nenday</i>	1.1	1.1	0	0	0	1.1	0	0
Nanday conure <i>Pyrrhura frontalis</i>	1.1	1.1	0	0	0	1.1	0	0
<i>chiripepe</i> Maroon-bellied conure <i>Bolborhynchus lineolo</i>	1.1	1.1	0	0	0	1.1	0	0
Barred parakeet <i>Forpus cyanopygius</i>	0	0.0.9	0	0	0	0.0.9	0	0
Mexican parrotlet <i>Brotogeris versicolorus</i>	0.5	0.5	0	0	0.1	0	0.1	0.1
Canary-winged parakeet <i>Brotogeris jugularis</i>	4.4.5	0.0.10	0	0	0.0.2	0	0	0.0.8
Orange-chinned parakeet <i>Brotogeris sanctithomae</i>	0	0.0.1	0	0	0.0.1	0	0	0
Tui parakeet <i>Pionites melanocephala</i>	1.0	1.0	0	0	0	0	0	1.0
Black-headed caique <i>Pionopsitta pileata</i>	0.1	0.1	0	1.2	0	0	0	1.3
Pileated parrot <i>Pionites leucogaster</i>	0.1	0	0	0	0	0	0	0
White-bellied caique <i>Pionus menstruus</i>	0	0	0	0.0.1	0	0	0	0.0.1
Blue-headed parrot <i>Amazona leucocephala</i>	0	0	0	0.0.1	0	0	0	0.0.1
<i>caymanensis</i> Grand Cayman white- fronted Amazon parrot <i>Amazona albifrons</i>	1.2	1.1—0.1	0	0	0	0	0	1.1—0.1
White-fronted Amazon parrot <i>Amazona ochrocephala</i>	1.1	0	0	0	0	0	0	0
Yellow-headed Amazon parrot <i>Amazona amazonica</i>	0.0.1	0.0.5	0	0.0.1	0.0.1	0	0	0.0.5
Orange-winged Amazon parrot <i>Amazona vinacea</i>	0.1	0	0	0	0	0	0	0
Vinaceous Amazon parrot <i>Amazona guildingii</i>	0.1	0	0	0	0	0	0	0
St. Vincent Amazon parrot	—0.0.1	—0.1	0	0	0	0	0	—0.1

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<b>CUCULIFORMES</b>								
Cuculidae								
<i>Geococcyx californianus</i>								
Roadrunner	0	0	0.0.1	1.1	0.0.1	0	0	1.1
Musophagidae								
<i>Tauraco livingstoni</i>								
<i>schalowi</i>								
Schalow's turaco	2.0	2.0	0	0	0	0	0	2.0
<i>Tauraco erythrolophus</i>								
Red-crested turaco	0.1	0.1	0	0	0.1	0	0	0
<i>Tauraco leucotis</i>								
White-cheeked turaco	0.0.2	1.1	0	0	0	0	0	1.1
<b>STRIGIFORMES</b>								
Tytonidae								
<i>Tyto alba</i>								
Barn owl	1.1.11	2.2.3	0.0.13	0	0.0.1	0.0.14	0	1.1.3
Strigidae								
<i>Otus asio</i>								
Screech owl	0.0.3+0.0.3	1.1	0	0	0	0	0	1.1
<i>Bubo virginianus</i>								
Great horned owl	0.0.1	0.0.2	0	0	0	0	0.0.1	0.0.1
<i>Ketupa zeylonensis</i>								
Indian fishing owl	+1.0	+1.0	0	0	0	1.0	0	0
<i>Ketupa ketupa</i>								
Malay fishing owl	0.1	0.1	0	0	0	0	0	0.1
<i>Nyctea scandiaca</i>								
Snowy owl	2.1	1.1-1.0	0	1.0	1.0	0	0	1.1
<i>Micrathene whitneyi</i>								
Elf owl	1.1.1	1.1.1	0	0.0.1	0.0.1	0	0	1.1.1
<i>Speotyto cunicularia</i>								
Burrowing owl	2.2.11	3.3.18	0.0.7	0	0.0.2	0.0.18	0	7.2.2
<i>Strix leptogrammica</i>								
Nepal brown wood owl	0.1	0.1	0	0	0	0	0	0.1
<i>Strix varia</i>								
Barred owl	0	-0.0.1	0	0	0	0	0	-0.0.1
<i>Rhinoptynx clamator</i>								
Striped owl	0.0.1	0.0.1	0	0	0	0.0.1	0	0
<b>CAPRIMULGIFORMES</b>								
Podargidae								
<i>Podargus strigoides</i>								
Tawny frogmouth	0.0.1+0.0.2	0.0.1+1.1.0	0	0	0	0	0	0.0.1+0.1.1
<b>TROGONIFORMES</b>								
Trogonidae								
<i>Pharomachrus mocino</i>								
Resplendent guetzal	-0.0.1	-0.0.1	0	0	0	0	0	-0.0.1
<b>CORACIIFORMES</b>								
Alcedinidae								
<i>Dacelo gigas</i>								
Laughing kookaburra	1.1	0	0	0	0	0	0	0
Upupidae								
<i>Upupa epops</i>								
Hoopoe	1.1.5	0.0.5	0	0	0.0.5	0	0	0

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<b>Bucerotidae</b>								
<i>Buceros hydrocorax</i>								
Rufous hornbill	0	0	0	+0.2	0	0	0	+0.2
<i>Buceros rhinoceros</i>								
Rhinoceros hornbill	1.1	1.1	0	0	0	0	0	1.1
<i>Bucorvus abyssinicus</i>								
Abyssinian ground hornbill	1.1	1.1	0	0	0	0	0	1.1
<b>PICIFORMES</b>								
<b>Ramphastidae</b>								
<i>Pteroglossus</i>								
<i>beauharnaesii</i>								
Curl-crested aracari	1.1	1.1	0	0	0	0	0	1.1
<i>Ramphastos sulfuratus</i>								
Keel-billed toucan	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Ramphastos cuvieri</i>								
Cuvier's toucan	0.0.1	0.0.1	0	0	0	0.0.1	0	0
<i>Ramphastos toco</i>								
Toco toucan	2.1.1	1.1	0	0	0	0	0	1.1
<b>Picidae</b>								
<i>Colaptes auratus</i>								
Yellow-shafted flicker	1.0	1.0	0	0	1.0	0	0	0
<i>Melanerpes cruentatus</i>								
Yellow-tufted woodpecker	1.0	0	0	0	0	0	0	0
<i>Sphyrapicus varius</i>								
Yellow-bellied sapsucker	0	0.1	0	0	0.1	0	0	0
<i>Dendrocopos pubescens</i>								
Downy woodpecker	0	0	0	1.0	1.0	0	0	0
<b>PASSERIFORMES</b>								
<b>Eurylaimidae</b>								
<i>Calyptomena viridis</i>								
Lesser green broadbill	1.1	0.1	0	0	0	0	0	0.1
<b>Dendrocolaptidae</b>								
<i>Xiphocolaptes</i>								
<i>promeropirhynchus</i>								
Strong-billed woodcreeper	0.0.1	0.0.1	0	0	0.0.1	0	0	0
<b>Cotingidae</b>								
<i>Rupicola peruviana</i>								
Peruvian cock-of-the- rock	1.1	0.1	0.0.2	+1.0	0.0.2	0	0	0.1+1.0
<i>Pipreola jacunda</i>								
Orange-breasted fruiteater	1.0	0	0	0	0	0	0	0
<b>Pipridae</b>								
<i>Chiroxiphia linearis</i>								
Long-tailed blue-backed manakin	1.0	1.0	0	0	0	0	0	1.0
<b>Tyrannidae</b>								
<i>Sayornis phoebe</i>								
Eastern phoebe	0.0.1	0	0	0	0	0	0	0
<b>Pittidae</b>								

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>Pitta sordida</i>								
Hooded pitta	1.0	0	0	0	0	0	0	0
<i>Pitta caerulea</i>								
Giant pitta	1.0	1.0	0	1.0	0	0	1.0	1.0
Alaudidae								
<i>Eremopterix leucotis</i>								
Chestnut-backed finch lark	1.0	0	0	0	0	0	0	0
<i>Eremophila alpestris</i>								
Horned lark	0	0.0.1	0	0	0.0.1	0	0	0
Oriolidae								
<i>Oriolus oriolus</i>								
European golden oriole	0.1	0.1	0	0	0	0	0	0.1
<i>Oriolus chinensis</i>								
Black-naped oriole	1.0	1.0	0	0	0	0	0	1.0
Corvidae								
<i>Cyanocitta cristata</i>								
Blue jay	0	0.0.2	0	0.0.1	0.0.2	0	0	0.0.1
<i>Aphelocoma coerulescens</i>								
Scrub jay	0.0.2	0	0	0	0	0	0	0
<i>Cyanocorax affinis</i>								
Black-chested jay	1.0	1.0	0	0	0	0	0	1.0
<i>Cyanocorax chrysops</i>								
Plush-crested jay	0.1	0.1	0	0	0.1	0	0	0
<i>Cyanocorax yncas</i>								
Green jay	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Cyanocorax sanblasiensis</i>								
San Blas jay	0.1	0.1	0	0	0	0	0	0.1
<i>Garrulus lanceolatus</i>								
Black-throated jay	1.0	1.0	0	0	0	0	0	1.0
<i>Urocissa erythrorhyncha</i>								
Red-billed blue magpie	0.0.5	0.0.7	0	0.0.1	0.0.3	0	0	0.0.5
<i>Pica pica</i>								
Black-billed magpie	0	1.1.4	0.0.4	0	0.0.5	0.0.1	0	0.0.4
<i>Pica nuttalli</i>								
Yellow-billed magpie	0.0.2	0.0.1	0	0	0	0	0	0.0.1
<i>Corvus ossifragus</i>								
Fish crow	0	0.0.1	0	0	0	0.0.1	0	0
<i>Corvus albus</i>								
Pied crow	0.0.2	0.0.1	0	0	0	0	0	0.0.1
<i>Corvus cryptoleucus</i>								
White-necked raven	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Corvus corax</i>								
Common raven	0.0.2	0	0	0	0	0	0	0
Ptilonorhynchidae								
<i>Ptilonorhynchus violaceus</i>								
Satin bowerbird	1.1	1.1	0	0	0	0	0	1.1
Paradisaeidae								
<i>Paradisaea raggina</i>								
Red-plumed bird-of-paradise	0.1	0.1	0	0	0	0	0	0.1
Timaliidae								
<i>Garrulax leucolophus</i>								
White-crested laughing thrush	1.1.2	0.0.3	0	0	0	0	0	0.0.3

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>Leiothrix argentauris</i>								
Silver-eared mesia	1.1	1.1	0	0	1.0	0	0	0.1
<i>Leiothrix lutea</i>								
Pekin robin	1.0	0.0.1	0	0.0.8	0.0.1	0	0.0.3	0.0.5
<i>Turdoides jardinei</i>								
Arrow-marked babbler	0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Picathartes</i>								
<i>gymnocephalus</i>								
White-necked rock-fowl	0.0.4	0.0.2	0	0	0	0	0	0.0.2
<i>Pycnonotidae</i>								
<i>Pycnonotus cafer</i>								
Red-vented bulbul	0.0.1	0.0.1	0	0	0.0.1	0	0	0
<i>Chloropseidae</i>								
<i>Chloropsis aurifons</i>								
Gold-fronted leafbird	0.0.2	0	0	0	0	0	0	0
<i>Troglodytidae</i>								
<i>Salpinctes obsoletus</i>								
Rock wren	0	4.1	0.0.6	0	0.0.6	0	1.0	3.1
<i>Thryomanes bewickii</i>								
Bewick's wren	0	0.0.1	0	0	0	0	0	0.0.1
<i>Thryothorus ludovicianus</i>								
Carolina wren	0	0.0.2	0	0.0.4	0.0.2	0	0.0.4	0
<i>Troglodytes aedon</i>								
House wren	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Mimidae</i>								
<i>Mimus polyglottos</i>								
Mockingbird	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Turdidae</i>								
<i>Sialia sialis</i>								
Bluebird	0	2.0	0	0.1	2.1	0	0	0
<i>Zoothera citrina</i>								
Orange-headed ground thrush	1.1	1.1	0	0	0	0	1.0	0.1
<i>Turdus migratorius</i>								
American robin	1.1	0.0.2	0	0	0.0.1	0	0	0.0.1
<i>Artamidae</i>								
<i>Artamus personatus</i> x								
<i>Artamus superciliosus</i>								
Masked wood-swallow x white-browed wood-swallow, hybrid	0.1	0.1	0	0	0	0	0	0.1
<i>Laniidae</i>								
<i>Lanius ludovicianus</i>								
Loggerhead shrike	0.0.1	0	0	0	0	0	0	0
<i>Laniarius atro-coccineus</i>								
Crimson-breasted shrike	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Sturnidae</i>								
<i>Onychognathus morio</i>								
Red-winged starling	2.0	2.0	0	0	0	0	1.0	1.0
<i>Lamprotornis corruscus</i>								
Black-bellied glossy starling	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Lamprotornis caudatus</i>								
Long-tailed glossy starling	0	0	0	1.1	0	0	0	1.1

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
<i>Cinnyricinclus leucogaster</i>								
Violet-backed starling	1.0	1.0	0	0	1.0	0	0	0
<i>Cosmopsarus regius</i>								
Golden-breasted starling	0.0.1	0.0.1	0	0.0.3	0	0	0	0.0.4
<i>Sturnus malabaricus blythii</i>								
White-headed mynah	1.0	0	0	0	0	0	0	0
<i>Spreo superbus</i>								
Superb starling	0	0	0	+0.0.2	0	0	0	+0.0.2
<i>Leucopsar rothschildi</i>								
Rothschild's mynah	3.3.19	3.3.22	0.0.4	0	0.0.5	0.0.11—1.1	0	8.6—1.1
<i>Acridotheres cristatellus</i>								
Crested mynah	0.0.1	0.0.1	0	0	0	0	0	0.0.1
<i>Gracula r. religiosa</i>								
Northern hill mynah	0.0.5	0.0.3	0	0	0.0.2	0	0.0.1	0
<i>Gracula religiosa indica</i>								
Southern hill mynah	0.0.1	0	0	0	0	0	0	0
<i>Buphaga erythrorhyncha</i>								
Red-billed oxpecker	0.0.2	0.0.2	0	0	0.0.1	0	0	0.0.1
Meliphagidae								
<i>Melithreptus lunatus</i>								
White-naped honeyeater	1.1	0.0.2	0	0	0.0.1	0	0	0.0.1
Nectariniidae								
<i>Chalcomitra amethystina</i>								
Amethyst sunbird	0	0	0	0.0.1	0.0.1	0	0	0
<i>Chalcomitra senegalensis</i>								
Scarlet-chested sunbird	1.0	0	0	0	0	0	0	0
Zosteropidae								
<i>Zosterops senegalensis kikuyuensis</i>								
Kikuyu white-eye	2.1	1.1	0.0.1	0	0.0.1	0	0	1.1
Coerebidae								
<i>Coereba flaveola</i>								
Bananaquit	1.0	1.0	0	0	0	0	1.0	0
<i>Cyanerpes caeruleus</i>								
Yellow-legged honeycreeper	2.1	2.0	0	0	0	0	1.0	1.0
<i>Cyanerpes cyaneus</i>								
Red-legged honeycreeper	1.1	1.1	0	3.3	1.0	0	1.1	2.3
Parulidae								
<i>Dendroica palmarum</i>								
Palm warbler	0	0	0	0.0.1	0.0.1	0	0	0
<i>Setophaga ruticilla</i>								
American redstart	0	0	0	0.0.5	0.0.2	0	0.0.3	0
Ploceidae								
<i>Euplectes afra</i>								
Napoleon weaver	5.1	5.1	0	0	2.0	0	0	3.1
<i>Euplectes orix</i>								
Red bishop	4.0	5.1	0	0	2.0	0	0	3.1
<i>Ploceus luteolus</i>								
Masked weaver	0.0.2	1.0	0	0	0	0	0	1.0
<i>Ploceus cucullatus</i>								
Vitelline masked weaver	0.0.1	0	0	0	0	0	0	0
<i>Steganura paradisea</i>								

<i>Aves</i>	Status 31 Dec. 73	Status 31 Dec. 74	Hatched	Received	Died	Sent Out	Other	Status 31 Dec. 75
Paradise whydah	5.1	0.05	0	0	0	0	0.0.1	0.0.4
<i>Vidua fischeri</i>								
Fischer's straw-tailed whydah	0.1	0.1	0	0	0	0	0	0.1
<i>Lonchura malacca</i>								
Tri-colored nun	0.0.6	0.0.5	0	0	0.0.2	0	0	0.0.3
<i>Lonchura punctulata</i>								
Nutmeg finch	0.0.3	0.0.3	0	0	0.0.1	0	0	0.0.2
<i>Lonchura domestica</i>								
Bengalese finch	0.0.6	0.0.5	0	0	0.0.4	0	0	0.0.1
<i>Amadina fasciata</i>								
Cut-throat finch	5.1	4.2	0	0	1.1	0	1.1	2.0
<i>Estrilda amandava</i>								
Strawberry finch	1.0	1.1	0	0	1.0	0	0	0.1
<i>Estrilda astrild</i>								
Common waxbill	4.1	0.0.1	0	0	0	0	0	0.0.1
<i>Estrilda subflava</i>								
Zebra or gold-breasted waxbill	1.0	0	0	0	0	0	0	0
<i>Estrilda melpada</i>								
Orange-cheeked waxbill	0.0.1	0.0.1	0	0	0.0.1	0	0	0
<i>Estrilda caerulescens</i>								
Lavender finch	0.0.1	0	0	0	0	0	0	0
<i>Lagonistricta senegala</i>								
Red-billed fire finch	2.2.4	0.4	0	0	0.2	0	0.1	0.1
<i>Lagonistricta rubricata</i>								
African fire finch	2.2.2	0	0	0	0	0	0	0
<i>Uraeginthus bengalensis</i>								
Cordon bleu finch	2.1	0	0	0	0	0	0	0
<i>Uraeginthus cyanocephalus</i>								
Blue-capped cordon bleu finch	1.1	0	0	0	0	0	0	0
<i>Poephila castanotis</i>								
Zebra finch	0.0.1 + 1.1	4.2	0	0	2.2	0	0	2.0
<i>Poephila gouldiae</i>								
Gouldian finch	0.3	2.0	0	0	2.0	0	0	0
<i>Poephila acuticauda</i>								
Long-tailed finch	2.2	1.1	0	0	0.1	0	0	1.0
<i>Padda oryzivora</i>								
Java finch	1.0	1.0	0	0	1.0	0	0	0
<i>Passer luteus</i>								
Gold song sparrow	0.0.4	0.0.4	0	0	0.0.1	0	0	0.0.3
Icteridae								
<i>Quiscalus quiscula</i>								
Common grackle	0.0.3	2.0	0	0	0	0	0	2.0
<i>Agelaius phoeniceus</i>								
Red-winged blackbird	0	1.0	0	0	0	0	0	1.0
<i>Icterus nigrogularis</i>								
Yellow oriole	1.0	0	0	0	0	0	0	0
<i>Icterus galbula</i>								
Northern oriole	0	3.0	0	0	0	0	1.0	2.0
<i>Xanthocephalus xanthocephalus</i>								
Yellow-headed blackbird	0.0.1	3.0	0	0	0	0	1.0	2.0

Aves	Status	Status	Hatched	Received	Died	Sent Out	Other	Status
	31 Dec. 73	31 Dec. 74						31 Dec. 75
Thraupidae								
<i>Tangara arthus</i>								
Black-eared golden tanager	1.0	0	0	0	0	0	0	0
<i>Tangara nigrocincta</i>								
Masked tanager	1.0	0	0	0	0	0	0	0
<i>Thraupis episcopus</i>								
Blue-gray tanager	1.0	0.03	0	0	0	0	0.02	0.01
<i>Thraupis sayaca</i>								
Sayaca tanager	0.01	0.01	0	0	0	0	0.01	0
<i>Thraupis bonariensis</i>								
Blue and yellow tanager	1.0	1.0	0	0	1.0	0	0	0
<i>Ramphocelos bresilius</i>								
Brazilian scarlet tanager	0	0	0	2.0	0	0	1.0	1.0
Fringillidae								
<i>Paroaria coronata</i>								
Red-crested cardinal	0.05	1.1.1	0.0.2	0	0.0.1	0	0.0.1	1.1.1
<i>Cardinalis phoeniceus</i>								
Vermilion cardinal	1.0	1.0	0	0	0	0	0	1.0
<i>Richmondia cardinalis</i>								
Cardinal	1.0	1.0	0	0	0	0	0	1.0
<i>Hesperiphona vespertina</i>								
Evening grosbeak	0	0	0	0.0.1	0.0.1	0	0	0
<i>Passerina cyanea</i>								
Indigo bunting	0	1.0	0	0	1.0	0	0	0
<i>Passerina leclancherii</i>								
Rainbow bunting	2.1	2.1	0	0	1.0	0	1.0	0.1
<i>Fringilla coelebs</i>								
Chaffinch	0	0.0.1	0	0	0	0	0	0.0.1
<i>Serinus mozambicus</i>								
Green singing finch	0	1.0	0	0.0.1	1.0	0	0	0.0.1
<i>Lophospingus pusillus</i>								
Black-crested finch	2.2.1	0.0.3	0	0	0.0.1	0	0.0.1	0.0.1
Mammalia								
	Status	Status	Born	Other	Died	Other		Status
	31 Dec. 73	31 Dec. 74	(Stillborn)	Acquisition	(Stillborn)	Disposition		31 Dec. 75
MONOTREMATA								
Tachyglossidae								
<i>Tachyglossus aculeatus</i>								
Short-nosed echidna	0.0.1	0.0.3	0	0	0	0	0	0.0.3
MARSUPIALIA								
Dasyuridae								
<i>Dasyurus albopunctatus</i>								
New Guinea dasyure	0	0	0	1.0	0	0	0	1.0
Phalangeridae								
<i>Trichosurus vulpecula</i>								
Brush-tailed possum	0	1.0	0	0.1	0	0	0	1.1
<i>Petaurus breviceps</i>								
Sugar glider	7.9	3.5	1.1	0	0.1	1.1	1.1	3.4

Mammalia	Status 31 Dec. 73	Status 31 Dec. 74	Born (Stillborn)	Other Acquisition	Died (Stillborn)	Other Disposition	Status 31 Dec. 75
<b>Phascolomidae</b>							
<i>Vombatus ursinus</i>							
Common wombat	1.2	1.2	0	0	0.1	0	1.1
<b>Macropodidae</b>							
<i>Potorous apicalis</i>							
Southern potoroo	1.0	1.0+0.1	0	0	0	0	1.0+0.1
<i>Dendrolagus matschiei</i>							
Matschie's tree kangaroo	2.5	2.6	2.1	1.0	1.1	1.0	3.6
<i>Macropus parma</i>							
White-fronted wallaby	1.1	1.1	0	0	0.1	0	1.0
<i>Megaleia rufa</i>							
Red kangaroo	2.3.1	3.4	0.0.2	1.2	0.1	3.1.1	1.4.1
<b>INSECTIVORA</b>							
<b>Soricidae</b>							
<i>Blarina brevicauda</i>							
Short-tailed shrew	0	0.0.1	0	0	0.0.1	0	0
<b>Macroscelididae</b>							
<i>Elephantulus rufescens</i>							
Elephant shrew	0	0	0	1.1	0	0	1.1
<b>Tupaiaidae</b>							
<i>Tupaia glis</i>							
Common tree shrew	0	1.0	0.1.1	0.2	0.2.1	0	1.1
<b>CHIROPTERA</b>							
<b>Phyllostomatidae</b>							
<i>Anoura geoffroy</i>							
Tailless bat	0.1	0	0	0	0	0	0
<i>Carollia perspicillata</i>							
Short-tailed bat	2.2.1	0	0	0	0	0	0
<b>PRIMATES</b>							
<b>Lemuridae</b>							
<i>Cheirogaleus major</i>							
Greater dwarf lemur	1.0	0	0	0	0	0	0
<i>Nycticebus coucang</i>							
Slow loris	1.1	0.3	0	1.0	0.1	0	1.2
<i>Perodicticus potto, Esq.</i>							
Potto	0	1.1	0	0	0	0	1.1
<i>Galago crassicaudatus</i>							
Thick-tailed bushbaby	1.0.3+1.2	1.0+1.2-1.2	1.0.1(1)	0	1(1)+0.1	2.0	+1.1-1.2
<i>Galago senegalensis</i>							
Senegal bushbaby	0	1.3	0	0	0.1	0	1.2
<b>Cebidae</b>							
<i>Aotus trivirgatus</i>							
Douroucouli	1.1	1.1	0.1	0	0.1	0	1.1
<i>Cacajao rubicundus</i>							
Red uakari	0	0.2	0	+1.0	0	-0.1	0.1+1.0-0.1
<i>Alouatta villosa</i>							
Mantled howler monkey	1.1	1.1	0	0	0	0	1.1
<i>Cebus capucinus</i>							
White-throated capuchin	+1.0	+1.0	0	0	0	0	+1.0
<i>Saimiri sciureus</i>							
Common squirrel monkey	3.3	2.4	0	1.0	0.1	1.0	2.3

Mammalia	Status 31 Dec. 73	Status 31 Dec. 74	Born (Stillborn)	Other Acquisition	Died (Stillborn)	Other Disposition	Status 31 Dec. 75
<i>Ateles fusciceps</i>							
Brown-headed spider monkey	2.4	4.4	1.0	0	1.0	0	4.4
<i>Lagothrix lagotricha</i>							
Woolly monkey	2.1	2.1	0	+0.1	0	0	2.1+0.1
Callithricidae							
<i>Callimico goeldi</i>							
Goeldi's marmoset	0	0.1	0	0	-0.1	-0.1	0
<i>Callithrix geoffroyi</i>							
White-fronted marmoset	1.1.1	1.1	0	0	0	0	1.1
<i>Leontideus r. rosalia</i>							
Golden lion marmoset	5.2-1.0+1.1	5.5	1.2(3.2)	1.0	1.1(3.2)	2.2	4.4
<i>Saguinus geoffroyi</i>							
Geoffroy's tamarin	1.1.1	0.2	0	1.0	0.1	0	1.1
<i>Saguinus nigricollis</i>							
Black and red tamarin	2.1	3.1	0	0	0	0	3.1
<i>Saguinus oedipus</i>							
Cotton-headed tamarin	2.2	0	0	0	0	0	0
Cercopithecidae							
<i>Cercocebus albigena</i>							
Grey-cheeked mangabey	0	0	0	1.0	0	0	1.0
<i>Cercopithecus diana diana</i>							
Diana monkey	0	0	0	+1.0	0	0	+1.0
<i>Cercopithecus d. roloway</i>							
Roloway monkey	0	0	0	+1.1	0	0	+1.1
<i>Macaca nigra</i>							
Black or Celebes ape	1.2	1.2-0.1	1.0	0.2	1.0	-0.1	1.3-0.2
<i>Macaca silenus</i>							
Lion-tailed macaque	1.2-1.0	1.2-1.0	0.0.2	0	0.0.1	0	1.3-1.0
<i>Macaca sylvanus</i>							
Barbary ape	4.4	4.4	2.1(0.1)	0	1.0(0.1)	2.0	3.5
<i>Theropithecus gelada</i>							
Gelada baboon	1.4	1.4	0	0	0	1.4	0
<i>Colobus guereza</i>							
Colobus monkey	2.3	2.4	0.1	0	0.1	0	2.4
<i>Presbytis senex senex</i>							
Purple-faced langur	1.1	1.1	0	0	0	0	1.1
Pongidae							
<i>Hylobates concolor</i>							
Black gibbon	2.2	2.2	0	0	0	0	2.2
<i>Hylobates hoolock x</i>							
<i>H. agilis</i>							
Hybrid gibbon	0.1	0.1	0	0	0	0	0.1
<i>Hylobates syndactylus</i>							
Siamang	1.1	1.1	0	0	0	0	1.1
<i>Gorilla g. gorilla</i>							
Lowland gorilla	2.1-1.0	2.1-1.0	0	0	0	0	2.1-1.0
<i>Pan troglodytes</i>							
Chimpanzee	1.0-0.1	1.0	0	0	0	0	1.0
<i>Pongo pygmaeus</i>							
Orangutan	2.3-4.2	2.2-4.3	0	0	0	0	2.2-4.3

EDENTATA

Myrmecophagidae

*Myrmecophaga tridactyla*

Mammalia	Status 31 Dec. 73	Status 31 Dec. 74	Born (Stillborn)	Other Acquisition	Died (Stillborn)	Other Disposition	Status 31 Dec. 75
Giant anteater	1.0	1.0	0	+0.1	0	0	1.0+0.1
<i>Tamandua tetradactyla</i>							
Tamandua	0	0	0	0.1	0	-0.1	-0.1
Bradyrodidae							
<i>Choloepus didactylus</i>							
Two-toed sloth	2.3	1.2	0	0	0	0	1.2
Dasyproctidae							
<i>Cabassous centralis</i>							
Naked-tailed armadillo	0	0	0	1.1	1.1	0	0
<i>Zaedyus pichi caurinus</i>							
Pichi	-0.1	-0.1	0	0	0	0	-0.1
RODENTIA							
Sciuridae							
<i>Callosciurus erythraeus</i>							
Pallas squirrel	1.0	1.0	0	0	1.0	0	0
<i>Cynomys ludovicianus</i>							
Black-tailed prairie dog	0	0	0	2.4	0	-2.4	-2.4
<i>Cynomys parvidens</i>							
Utah prairie dog	2.2.3	3.5	5.5	0	0	5.5	3.5?
Heteromyidae							
<i>Dipodomys</i> sp.							
Kangaroo rat	1.1	0	0	0	0	0	0
Cricetidae							
<i>Mystromys albicaudatus</i>							
White-tailed rat	2.0	2.0	0	0	2.0	0	0
<i>Neotoma floridana</i>							
Eastern woodrat	1.2	1.4	2.1	0	1.1	1.3	1.1
<i>Ochrotomys nuttalli</i>							
Golden mouse	0.2	0	0	0	0	0	0
<i>Peromyscus</i> sp.							
Deer mouse	0.2	1.3	0	0	0	1.3	0
<i>Tylomys nudicaudatus</i>							
Peters' climbing rat	0	2.0	0	0	1.0	0	1.0
<i>Microtus ochrogaster</i>							
Prairie vole	0	0	0.0.1	1.5	0.0.3	0.0.1	2.1
<i>Meriones unguiculatus</i>							
Mongolian gerbil	1.0	0	0	0	0	0	0
Muridae							
<i>Acomys</i> sp.							
Spiny mouse	0.0.14	1.5	0.0.12	0	0.1	2.2	7.6
<i>Pseudomys australis</i>							
Eastern mouse	0	0	0	2.2	0	0.2	2.0
Hystricidae							
<i>Atherurus africanus</i>							
Brush-tailed porcupine	1.0	1.0	0	0	0	0	1.0
<i>Hystrix cristata</i>							
Crested porcupine	1.1	1.1	0	0	0	0	1.1
Caviidae							
<i>Dolichotis patagona</i>							
Patagonian cavy	-0.1	0	0	0	0	0	0
Dasyproctidae							
<i>Cuniculus paca</i>							
Paca	1.1	1.2	0	0	0.1	0	1.1
<i>Dasyprocta</i> sp.							

<i>Mammalia</i>	Status 31 Dec. 73	Status 31 Dec. 74	Born (Stillborn)	Other Acquisition	Died (Stillborn)	Other Disposition	Status 31 Dec. 75
Common agouti	1.4.2	0	0	0	0	0	0
<i>Myoprocta pratti</i>							
Acouchi	0	0	0	1.1	0.1	0	1.0
Capromyidae							
<i>Capromys pilorides</i>							
Desmarest's or Cuban hutia	0	0	0	1.1	0	0	1.1
Octodontidae							
<i>Octodon degus</i>							
Degu	0	1.2	4.1.3	0.2	2.2.3	0	3.3
Echimyidae							
<i>Proechimys semispinosus</i>							
Tome's spiny rat	1.0	1.0	0	0	1.0	0	0
CARNIVORA							
Canidae							
<i>Canis lupus</i>							
Grey wolf	-2.1	-2.1	0	0	0	0	-2.1
<i>Nyctereutes procyonoides</i>							
Raccoon dog	1.0	1.2	2.5	0	0.2	0.1	3.4
<i>Urocyon cinereoargenteus</i>							
Grey fox	1.0	0	0	0	0	0	0
Ursidae							
<i>Helarctos malayanus</i>							
Sun bear	1.2	1.2	0	0	0	0	1.2
<i>Melursus ursinus</i>							
Sloth bear	1.1	1.2	0	0	0	0	1.2
<i>Tremarctos ornatus</i>							
Spectacled bear	0.1+1.0-1.0	0.1+1.0-1.0	0	0	0	0	0.1+1.0-1.0
<i>Ursus arctos arctos</i>							
European brown bear	1.1	1.1	2.2	0	0	2.2	1.1
<i>Ursus arctos middendorffi</i>							
Kodiak bear	1.1	1.1	1.2	0	0	0	2.3
<i>Ursus americanus</i>							
Black bear	2.1	2.1	0	0	0	0	2.1
<i>Ursus maritimus</i>							
Polar bear	1.2	1.2	0	0	0	0	1.2
<i>Ursus maritimus x Ursus middendorffi</i>							
Hybrid bear	0.1	0	0	0	0	0	0
Procyonidae							
<i>Bassariscus astutus</i>							
North American cacomistle	1.0	1.0	0	0	0	1.0	0
<i>Bassaricyon sp.</i>							
Olingo	0	0.1	0	0	0	0.1	0
<i>Potos flavus</i>							
Kinkajou	1.2	1.2	0	0	0	0	1.2
Ailuropodidae							
<i>Ailurus fulgens</i>							
Red panda	3.3	1.4-1.1	2.2	2.1	1.0	0.1-1.1	4.6
<i>Ailuropoda melanoleuca</i>							
Giant panda	1.1	1.1	0	0	0	0	1.1
Mustelidae							
<i>Eira barbara</i>							

<i>Mammalia</i>	Status 31 Dec. 73	Status 31 Dec. 74	Born (Stillborn)	Other Acquisition	Died (Stillborn)	Other Disposition	Status 31 Dec. 75
Tayra	1.2	1.1	0	0	1.0	0	0.1
<i>Galictis vittata</i>							
Allemand's grison	0	1.1	0	0	0	0	1.1
<i>Ictonyx striatus</i>							
Zorilla	0	0	0	1.1	0	0	1.1
<i>Martes flavigula</i>							
Yellow-throated marten	-1.0	-1.0	0	0	0	0	-1.0
<i>Mustela erminea</i>							
Stoat	+0.1	0.1	0	0	0.1	0	0
<i>Mellivora capensis</i>							
Ratel	1.0	1.0	0	0	0	0	1.0
<i>Meles meles</i>							
Eurasian badger	0.1	0.1	0	0	0.1	0	0
<i>Melogale moschata</i>							
Chinese ferret badger	0.1	0.1	0	0	0	0	0.1
<i>Viverridae</i>							
<i>Genetta tigrina</i>							
Blotched genet	3.1	1.1-1.0	0	0	0	-1.0	1.1
<i>Prionodon linsang</i>							
Linsang	1.0	0	0	0	0	0	0
<i>Viverra zibetha</i>							
Large Indian civet	0	1.0	0	0	0	1.0	0
<i>Viverricula indica</i>							
Small Indian civet	1.0	1.0	0	0	0	1.0	0
<i>Arctictis binturong</i>							
Binturong	1.1	2.2	0	0	0	0	2.2
<i>Nandinia binotata</i>							
African palm civet	1.1	1.1	0	0	0.1	1.0	0
<i>Paguma larvata</i>							
Formosan masked civet	1.0	0	0	0	0	0	0
<i>Paradoxurus herma- phroditus</i>							
Common palm civet	1.1	1.1	0	0	0	0	1.1
<i>Fossa fossa</i>							
Malagasy civet or fanaloka	2.0	2.0	0	0	0	0	2.0
<i>Hemigalus derbyanus</i>							
Banded palm civet	1.1	0	0	0	0	0	0
<i>Galidia elegans</i>							
Ring-tailed mongoose	3.0	2.0	0	0	0	0	2.0
<i>Atilax paludinosus</i>							
Marsh mongoose	2.0	2.0	0	0	1.0	0	1.0
<i>Bdeogale nigripes</i>							
Black-legged mongoose	0.1	0	0	0	0	0	0
<i>Suricata suricatta</i>							
Slender-tailed meerkat	0	4.1	0	0	1.0	0	3.1
<i>Cryptoprocta ferox</i>							
Fossa	1.0	1.0	0	0	1.0	0	0
<i>Hyaenidae</i>							
<i>Crocuta crocuta</i>							
Spotted hyena	1.1	1.1	0	0	0	0	1.1
<i>Felidae</i>							
<i>Felis bengalensis</i>							
Leopard cat	1.1-0.1	1.4	0	0	0	0.3	1.1
<i>Felis colocolo</i>							

<i>Mammalia</i>	Status 31 Dec. 73	Status 31 Dec. 74	Born (Stillborn)	Other Acquisition	Died (Stillborn)	Other Disposition	Status 31 Dec. 75
Pampas cat <i>Felis concolor</i>	1.0	1.0	0	0	0	-1.0	-1.0
Puma <i>Felis geoffroyi</i>	-1.1	0	0	0	0	0	0
Geoffroy's cat <i>Felis manul</i>	1.1	1.1	0	0	0	0	1.1
Pallas' cat <i>Felis temmincki</i>	1.1	1.1	0	0	0	0	1.1
Golden cat <i>Panthera onca</i>	1.1	0	0	0	0	0	0
Jaguar <i>Panthera pardus</i>	2.2	3.1	0	+1.1	0	2.0	1.1+1.1
Leopard, black <i>Panthera tigris</i>	-1.0	-1.0	0	0	0	0	-1.0
Bengal tiger <i>Panthera tigris</i>	1.2	-1.2	0	0	0	0	-1.2
Bengal tiger, white <i>Acinonyx jubatus</i>	-0.2	-1.4	0	0	0	0	-1.4
Cheetah	1.1	1.1+1.2	0	0	0	0	1.1+1.2
PINNIPEDIA							
Otariidae							
Zalophus californianus California sea lion	1.2	1.1	0	0	0	0	1.1
PROBOSCIDEA							
Elephantidae							
Elephas maximus indicus Indian elephant	0.2	0.2	0	0	0	0	0.2
Loxodonta africana knochenhaueri African bush elephant	0.1	0.1	0	0	0	0	0.1
Loxodonta africana cyclotis African forest elephant	1.0	1.0	0	0	0	0	1.0
PERISSODACTYLA							
Equidae							
Equus burchelli Common zebra	2.5	1.6	1.0	0	0.1	1.4	1.1
Tapiridae							
Tapirus terrestris South American tapir	1.1	1.1	0	0	0	0	1.1
Rhinocerotidae							
Ceratotherium simum cottoni Northern white rhinoceros	-1.1	-1.1	0	0	-1.0	0	-0.1
Diceros bicornis Black rhinoceros	1.2	1.2	0	0	0	0	1.2
Rhinoceros unicornis Great Indian rhinoceros	1.1	2.1	0	0	0	-1.0	1.1-1.0
ARTIODACTYLA							
Hippopotamidae							
Choeropsis liberiensis							

<i>Mammalia</i>	Status 31 Dec. 73	Status 31 Dec. 74	Born (Stillborn)	Other Acquisition	Died (Stillborn)	Other Disposition	Status 31 Dec. 75
Pygmy hippopotamus	1.7-1.0	1.6-1.0	2.1	0	0.1	0	2.6-1.0
<i>Hippopotamus amphibius</i>							
Hippopotamus	2.1	2.1	0	0	0	1.0	1.1
Camelidae							
<i>Camelus bactrianus</i>							
Bactrian camel	-0.1	-0.1	0	0	0	-0.1	0
Cervidae							
<i>Muntiacus reevesi</i>							
Reeves' muntjac	6.3-1.1+0.1	4.5+0.1-1.1	1.3	0	1.0-0.1	0	4.8+0.1-1.0
<i>Cervus axis</i>							
Axis deer	1.2	2.1	0(1)	0	1.1(1)	0	1.0
<i>Cervus eldi thamin</i>							
Burmese brow-antlered deer	3.6-0.1	4.6+0.1	0.2	0	0	2.2	2.7
<i>Elaphurus davidianus</i>							
Père David's deer	6.9	2.2	0	0.1	0	0	2.3
<i>Mazama americana</i>							
temama							
Red brocket	0	0	0	1.1	0	0	1.1
<i>Odocoileus virginianus</i>							
Whitetail deer	1.0	1.0	0	0	0	1.0	0
<i>Rangifer tarandus</i>							
Reindeer	1.8	1.6	2.1	0	1.0	0	2.7
Giraffidae							
<i>Giraffa camelopardalis</i> <i>tippelskirchi</i>							
Masai giraffe	1.5	1.5	0.1(1)	0	0(1)	0.1	1.5
Antilocapridae							
<i>Antilocapra americana</i>							
Pronghorn antelope	1.0	0	0	0	0	0	0
Bovidae							
<i>Syncerus caffer</i> *							
African buffalo	1.4	2.4	0	0	0	1.3	1.1
<i>Tragelaphus eurycerus</i>							
Bongo	1.3	2.4	0	0	1.1	-0.1	1.2-0.1
<i>Tragelaphus strepsiceros</i>							
Greater kudu	1.6	1.5	2.1	0	2.1	0.2	1.3
<i>Cephalophus sylvicultor</i>							
Yellow-backed duiker	0	0	1.0*	1.1	0	0	2.1
<i>Connochaetes taurinus</i>							
<i>albojubatus</i>							
White-bearded wildebeest	3.9	4.9	2.0(1)	0	1.0(1)	1.3	4.6
<i>Damaliscus dorcas phillipsi</i>							
Blesbok	0	0	0.1*	0.3	0.1	0	0.3
<i>Hippotragus niger</i>							
Sable antelope	1.4	2.5	1.1	0	1.1	-0.2	2.3-0.2
<i>Oryx dammah</i>							
Scimitar-horned oryx	3.4-2.1	1.4-2.2	2.0	0	0	0.2	3.2-2.2
<i>Gazella dorcas</i>							
Dorcas gazelle	5.10	3.14	4.5	1.0	2.2	0-2.6	4.11-2.6
<i>Madoqua kirki</i>							
Dik dik	2.3	3.5	3.2	0	4.1	0	2.6
<i>Capra hircus</i>							
African pygmy goat	0.2	0.2	0	0	0	0.2	0

## National Zoological Park

### Status of the Collection 31 December 1974

	<i>Amphibians</i>	<i>Reptiles</i>	<i>Birds</i>	<i>Mammals</i>	<i>Total</i>
ORDERS	2	3	20	12	37
FAMILIES	11	27	69	49	156
SPECIES	24	130	336	130	620
SPECIMENS	43	415	1,519	645	2,622

### Changes in the Collection 1974

	OAM <i>Amphibians</i>	OAM <i>Reptiles</i>	OAM <i>Birds</i>	OAM <i>Mammals</i>	CRC <i>Mammals</i>	OZR <i>Mammals</i>	<i>Total</i>
Status 31 Dec. 1973 *	73	341	1,365	444	0	189	2,412
Born/hatched †	0	105	933	112	0	80	1,230
Other acquisition	48	136	291	49	17	1	542
Total in	121	582	2,589	605	17	270	4,184
Died	60	75	461	79	0	71	746
Other disposition	7	111	345	66	0	11	540
Adjustment	11	19	264	26	0	6	326
Status 31 Dec. 1974 *	43	415	1,519	434	17	194	2,622

\* Includes loans from NZP.

† Includes stillbirths.

### Status of the Collection 31 December 1975

	<i>Amphibians</i>	<i>Reptiles</i>	<i>Birds</i>	<i>Mammals</i>	<i>Total</i>
ORDERS	2	3	20	12	35
FAMILIES	5	23	62	43	133
SPECIES	16	104	302	133	555
SPECIMENS	50	403	1,313	700	2,466

### Changes in the Collection 1975

	OAM <i>Amphibians</i>	OAM <i>Reptiles</i>	OAM <i>Birds</i>	OAM <i>Mammals</i>	CRC <i>Mammals</i>	OZR <i>Mammals</i>	<i>Total</i>
Status 31 Dec. 1974 *	43	415	1,519	434	17	194	2,622
Born/hatched †	0	32	708	124	9	96	969
Other acquisition	32	186	94	56	27	57	452
Total in	75	633	2,321	614	53	347	4,043
Died	25	116	533	92	7	93	866
Other disposition	0	114	442	92	3	33	684
Adjustment	0	0	33	0	0	6	27
Status 31 Dec. 1975 *	50	403	1,313	430	43	227	2,466
Loans to NZP	1	13	20	17	23	5	0

\* Includes loans from NZP.

† Includes stillbirths.

## Office of Animal Management

### Amphibians/Reptiles Born/Hatched 1973-1975

(In the following lists, 1st number = survived 30 days; 2d number = did not survive 30 days; — = species not in collection.)

Name	1973	1974	1975
Surinam toad	0, 4	0	0
Common snapping turtle	3, 0	0	0
Red-eared turtle	0	4, 0	0
Spotted turtle	1, 1	0	0, 1
White-lipped mud turtle	1, 0	0	0
African helmeted turtle	0	10, 0	0
Leopard gecko	0	15, 0	7, 0
Gecko ( <i>Hemidactylus brookii</i> )	—	—	2, 0
Giant day gecko	8, 0	2, 1	0
Gliding gecko	—	—	0, 2
Turnip-tailed gecko	—	—	2, 0
Burmese python	6, 0	46, 1	0
African house snake	—	—	4, 0
Banded red snake	1, 0	0	0
Corn snake	0	20, 2	11, 1
Ratsnake	3, 1	7, 0	0
Bullsnake	0	3, 0	0
Coast garter snake	—	9, 0	0
Copperhead	20, 0	0	0
Timber rattlesnake	0	8, 1	0

### Birds Hatched

(In the following lists, 1st number = survived 30 days; 2d number = did not survive 30 days; — = species not in collection.)

Name	1973	1974	1975
Ostrich	0	0	2, 0
Common rhea	0, 5	31, ?	0
Emu	0, 1	4, 0	0
North Island brown kiwi	—	—	1, 0
Andean tinamou	2, 2	0, 1	—
Boat-billed heron	2, 5	4, 0	—
Sacred ibis	0	1, 0	2, 0
Scarlet ibis	0	0	2, 0
Black swan	5, 0	1, 1	5, 4
Black-necked swan	4, 2	9, 0	1, 4
Lesser white-fronted goose	0	0, 1	0
Nene	0	3, 4	21, 1
Atlantic Canada goose	0	1, 0	5, 0
Ashy-headed goose	0	0	2, 1
Cape shelduck	0	0	6, 0
Radjah shelduck	6, 2	2, 1	9, 2
European shelduck	1, 0	5, 1	1, 0
Patagonian crested duck	—	0	1, 0
Hawaiian duck	4, 10	16, 1	28, 1
Indian spotbill	7, 0	23, 0	0
Philippine x mallard duck, hybrid	1, 0	—	—
South African yellowbill	0	7, 0	8, 1
Australian grey teal	3, 0	17, 2	18, 4

Name	1973	1974	1975
Gadwall	0	1, 1	0
Northern pintail	0	1, 0	2, 0
Blue-winged teal	0	10, 1	5, 3
Northern cinnamon teal	6, 0	23, 1	7, 0
Ringed teal	17, 3	7, 3	0
Pacific eider	—	—	7, 1
Red-crested pochard	3, 0	1, 0	4, 0
Redhead	1, 0	1, 0	0
Greater Brazilian teal	0	2, 0	2, 1
North American wood duck	11, 9	43, 9	32, 8
Mandarin	3, 1	28, 5	19, 5
American goldeneye	0	0	2, 0
Barrow's goldeneye	0	5, 2	3, 3
Bufflehead	0	0, 5	0
American merganser	0	3, 0	8, 14
North American ruddy duck	0	0, 2	3, 15
Black vulture	—	1, 3	5, 0
Bald eagle	1, 0	0	0
White-headed piping guan	0	0	6, 3
Gambel's quail	—	—	5, 1
California quail	0	0, 17	1, 0
Eastern bobwhite	0	41, 0	0
Blue-breasted quail	1, 1	16, 19	17, 14
Bare-throated tree partridge	7, 4	0	0
Crested green-wood partridge	30, 18	54, 37	55, 33
Burmese red jungle fowl	—	47, 0	73, 0
Ceylon jungle fowl	—	0	6, 3
White-crested kalij pheasant	2, 2	3, 0	3, 0
Swinhoe's pheasant	3, 2	18, 1	27, 2
Elliot's pheasant	—	1, 0	0
Hume's bar-tailed pheasant	0	0	4, 1
Golden pheasant	18, 2	11, 2	0, 2
Lady Amherst pheasant	0	11, 0	12, 4
Bornean great argus pheasant	14, 2	7, 1	9, 4
Indian blue peafowl	17, 0	41, 1	13, 1
Vulturine guineafowl	—	14, 0	63, 4
Wild turkey	0	25, 1	0
Sarus crane	1, 1	2, 2	4, 1
Stanley's crane	2, 0	4, 1	0, 1
African black crane	2, 1	5, 30	0, 2
Sunbittern	0	0, 6	2, 1
Spur-winged plover	0	0	0, 1
Laughing gull	5, 0	0	0
Silver gull	7, 0	0	0
Laughing x silver gull, hybrid	3, 0	0	0, 1
Inca tern	0	3, 2	2, 0
Mourning dove	20, 0	3, 1	0
Ring-necked dove	0	1, 1	0
Chinese necklace dove	49, 0	0	0
Nicobar pigeon	2, 0	1, 1	1, 0
Red lory	0	0, 2	1, 0
Princess parrot	0	2, 0	4, 0
Turquoise parrot	2, 0	0	0
Peach-faced lovebird	28, 0	29, 8	0
Jandaya conure	—	0	1, 0
Roadrunner	—	—	0, 1
Barn owl	0	7, 2	13, 0

<i>Name</i>	1973	1974	1975
Burrowing owl	16, 3	14, 0	7, 1
Peruvian cock of the rock	0	0, 1	0, 2
Black-billed magpie	—	0	0, 4
White-crested laughing thrush	0	0, 1	0
Rock wren	0	0	0, 6
Rothschild's mynah	12, 0	11, 5	3, 1
Kikuyu white-eye	0	0	0, 1
Cut-throat finch	3, 0	0	0
Red-billed fire finch	4, 0	5, 0	0
Zebra finch	1, 0	1, 0	0
Red-crested cardinal	0	0	0, 2
Black-crested finch	1, 1	0	0

### Mammals Born

(In the following lists, 1st number = survived 30 days; 2d number = did not survive 30 days; — = species not in collection.)

<i>Name</i>	1973	1974	1975
Sugar glider	6, 0	2, 0	2, 0
Matschie's tree kangaroo	1, 1	2, 0	2, 1
Red kangaroo	3, 1	3, 0	2, 0
Common tree shrew	—	0	0, 2
Linnaeus' short-tail fruit bat	4, 0	0	—
Thick-tailed bushbaby	3, 0	0	1, 2
Douroucouli	0	0	1, 0
Common squirrel monkey	0, 1	0	0
Brown-headed spider monkey	1, 3	2, 0	0, 1
Geoffroy's tamarin	1, 2	0	0
Golden lion marmoset	4, 0	8, 1	2, 6
Black and red tamarin	1, 3	2, 0	0
Black or Celebes ape	1, 0	1, 0	1, 0
Lion-tailed macaque	1, 0	0	1, 1
Barbary ape	0	0	2, 2
Colobus monkey	1, 0	1, 1	1, 0
Black or white-cheeked gibbon	1, 0	0	0
Orangutan	1, 0	0	0
Two-toed sloth	0	1, 0	0
Utah prairie dog	4, 0	4, 0	10, 0
Eastern woodrat	0	3, 3	3, 0
Prairie vole	—	—	1, 0
Spiny mouse	0	3, 0	12, 0
Paca	1, 0	1, 0	0
Degu	—	0	4, 4
Raccoon dog	0	0	6, 1
European brown bear	2, 0	0	4, 0
Kodiak bear	0	0, 1	3, 0
Polar bear	0, 1	0	0
Sun bear	0	0, 1	0
Sloth bear	0	1, 0	0
Kinkajou	1, 0	0	0
Red panda	2, 0	2, 3	4, 0
Blotched genet	2, 0	2, 2	0
Binturong	0, 3	3, 0	0
Malagasy civet or fanaloka	0, 1	0	0

<i>Name</i>	<i>1973</i>	<i>1974</i>	<i>1975</i>
Leopard cat	1,0	3,0	0
Geoffroy's cat	2,1	0	0
Jaguar	2,0	2,0	0
Bengal tiger	3,3	0	0
Common zebra	1,0	0	1,0
Great Indian rhinoceros	0	1,0	0
Pygmy hippopotamus	1,0	0	2,1
Hippopotamus	1,0	1,0	0
Reeves' muntjac	3,0	4,1	4,0
Axis deer	0,1	0,1	0,1
Sika deer	1,0	—	—
Burmese brow-antlered deer	3,2	2,5	2,0
Père David's deer	3,0	1,0	0
Reindeer	1,2	3,1	2,1
Masai giraffe	1,0	1,0	1,1
African buffalo	0	1,0	0
Bongo	0	1,1	0
Greater kudu	3,0	2,1	3,0
Yellow-backed duiker	0	0	1,0
White-bearded wildebeest	4,1	3,0	2,1
Blesbok	—	—	0,1
Sable antelope	1,1	2,0	2,0
Scimitar-horned oryx	2,0	2,2	2,0
Dorcas gazelle	4,2	6,3	8,1
Dik dik	1,2	4,1	4,1

## Office of Animal Health

R. Mitchell Bush, D.V.M., Head

The primary function and goal of the Office of Animal Health is the delivery of the best health care available to the animal collection at the Rock Creek facility. The sphere of responsibility has been expanded in the last two years to provide the same services to the Conservation and Research Center in Front Royal, Virginia. The delivery of veterinary care to the Conservation and Research Center is different than at the Zoo proper, because of the type of enclosures and inability to watch closely and handle the herd animals in these large enclosures. This difficulty necessitates the herd-management approach in conjunction with individual care.

### Clinical Work

The ideal approach in all fields of medicine, especially exotic, is preventive medicine. The staff conducts yearly TB testing and physical examinations on all primates, and yearly vaccinations and physical examinations on all Canidae, Procyonidae, Ailuropodidae, Mustelidae, Viverridae, and Felidae. Another major measure of preventive medicine is the maintenance of the Quarantine Facility at the Hospital; there were 311 newly arriving specimens quarantined for 18,690 quarantine days (number of animals times number of days in quarantine). The purpose of the quarantine is to prevent the introduction of any infectious agent into our existing collection. The status of all collection specimens is monitored by routine fecal examinations and the administration of appropriate therapy when parasites are found. This area of preventive medicine is leading us to combine worming medication with the daily feed of animals that have severe and chronic problems. The initial results have been very rewarding in controlling intestinal parasites.

With the augmentation of clinical support by the veterinary internship and veterinary assistant, it is now possible to increase our care to hospitalized animals. We had 2,200 hospital days in 1974 compared to 11,516 hospital days in 1975. The additional days reflect our increased clinical capability, but also include animals within the hospital for both short-term and long-term research projects.

The number of animal treatments (number of cases treated) has also grown with the increased clinical support and the increased clinical load at Front Royal. The treatments in 1974 were 4,500, while the 1975 caseload was well over 5,000.



12. Dr. R. Mitchell Bush, Zoo veterinarian, studies X rays of a flamingo's broken leg in cast and pins in order to monitor its healing progress.

The growth in clinical activity in this case does not reflect a worsening health situation, but rather reflects the ability of the Office to respond with appropriate health-care delivery to the same type of inherent problems always seen in a collection of our size.

Another clinical parameter that is increasing is our radiology service, which has grown from 137 studies in 1973 to 360 studies in 1974 and to 524 in 1975. Likewise, the number of surgical operations has increased slightly from 515 in 1974 to about 550 in 1975.

## Research

In the daily practice of exotic medicine, a veterinarian is constantly frustrated by the obvious lack of basic medical information about the exotic species; i.e., basic and necessary information about normal anatomy, physiology, clinical laboratory values, and response to medications, vaccines, and anesthetics. By necessity and interest, more and more of these answers are being sought. Thirteen years ago, both space and staff for such activity were limited, but with our present status, we are able to begin to study many of these basic problems. Our major areas of study at the present time include the following clinically related research areas.

- The physiological effects of restraint and immobilization on exotics by

measuring blood gases and physiological changes. This study is funded by the Smithsonian Research Foundation.

- Blood levels of antibiotics in exotic specimens, including snakes, birds, and elephants.
- Ante-mortem diagnosis of avian tuberculosis in birds and marsupials, and specific vaccine production.
- Normal clinical pathology values in cranes, birds of prey, dorcas gazelles (*Gazella dorcas*), golden marmosets (*Leontideus rosalia*), and others.
- Comparative studies in orthopedics, ophthalmology, and dentistry, with collaboration by specialists in the field of human medicine and surgery.
- Physiological studies in reptiles, including blood volume, red blood cell survival time, and uric-acid metabolism.
- Evaluation of infertility in selected exotics, namely cheetahs (*Acinonyx jubatus*) and gorillas (*Gorilla gorilla*).

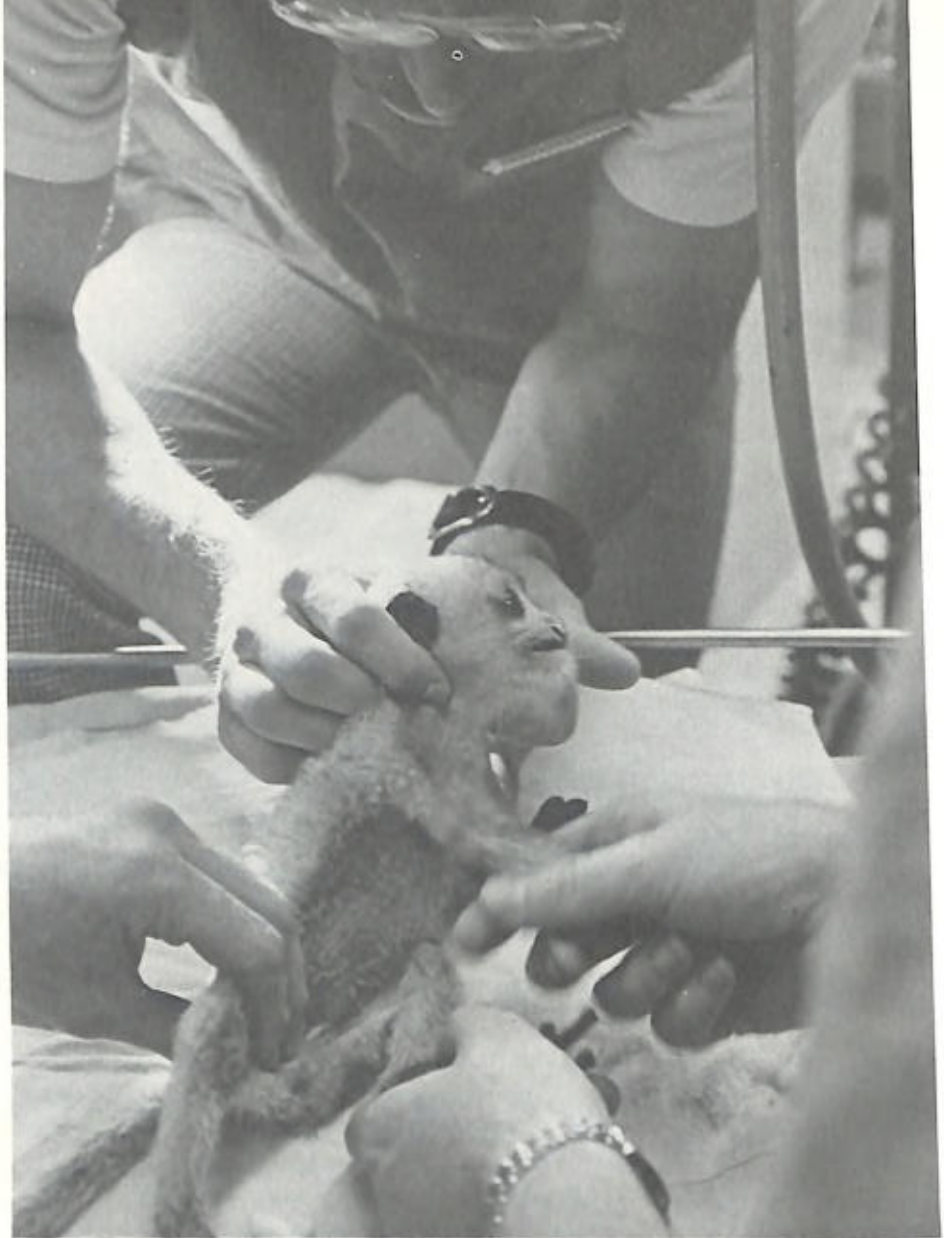
These and other studies are ongoing, aided by our increased staff and facilities, and we hope that further work might be undertaken and completed as further resources become available. The goal of this research is to develop new information and technology that will be useful to the field of exotic animal medicine and surgery. This Office has published 29 articles in 14 journals in the last three years to disseminate widely the information gained through research and clinical trials. The Office has made 12 oral presentations at 9 scientific meetings during this time and prepared 3 scientific exhibits which illustrate the many facets of exotic animal medicine.

## Teaching

The Office's role in education, like research, has continued to grow. The scope of the training offered varies from work-study programs for college students to the in-depth post-doctoral training of veterinary interns in exotic medicine and surgery. The teaching load is increasing and a new position of senior veterinarian has been created to fulfill the need. The position has been filled appropriately by Dr. Clinton W. Gray, the founder of the Office of Animal Health, and whose many years of experience in the field of exotics will greatly enhance these educational functions. The programs of the senior veterinarian include a monthly seminar series on exotics, attended by veterinarians on the East Coast who are working with such animals.

The Office of Animal Health is also involved in pre- and post-doctoral training of veterinarians. The veterinary internship is very well received. It has provided additional clinical coverage at both the Zoo and the Conservation and Research Center. The many research activities and collaborative projects of the Office of Animal Health provide in-depth training for the interns that is both varied and selected. The pre-doctoral program, or preceptorship, for veterinary students at NZP is also expanding. Its purpose is to expose future veterinarians to the many varied aspects of exotic practice. The program is also very rewarding and well-received, judging from the increasing number of applications for this type of program.

The teaching role of the Office also includes seminars at various institutions. Dr. Mitchell Bush, head of the Office of Animal Health, maintains a joint academic appointment in the Zoo's Office of Animal Health and in



13. With the help of aides, a Zoo veterinarian examines a baby black-and-white colobus monkey. A physical examination, such as this, may include checking an animal's pulse rate and taking measurements to study its growth.

the Department of Radiology at the Johns Hopkins University School of Medicine. Dr. Bush is involved in teaching the subject of comparative and exotic animal medicine in both departments. He holds a visiting clinical professorship at Vanderbilt Hospital and is a consultant to the George Washington University School of Medicine, Largo Wildlife Preserve, and Lion Country Safari at Doswell, Virginia. Selected lectures are presented to the elective course on exotic animal medicine at the University of Pennsylvania School of Veterinary Medicine, and seminars are offered to allied medical groups such as dentists, radiologists, and anesthesiologists. Many of the allied health professionals have expressed real interest in helping solve a number of our problems that relate to their sphere or specialty. This additional help has proved invaluable on many occasions.

**Office of Animal Health  
1973**

<i>OAH Case Load</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
NO. OF NZP PATIENTS: TOTAL	199	169	241	177	247	280	192	224	298	173	222	154	2,576
Mammals	153	130	175	133	161	169	138	169	184	103	158	108	1,781
Birds	26	19	32	28	61	86	41	36	85	52	48	32	546
Reptiles	20	20	34	16	25	25	13	19	29	18	16	14	249
ANESTHESIA: TOTAL	15	18	15	12	11	16	11	22	20	9	31	19	199
CI-744	12	16	10	8	11	15	9	20	9	5	23	9	147
Fluothane/halothane	3	2	4	4	0	1	1	2	11	4	8	10	50
Rompun	0	0	1	0	0	0	1	0	0	0	0	0	2
SURGERY: TOTAL	11	6	6	5	9	7	9	17	11	11	23	9	124
Orthopedic	6	4	2	2	6	3	3	1	4	4	6	3	44
Obstetric	0	0	0	1	1	0	0	0	1	0	1	1	5
Traumatic	1	0	0	0	0	1	1	1	1	2	1	0	8
Other	4	2	4	2	2	3	5	15	5	5	15	5	67
NO. OF NON-ZOO PATIENTS	0	6	1	9	4	19	7	0	0	0	10	18	74
NO. OF RESEARCH PATIENTS	0	1	0	0	0	1	1	7	0	1	1	1	13

**1974**

<i>OAH Case Load</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
NO. OF NZP PATIENTS: TOTAL	295	211	236	252	295	286	190	214	239	267	268	253	3,008
Mammals	202	160	133	142	150	183	86	117	139	150	150	180	1,792
Birds	43	39	92	102	115	80	96	87	68	98	105	48	973
Reptiles	50	12	11	8	30	23	8	10	32	21	13	25	243
ANESTHESIA: TOTAL	20	17	18	28	15	15	13	6	13	30	31	32	238
CI-744	12	7	10	3	6	5	7	6	11	15	23	27	132
Fluothane/halothane	8	10	8	25	7	9	4	0	2	6	8	5	92
Rompun	0	0	0	0	2	1	2	0	0	9	0	0	14
SURGERY: TOTAL	10	11	16	13	11	3	10	7	10	14	8	10	123
Orthopedic	5	1	7	7	5	2	3	4	2	5	4	1	46
Obstetric	1	1	1	0	0	0	0	0	0	1	1	2	7
Traumatic	1	0	1	1	1	1	2	0	2	0	1	2	12
Other	3	9	7	5	5	0	5	3	6	8	2	5	58
NO. OF NON-ZOO PATIENTS	4	0	15	10	11	6	2	2	10	13	11	10	94
NO. OF RESEARCH PATIENTS	0	0	0	0	0	0	0	0	0	5	5	10	20

**1975**

<i>OAH Case Load</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>	<i>June</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Total</i>
NO. OF NZP PATIENTS: TOTAL	395	343	431	462	442	481	685	709	394	422	313	391	5,468
Mammals	285	222	303	350	299	302	403	374	242	251	194	233	3,458
Birds	91	112	115	91	121	149	223	269	117	132	101	152	1,673
Reptiles	19	9	13	21	22	30	59	66	35	39	18	6	337
ANESTHESIA: TOTAL	49	29	48	66	65	60	78	83	78	42	35	59	692
CI-744	35	20	37	49	44	57	62	60	50	6	20	34	474
Fluothane/halothane	2	8	6	8	13	2	16	18	23	27	10	21	154
Rompun	12	1	5	9	8	1	0	5	5	9	5	4	64
SURGERY: TOTAL	30	24	21	19	21	16	27	29	17	10	13	31	258
Orthopedic	9	9	8	5	12	6	11	12	11	8	3	18	112
Obstetric	1	0	0	2	1	1	0	1	0	0	1	0	7
Traumatic	5	2	3	3	2	0	1	2	0	1	1	0	20
Other	15	13	10	9	6	9	15	14	6	1	8	13	119
NO. OF NON-ZOO PATIENTS	0	0	0	4	23	23	42	42	28	10	14	44	230
NO. OF RESEARCH PATIENTS	2	8	31	16	5	0	18	14	32	14	6	98	244

## Office of Pathology

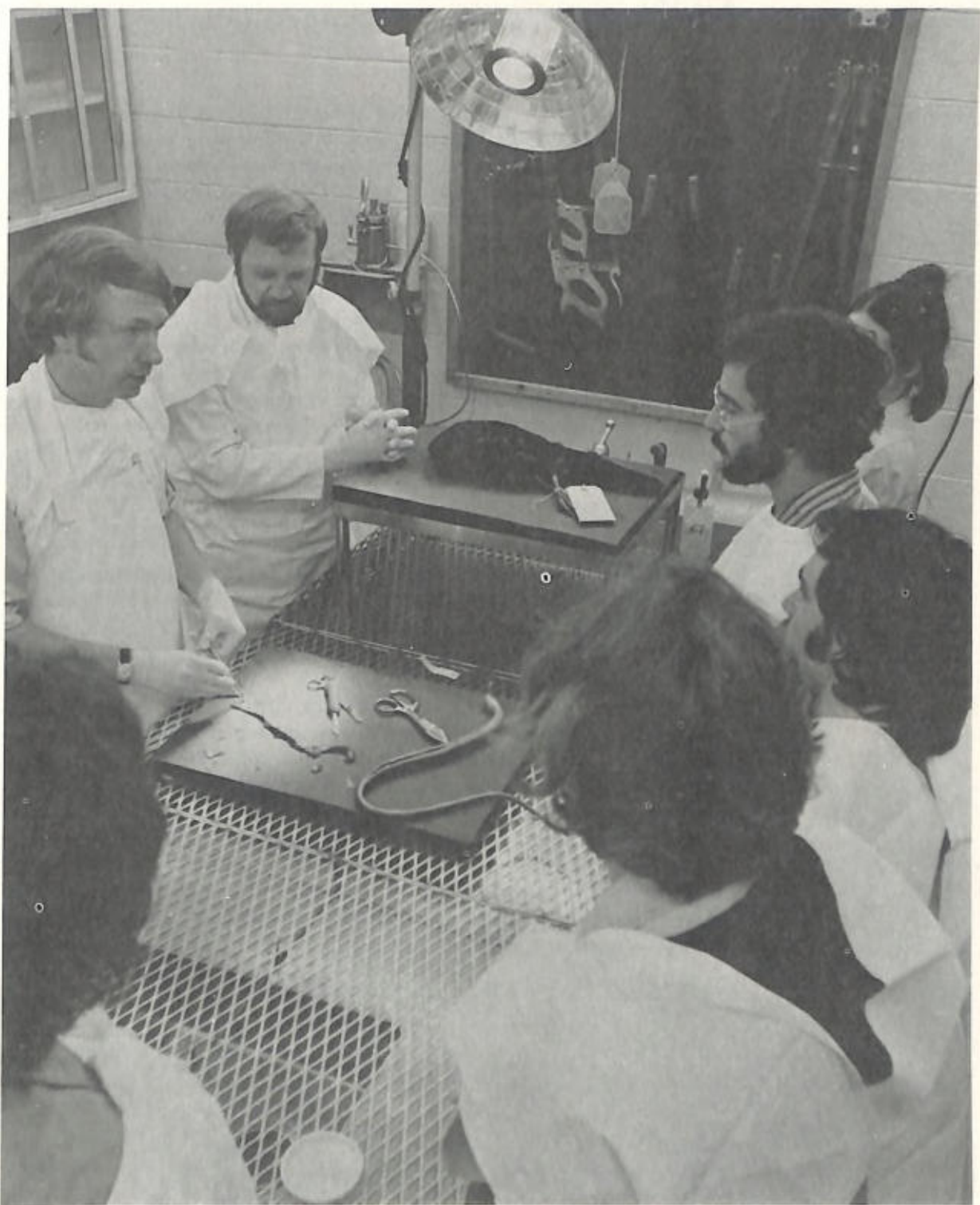
Richard J. Montali, D.V.M., Head

The Office of Pathology began as a separate division and after several years combined with Animal Health to become the Office of Animal Health and Pathology (OAH&P). In 1975, under a new realignment program, the Pathology Section of OAH&P became a separate office under the direction of Dr. Richard J. Montali, a veterinary pathologist, formerly a faculty member in the Department of Pathology and Division of Laboratory Animal Medicine at the Johns Hopkins University School of Medicine.

### Clinical Work

The Office of Pathology (OP) functions are divided into diagnosis, teaching, and research. The diagnostic aspect, of course, is the foremost mission of this Office. This fact necessitates a close working relationship with the Office of Animal Health (OAH), since most of the prophylactic programs and clinical surveillances of the NZP collection are mediated through the clinical veterinarians. Routine blood tests, urinalyses, cultures, parasite examinations, and other diagnostic tests are performed in our laboratories. All animals that die are necropsied and completely examined grossly and histopathologically to gain insight into the various causes of death in a zoo setting. The importance of this capability is exemplified in the case of an outbreak of a fatal, contagious viral disease of Anseriformes that occurred in our duck ponds early last spring. Called duck virus enteritis, this was a condition of ducks, geese, and swans that made its way into our collection via migratory waterfowl and essentially threatened our whole Anseriform collection. Because we were able to give the OAH an accurate diagnosis, that Office then implemented measures to vaccinate the remaining waterfowl collection and halted the spread of this disease. More recently, an outbreak of a bacterial disease known as *Versinia pseudotuberculosis* occurred in our hoofstock and several valuable animals were lost. Through the diagnostic capabilities of our laboratories, we have isolated the cause and have preliminary evidence that it was carried into the yards by wild rodents and possibly pigeons. An all-out effort is currently being made to exterminate these vermin.

The OP has taken a new direction for record-keeping by establishing and streamlining the flow of information for pathologic diagnoses, with an IBM data-retrieval system, which can also integrate previous material generated in this office. The IBM retrieval system for our color-slide col-



14. An autopsy of a glass lizard (a legless species) is conducted by Dr. Richard J. Montali, Zoo pathologist, while keepers and students from George Washington University observe closely. The Office of Pathology is involved in several cooperative teaching programs.

lection has accessioned almost 3,000 examples to date of pathologic and clinical conditions done collaboratively with OAH.

## Teaching

A very vital function of this office is teaching. Over the past year the following individuals have participated in the necropsy service, in which cases are worked up under the supervision of the pathologist and signed out with him at a dual-headed microscope. Drs. Boyce, Baskin, and Parker, residents in veterinary pathology from the AFIP; Dr. Lily Ruckstuhl, a physician from George Washington University; and Anthony Borzotta, resident in pathology from Georgetown University, have all participated as prosectors. Dr. Philip Ensley, a clinical intern, also spends a block of time on the pathology service. Dr. Montali maintains academic appointments as assistant professor of pathology and laboratory animal medicine at the Johns Hopkins University School of Medicine and as assistant clinical professor of pathology at George Washington University. This past semester a course in comparative pathology was taught in conjunction with Dr. Bernard Zook, in which four graduate students from George Washington participated.

## Research

The OP has a number of ongoing research projects which include case reports and collaborative studies with the Office of Animal Health. Among the major studies is a clinical and pathological study, with epidemiological factors, of the avian tuberculosis problem at the National Zoo. We are studying the pathology of gentamicin toxicity in snakes; are continuing our studies based on the outbreak of duck virus enteritis with successful vaccination as described above; and have a number of collaborative studies, including one on viral inclusion disease of boa constrictors, others in avian bone repair, and numerous independent research projects carried out by staff members, AFIP fellows, and others.

In the future, the OP will continue not only to provide diagnostic support for the health surveillance of the NZP collection, but also to strive for excellence in gathering new information and disseminating it in the form of scientific publications, symposia, and seminars for the benefit of captive animals and wildlife in general.

### Clinical Pathology Procedures

<i>Procedures</i>	<i>1973</i>	<i>1974</i>	<i>1975</i>
Parasites	946	851	1119
Cultures	177	236	298
Hematology	627	930	1559
Chemistry	758	1300	2900
SMA	324		
CPK <sup>12</sup>	210		
Lead	138		
Miscellaneous *	86		
Urinalysis	50	101	165
Chromosomes	54	39	3

\* Includes pregnancy test on primates started in 1975. Vaginal smears for estrous cycle.

Mortality and Causes of Death—NZP—1973–1975

Mortality 1973

<i>Animals</i>	<i>In Collection</i>		
	<i>30 Days</i>	<i>30 Days</i>	<i>Unknown</i>
Birds	131	165	4
Mammals	30	84	
Reptiles	29	114	2
<b>TOTALS</b>	<b>190</b>	<b>363</b>	<b>6</b>

Necropsy Summary 1974

(A, in collection more than 30 days; B, in collection less than 30 days)

<i>Cause of Death</i>	<i>Amphibians and Reptiles</i>		<i>Birds</i>		<i>Mammals</i>	
	<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>	<i>A</i>	<i>B</i>
Genetic and prenatal influence					1	6
Infectious disease	14	1	25	2	7	1
Parasitism			3	0	1	0
Intoxication or chemical agent						
Trauma or physical agent	9		61	4	13	3
Disturbance of:						
circulatory system	4	1	9	1	6	0
Central nervous system					1	0
digestive system	13	1	8	1	7	0
genital system			1	0	1	0
hemo-lymphopoietic system			1	0	1	0
integumentary system			1	0		
musculo-skeletal system			1	0	1	0
respiratory system	1		4	0	6	0
urinary system					2	0
metabolism	1		0	1		
nutrition	13		24	4	3	4
Senility			3		6	0
Neoplasms	2		1	0		
Poor specimen (euthanasia)	1				2	0
Undetermined	20	4	27	23	11	4
Incomplete cases	6		10	0	4	0
<b>TOTALS</b>	<b>84</b>	<b>7</b>	<b>186</b>	<b>37</b>	<b>73</b>	<b>18</b>

Mortality by Month and Stay, 1975  
AMPHIBIANS AND REPTILES

<i>Order or Family</i>	<i>No. of Deaths</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>
Caudata	10	0	3	0	0	1
Chelonia	14	1	0	0	3	1
Crocodylia	2	0	1	1	0	0
Salientia	8	0	0	0	0	0
Sauria	56	2	3	3	5	7
Serpentes	33	1	1	3	1	5
TOTAL	123	4	8	7	9	14

Mortality by Month and Stay, 1975  
BIRDS

<i>Order or Family</i>	<i>No. of Deaths</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>
Anseriformes	155	1	4	3	8	56
Apterygiformes	1	0	0	0	0	0
Charadriiformes	11	0	0	2	0	4
Ciconiiformes	5	0	0	0	0	0
Columbiformes	9	0	2	1	1	0
Coraciiformes	5	1	0	0	0	0
Cuculiformes	2	0	0	0	0	0
Falconiformes	1	0	0	0	0	0
Galliformes	209	15	11	20	22	24
Gruiformes	14	2	0	1	0	2
Passeriformes	74	5	5	7	3	7
Pelecaniformes	2	0	0	1	0	0
Piciformes	4	1	0	0	0	1
Psittaciformes	19	3	1	0	1	1
Rheiformes	2	0	1	0	0	0
Strigiformes	5	0	0	1	0	0
Tinamiformes	3	1	0	1	0	0
TOTAL	521	29	24	37	35	95

Mortality by Month and Stay, 1975  
MAMMALS

<i>Order or Family</i>	<i>No. of Deaths</i>	<i>Jan</i>	<i>Feb</i>	<i>Mar</i>	<i>Apr</i>	<i>May</i>
Ailuropodidae	1	0	0	0	0	0
Bovidae	19	2	0	0	0	4
Canidae	4	0	0	0	0	1
Cervidae	4	0	1	0	0	0
Chiroptera	30	0	0	9	19	0
Edentata	2	0	0	0	0	0
Equidae	3	0	1	0	0	0
Felidae	0	0	0	0	0	0
Giraffidae	1	0	1	0	0	0
Hippopotamidae	1	0	1	0	0	0
Insectivora	5	0	0	0	2	0
Marsupialia	9	0	1	0	0	0
Mustelidae	3	0	1	0	0	0
Primates	28	1	2	4	5	4
Procyonidae	0	0	0	0	0	0
Rodentia	66	6	2	4	3	5
Ursidae	0	0	0	0	0	0
Viverridae	4	0	0	1	0	0
TOTAL	180	9	10	18	29	14

<i>June</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Month of Death Unknown</i>	<i>Stay &lt;30 Days</i>	<i>Stay &gt;30 Days</i>	<i>Stay Unknown</i>
1	1	1	1	1	0	1	0	1	6	3
1	4	1	1	0	1	1	0	2	22	1
0	0	0	0	0	0	0	0	0	1	1
0	1	0	0	2	2	3	0	1	7	0
5	4	11	5	0	6	4	1	14	36	6
5	2	1	3	3	4	4	0	5	24	4
12	12	14	10	6	13	13	1	23	85	15

<i>June</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Month of Death Unknown</i>	<i>Stay &lt;30 Days</i>	<i>Stay &gt;30 Days</i>	<i>Stay Unknown</i>
16	30	20	4	1	3	5	5	69	78	9
0	0	1	0	0	0	0	0	0	1	0
0	0	2	2	0	1	0	0	0	10	1
0	0	0	2	1	2	0	0	0	5	0
2	0	0	1	1	1	0	0	1	7	1
0	1	0	1	0	0	2	0	0	5	0
0	0	0	0	0	1	0	1	1	1	0
0	1	0	0	0	0	0	0	0	1	0
20	26	19	15	20	9	7	0	70	121	18
2	0	1	0	2	1	1	2	6	7	1
12	6	7	2	8	7	5	0	13	55	6
0	0	1	0	0	0	0	0	0	1	1
1	0	0	0	1	0	0	0	0	4	0
1	1	2	1	1	5	2	0	0	19	0
1	0	0	0	0	0	0	0	1	1	0
0	1	0	1	2	0	0	0	1	4	0
0	1	0	0	0	0	0	0	1	2	0
55	67	53	29	37	30	22	8	163	322	37

<i>June</i>	<i>July</i>	<i>Aug</i>	<i>Sept</i>	<i>Oct</i>	<i>Nov</i>	<i>Dec</i>	<i>Month of Death Unknown</i>	<i>Stay &lt;30 Days</i>	<i>Stay &gt;30 Days</i>	<i>Stay Unknown</i>
0	0	0	0	0	0	1	0	0	1	0
2	0	2	3	0	3	3	0	6	13	0
0	2	0	0	0	0	0	1	2	1	1
1	0	1	0	0	1	0	0	2	2	0
0	0	0	0	0	0	2	0	0	2	28
0	0	1	1	0	0	0	0	1	1	0
0	0	0	0	0	1	1	0	1	2	0
0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0	1
0	1	0	1	0	0	0	1	2	3	0
0	2	2	0	3	0	1	0	2	7	0
0	0	0	1	0	0	1	0	0	2	1
0	2	3	1	2	1	1	2	13	9	6
0	0	0	0	0	0	0	0	0	0	0
5	2	10	5	6	2	12	4	17	40	9
0	0	0	0	0	0	0	0	0	0	0
0	2	0	1	0	0	0	0	0	3	1
8	11	19	13	11	8	22	8	46	86	48

## Cause of Death by Order/Family, 1975

## AMPHIBIANS

<i>Number Affected</i>	<i>Diagnosis</i>
	CAUDATA
1	Infectious, bacterial, bacillemia
4	Not evident
1	Nutritional, inanition
1	Parasitism, helminthiasis
1	Physical, hyperthermia, iatrogenic
1	Undetermined, autolyzed
1	Urinary, renal, tubular, necrosis
—	
10	
	SALIENTIA
1	Circulatory, myocardial, hemorrhages
1	Digestive, cloacal prolapse
1	Digestive, colitis
2	Parasitism, ascaridoid larva
1	Trauma, undetermined
1	Undetermined, autolyzed
1	No carcass
—	
8	

## REPTILES

<i>Number Affected</i>	<i>Diagnosis</i>
	CHELONIA
1	Circulatory, anasarca
1	Disturbance of circulation, anasarca
1	Metabolic, metastatic, calcification
1	Not evident
1	Parasitism, helminthes
1	Parasitism, oxyuridae, gastric
1	Perinatal, not evident
1	Tumor, leukemia, myelogenous
2	Undetermined, autolyzed
2	Undetermined, no carcass
2	Urinary, nephrosis
—	
14	
	CROCODYLIA
1	Digestive, gastritis, gangrenous
1	Infectious, no agent, granulomatosis
—	
2	
	SAURIA
1	Circulatory, arteriosclerosis
1	Circulatory, hemorrhage
1	Circulatory, hemorrhage, peritoneal
1	Circulatory, congestive heart failure
1	Digestive, colitis, chronic
1	Digestive, intussusception
1	Digestive, liver, abscesses, bacterial

1	Digestive, liver, cysts
1	Euthanasia
1	Euthanasia, ataxia
1	Infectious, bacterial, pyogranulomas, bacillary
1	Infectious, bacterial, salmonellosis
3	Infectious, bacterial, sepsis
2	Metabolic, gout
1	Metabolic, metastatic, calcification
1	Musculoskeletal, myositis
3	Not evident
14	Nutritional, inanition
1	Nutritional, myodegeneration
1	Nutritional, secondary hyperparathyroidism
1	Parasitism, <i>Entamoeba invadens</i>
1	Peritoneum, peritonitis, yolk
1	Perinatal, not evident
1	Peritoneum, peritonitis, histiocytic
1	Reproductive, egg bound
1	Reproductive, oophoritis, cystic
1	Respiratory, pneumonia, acute
1	Stress, new arrival
3	Toxicity, detergent
1	Trauma, accidental
1	Trauma, undetermined
3	Undetermined, autolyzed
1	Undetermined, no carcass
1	Urinary, nephritis

—  
56

## SERPENTES

1	Digestive, colitis, necrotic
2	Digestive, colitis, ulcerative, <i>Arizona</i> sp.
1	Digestive, enteritis, necrotic
1	Digestive, enterohepatitis
1	Digestive, esophageal rupture
1	Digestive, gastritis
1	Digestive, hepatitis, bacterial
1	Endocrine, adrenal, atrophy
1	Euthanasia
1	Infectious, abscesses, disseminated
1	Infectious, bacterial, abscesses, disseminated
1	Infectious, bacterial, <i>Mycobacterium</i> sp.
1	Metabolic, gout
2	Not evident
6	Nutritional, inanition
1	Perinatal, not evident
1	Protozoan, <i>Cryptosporidia</i> sp.
1	Reproductive, oviduct, ruptured
1	Respiratory, pneumonia, <i>Pseudomonas, aeruginosa</i>
1	Stress, post-operative
1	Trauma, cagemate
3	Undetermined, autolyzed
1	Undetermined, no carcass
1	Urinary, nephrosis

—  
33

BIRDS

<i>Number Affected</i>	<i>Diagnosis</i>
	ANSERIFORMES
1	Central nervous, meningitis, bacillary
1	Digestive, colicystitis, bacillary
1	Digestive, enteritis, acute
1	Digestive, hepatitis
1	Digestive, intestinal hemorrhage
1	Digestive, ventriculitis
1	Euthanasia, ataxia
4	Euthanasia, perosis
1	Euthanasia, runt
1	Euthanasia, trauma
4	Immunologic, amyloidosis
8	Infectious, bacterial, <i>Mycobacterium avium</i>
1	Infectious, bacterial, pneumonia, cocci
4	Infectious, bacterial, sepsis
6	Infectious, fungal, <i>Aspergillus flavus</i>
1	Infectious, fungal, <i>Aspergillus</i> sp.
1	Infectious, fungal, <i>Candida albicans</i>
30	Infectious, viral, duck virus enteritis
1	Metabolic, gout
13	Not evident
1	Parasitism, coccidiosis
1	Parasitism, <i>Echinuria</i> sp.
1	Perinatal, gout
2	Perinatal, intestinal hemorrhage
14	Perinatal, not evident
2	Perinatal, omphalitis
1	Perinatal, omphalitis, bacterial
2	Perinatal, pulmonary edema
1	Perinatal, pyoderma
1	Perinatal, ruptured yolk sac
1	Perinatal, stillborn
1	Perinatal, torticollis
1	Perinatal, trauma
3	Perinatal, undetermined, autolyzed
1	Perinatal, yolk sacculitis
1	Protozoan, <i>Hemoproteus nettionis</i>
1	Reproductive, impacted egg
1	Reproductive, ruptured egg
3	Respiratory, pneumonia, bacterial
1	Respiratory, CRD
7	Stress, restraint
2	Trauma, accidental
5	Trauma, predator
3	Trauma, self
4	Trauma, undetermined
5	Undetermined, autolyzed
5	Undetermined, no carcass
1	Urinary, nephrosis
155	
	APTERYGIFORMES
1	Reproductive, impacted egg
	CHARADRIIFORMES
1	Immunologic, amyloidosis

<i>Number Affected</i>	<i>Diagnosis</i>
6	Infectious, bacterial, <i>Mycobacterium avium</i>
1	Infectious, fungal, <i>Aspergillus</i> sp.
1	Trauma, predator
1	Undetermined, no carcass
1	Undetermined, not evident
—	
11	
	CICONIIFORMES
1	Infectious, bacterial, sepsis
1	Infectious, fungal, <i>Aspergillus</i> sp.
3	Not evident
—	
5	
	COLUMBIFORMES
1	Digestive, crop, gangrenous
1	Infectious, bacterial, sepsis
2	Not evident
1	Parasitism, <i>Ascaridia columbae</i>
1	Perinatal, impacted crop
2	Trauma, undetermined
1	Urinary, nephritis
—	
9	
	CORACIIFORMES
2	Infectious, bacterial, <i>Mycobacterium avium</i>
1	Metabolic, gout
1	Nutritional, inanition
1	Trauma, vandalism
—	
5	
	CUCULIFORMES
1	Infectious, bacterial, <i>Mycobacterium avium</i>
1	Not evident
—	
2	
	FALCONIFORMES
1	Trauma, self
	GALLIFORMES
1	Cardiovascular, pericarditis
1	Cardiovascular, subacute, bacterial, endocarditis
1	Circulatory, congestive heart failure
2	Congenital, torticollis
1	Digestive, cholecystitis
1	Digestive, cloacal obstruction
1	Digestive, enteropathy
1	Digestive, hemorrhage
1	Digestive, hepatic necrosis
1	Digestive, hepatitis, necrotic
1	Digestive, proventriculitis, bacterial
1	Digestive, typhlitis, <i>Pseudomonas aeruginosa</i>
3	Euthanasia
9	Euthanasia, experimental, tuberculosis
1	Euthanasia, malformation

4	Euthanasia, perosis
1	Euthanasia, splayed legs
1	Euthanasia, wound
1	Immunilogic, amyloidosis
7	Infectious, bacterial, <i>Mycobacterium avium</i>
1	Infectious, bacterial, periesophagitis
1	Infectious, bacterial, sepsis
1	Infectious, bacterial, sepsis, <i>E. coli</i>
1	Infectious, bacterial, collibacillosis
3	Infectious, fungal, <i>Aspergillus fumigatus</i>
3	Infectious, fungal, <i>Aspergillus</i> sp.
1	Metabolic, gout
22	Not evident
2	Nutritional, inanition
2	Parasitism, <i>Heterakis</i> sp.
2	Perinatal, cloacal obstruction
1	Perinatal, euthanasia
1	Perinatal, gastric hemorrhage
1	Perinatal, hepatic necrosis
31	Perinatal, not evident
1	Perinatal, omphalic abscess
2	Perinatal, omphalitis
1	Perinatal, pasted vent
1	Perinatal, pneumonia
1	Perinatal, pyoderma
6	Perinatal, ruptured yolk sac
4	Perinatal, stress
1	Perinatal, trauma, accidental
1	Perinatal, trauma, self
1	Perinatal, undetermined, autolyzed
1	Peritoneum, peritonitis, foreign body
4	Protozoan, histomoniasis
2	Protozoan, histomoniasis, suspect
1	Reproductive, egg bound
1	Reproductive, impacted egg
1	Reproductive, peritonitis, yolk
1	Respiratory, pneumonia, chronic
1	Respiratory, pulmonary, hemorrhage
1	Sensory, ophthalmitis, bacterial
1	Stress
1	Stress, multiple factors
1	Stress, not eating
3	Stress, post-surgical
6	Stress, post-vermifuge
1	Toxicity, unknown
4	Trauma, accidental
17	Trauma, cagemate
2	Trauma, predator
16	Trauma, undetermined
1	Trauma, vandalism
7	Undetermined, autolyzed
1	Undetermined, no carcass
1	Urinary, nephropathy, urates
1	Urinary, nephrosis
1	Urinary, tubular necrosis

## GRUIFORMES

1	Digestive, hepatic necrosis
1	Euthanasia
3	Infectious, bacterial, <i>Mycobacterium avium</i>
1	Infectious, bacterial, sepsis, suspect
1	Infectious, fungal, mycotic, suspect
1	Not evident
1	Nutritional, inanition
2	Perinatal, undetermined, autolyzed
1	Respiratory, pneumonia, <i>Pseudomonas aeruginosa</i>
1	Trauma, undetermined
1	Undetermined, no carcass
—	
14	

## PASSERIFORMES

1	Digestive, esophageal, impaction
1	Digestive, esophagitis, caseous
2	Digestive, intestinal hemorrhage
1	Iatrogenic, anesthetic
1	Immunologic, amyloidosis
1	Infectious, bacterial, endocarditis, <i>Staphylococcus</i> sp.
1	Infectious, bacterial, granulomatosis
11	Infectious, bacterial, <i>Mycobacterium avium</i>
1	Infectious, fungal, <i>Aspergillus fumigatus</i>
1	Infectious, no agent
2	Metabolic, gout
10	Not evident
1	Parasitism, nematode, intestine
5	Perinatal, not evident
1	Perinatal, omphalitis
1	Peritoneum, peritonitis, egg yolk
1	Physical, drowned
7	Trauma, cagemate
1	Reproductive, egg bound
1	Trauma, self
4	Trauma, undetermined
16	Undetermined, autolyzed
1	Undetermined, no carcass
1	Urinary, nephritis, chronic
1	Urinary, pyelitis
—	
74	

## PELECANIFORMES

1	Not evident
1	Trauma, vandalism
—	
2	

## PICIFORMES

1	Euthanasia, deformity
1	Euthanasia, gangrene
2	Undetermined, autolyzed
—	
4	

<i>Number Affected</i>	<i>Diagnosis</i>
	PSITTACIFORMES
1	Cardiovascular, atherosclerosis
1	Circulatory, shock, post-surgical
2	Infectious, bacterial, <i>Mycobacterium avium</i>
1	Infectious, fungal, <i>Aspergillus flavus</i>
1	Infectious, fungal, <i>Candida albicans</i>
3	Metabolic, gout
3	Not evident
1	Parasitism, ascarid
1	Parasitism, <i>Ascaridia columbae</i>
1	Parasitism, <i>Ascarid</i> sp.
1	Trauma, accidental
1	Trauma, cagemate
2	Undetermined, autolyzed
—	
19	
	RHEIFORMES
2	Immunologic, amyloidosis
	STRIGIFORMES
1	Circulatory, passive congestion
1	Digestive, hepatic necrosis
1	Stress
1	Trauma, accidental
1	Trauma, self
—	
5	
	TINAMIFORMES
1	Disturbance of circulation, shock, hemorrhagic
2	Infectious, bacterial, <i>Mycobacterium avium</i>
—	
3	

## MAMMALS

<i>Number Affected</i>	<i>Diagnosis</i>
	AILUROPODIDAE
1	Infectious, bacterial, sepsis, suspect
	BOVIDAE
1	Central nervous, degeneration
1	Digestive, colitis, penetrative
1	Euthanasia, post-surgical trauma
1	Euthanasia, weak pastern
1	Infectious, fungal, <i>Aspergillus fumigatus</i>
2	Not evident
1	Perinatal, abortion
2	Perinatal, stress
1	Perinatal, stress, multiple factors
1	Respiratory, pulmonary, atelectasis
1	Stress, multiple factors
1	Trauma, cagemate
3	Trauma, self

<i>Number Affected</i>	<i>Diagnosis</i>
1	Trauma, undetermined
1	Undetermined, autolyzed
—	
19	
	CANIDAE
1	Infectious, bacterial, sepsis
2	Perinatal, abortion
1	Tumor, rhabdomyosarcoma, embryonal
—	
4	
	CERVIDAE
1	Disturbance of circulation, shock, traumatic
1	Perinatal, dystocia
1	Trauma, self-inflicted
1	Urinary, pyelitis
—	
4	
	CHIROPTERA
1	Circulatory, shock
1	Digestive, enteritis
1	Digestive, gastric, distention
1	Infectious, bacterial, sepsis
1	Not evident
16	Physical agent, heat stroke
1	Respiratory, pulmonary, hemorrhage
6	Stress, new arrival
1	Undetermined, autolyzed
1	Undetermined, not evident
—	
30	
	EDENTATA
1	Euthanasia, toxoplasmosis
1	Respiratory, pneumonia, streptococcal
—	
2	
	EQUIDAE
1	Digestive, colon, rupture
1	Perinatal, stress
1	Tumor, kidney, adenocarcinoma
—	
3	
	FELIDAE
0	
	GIRAFFIDAE
1	Perinatal, premature birth, months 3
	HIPPOTAMIDAE
1	Perinatal, stress, neonatal
	INSECTIVORA
1	Not evident

<i>Number Affected</i>	<i>Diagnosis</i>
1	Perinatal, not evident
1	Respiratory, pneumonia
1	Undetermined, autolyzed
1	Undetermined, no carcass
—	
5	
	MARSUPIALIA
1	Circulatory, hepatic vein thrombosis
1	Euthanasia, <i>Mycobacterium avium</i>
1	Perinatal, gastric dilation
1	Perinatal, trauma
1	Stress, exposure
2	Trauma, predator, dogs
2	Undetermined, autolyzed
—	
9	
	MUSTELIDAE
1	Not evident
1	Nutritional, inanition
1	Urinary, pyelonephritis
—	
3	
	PRIMATES
1	Circulatory, cardiac insufficiency
1	Digestive, enteritis
1	Digestive, enteritis, ulcerative
1	Infectious, bacterial, sepsis
1	Infectious, bacterial, sepsis, enterococcal, suspect
1	Infectious, bacterial, sepsis, <i>Pseudomonas aeruginosa</i>
1	Infectious, viral, speculative
1	Nutritional, inanition
3	Perinatal, abortion, triplets
1	Perinatal, dystocia
1	Perinatal, macerated fetus
3	Perinatal, maternal trauma
1	Perinatal, pneumonia
1	Perinatal, pulmonary aspiration
3	Perinatal, stillborn
1	Perinatal, stress
1	Perinatal, triplet
1	Reproductive, macerated fetus
1	Peritoneum, peritonitis
1	Respiratory, pleural, effusions
—	
28	
	PROCYONIDAE
0	
	RODENTIA
1	Digestive, gastric rupture
1	Digestive, gastric ulcers
1	Disturbance of circulation, shock, hemorrhagic
1	Endocrine, adrenal atrophy
3	Euthanasia

<i>Number Affected</i>	<i>Diagnosis</i>
5	Euthanasia, otitis media
1	Euthanasia, otitis media, <i>Proteus</i> sp.
1	Euthanasia, suppurative wounds
2	Iatrogenic, anesthetic
1	Infectious, agent unknown
1	Infectious, bacterial, sepsis
1	Integument, dermatitis, ulcerative
1	Musculoskeletal, mandibular abscesses
6	Not evident
2	Nutritional, inanition
1	Nutritional, inanition, abscessed teeth
5	Perinatal, aborted
1	Perinatal, atelectasis
2	Perinatal, not evident
1	Perinatal, pulmonary hemorrhage
1	Perinatal, stillborn
4	Perinatal, undetermined, autolyzed
1	Reproductive, retained fetus
2	Respiratory, pneumonia
1	Respiratory, pneumonia, <i>Proteus</i> sp.
1	Respiratory, pneumonitis
2	Respiratory, pulmonary edema
1	Respiratory, pulmonary hemorrhage
1	Stress, undetermined
1	Trauma, accidental
5	Trauma, cagemate
1	Tumor, malignant, histiocytosis
1	Tumor, rhabdomyosarcoma
1	Tumor, uterine adenocarcinoma
3	Undetermined, autolyzed
1	Undetermined, no carcass
1	Urinary, nephritis, chronic
—	
66	
	URSIDAE
0	
	VIVERRIDAE
1	Euthanasia, encephalitis
1	Euthanasia, senility
1	Iatrogenic, anesthetic
1	Respiratory, chronic passive congestion
—	
4	

# Office of Zoological Research

John F. Eisenberg, Resident Scientist

The Office of Zoological Research (OZR) was founded in 1965 and charged with responsibility for developing a research program in the National Zoological Park which would gather information relevant to the care and maintenance of exotic species in captivity; promote active research on selected species of vertebrates held in the Zoo's collection; and encourage participation by graduate-level and postgraduate students in utilizing the Zoo for research.

## Special Events

In August 1973, the National Zoological Park, with the University of Maryland and George Washington University, hosted the Thirteenth International Ethology Congress. Morning plenary sessions were held in the Baird Auditorium of the Smithsonian's Museum of Natural History; afternoon paper sessions were held on the campus of George Washington University. Over 350 delegates from 11 different countries registered for the Congress. It opened on August 14 with a reception at the Elephant House, which by all accounts was a success. The closing banquet of the Congress was held on the evening of August 22 in the Great Hall of the Smithsonian. Close cooperation among various bureaus of the Smithsonian and offices at the National Zoological Park insured the success of this Congress. To all of those who assisted our office in the execution of Congress activities, the staff owes a debt of deep gratitude.

## Changes in Personnel

Commencing in 1973 and continuing through 1975, several major changes in the OZR staff occurred. The office was privileged to add Dr. Eugene Morton to its staff who, by pursuing his intense interest in avian behavior and ecology, should serve to balance our research efforts, which previously had been weighted heavily toward investigations of mammalian behavior and ecology. Dr. Gerald G. Montgomery transferred to the Smithsonian Tropical Research Institute at the end of 1975 to pursue full-time field research in the tropics. Carolyn Dorsey and Betty Howser joined the staff as biotechnician and secretary, respectively. Larry Newman joined us as a keeper. The tragic loss in October 1975 of Dr. Helmut K. Buechner, senior ecologist, was keenly felt by all.

## Field Work

Dr. Montgomery continued with field research on Barro Colorado Island in the Panama Canal Zone. Two new field projects were initiated, including a radio telemetry life history study of *Tamandua* and field determination of the digestive efficiencies of three-toed sloths (*Bradypus infuscatus*).

Two *Tamandua* were radio-tracked in 1973. One was followed for one week during the dry season and the second for three weeks during the rainy season. By radio-marking a wild *Tamandua*, Dr. Montgomery found that it was possible to locate the animal and approach closely enough to observe it from as little as one meter away while it fed and foraged.

The second new study grew out of previous work with the three-toed sloth. The project attempted to measure the rate at which three-toed sloths living in the wild digest the leaves of various tree species. Dr. R. Mitchell Bush, Zoo staff veterinarian, cooperated in this effort. Sloths were captured from the wild and brought to the laboratory, where surgical procedures were employed to implant a gastric fistula. Through the fistula, a bag containing small samples of leaves could be inserted. The samples were weighed prior to insertion in the sloth's stomach. The fistula was reclosed and the animals were released into the wild. Upon recapture, the specimens had the bag removed through the fistula and the rate of digestion was estimated by reweighing the leaf samples. In five experiments, old leaves from a particular species of tree were digested more slowly than were young leaves from the same tree species. Leaves of the same age from a species of tree which most sloths use regularly were digested at higher rates than were leaves from trees in which sloths were rarely located. To date, the sample sizes are not large enough to show significant statistical differences. However, the trends shown by these results support our interpretation of data concerning the basis for the sloths' selection of certain tree species.

To facilitate communication among scientists studying adaptations for leaf-eating, Dr. Montgomery arranged a conference on arboreal herbivores at the Conservation and Research Center in Front Royal, Virginia, in May 1975. The proceedings will be published as a monograph.

In an effort to establish new research areas for our studies of the behavior and ecology of Neotropical mammals, Dr. John Eisenberg took two trips in 1973 to South America. From February 19 to March 3, he visited Colombia, inspecting possible study sites in La Macarena and El Tuparro National Parks. A second trip, from April 14 to 22, was made to Venezuela where Dr. Eisenberg conferred with Venezuelan scientists and visited Guatopo National Park and Rancho Grande. In the fall of 1974, final plans were made with Venezuelan scientists to inaugurate a program of field studies on vertebrate behavior and ecology in Venezuela in conjunction with Venezuelan researchers and students.

Dr. Montgomery visited Venezuela in June and July 1974, and March and April 1975, and radio-tracked both giant anteaters and golden anteaters (*Tamandua longicaudata*) on the land so generously offered by Sr. Tomas Blohm. Dr. Montgomery was so encouraged by Dr. Eisenberg's success that he plans to extend his anteater studies to Venezuela in order to effect a complete comparison among the three genera, *Myrmecophaga*, *Tamandua*, and *Cyclopes*. (Dr. Montgomery had studied the latter two genera previously in Panama.)

In June 1975, Dr. Eisenberg established a research program with two

graduate students in Parque Nacional Guatopo and at the ranch of Señor Blohm, south of Calabozo in Guarico. The population dynamics of rodents, marsupials, and howler monkeys will be actively pursued. Drs. Eugene Morton and Dale Marcellini are developing parallel programs with birds and reptiles at the two study areas.

Carolyn Dorsey, in cooperation with Dr. Montgomery, began processing leaves to prepare a histological key to the leaves of plants which grow on Barro Colorado Island. This key will be used in comparative histological determinations of the food habits of folivorous animals, both vertebrate and invertebrate.

Dr. Morton continued research on the behavioral ecology of North American migrant birds on their wintering grounds in Panama. This research was sponsored by the National Geographic Society, with the cooperation of the Smithsonian Tropical Research Institute. Locally, field work was completed on the behavior of the Carolina wren (*Thryothorus ludivicianus*), and a study of breeding behavior in the eastern bluebird (*Sialia sialis*) was initiated at the Conservation and Research Center.

Rasnayagam Rudran successfully completed his study on the feeding ecology of the blue monkey (*Cercopithecus mitis*) in Uganda. His research was sponsored by Dr. Thomas Struhsaker and the New York Zoological Society. Drs. Eisenberg and Kleiman visited the Rudrans during July and were able to survey several different primate habitats in their itinerary within Uganda.

In 1974, Wolfgang P. J. Dittus was awarded a Ph.D. degree by the University of Maryland, upon submission of his dissertation based on his field research in Sri Lanka (see Dittus, 1974).

## Captive Studies

Within the Park, participation in breeding programs was continued and special efforts were made to involve keepers, volunteers from FONZ, and students in the collection of behavioral data. Dr. Devra Kleiman completed a study of the estrous cycles and reproductive behavior of the Zoo's three tigresses (*Panthera tigris*). The tigresses showed a highly variable estrous cycle, averaging fifty days. From observations on behavior, Dr. Kleiman developed a "heat score" which could be used in the management of introductions for breeding (Kleiman, 1974). Observations on cheetah behavior, begun in 1972, continued through 1975, resulting in an attempt to induce mating and ovulation hormonally in two females.

Observations of the social interactions and play behavior of the giant pandas (*Ailuropoda melanoleuca*) continued and 7-day nocturnal watches were organized prior to estrus in April 1973, with FONZ volunteers collecting the data. This pre-estrus watch has become an annual event. The results of some aspects of this study were included in a paper published by Dr. Kleiman (1974).

The development of a second litter of lesser pandas (*Ailurus fulgens*) was followed by Drs. Montgomery and Kleiman and Miles Roberts (Roberts, 1975). Anal gland scent from the young was collected for biochemical analysis. Dr. Kleiman completed an investigation of scent-marking behavior in a pair of binturongs (*Arctictis binturong*) (Kleiman, 1974).

Dr. Eugene Morton, together with R. Medford, studied vocal communication and breeding behavior in captive rock wrens (*Salpinctes obsoletus*). Successful hatching of eggs from hand-raised birds was achieved. Data were collected on vocal communication from hand-raised house wrens (*Troglodytes aedon*) and Bewick's wrens (*Thryomanes bewickii*).

Dr. Buechner continued his studies on the behavior of the Indian rhinoceros (*Rhinoceros unicornis*). Behavioral changes following conception were observed in both the male and the female.

Dr. Buechner and Judith Block prepared a television tape of the rhinoceros birth which will be of considerable use in the continuing investigations on this species (see Buechner et al., 1975).

Dr. Buechner continued his studies of reproductive behavior in the sable antelope (*Hippotragus niger*). The courtship, sexual behavior, and postconception behavior were recorded on videotape. Seven complete copulations were analyzed from 7 hours of videotape. One female was followed throughout her 48 hours of estrus, as a basis for determining the short-term rhythm of sexual receptivity (see Buechner et al., 1974).

Dr. Buechner continued with his analysis of data based on earlier field work with the Uganda kob (*Adenota kob thomasi*). With assistance from H. Daniel Roth, the data were subjected to mathematical treatment demonstrating a marked inequality of breeding success among males on the territorial breeding ground (lek) and thus confirming that strong sexual selection exists as one of the functions of the kob's lek system of social organization (Buechner and Roth, 1974).

With an enthusiastic group of students and volunteers, Dr. Buechner continued to study in detail the reproductive and social behavior of several additional ungulate species, including the bongo (*Boocercus eurycerus*) and the Eld's deer (*Cervus eldi*). His death interrupted a successful observational series, but several students have carried on in a manner of which he most certainly would have approved.

A colony of nectarivorous bats (*Carollia perspicillata* and *Glossophaga soricina*), obtained in October 1972, bred successfully; and unique information on growth patterns, interbirth intervals, weaning ages, and the development of flight was collected by Dr. Kleiman and Todd Davis, a graduate student. Of the 30 young born to the colony, 80 percent survived. The success results from the control achieved in maintaining appropriate temperature and humidity in our climate control rooms where the bats are housed.

In 1974, the colony of nectarivorous bats (*C. perspicillata*) suffered severe mortality when the group was heat-stressed, following a failure in the control system of the environmental room. The colony has been re-established with the cooperation of Dr. Charles Handley, Jr. of the National Museum of Natural History. The full annual cycle of reproduction in the nectarivorous bats has been documented by Dr. Kleiman and Mr. Davis. The results of this study will be published as a chapter in "The Biology of the New World Leaf-nosed Bats," edited by Robert J. Baker.

Studies continued on the reproduction, growth, and behavior of several species of caviomorph rodents. Todd Davis and Dr. Kleiman completed a film on the comparative behavior of *Octodon degus*, *Spalacopus cyanus*, *Octodontomys gliroides*, and *Pediolagus salinicola*. Susan Wilson concluded a study of juvenile play behavior and behavioral development in several

caviomorph species, which was incorporated into a joint paper by Ms. Wilson and Dr. Kleiman (1974). Mr. Davis completed an analysis of agonistic behavior in male *O. degus* (see Davis, 1975), and Dr. Kleiman a study of urine-marking behavior (Kleiman, 1975).

In 1974, Victoria Guerrero completed the research for her doctoral dissertation on the effects of female hormonal condition on courtship and copulation in the green acouchi (*Myoprocta pratti*). Christine Schonewald initiated research on courtship behavior in the green acouchi (*M. pratti*). Her research program will include a detailed quantitative analysis of the entrainment of the pair's behavior as courtship continues over time until a bond is established. Dr. Eisenberg continued his research on the vocalizations of caviomorph rodents. A series of recordings from each of the species in our collection were analyzed and the results were compared in a recent publication (Eisenberg, 1974). The reproductive and social behavior of the caviomorphs was summarized by Dr. Kleiman (1974).

The new facility housing the endangered golden marmosets (*Leontopithecus rosalia*) was completed and by December 1973 eight golden marmosets had been transferred to the Office of Zoological Research. Intensive investigations were initiated on various aspects of sociosexual, reproductive, pair-bonding, and parental-care behaviors, in an effort to promote the successful propagation of this species. Under the direction of Dr. Kleiman, several students participated in the study, which has been supported by the National Institute of Mental Health.

Studies of the sociosexual behavior of *Leontopithecus* have been conducted by Dr. Kleiman and results to date suggest a peak breeding season from October to January, with the majority of births occurring in spring and early summer. A two-to-three-week estrous cycle has been detected, based on intervals in observed sexual behavior, and the gestation period has been recalculated as 125 to 132 days, based on 8 pregnancies. The Zoo's first second-generation birth occurred in April 1974.

Karen O'Donnell, a summer student in 1974, completed a study for a master's thesis on the diurnal activity and social behavior of golden marmosets. Jan Hitchcock began an investigation comparing the social interactions of the five marmoset pairs in order to develop a behavior profile for a successful breeding pair of golden marmosets. Robert Hoage, a doctoral student, began a detailed study of parental care and infant development in the lion marmosets in 1974. Kenneth Green and Lisa McLanahan initiated a preliminary analysis of the vocal repertoire of the golden marmoset. Of special interest is the discovery that members of a mated pair synchronize their long call vocalizations. The relative role of the male and female in long call initiation was explored. Carolyn Dorsey and David Mack initiated studies of visual and olfactory communication mechanisms.

In 1975, Dr. Kleiman convened a conference on marmoset biology at the Conservation and Research Center at Front Royal. The meeting brought together experts from several foreign countries. The proceedings will be published as a monograph.

Drs. Kleiman and Eisenberg were awarded grant funds to initiate a study of social communication in South American canids, to be conducted at the Conservation and Research Center. In 1975, the construction of the canid facility was completed. Two pairs of *Chrysocyon*, which were a



15. These zoologists from around the world participated in a conference on the biology and conservation of marmosets and tamarins at the Conservation and Research Center in 1975. The Center has become the selected site for a growing number of national and international conferences.

gift to the Zoo from the zoos of Brazilia and São Paulo, were transported by Dr. Kleiman from São Paulo to Front Royal. Five *Cerdocyon* were made available as gifts from Dr. Juan Gomez-Nuñez and Dr. Pedro Trebbau of Venezuela. A female *Speothos* was obtained from Dr. Richard Faust of the Frankfurt Zoological Society to join two males, one on loan from the Lincoln Park Zoo in Chicago. *Chrysocyon* was bred successfully, but the young did not survive. *Cerdocyon* has bred and is successfully rearing the cubs.

The successful breeding of the long-tailed tenrec (*Microgale talazaci*) in the third generation prompted Eugene Maliniak to prepare a manuscript concerning its captive propagation (Eisenberg and Maliniak, 1974).

Thanks to patient observation and record-keeping by the keeper staff, the activities, food intake, and movement patterns of a female two-toed sloth (*Choloepus didactylus*) were followed through three successful parturitions.

In July 1973, Dr. Ilan Golani joined the staff for one year as a Smithsonian post-doctoral fellow. His research interests included the use of movement notation in the fine-grained analysis of animal behavior patterns. Together with Dr. Eisenberg, he made several films on the locomo-

tion and courtship patterns of the Tasmanian devil (*Sarcophilus harrisii*). Utilizing his movement notation technique, Dr. Golani has prepared a detailed description of the movement patterns of *Sarcophilus* to compare with his previous work on courtship in the golden jackal (*Canis aureus*) (Golani, 1976).

Lang Elliott conducted a successful research program on the periodicity of activity, food hoarding, and food consumption of the eastern chipmunk (*Tamias striatus*) during winter torpor. The environmental control rooms were utilized successfully in maintaining the necessary low ambient temperatures. This research comprises part of Mr. Elliott's investigations on the spacing behavior and feeding ecology of the chipmunk and related sciurids.

### Outside Activities

Dr. Helmut Buechner participated in a conference of scientists and engineers concerning the satellite tracking and remote sensing of wildlife populations held from April 24 to 27, 1973, at the NASA Ames Research Center. He presented an invited lecture on "Lek Territoriality in the Uganda Kob Antelope" for the District of Columbia Academy of Medicine on June 7; and again, with a twenty-minute film for the Wildlife Diseases Conference, at the University of Connecticut, on August 24. Dr. Buechner consulted with the staff at the Philadelphia Zoo, at the request of the director, concerning problems that have arisen concerning the breeding of their Indian rhinoceros pair.

Dr. Gerald G. Montgomery participated in the Third International Symposium on Tropical Ecology held in Caracas, Venezuela, on February 12 and, together with Melvin Sunquist, presented a paper entitled, "Impact of Sloths on Tropical Forest Energy Flow and Nutrient Cycling." Dr. Montgomery also presented a paper entitled "Social Weaning and Home Range Inheritance in Three-toed Sloths" at the Thirteenth International Ethology Congress held in Washington, D.C.

A symposium on the "Biology of Hystricomorph Rodents," held by the Zoological Society of London, England, during June was attended by Drs. Eisenberg and Kleiman, and papers were presented: Eisenberg on "The Function and Motivation of Hystricomorph Vocalizations"; and Kleiman on "The Behavior Patterns of Hystricomorph Rodents."

The American Association of Zoological Parks and Aquariums' meeting, held in Houston during October, was attended by Drs. Eisenberg and Kleiman and the following papers were presented: Eisenberg on "The Design and Administration of Zoological Research Programs"; and Kleiman on "The Management of Breeding Programs in Zoos."

The Animal Behavior Society meeting, held in Houston during December, was attended by Susan Wilson and Dr. Kleiman, who jointly presented a paper entitled "Eliciting and Soliciting Play: A Comparative Study."

Dr. Kleiman presented a film on the behavior of the Canidae at the Brain, Behavior and Evolution Laboratories of the National Institutes of Health, Poolesville, Maryland.

Dr. Eisenberg taught a course titled "Sociobiology" at the University of Maryland during the fall semester of 1973.

In 1974, Drs. Kleiman and Eisenberg jointly edited a special section of the *International Zoo Yearbook*, entitled "Small Mammals in Captivity," published in 1975.

Dr. Kleiman attended the Third International Conference on the World's Cats in Seattle, Washington, from April 26 to 28, 1974, and delivered a paper on using checksheets to determine estrus in tigers and cheetahs. In September, she presented a paper on breeding programs at the Zoo to the American Association of Laboratory Animal Science. She also presented an invited lecture on olfactory communication in caviomorph rodents at the Monell Chemical Senses Center of the University of Pennsylvania. In addition, Dr. Kleiman taught a course entitled "Hormones and Behavior" at George Washington University during the spring semester.

Dr. Eisenberg presented a paper entitled "Evolution of the Reproductive Unit in the Class Mammalia" at the Daniel Lehrman Memorial Symposium at Rutgers University in April. In May, he presented a paper on communication in marsupials for the Animal Behavior Group at Rockefeller University. In July, Dr. Eisenberg presented a paper on phylogeny, behavior, and ecology in the Mammalia at the Phylogeny of Primates Conference at Burg Wartenstein, Austria. In November, he presented a paper on the use of zoological parks for scientific study at the Centennial Symposium of the Zoological Society of Philadelphia.

Dr. Montgomery gave invited seminars at the Smithsonian Tropical Research Institute on five occasions, reporting on research on sloths, anteaters, and yellow fever. In addition, Drs. Montgomery and Yael Lubin twice gave invited lectures to isthmian conservation societies, showing movies and slides of work with anteaters. Dr. Montgomery provided guidance for the summer research programs of two students, Kathy Hrnda of Goddard College, and Jeff Waage of Princeton.

In the spring of 1975, Dr. Kleiman attended the "Symposium On Human Sexuality As A Science," sponsored by the American Association for the Advancement of Science and held in New York, where she presented "A Review of the Social, Sexual, and Parental Behavior of Mammals Exhibiting Monogamy."

Dr. Eisenberg participated in a discussion group concerning issues of behavioral evolution in the Class Mammalia, held by the Departments of Biology and Psychology, Livingston College, Rutgers University, on April 15.

The team of Drs. Eisenberg and Kleiman attended the Eastern Regional Conference on Reproductive Behavior held at Nags Head, North Carolina, from May 18 to 21, where two papers were presented: "Aspects of Reproduction in the Atelinae (Primates, Cebidae)," by Eisenberg; and "The Reproductive Cycle and Sociosexual Interactions in Pairs of Golden Lion Marmosets (Primates, Callithricidae)," by Kleiman. They also gave presentations at the Animal Behavior Society Annual Meeting at Wilmington, North Carolina: "Sociosexual Interactions and Paternal Care in Monogamous Mammals," by Kleiman; and "Tenrecs of Madagascar," a film by Dr. Eisenberg and Dr. Edwin Gould.

Dr. Eisenberg participated in the National Aeronautics and Space Workshop on Evolution of Intelligent Species and Technological Civilizations, held at Stanford Institute for Advanced Study, Palo Alto, California, from November 24 to 25.

Dr. Kleiman accepted an invitation to lecture on the subject "Monogamy in Mammals" for the Institute for Men, Women and Children in the District of Columbia.

Dr. Eugene Morton was invited to speak on various aspects of his work on avian communication systems by the Maryland Ornithological Society, the Nuttall Ornithological Club at Harvard University, the Department of Zoology at the University of Maryland, and the Department of Biology at Johns Hopkins University in Baltimore. Jointly with Dr. Eisenberg, Dr. Morton taught a course in sociobiology at the University of Maryland during the fall semester of 1975.

## Conservation and Research Center

Christen Wemmer, Curator-in-Charge

The purpose of the Conservation and Research Center (CRC) is to conserve rare and endangered species of mammals, birds, and terrestrial vertebrates through captive propagation and research. To accomplish this task, a large amount of space was needed. The reasons are twofold. First of all, it is desirable to maintain animals under conditions that approximate their natural social organization as much as possible. In the case of Père David's deer, for example, adequate acreage must be available to support a dominant male (the harem master), a group of females and their immature offspring, and a bachelor herd. For animals that do not live in social groups, a series of enclosures is necessary to maintain a sufficiently large breeding population. Natural social organization promotes maximal productivity under otherwise optimal conditions.

Research also plays an important role in any conservation effort. It is essential to understand as many aspects of an animal's biology as possible, to breed it under conditions removed from the setting in which it evolved.



16. On the property of the Conservation and Research Center, zebras roam the rolling foothills of the Blue Ridge. In this natural setting, zoologists can study in detail the behavior of these and other hoofstock.

Captive breeding must be a scientifically controlled process, because in captivity so many of the natural variables that affect a species are removed or replaced by unknowns.

The ultimate goals of the Center are thus: (1) to sustain intelligently the gene pools of rare and endangered species through scientific management practices developed through research, and (2) to augment and diffuse knowledge to the scientific and lay public about the biology and conservation of rare and endangered vertebrates.

Like the Office of Animal Management (OAM) and the Office of Zoological Research (OZR), the CRC is responsible for the husbandry and propagation of those species contained in its collection. Through the Center, the Zoo is now able to expand breeding and research programs that were once restricted to the confines of the Rock Creek property. The red panda, for example, has never been bred with the consistent success that has been achieved through the efforts of the Office of Animal Management. This program can be sustained and expanded at Front Royal. Likewise, the Center's ability to simulate natural conditions makes it an ideal site for studies of behavior and reproduction by graduate students and post-doctoral interns working out of OAM, OZR, and the Office of Animal Health and Pathology (OAHF).

## Historical Background

In 1909, the United States government secured options on several farms in the vicinity of Front Royal, Virginia, for use as a concentration point for horses purchased for the Army. The farms, together with intervening acreage, were later purchased, so that by 1911 the government owned a tract of about 4,000 acres. There was a bountiful supply of spring water and the Army planned on a large center for the breeding and training of horses and mules for the cavalry. Construction of permanent buildings was started in 1912 and continued to 1916. Between 1916 and 1943, there were numerous changes, including the construction of the War Dog Reception and Training Center during 1942 to 1943; however, by the end of 1916, the major building phase for the Aleshire Quartermaster Remount Depot was completed. The majority of the buildings were grouped to form the "Post," while eleven barn/stable complexes were constructed throughout the site. Some 90 miles of fences enclosed pastures for grazing and wood lots for timber and training trails. A system of lanes provided access to all parts of the depot as well as to the railroad in Front Royal.

Over the years, the Remount Depot evolved into a center for the breeding and raising of horses and mules, which were then trained for use by cavalry. With a mixed civilian/military staff of some 400 people, the animals and the land were well cared for. A complete veterinary facility checked each animal and kept all in good health. An "army" kept the fields in military form and all structures—buildings, fences, barns, stables, roads—in tip-top shape.

During World War II, the depot housed a K-9 training facility and also German prisoners-of-war. There was a second building boom of World War II "temporaries," of which little remains today. Most of the very neat rock piles scattered about the property date from this period.

After World War II, the place of cavalry in "modern" warfare was

questioned. Despite all the pressure that could be mustered, Congress passed legislation in 1948 transferring the land assets of the Remount Service to the United States Department of Agriculture for use as a Beef Cattle Research Station. Fields that had once been home for 6,000 horses and mules were now occupied by Angus, Hereford, and Shorthorn cattle.

The Agriculture Research Service, in conjunction with the Virginia Polytechnic Institute, raised cattle under strict controls to see which did best on what combination of feeds and grasses. In 1972, the station had Virginia's largest and the nation's fourth largest Shorthorn registration.

There were other activities at the station besides the raising of cattle. The Department of State used a portion of the station's buildings as an Emergency Relocation Site and a communications station. The State Department equipped several buildings as offices, enough for the secretary of state and 700 other State Department employees. By 1972, all that was left of this activity was the communications station.

The Office of Personnel of the Department of Agriculture modified two colt barns, three of the staff officers' quarters, the veterinary corps barracks, and the hospital into a conference center. Department of Agriculture conferences and training sessions were held here on an almost continual basis, along with the Foreign Service Institute of the Department of State.

In the winter of 1973, the Department of Agriculture decided to conclude activities at Front Royal. Staff rolls had been terminated, cattle sold, and the buildings closed by the end of June of that year. At this juncture, the National Zoological Park entered the picture.

The Zoo staff had been searching for a breeding farm site for some fourteen years. Possible site locations at La Plata, Maryland, the Great Dismal Swamp in Virginia, and a 900-acre portion of Camp A. P. Hill in Virginia had all been considered, but the Front Royal site offered more than anyone had dared hope for in the way of potential and usable on-site facilities.

## Topography

The Conservation and Research Center comprises some 3,150 acres of the former Remount Depot/Research Station.

The site ranges in elevation from 900 feet to 1,200 feet above sea level. The terrain is montane, ranging from gentle rolling hills to a few steep slopes. Approximately 50 percent of the land area is wooded, with the remainder being open pasture. Oak, maple, hickory, ash, and tulip poplar are the dominant trees. Open areas abound with a wide variety of annuals and perennials. The top soil is thin, covering slate and limestone. Several spring-fed streams meander through the site and a 1/4-acre spring-fed pond serves as a reservoir.

## Climate

The following climatic information was obtained from the United States Department of Commerce (Climatology of the U.S. No. 86-39-Virginia). Data are based on a 10-year average (1951-1960) and were collected at Woodstock, Virginia, a town some 16 miles west of Front Royal.

Total snowfall (range and average)	:	11.3"—40.7" (19.6")
Mean number of days/years with temp. < 32°	:	116
Mean number of days/years with temp. > 90°	:	39
Total precipitation (range and average)	:	27"—44" (34.8")
Minimum temperatures (°F)	:	Jan.—22    Nov.—0 Feb.—12    Dec.—3 Mar.—5

## Grounds and Facilities

The Conservation and Research Center (CRC) is composed of three primary operations: an animal operation, a farming operation, and a maintenance operation. The day-to-day administration of the Center is dealt with by the curator-in-charge, two conservation project officers, an administrative assistant, and a secretary. The center has 16 full-time employees; 13 families, including representatives from the Office of Zoological Research (OZR) and the Office of Construction Management (OCM), live on the center property. An additional 5 seasonal employees are hired to harvest grass, hay, and alfalfa during the spring and summer.

Eighty-seven buildings presently house maintenance shops, offices, animal quarters, and housing for personnel and visitors and offer a myriad of other uses. Most of the buildings are grouped in a central post area, with the large animal barns located in outlying areas. Several of the empty post buildings are being planned for future use as small mammal and bird housing facilities. A gravity-fed springwater system services the entire site. Other facilities include a sewage treatment plant and an electrical system. Two hundred acres of grass and hay and 27 acres of alfalfa provide enough selenium-rich hay to meet all of the Zoo's demands both at Rock Creek and at Front Royal. During favorable hay-production years, there is approximately a 25 percent surplus, but alfalfa production is greatly hampered by drought.

All of the foregoing resources and facilities are playing their important roles in the future development of the Front Royal site as a major breeding and research center of exotic species. But perhaps the most important resource that the site offers is land.

Land, one of today's most sought-after commodities, is of higher value to the zoological park or garden than to perhaps any other institution. Hoofstock require sizable tracts of land for proper housing and exhibition. If they are to be maintained in herds and bred on a large scale, the vast space needed is more than the urban zoo has available. The Front Royal site offers the National Zoological Park a rare opportunity that far too few zoos experience: namely, to have space available for maintaining large breeding herds of not one or two species of exotic ungulates, but several. With the addition of this generous tract of usable land and facilities, the Zoo is developing effective, large-scale programs for conservation and research.

## Programs at the Center

*Animal Breeding Programs.* One of the first tasks in setting up the Center was the renovation of existing buildings and the construction of new facil-

ities to contain various species of rare and endangered mammals and birds. Nine large enclosures, ranging in area from 4 to 45 acres, were constructed and house Reeve's muntjac, Père David's deer, Burmese brow-antlered deer, scimitar-horned oryx, Bactrian camels, onagers, and Grant's zebra. The vast size of these enclosures often makes them usable for mixed-species groups, such as the 35-acre pasture housing oryx and common rheas. All animals in these enclosures have access to a large barn. The barns (Greenhill, Meade, and Waller) were originally horse barns, but have been modified for use by exotic ungulates. Expansive areas are often desirable for maintaining viable breeding populations of other animals as well. The effective breeding of many birds, carnivores, primates, and small mammals requires large numbers of individuals that often must be housed singly, in pairs, or in families. The Reeve's muntjac, golden lion marmoset, and Matschie's tree kangaroo are examples of family-living species. In their system of social organization, male offspring are not tolerated when sexually mature. This means that adequate backup space must be available at all times. The requirements for solitary-living species such as the binturong are similar. Since the female rejects the male when she is pregnant, additional space is required for males and for the offspring upon weaning.

There are plans for other facilities, some of which are about to become realities. The Zoo has an impressive record for breeding red pandas, Matschie's tree kangaroos, golden marmosets, and Rothschild's mynahs. Construction has just been completed on a spacious one-level cement building (formerly used for offices and originally converted from a colt stable), in which each species will be represented by a series of breeding pairs with access to both indoor and outdoor enclosures. Work is about to begin on another building which will be modified for three rare small-to-medium-sized cats: the flat-headed cat, the marbled cat, and the clouded leopard. An incubator-brooding facility is planned to enhance the breeding of rare and endangered birds.

A commissary was needed to furnish food for the animals. An ideal building, the old granary built in 1916, was already centrally located on the campus. Renovations are nearly complete, adapting it for frozen- and cold-food storage, as well as for the breeding of rabbits and small rodents. The production of hay and alfalfa was a tradition that has been firmly entrenched in the Center's history, and the Zoo was fortunate to be able to inherit the expertise that had nurtured this precious asset.

## Research Programs

The establishment of each species at the Center is preceded by an exhaustive literature survey and the preparation of an information summary and captive-management plan. These facts serve as guidelines for cage design and initial management. The captive husbandry of most wild animals, however, is in a rudimentary state and requires refinement through research. Research at the Center is carried out by staff members of OZR, OAM, and CRC.

Presently, there are three major ongoing research projects. The comparative behavior of three species of South American canid is being investigated by Charles Brady, a doctoral candidate from the University of Ohio. A grant to Dr. Devra Kleiman is funding this research and also has defrayed

the cost of renovating the facility. A series of indoor pens attached to outdoor enclosures houses maned wolves, crab-eating foxes, and bush dogs. Observations of staged encounters between the dogs of each species are made with videotape from an observation booth. Each animal has its own den and yard, but bush dogs and crab-eating foxes are allowed to pair up for rearing the litter, just as they do in the wild. The purpose of this research is to examine the relationship between communication systems and social organization by comparing three types of dogs that have contrasting life styles. An important product of the study will be the elucidation of each species' reproductive biology.

A study of the nutrition and range management of the Père David's deer, under the direction of Dr. James Whelan, is being undertaken by Kerry Malson as a master's thesis project at Virginia Polytechnic Institute. The primary purpose is to obtain accurate estimates of the seasonal carrying capacity of the 35-acre paddock. This information is required to maintain the population at a stocking level commensurate with sustained forage production; to prevent soil erosion and other forms of habitat degradation; and to maintain adequate cover.

A three-year study on the social structure and communication of Père David's deer is being undertaken by Drs. Wemmer and Collins. The goal of this study is to document seasonal changes in social organization and to elucidate the communicative processes by which social relationships form, are maintained, and change. Observations, in the form of dictated notes and film, are made from a 4-wheel-drive vehicle. The study also employs tape-recording of vocalizations and playback experiments, in an effort to understand the function of certain common social signals, such as the stags' rutting call. An investigation of this deer's social dynamics will provide information for assessing the effects of sex ratio and age structure on the productivity of the herd.

### Cooperation With Other Zoos

The assemblage of the Center's present breeding groups has been the result of cooperative agreements with several other zoos. The Bactrian camel herd, for example, is jointly owned by the Minnesota Zoological Gardens and the NZP, while the New York Zoological Society has contributed over one-third of the Père David's deer. Lincoln Park Zoo, the Los Angeles Zoo, and San Diego Zoo have all made important contributions to establishing herds of hoofstock.

### Conferences

The presence of the Center's conference facilities has added a new dimension to the Zoo's role in disseminating scientific information. The Conference Center has allowed us to bring scientists together from Europe, South America, and Australia to discuss such diverse topics as the biology of arboreal foliovores (Dr. Gerald Montgomery, convener), lizard brains and behavior (Dr. Dale Marcellini, convener), and the biology of golden marmosets (Dr. Devra Kleiman, convener).

## Visitor Services: Education/Information and Graphics/Exhibits

For all concerned with providing programs and services for Zoo visitors, the years from 1973 to 1975 were times of growth and change, responding to new demands imposed by the expanding Zoo. Offices were reorganized with a more professional emphasis, and new programs and exhibits were planned in conjunction with the requirements of the Master Plan.

1973: The Office of Interpretation, Saul Schiffman, Chief

In 1973 the Zoo's Office of Interpretation, housed in a small stone building behind the Reptile House, encompassed a number of different functions. These included label and exhibit production, public relations, information, and interpretive programs.

Under the guidance of Saul Schiffman, on temporary assignment to the Zoo from the United States Park Service, the office benefited from the long experience of that organization. A park naturalist was soon added to the staff of seven, and interpretive programs, given in a small, newly built log amphitheater, supplemented the Friends of the National Zoo's volunteer guide program.

Outside production help from the Smithsonian's Office of Exhibits Central (OEC) augmented the efforts of the small exhibits shop. Completed projects included an interpretive display about waterfowl, three-dimensional bird-identification labels for the waterfowl ponds, and a panel on the golden marmosets for the Small Mammal House. Plans were underway for OEC to design and produce a major exhibit for the Giant Panda House. Other exhibits were purchased, including twenty-seven syndicated interpretive panels, ordered from Museum Planners, for installation throughout the Park.

In addition to handling all press relations and inquiries to the Zoo, the public information officer wrote the text for signs and labels. She also produced a monthly newspaper, *Tiger Talk*, for distribution to Zoo employees.

1974-1975: The Office of Visitor Services,  
Warren J. Iliff, Assistant Director

In 1974 a reorganization of the Office of Interpretation occurred, which encouraged more job specialization. The Office was split into two new ones: the Office of Graphics and Exhibits (OGE) and the Office of Educa-

tion-Information (OEI), which included the library. These two, along with a third unit, the Office of Protective Services, were administered under the umbrella of a newly created Office of Visitor Services, headed by Warren Iliff, formerly executive director of the Friends. (Mr. Schiffman returned to the Park Service upon the completion of the two-year loan period.) A graphic designer, Robert Mulcahy, was hired to head OGE, and an education specialist, Judith White, to head OEI.

The OEI staff moved to the Zoo's administration building and the graphics staff remained behind the Reptile House with an expanded exhibits laboratory. A writer was hired in OEI to help with brochures, labels, and exhibit copy, thus freeing the public information officer to concentrate more on press matters.

In November 1975, Warren Iliff resigned his post as assistant director for visitor services, to accept the position of director of the Portland (Oregon) Zoo.

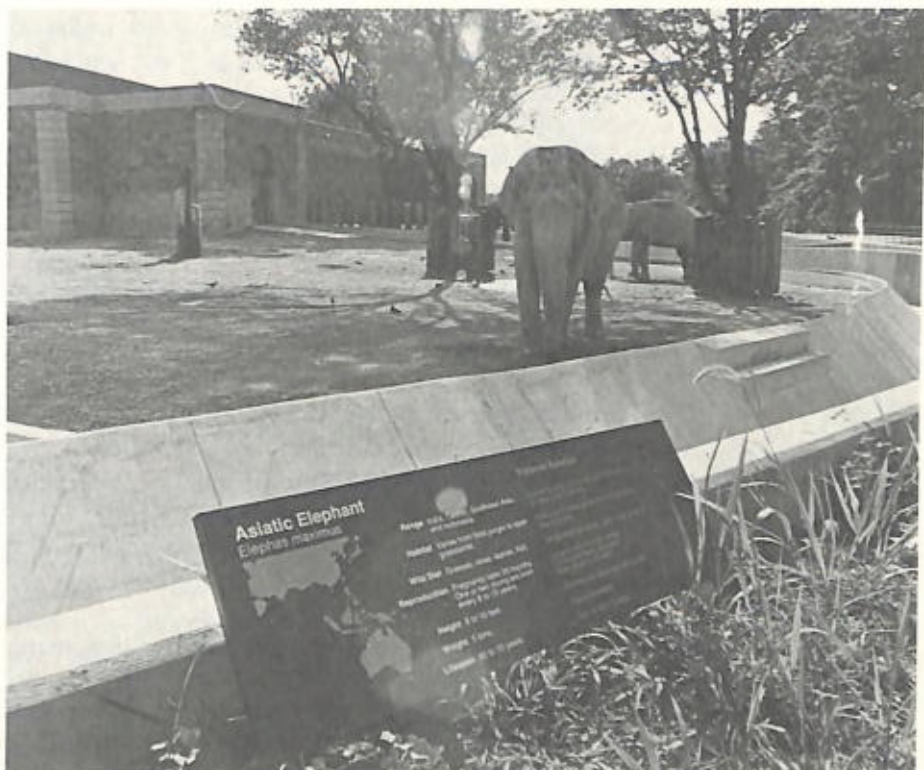
#### Office of Education/Information, Judith White, Chief

Conceptual planning for signs and exhibits became a responsibility of the Office of Education-Information, working as a team with the Office of Graphics and Exhibits (OGE) and the Office of Animal Management (OAM). Labels received first priority. A standardized identification (I.D.) label was designed, with information displayed in English, Spanish, and French, and installed throughout the Reptile House and renovated Monkey House. After a trial period, French was dropped, a few other revisions were made, and a final two-language version was approved for use throughout the Park. By the end of 1975, new I.D. labels were written for over half the species in the collection.

To supplement the rather terse I.D. label, an accompanying sign—called a visual key—was designed. It consisted of a statement about an aspect of biology relating to the animal exhibit and a photograph or drawing to enhance the statement and highlight a feature of the animal. It was hoped that a collection of such signs, as in the Reptile House, would provide a teacher or an interested student with a comprehensive body of zoological information about one group of the Zoo's animal collection. In 1975, visual keys were written and installed throughout the Reptile House, and written and designed for about fifty exhibits in the Small Mammal House.

The OEI/OAM/OGE team completed plans for more extensive interpretive exhibits for two Master-Plan construction areas: the lion-tiger complex and the Elephant House. These exhibits featured photo-collages, films, and free-standing displays. Two other proposals were researched by study, consultation, and visits to other institutions, including the Arizona-Sonora Desert Museum in Tucson and Boston's Franklin Park Zoo. These proposals were outlined on paper and in model form, but further development was postponed until 1976. One outline proposed a "mini-classroom" in the Reptile House; the other proposed exhibits for the renovated Bird House which called for active involvement of the visitor.

*Audiovisual Projects.* Audiovisual production was a new venture for the Zoo. In 1975, work began on two films to be produced by the Smithsonian's Motion Picture Unit for showing in the small theater in the lion-



17-18. While animals explore their spacious new yards at the Elephant House, visitors can read concise new identification labels detailing such facts as range, wild diet, and life-span.

tiger complex. A grant was awarded under the Smithsonian's foreign-currency program, so that one of them could be illustrated by the excellent animators of Film Polski in Warsaw, Poland. This film is to be the story of cat evolution, called *The Big Cats and How They Came To Be*. The second film, *Tiger*, is to be a "live-action" profile of that endangered cat.

The pervasive and constant construction at the Zoo called for telling the visitor what the changes were all about. To do that, a 3-screen slide presentation was designed and produced in 1975 by The Design Center of Washington, D.C., in cooperation with OEI. Unfortunately, delay in constructing the viewing pavilion prevented the slide presentation's showing that year.

*Programs with Friends of the National Zoo.* OEI continued in guiding the Friends of the National Zoo in their active guide and docent programs. A few experimental approaches were tried: a "touch it" snakeskin box was developed; a storage unit/information panel called the "Docent Module" was set up for volunteers in the Reptile House; and the services of a resource teacher were obtained to develop educational materials to accompany the film *Zoo*, produced by the Friends and written and directed by Jan Skrentny.

*ZooBook.* A new departure in written material produced by the Zoo was the development of *ZooBook*. This pictorial essay, written by the Office of Education-Information and photographed by Jan Skrentny, tells the story of the Zoo's animals and of the people and programs that revolve around them.

*Information.* In 1975, in addition to ongoing dealings with the press, two innovations were added in the information area. *Tiger Talk* was redesigned with a new format and published on a weekly basis. The new look is printed on both sides of a single sheet of paper, with short paragraphs on events within the Zoo. Circulation reached 385 copies, including those sent to some persons at the Smithsonian on the Mall and at the Friends' office. A second development was the monthly photo-caption story, which was mailed to 150 selected newspapers in the United States. The three-month trial worked out well, and plans are being made to make it a full-time project.

*Special Events.* A number of special events helped celebrate new exhibits and the Zoo's growth. The exhibit in the Giant Panda House was officially opened in 1974. The opening of the renovated Monkey House in 1975 was marked by several events, including the first Smithsonian Women's Council auction. This house was also the site of a dinner honoring a number of zoo directors, both American and foreign, on their return from the Conference of International Union of Directors of Zoological Gardens in Colorado. Also, *The Happy Frog*, a sculpture donated by the Twentieth Century Club, was dedicated in 1975.

*Visitor Survey.* A survey of the Zoo's visitors continued throughout 1975. Westat, Inc., of Rockville, Maryland, conducted the survey with the guidance and help of the visitor services staff. From time to time, OEI used a number of high-school volunteers to observe visitors' responses to animal exhibits and signs. It is hoped that continuing observations will be made by staff and volunteers as new exhibits go up around the Park.

*NZP Library.* The mission of the library is to manage and deliver current scientific information and documents in a timely and efficient manner.

This was not done effectively until 1973, when the Smithsonian Libraries assigned a professional librarian to the Zoo on a part-time basis. This was the first time the Zoo had had a librarian in the Park. For a short time, the library was housed in the Administration Building; then in May 1973, it was relocated to the Hospital-Research Building.

The changes that took place within the library during these years indicate that the library is on its way to becoming an efficient information system. For example, a Zoo-wide inventory was completed to locate all library materials in use throughout the Park; procedures were developed for charging out books, receiving and routing journals, and requesting materials from other libraries; and a library technician was added on a half-time basis in 1975 to give the library coverage four days a week.

#### Office of Graphics/Exhibits, Robert E. Mulcahy, Chief

The first major concern of OGE after its creation in 1974 was a complete survey of the animal identification labeling problems for a rapidly changing new Zoo. With the Office of Education-Information, a new format was designed to present information on a scale of simple (common name) to complex (social status). The factors determining the form of the final label were: legibility at various distances; legibility at low light levels; ease of production; and flexibility of the final products used as a back-lit, transparent label or as silk-screened, reflective copy. The first completed label system in the Reptile House clarified necessary additional changes in the labeling system. As we move toward completion of labeling in the entire Zoo, additional changes and adjustments may be made to better inform the visiting public.

The remodeled Monkey House provided the first large collaborative effort among the Offices of Animal Management, Graphics and Exhibits, and Construction Management, and dealt with animal exhibits. Concepts were developed, sketched, and discussed with references to each of the new occupants. Each species' behavioral patterns, method of mobility, and social structure were researched and concepts were developed into scale-models of each environment. After much experimentation, gumbo wood was chosen as the basic material for the interior habitats, because of its ability to absorb moisture and dry out in a never-ending cycle, without affecting the structure of the wood. The Victor Stanley Company of Maryland produced the prototype habitat to our specifications in the spider-monkey enclosure, so that OAM and OGE could test the function of the systems design. Since it appeared that the monkeys' behavior showed their approval, it was a successful project. But, more significantly, it has complete flexibility and can be adapted or changed as time or the animals' social development may require.

*Expansion and Développement.* 1975 saw the expansion of production capabilities, made possible by the purchase of new equipment; the reorganization of the OGE group; the contracting of outside services; and additional use of the Office of Exhibits Central. The OGE staff could function as a team on major projects of a large scope, but could also act as individuals responsible for their personal project areas. A staff photographer/darkroom technician was added to perform the many necessary graphic processes required in a design production office. A photostat ma-

chine was purchased to increase photocopy reproduction and allow more concise scheduling of the photographic/darkroom production time. The addition of the 3M color-key process made it possible to produce faster and more accurate graphic comprehensives for presentations.

*Graphics Master Plan.* The coordination of the graphics Master-Plan program designed by Wyman and Cannan, becomes a reality as each phase of animal-symbol development was reviewed and corrections were made. A system of six trails covering specific areas of the Zoo, such as the bird yards, the Elephant House area, and the waterfowl area, was devised to make the Zoo more comprehensible to the visitor.

*Outside Contractors.* The contracting of outside suppliers has been highly successful, as evidenced by the new restaurant facilities and the efficiency of label production. OGE acted as art director and coordinator in these projects and used outside design firms as extra sets of hands. Work on the restaurant also gave OGE the opportunity to become involved in space planning, interior design, and a graphic identity program at the Mane Restaurant, the Panda Cafe, and the souvenir sales kiosks.

## Office of Police and Safety

Capt. Samuel Middleton, Chief

The development of the protection and safety programs over the past three years reflects the dramatic emphasis of the changing Zoo. During this period of accelerated construction and of creative advances in animal management, exhibition, research, and education, the Office of Police and Safety (OPS) underwent its own changes to keep pace, without affecting the quality of basic protection. The changes began in 1973, when plans were developed to combine protection and safety under a single direction to allow for better coordination of both programs. The vital relationship these programs have in relation to visitors and to the input of other Zoo programs was recognized in 1974 when they were placed under the guidance of an assistant director for visitor services. This emphasis on service, public relations, and interactions continued; with more positive program direction, it had evolved by 1975 into a major Office of Police and Safety, reporting directly to the deputy director of the Zoo. This growth was one of emphasis and maturation to accommodate the total Zoo development, rather than simply growth in size. It was accomplished by internal review, training, changes in philosophy, and changes in emphasis, with no appreciable increase in resources.

The internal changes, which continue since the organization is not static, included in-service training for all current officers with a curriculum expanded to incorporate public/police relationship and Zoo information. Improved career ladders were developed, which allow for expanding recruitment areas to recruit younger and less police-experienced recruits. This, plus improved on-the-job training, should in time provide development of a well-trained, public-park-oriented, visitor-service-motivated force to meet the challenges that will continue to present themselves. During this period, uniform changes were made in a continuing attempt to present our police as aides and protectors of visitors and to de-emphasize the militaristic appearance. The objective is to have a well-trained, competent force prepared for any emergency, but whose appearance and bearing conform to the educational, cultural, and public enjoyment purposes of the Zoo.

Concurrently with the evolving organization, the key job of protecting the animals, public, and employees continued without de-emphasis. Traffic control, security patrols, more responsive reaction, and diligent police

work continue to maintain the Park as a safe, orderly, inner-city park where the public may enjoy a relatively incident-free visit. The three-year history shows continuing large crowds, but a substantial decrease in traffic violations and accidents; a decrease in juvenile offenses and vandalism; and no significant increase in any category of offense. Increased vigilance, however, will be required as the ever-growing crowds become more susceptible to incidents of robbery, i.e., pickpockets and snatches, which reflected the largest incident increase over the past three years.

Increased public service, including the establishment of a fully operating first-aid station, continued excellence in police protection, and a developing work-force represent a significant advance over the past three years.

When it is recognized that these advances were made during the dynamic Zoo-wide activity with a veteran work force and increased pressures, the performance of the NZP police is remarkable. And in all of this, the pathos of living drama was compassionately played as the more-than-600 lost children were reunited with their parents.

### **Departmental Changes and Training**

In 1974, there were significant changes affecting the Police Department during the year. In March, the Office of Protective Services was established with the Police Unit and the Office of Health and Safety under the new visitor-services group, placing additional emphasis on service to the public. The group was headed by Warren Iliff, an assistant director for visitor services. Lt. Samuel L. Middleton was selected to command the unit and was subsequently promoted to captain in May. Captain Middleton instituted in-service training for all police officers at the Federal Law Enforcement Training Center at the Washington, D.C., office. In addition to police subjects, public/police relationship and Zoo information were part of the curriculum. In-service and other continuing training efforts were initiated to provide the police with more positive attitudes in their interaction with the public.

A new winter uniform item (jacket) was selected, which covers weapons and is less militaristic in appearance. Five motorbikes were placed into service in July to accelerate response to foot-patrol stations and to permit more circuit patrols in areas not accessible to the scout car or 3-wheel motorcycle and to increase efficiency in providing service to the public.

Sgt. Vincent T. McGoldrick and Officer Robert L. Ruffin attended motor-scooter training at the Metropolitan Police Department Training School in August. Upon their return, they established a training program to teach additional officers in the safe operation of motorbikes.

In November 1975, a reorganization abolished the Visitor Services Group, and the Office of Protective Services was redesigned as the Office of Police and Safety (OPS). Captain Middleton was selected as the acting chief of the new unit, which contains the police unit and a health-and-safety unit. OPS reports directly to the office of Deputy Director Edward Kohn. The programs initiated under Visitor Services are paramount and remain in effect.

In June and July, 5 new officers were hired, bringing the complement up to 31. As of August 1, 1 officer transferred and 1 was separated, reducing the total to 29 men.

In June, 3 new classes and/or grades for hiring police officers were initiated by Acting Chief Middleton to attract younger individuals to the department. Four officers were hired at lower salary and experience levels and slated to attend the Federal Law Enforcement Training Center.

**Accidents and  
First Aid**

The number of accidents decreased over a 3-year period. In 1973, 32 accidents were recorded; in 1974 there were 21; and in 1975 only 13, marking a 48 percent decrease over the previous year. One fatality was recorded in April, during an extremely windy day, when a tree limb snapped off and struck an 11-year-old girl.

The number of first-aid cases treated and recorded by police also decreased steadily, from 430 in 1973 to 220 in 1975.

**Violations**

The number of violations, including juveniles and adults, remained relatively constant; 172 recorded in 1973, 107 in 1974, and 132 in 1975. The increase between 1974 and 1975 was due to pickpockets and purse-snatching.

**Assistance**

Cases of assistance by police to visitors, other agencies, and departments totaled approximately 8,700 in 1973, 7,500 in 1974, and 7,650 in 1975.

# Office of Facilities Management

Emanuel Petrella, Chief

## Organizational Structure and Management Elements

The Office of Facilities Management (OFM) is primarily a maintenance and service organization, with direct responsibility for the maintenance, repair, and upkeep of the buildings, grounds, and facilities within the buildings.

The office is divided into five separate units under the supervision of a unit foreman, who receives guidance through directives and established procedures from the deputy chief and the chief. The units are: the Maintenance Unit, the Transportation Unit, the Grounds Unit, the Services Unit, and the Procurement and Property Management Unit.

The bulk of available manpower is assigned to specific and recurring duties. These include the boiler-plant operation, supplying steam heat and hot water; the operation and upkeep of mechanical equipment, which pro-



19. Carpenters, part of the staff of the Office of Facilities Management, are among many highly skilled craftspeople at the Zoo.

vides air circulation, air-conditioning, and refrigeration; maintenance of the electrical distribution system; repair and upkeep of the building structures; repair and upkeep of the plumbing system; cold- and hot-water piping and fixtures, steam-distribution piping, and sewage and waste-disposal piping; the care and upkeep of lawns, shrubbery, and trees; the maintenance of sidewalks and roads; pickup and removal of trash and debris and the cleaning of buildings; repair and preventive maintenance of all vehicles in the Park; and pickup and delivery service for the Park.

These functions consume an annual average of 70 percent of the total productive available man-hours. The percentage of man-hours allocated to them is not sufficient to maintain the facilities in the most desirable status. It is also necessary to provide manpower support to the zoological collection. A brief summary of this support includes care and upkeep of water-fowl ponds, animal paddocks and shelters, wading and watering ponds, birthing and nesting dens, protective animal fencing and guardrails, animal-paddock landscape schemes, and natural-habitat background schemes for cages of zoo specimens and for water temperature-controlled tanks. The support services mentioned here are just the major areas in which OFM is involved. Numerous daily telephone requests are received from various animal keepers asking for assistance or reporting something which needs immediate attention.

# Office of Construction Management

Robert Engle, Construction Manager

## Purpose

The Office of Construction Management (OCM) provides professional services in preparation of plans and specifications, supervision of contract architects, coordination of design programs with the Zoo staff, award and administration of contracts, management and inspection of construction and construction contracting, and coordination of major renovation and repairs with the Office of Facilities Management.

The major objective is to accomplish redevelopment of the Zoo at the earliest date by the use of efficient planning and scheduling to expedite all elements of the program while providing maximum consideration for the animals and minimizing the impact of construction on the operation of the Park and on the flow of visitors.

During the triannual period of this report, OCM was established to administer the accelerating design and construction program related to implementation of the Master Development Plan. The Planning and Design Unit, consisting of Norman Melun, David Boothe, Walter Dobbins, and Betty Schaad, was the nucleus for the new office and was supplemented by Fred Barwick, who was designated contracting officer in March 1974, and Robert Engle, designated as construction manager in April 1974. With the establishment of the office, the Zoo was authorized to award and administer design and construction contracts in-house. Construction inspection capability was strengthened by adding construction representatives: Donald Muddiman in August 1973, Thomas O'Pray in July 1974, and James Malin in April 1975.

## Master Development Plan Approval

Approval of the Master Plan for the National Zoological Park, as prepared by architects Faulkner, Fryer and Vanderpool, and approved by the National Capital Planning Commission and the Commission of Fine Arts in 1972, opened the way for intensive development action. Previously appropriated funds were reprogrammed for renovation of the Monkey House and funds for the Lion-Tiger Exhibit were appropriated in the Fiscal Year 1974 budget. The last project accomplished prior to starting Master Plan projects was Phase II of the giant panda exhibit. Phase I, completed in 1972, provided indoor housing for the giant pandas. Phase II, started in March 1973, and completed in November 1973, provided two outdoor yards of one-fourth acre each. The total cost of construction work for the pandas was \$486,000.

### **Monkey House Renovation**

Renovation of the badly deteriorated Monkey House, built in 1904, was started in November 1973, by the Charles H. Riddle Company. The architect's design had to be reduced prior to bidding, because it was over the budget. As a result, new exterior cages and sidewalks were deleted, and the existing exterior cages were sand-blasted to remove lead-base paint and were then painted black. Monkeys were temporarily housed in new cages in the basement of the Reptile House. The interior of the Monkey House was completely renovated, with twelve new glass-fronted cages, new utilities including air-conditioning, new flagstone flooring, and a new exterior cage for spider monkeys. The work was completed in November 1974 at a total cost of \$675,000.

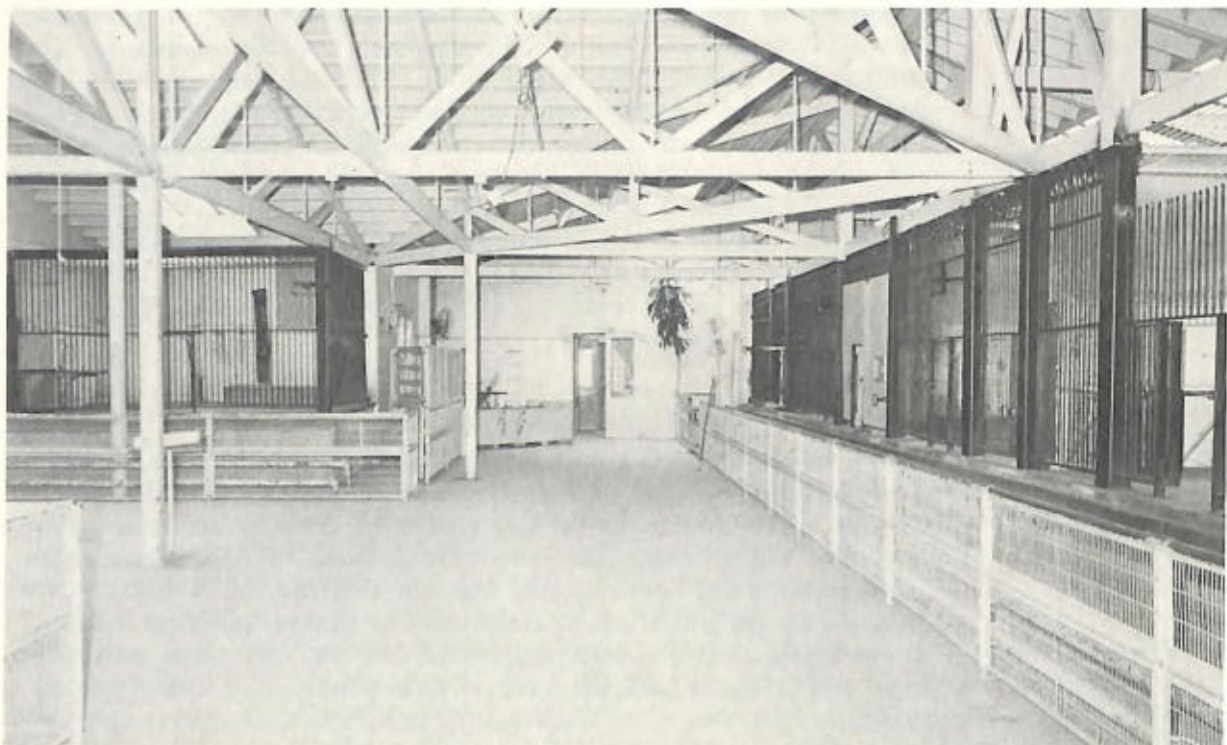
### **Lion-Tiger Exhibit**

Design for the Lion-Tiger Exhibit was started in February 1973, by architects Faulkner, Fryer and Vanderpool, under the supervision of the General Services Administration. By the time plans were complete and construction started in July 1974, the old Lion House, built in 1891, had been razed, telephone lines had been relocated from the site, and the cheetahs moved from the site to a new exhibit constructed in Beaver Valley, at a cost of \$75,000. During the construction period, the big cats were boarded at other zoos. The new facility was conceived as a complex of three "theaters" which would appear to be water-moated islands in a curvilinear structure, shaped to fit the natural topography of the hilltop site. No attempt was made to reproduce synthetically the native habitat of either lions or tigers.

The building has 33,500 square feet of space, including an audio-visual room, a multipurpose room, a kitchen, and 11 offices. There are 2 interior exhibit cages, of 540 square feet each, for exhibiting females and young. Each of the 3 interior animal containment wings has 5 regular dens plus several cubbing dens. The total cost of the exhibit, to be completed in April 1976, by Associated Builders, Inc., will be nearly \$3,000,000. The design had intended that each of the terrace walls be made of stone masonry; however, the need to reduce the design to stay within the budget resulted in a change to concrete. To minimize the impact of architecture, all concrete was formed with rough boards and a buff-colored cement was used. The Lion-Tiger Exhibit was awarded a design award at the Second Biennial Design Awards Program held by the General Services Administration on June 26, 1975.

### **Bicentennial Improvements**

Starting in 1974, improvements to existing Zoo facilities were accelerated so that the Park could be in the best possible condition for the Bicentennial summer. It was decided that all work through the central part of the Park should be completed by April 1976, and that work should be scheduled and controlled to minimize closings and adverse impact on continued visitor circulation in the Park. Of the numerous projects scheduled and completed during 1974 and 1975, the most notable were painting the great flight cage; improvements to the Small Mammal House; new lighting and glass in the Reptile House; improvements to the commissary; a new lesser panda exhibit; security glass for the giant panda exhibit; a visitors' pavilion;



20. The empty interior of the old Lion House as it appeared just before demolition.



21. This 1975 photograph shows the entrance of the Lion-Tiger Exhibit during construction. Nine months later, the building and viewing areas were completed and opened to the public.

improvements to the restaurant building; enlargement of the Panda Cafe; and conversion of the old street to the Monkey House into a sidewalk with extensive landscaping. A total of 520 new trees were planted, including those which were part of new construction projects.

#### **Elephant Yards and House**

In October 1974, Climate Engineering, Inc. started construction for new exterior yards at the Elephant House. The old yards' construction in 1935 had heavy moat walls, barred cages, and heavy railings. The yards were rebuilt approximately three times larger, in accordance with plans by architects Faulkner, Fryer and Vanderpool and landscape architect Lester Collins. Interior renovations of the Elephant House, designed by Wagner Associates, were started by George C. Martin, Inc., in August 1975. This renovation included new heating and ventilation, new handrails, a new platform for viewing the Nile hippo, and removal of bars from cage fronts. All work is planned to be completed during the spring of 1976 at a cost of nearly \$1,300,000.

#### **Bird Yards**

When the Bird House was renovated in 1960, funds were not available to complete the exterior yards. With funds appropriated in Fiscal Year 1975, plans were prepared by the architect and construction was started in November 1974 by the Charles H. Riddle Company for redevelopment of the Bird House Plaza. The development consists of a waterfowl exhibit, a flamingo exhibit, and several yard exhibits for cranes, ostriches, and other large birds. The major elements of construction are low fences, moats, stone walls, and heavy planting to enhance viewing. Interior renovation was started in September 1975 to improve the skylight, improve lighting to support plant growth, add air-conditioning to the building, and redo the painting. All work is scheduled to be completed by the spring of 1976 at a cost of \$1,400,000.

#### **Education-Administration Building**

A new Education-Administration Building was placed under construction contract with CSH Contractors, Inc., in August 1975. The new building, scheduled to be completed in December 1976, at a cost of \$2,500,000, was designed by Faulkner, Fryer and Vanderpool to include a 300-seat auditorium, a library, and classrooms. There will also be offices for the director, Zoo administration and education staffs, as well as the volunteer-education office of the FONZ.

#### **Other Exhibits**

By the end of 1975, construction plans were being completed by the architect for new bear exhibits and a new General Services and Parking Building. Funds were appropriated for both in the Fiscal Year 1976 budget and construction will start in early 1976. Also in planning stages are future Master-Plan increments for Beaver Valley area exhibits, including seals, sea lions, wolves, beavers, and otters, and for central-area exhibits, includ-

ing a new monkey island, a new ape house, renovation of the Small Mammal House, and renovation of the Reptile House.

### **Conservation and Research Center**

In addition to intensive design and construction programs in the Park, the Office of Construction Management was required to provide similar services at the newly acquired Conservation and Research Center at Front Royal, Virginia. In addition to master planning and inspections of existing buildings and utilities in 1974, plans were prepared for canine research facilities and for paddock fencing. In September 1975, architect Joseph Wagner was retained to prepare plans for renovation of housing and construction of small mammal facilities. Both projects were released for construction bidding in December 1975 and are scheduled for completion in the spring of 1976. At the end of 1975, plans are in preparation for bird and cat facilities, a commissary building, renovation of the administration building, electrical systems, and a new barn for hoofstock.

## Office of Management Services

Joe W. Reed, Chief

To meet its objectives, the National Zoological Park must acquire and use resources wisely. The Office of Management Services allocates the financial and human resources to meet the goals of the Zoo.

### Sources of Funds

As a bureau of the Smithsonian Institution, the Zoo receives annual appropriations from Congress.

	<i>Operating Funds</i>	<i>Construction</i>
1973	\$4,074,000	\$ 675,000
1974	4,676,000	3,790,000
1975	5,482,000	9,420,000

Construction funds are applied to specific building projects, which in 1973 through 1975 included designing and building the William M. Mann Lion-Tiger Exhibit, expanding the Elephant House yards and Bird House yards, and constructing the Education-Administration Building and the General Services Building.

### Use of Funds

<i>Activity</i>	<i>Percent of National Zoo Funding Spent</i>		
	<i>1973</i>	<i>1974</i>	<i>1975</i>
Animal Management			
acquisition and health	32	32	32
Zoological Research	3	4	5
Facilities Management			
maintenance	40	38	41
Education	1	2	2
Graphics/Exhibits	1	2	3
Protection	10	9	9
Administration, including			
Construction Management	13	13	8

Bequests to the Zoo by private donors, sales of animals, and other contributions add another \$50,000 annually to the funds available. Re-

search grants won by Zoo researchers provide \$80,000 in funds for specialized research each year. Since 1975, Friends of the National Zoo (FONZ), an ancillary organization whose contributions to the Zoo are approved jointly by its board and by the Director of the Zoo, have operated all concessions. Sales in 1975 equaled \$1,472,000. In 1973 and 1974, FONZ sold balloons, gift items, and train rides. Operation of the Zoo restaurant was assumed by FONZ in 1975. All income from these FONZ activities is spent on educational and research projects within the Zoo. These projects include volunteer-led tours for school children and information to visitors. FONZ also operates the parking concession at the National Zoo; each car pays \$1. After operational expenses, 75 cents of each dollar netted accumulates in a fund for parking improvements.

Between 1973 and 1975, the costs of doing business generally and particularly at zoos (the National Zoo not excepted) rose at extreme rates. The reasons are well-known—a zoo's needs are largely non-discretionary and unavoidable. The animals must be fed, their enclosures must be well maintained, and their comfort must be assured. The cost of feeding a rather stable number of animals rose \$108,000 between 1973 and 1975. The cost of one kilowatt-hour of electricity increased by 73 percent. Of the increased congressional budget voted for the National Zoo for its operations between 1973 and 1975, \$1,110,000 (or 79 percent) was for pay raises allocated to employees.

The Conservation and Research Center at Front Royal, Virginia, not in existence at all in 1973 and merely an embryo in 1974, had by 1975 operating expenses of \$266,000 and a staff of 16. New construction at the National Zoo has also added operating expenses for utilities, supplies, and equipment.

## Staff

The Zoo consists of animals, roads, buildings, grounds, and visitors, and a staff of varied talents and skills to maintain them. A total of 280 employees were paid from federal funds in 1975. Among the types of employees were:

- 54 animal keepers
- 81 craftspeople (plumbers, carpenters, auto mechanics, metal workers, heavy-equipment operators, et al.)
- 22 zoo professionals (veterinarians, wildlife biologists, zoologists, architects)
- 28 police officers

The average salary for a National Zoo employee was almost \$14,000. Forty employees had served more than 25 years with the Zoo. Eleven Zoo employees received the Smithsonian's special achievement awards for exceptional performance or for money-saving and improved-service ideas. To keep up with demands of an increasingly complex Zoo, training for employees was stepped up from 50 in 1973 at a total cost of \$2,500 to 200 in 1975 with a total cost of \$12,000.

To help lower paid Zoo employees attain greater skills and to help the

Zoo develop needed new talents, a craft careers program was begun. This program involves training for such specialty craft positions as electricians, welders, metal workers, and utility-system repairers.

As an equal opportunity employer, the Zoo is proud of such advances between 1973 and 1975 as the hiring of its women animal keepers, the advancement of a woman to head the Office of Education and a black man to head the Zoo's police force, and the promotion of a woman to senior research status.

## Friends of the National Zoo

Sabin Robbins, Executive Director

During the past three years (1973-1975), the Friends of the National Zoo (FONZ) grew to more than 10,000 individual, family, school, and corporate members. Its education and information services were upgraded and expanded. Interpretive programs, involving more than 300 volunteers and guides, reached more than 20,000 area school children. Further, the Friends provided important services to the Zoo and its visitors by operating the parking areas, gift shops, trackless trains, and food services.

In 1974, the Friends used more than \$50,000 of revenue generated from parking and souvenir service activities to fund a variety of education-research programs of direct benefit to NZP. Projects included the production of a twenty-minute color movie on the National Zoo for use as a pre-tour introduction for school groups; the creation, production, and distribution of new school-tour material including color slides, brochures, and printed reference material; and the funding of a part-time student to work on avian behavior research in the Bird House.

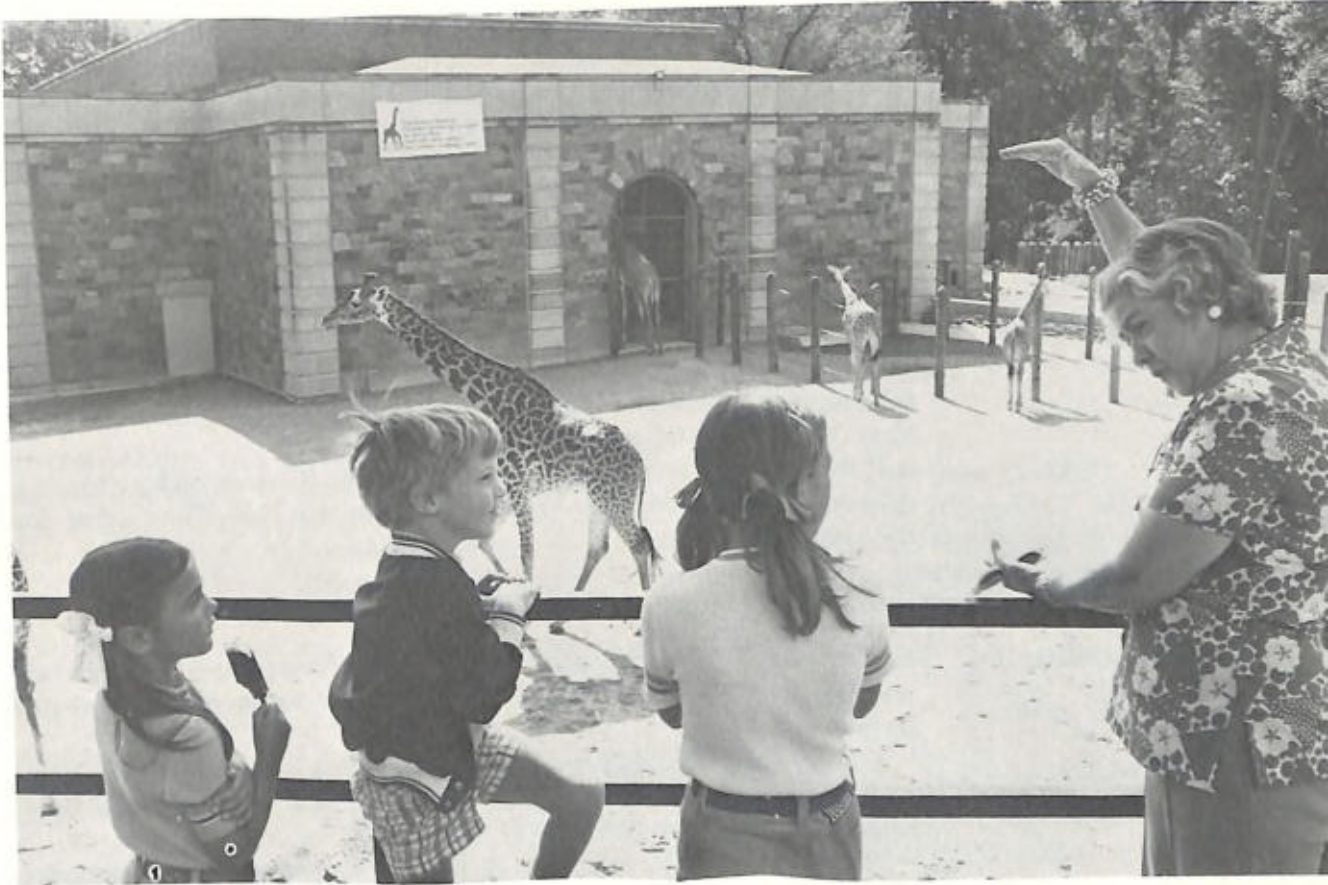
In 1975, more than \$100,000 in concession-generated revenue further expanded this important support program. Zoo education and research programs so funded included the development of a "Zoo Box" kit to add to the impact and use of the *Zoo* movie; publication of free information leaflets for Zoo visitors; and a scholarship program for Zoo classes.

In addition, FONZ committed \$20,000 to support of education-research projects requested by NZP. These included five summer research internships, publication of research and veterinary symposium papers, and grants for several short-term field studies.

### Education and Volunteer Services

FONZ education programs depended heavily on the trained and dedicated volunteers who contributed more than 16,500 hours. Some fifty guides conducted weekday tours for grades three and up throughout the school year. FONZ volunteers helped out in NZP offices, staffed summer information booths, answered questions at exhibit buildings, conducted tours for the handicapped, and assisted NZP staff in animal studies.

Unique at zoos, the FONZ preg-watch and animal behavior programs are designed to provide detailed information to the Zoo's animal management, health, and research office. Some 250 volunteers took turns observing giant and lesser pandas, gorillas, bongo, sable antelope, cheetahs, and Indian rhinos.



22. FONZ guide Peggy Siddall talks about the giraffe's height to three rapt listeners. Every year, over fifty guides enrich the experience of more than 20,000 local school children.

In 1975, FONZ produced and distributed an award-winning movie, *Zoo: Behind the Scenes at the National Zoo*, to explain the Zoo's care, feeding, and breeding programs.

To further expand the educational impact of the film, a film kit, or "Zoo Box," was developed for distribution in 1976.

In 1974 to 1975, FONZ sponsored a variety of Zoo classes which attracted 800 participants. In 1975, a new educational newsletter, "Paw Prints," was published bimonthly for junior members, schools, and libraries.

Each summer, junior members participated in a Junior Zoo Aide Program to inform the public about new programs at the Zoo. In 1974, volunteers used panel exhibits to dramatize the plight of endangered species. In 1975, junior aides conducted short tours explaining the "new Zoo."

### Membership Services

Intensified membership recruiting activities enabled FONZ to expand membership support from 2,000 in 1973 to more than 10,000 in 1975, ranking it among the three largest zoological societies in America.

New and expanded membership programs were offered, which included a wildlife lecture-film series, Zoo classes for all ages, field trips, overseas

safaris, special previews and events at the Zoo, and an enlarged ZooNight each spring. Dr. George Schaller reported on his studies of the African lion at a Lisner Auditorium lecture, and TV-celebrity Bill Burrud talked about poaching at the 1974 ZooNight.

An expanded and redesigned *ZooGoer* magazine, published bimonthly for members, schools, and libraries, won an award for graphic excellence from the American Association of Zoos and Aquariums.

### **Public Relations Activities**

In 1974 and 1975, the Friends distributed free Zoo information leaflets/maps to millions of visitors. Hundreds of information packets were mailed to requesting groups and individuals. FONZ staffers gave dozens of talks about the Zoo to area groups.

FONZ assisted the Zoo in hosting several special events such as opening celebrations for the Monkey House and an Auction Party Fund Raiser for the Smithsonian.

### **Visitor Services**

In 1975, the Friends embarked on one of its most important and far-reaching activities ever: the expanding and improving of all its visitor services.

A new Panda Gift Shop was built to provide a second source of high-quality, reasonably priced animal gifts, prints, and books. New balloon kiosks were built next to each gift shop.

The trackless trains continued to provide convenient and inexpensive transportation and information. A flash flood in Rock Creek in October 1975 caused extensive damage to equipment, but insurance coverage provided replacement with new or overhauled trains.

The biggest new visitor service program began in April 1975 when the Friends signed a five-year contract with the Smithsonian to handle all food services at the Zoo. Immediate changes were made to improve customer service, cleanliness, and food quality. In the fall, major construction began. The Mane Restaurant, across from the Lion-Tiger Exhibit was renovated, air-conditioned, and redecorated. The Panda Cafe was expanded and refurbished to recreate the ambience of a German beer garden. Four small kiosks were built to dispense snacks and ice cream.

All structures—new and old—were coordinated in color, style, and signs to complement the new Master-Plan graphic look throughout the Zoo.

### **Summary**

Thanks to the dedicated leadership of Arthur Arundel plus the strong involvement of the Board of Directors, FONZ has become a substantial asset to the Zoo. None of this, however, would have been possible without the encouragement of Secretary Ripley, the Smithsonian, and the special support of the staff of the National Zoological Park.

## Staff

(December 31, 1975)

### Directors of the National Zoological Park

Dr. William Temple Hornaday (Acting Superintendent)	March 2, 1889–June 15, 1890
Dr. Frank Baker	June 15, 1890–November 1, 1916
Mr. Ned Hollister	November 1, 1916–November 3, 1924
Dr. Alexander Wetmore	November 3, 1924–April 1, 1925
Dr. William Mann	May 13, 1925–October 31, 1956
Dr. Theodore H. Reed	March 12, 1958–

### Office of the Director

Director, Theodore H. Reed, D.V.M.  
Deputy Director, Edward Kohn  
Assistant Director for Conservation,  
John Perry

### Office of Animal Management

General Curator, Jaren G. Horsley

### Office of Animal Health

Head, R. Mitchell Bush, D.V.M.

### Office of Pathology

Head, Richard J. Montali, D.V.M.

### Office of Zoological Research

Resident Scientist, John F. Eisenberg

### Conservation and Research Center

Curator-in-Charge, Christen M.  
Wemmer

### Office of Education and Information

Chief, Judith White

### Office of Graphics and Exhibits

Chief, Robert E. Mulcahy

### Office of Police and Safety

Chief, Samuel L. Middleton

### Office of Facilities Management

Chief, Emanuel Petrella

### Office of Construction Management

Construction Manager, Robert C.  
Engle

### Office of Management Services

Chief, Joe W. Reed

### Associates in Ecology

S. Dillon Ripley

Lee M. Talbot

Jean Delacour

Bernard C. Zook

Edgardo Mondolfi

Theodore I. Grand

Edwin Gould

Leonard J. Goss

Paul Leyhausen

Charles R. Schroeder

### Research Associates

### Collaborators

Friends of the National Zoo  
President, 1973  
President, 1974-1975  
Executive Director

Peter C. Andrews  
Arthur W. Arundel  
Sabin Robbins

**Office of the Director**

Theodore H. Reed  
Edward Kohn  
John Perry  
Margaret C. Baity  
Martha H. Rogers  
Tabetha Gilmore

D.V.M., Director  
Deputy Director  
Assistant Director for Conservation  
Secretary  
Secretary  
Secretary

**Office of Animal  
Management**

Jaren G. Horsley  
Harold J. Egoscue  
Dale L. Marcellini  
William A. Xanten, Jr.  
Miles S. Roberts  
Guy A. Greenwell  
Charles W. Pickett, Jr.  
Michael L. Davenport  
Judith A. Block  
Sheryl Gilbert  
Cynthia G. Turner  
Samuel W. Beeler  
Caldwell Graham  
Tony J. Olds  
Herbert R. Stroman, Jr.  
Robert R. MacLeod  
Michael J. Johnson  
Moses Benson, Jr.  
George H. Adams  
James A. Taylor  
Charlotte A. Brown  
Carole A. Browning

General Curator  
Mammalogist  
Research Curator, Herpetology  
Curator, Mammals  
Curator, Mammals  
Curator, Birds  
Curator, Birds  
Curator, Reptiles  
Registrar  
Animal Specialist  
Animal Specialist  
Animal Keeper Foreman  
Animal Keeper Foreman  
Animal Keeper Foreman  
Animal Keeper Foreman  
Administrative Officer  
Training Coordinator  
Commissary Manager  
Procurement Assistant  
Commissary Foreman  
Secretary  
Secretary

**Office of Zoological  
Research**

John F. Eisenberg  
Helmut K. Buechner \*  
Devra G. Kleiman  
Gerald G. Montgomery †  
Eugene S. Morton  
Carolyn Dorsey  
David Mack  
Eugene Maliniak

Resident Scientist  
Ecologist  
Reproduction Zoologist  
Zoologist  
Ornithologist  
Biotechnician  
Biotechnician  
Biotechnician

\* Deceased, October 1975.

† Transferred to Smithsonian Tropical Research Institute, January 1976.

Michael Deal  
John Hough  
Larry Newman  
Betty Howser  
Wyotta Holden

Keeper  
Keeper  
Keeper  
Administrative Assistant  
Administrative Officer

#### Visiting Scholars and Graduate Students

Wolfgang Dittus  
John Seidensticker  
Rasnayagam Rudran  
A. Lang Elliot  
Margaret A. O'Connell  
Susan Wilson  
Robert Hoage  
Charles Brady  
Kenneth Green  
Christine Schonewald  
Todd Davis  
Rebecca Field  
Doris Watt  
R. Medford

Research Associate  
Research Associate  
Research Associate  
Smithsonian Pre-doctoral Fellow  
Smithsonian Pre-doctoral Fellow  
Pre-doctoral Research Associate  
Pre-doctoral Research Associate  
Pre-doctoral Research Associate  
Pre-doctoral Research Associate  
Pre-doctoral Research Associate  
Pre-doctoral Graduate Student  
Pre-doctoral Graduate Student  
Pre-doctoral Graduate Student  
Pre-doctoral Graduate Student

#### Office of Animal Health

R. Mitchell Bush, D.V.M.  
Clinton W. Gray, D.V.M.  
Philip K. Ensley, D.V.M.  
Thomas Schneider  
Lena May Bush  
Robert Douglas

Head  
Senior Veterinarian  
Veterinary Intern  
Biotechnician  
Biotechnician  
Keeper

#### Office of Pathology

Richard J. Montali, D.V.M.  
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Joan Zaremski  
Russell Davenport  
Leonard Harrell  
Joan Albert

Head  
Supervisor, Clinical Pathology  
Laboratory  
Medical Technologist  
Histological Technologist  
Autopsy Technician  
Secretary

#### Conservation and Research Center

Christen M. Wemmer  
Larry Collins  
Mary McComas  
Marleigh Hartman  
Leo Slaughter  
Berkeley Pomeroy  
Truen McDaniel

Curator-in-Charge  
Conservation Project Officer  
Administrative Assistant  
Clerk-Stenographer  
Animal Keeper Foreman  
Farm Foreman  
General Maintenance Foreman

<b>Office of Education- Information</b>	Judith White Judith King Emily Rudin Sybil Hamlet Michael Morgan Mildred Haltiwanger	Chief Program Assistant Education Writer Information Officer Information Assistant Secretary
<b>Office of Graphics and Exhibits</b>	Robert E. Mulcahy Joseph Falletta Jordan Ross Benjamin Butterfield Warren Cutler Max Hirshfeld Avanell Martin	Chief Visual Information Specialist Exhibits Specialist Exhibits Specialist Illustrator Photographer Administrative Assistant
<b>Office of Police and Safety</b>	Samuel L. Middleton Howard Maley Donald Grist Vincent McGoldrick Herbert Bell Stewart Lucas Raymond Luckey Robert Ruffin Anthony Kadlubowski	Chief Lieutenant Sergeant Sergeant Sergeant Sergeant Sergeant Sergeant Health and Safety Coordinator
<b>Office of Facilities Management</b>	Emanuel Petrella Robert Hacker Michael O'Brien  Robert F. Ogilvie Robert T. Chesley Carl F. Jackson Samuel W. Gordon James E. Deal  James E. Pearson  Thelma Davis	Chief Deputy Chief Facilities Maintenance and Repair Specialist General Foreman, Maintenance Unit Chief, Transportation Unit Chief, Services Unit Chief, Grounds Unit Chief, Property and Procurement Unit Employee Counselor and Development Coordinator Administrative Assistant
<b>Office of Construction Management</b>	Robert C. Engle David Boothe Norman Melun Walter Dobbins	Construction Manager General Engineer Staff Architect Architect

Fred Barwick  
Betty Schaad

Contracting Officer  
Administrative Assistant

**Office of Management  
Services**

Joe Reed  
Marilyn Keefe  
James Fitzpatrick  
Peter Kibbee  
Wilda Dooley

Chief  
Budget Analyst  
Accounting Technician  
Administrative Assistant  
Management Services Assistant

**Friends of the  
National Zoo**

Permanent Staff

Sabin Robbins  
Dennis Baker  
Cathy Kanak  
Director, Susan Trencher  
Assistant to the Director, Donna  
Schlegel  
Education Assistant, Maggie Morton  
Secretary, Mary Sawyer  
Director, Monica Morgan  
Assistant to the Director, Carla  
Goheen  
Computer Typist, Fran Bernstein  
Manager, Mike Gill  
Assistant Manager, Danny Daniels  
Assistant Manager, Jo Daniels  
Shop Manager, Claire Farnsworth  
Assistant Manager, Lisa DiGirolamo  
Shop Assistant, Wilma Platt  
Department Head, Renée Caldwell  
Maintenance Supervisor, Lawrence  
Chesley  
Mechanic, Kevin Polen  
Accountant, Norma Gay  
Bookkeeper, Cathy Ferguson  
Personnel Assistant, Mary Massey

Executive Director  
Associate Director  
Secretary  
Education and Volunteer Services

Membership and Publications

Food Services Department

Merchandising Department

Trains, Parking, and Maintenance  
Department

Business Office

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