



THE CRASH

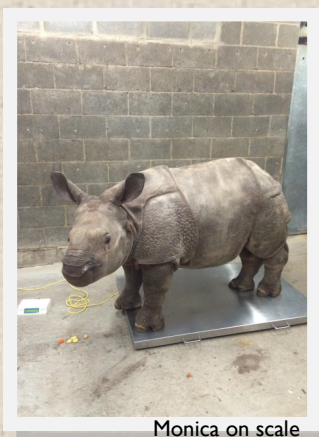
Newsletter for rhino professionals

February 2015

President's Perspective

Jane Kennedy, President
International Rhino Keeper Association

As a new year begins we all look back at the year that has passed. For rhinoceros it has been an up and down year. We again had a greater one-horned rhino born through artificial insemination. "Monica" came into the world in June and is now a healthy "little" girl topping 900 pounds! She is the apple of her keeper's eye, Joe Häuser and named for her "Al mom" Dr. Monica Stoops. Dr. Stoops and the Buffalo Zoo team worked together perfecting the technique



Monica on scale

for inseminating "Tasha" with sperm from deceased bull "Jimmy" who died in 2004. It took the first time they tried! Joe will be sharing at our Rhino Keeper Workshop how he and the team were able to have such success the first time out. Joe also leads our training committee and would love to talk to you about how you train your calves for a future article in the Crash. This issue's training article is about crate training, by Mike Connolly. Mike will also be attending the RKW sharing a Facility Focus on the Tulsa Zoo and Living Museum.

The Updated Rhino Husbandry Manual is finally here! Lara Metrione and Adam Eyers have been working on this updated manual for some time. It is a living document and will require correction from time to time. Its electronic format fits the need for updating as information changes. While the entire RHM is available online, we have chosen to share excerpts from it here on the Crash to help better develop keeper skills. Our first segment will cover acknowledgments and the overall crisis facing rhinos. These short segments will tie together topics in an easier to read format. At 327 pages reading the RHM in one sitting can be a daunting task, we hope breaking it up may encourage all of us to read it and use it as a reference for caring for our rhinos. A special thank you to Susie Ellis of IRF and Steve Shurter Chair of the RAG for allowing us to reprint parts of the manual in the Crash. Please note as you are reading that in just a few short months since publication some information is already outdated. Corrected information is noted in parenthesis.

Unfortunately, we have also had set backs in the world of rhino conservation. A record 1215 rhinos were poached last year in South Africa alone. Poaching has reared its ugly head with rhino losses in areas that have been safe for many years. Namibia, which had gone years without poaching, now is trying the extreme of de-horning some of its rhinos in an attempt to save them. Drastic times require drastic measures.

For me personally the passing of Angalifu the northern white rhino (Angi to us) was a difficult time. We all knew Angi's time was coming because he was at least 42! The longevity for NWR is 44, so he was close to the end. As a team we had been using stem cell therapy to help him with his chronic arthritis. I had hoped to share a positive outcome at the RKW this June, but that was not to be. Angi died on Sunday, Dec 14th; we were planning an immobilization Dec. 17th to better evaluate his condition. His passing a

Inside this issue:

Pre and Psrt RKW Trips	3-4
Rhino Crate Training	5-7
IRKA info	8
Rhino Husbandry Manual	9-13
New/Renewing Members	14
Supporting Institutions	15-16

few days before confirmed our fears that he was much sicker than we thought. On necropsy we found he had metastasized cancer, something stem cell therapy can't help. I will still share Angi's story at the RKW, but from a different perspective. With his death there are now only 5 NWR left in the world. Our lone female NWR Nola is receiving extra pampering because she is age 40 plus! We have now transitioned to a hospice care plan for her knowing her time is coming soon. What we do for this species can make a difference for all rhinos; membership in the IRKA can help us all better learn how to care for our aging rhino population, and how to help ensure all rhinos have a future on our planet.

The RKW is coming along well; the Chester Team is doing a smash up job for us! Speaker abstracts are rolling in and this promises to be another great workshop. Dr. Susie Ellis will again deliver "The State of the Rhino" as our opening keynote speaker. Her European counterpart Cathy Dean, of Save the Rhino International (SRI), will moderate on Tuesday's "Rhino May Day." Some of us may not know the Rhino May Day is hosted by SRI and the London Zoo, and is an annual event. It is a special opportunity for both the IRKA and SRI to meld their rhino meetings, enhancing both.

The scholarship application period is over and we will soon notify you of those who will qualify for financial help. Please remember our policy has been to award either by direct payment of the registration fee by the IRKA, or by receiving a check at the RKW for you to deposit later. Because we are traveling overseas, it will not be feasible to give US dollars at the RKW. Also since the scholarship amount may exceed the registration fee, those who chose to have the IRKA pay their registration fee may receive an additional check at the RKW. Application does not guarantee receiving a scholarship, but we will do our best to accommodate all.

Finally I'd like to encourage all of you to consider hosting the RKW in 2017 or 2019. The next few RKWs should be in North America. We have had several zoos ask about information, but have not received applications to host as of yet. The best way for us to serve you is to know ahead of time who may be interested in hosting in the future. Please feel free to contact me or any board member about hosting a RKW at your facility. Remember, regional RKWs are another way to host without having all of the responsibility fall on one facility.

I look forward to seeing you this June, and pray you and your rhinos have a prosperous new year.

As always: Learn. Share. Save.



Dave Gonzales-retired lead keeper with Angi in 2010

Pre and Post Rhino Keeper Workshop Trips

Pre-RKW Trips

Port Lympne Wild Animal Park, Thursday, June 11th, 2015

TBD

www.aspinallfoundation.org/port-lympne

West Midland Safari & Leisure Park, Friday, June 12th, 2015

Contact Person: Noel Carey, Head Keeper of Ungulates: noel.carey@wmssp.co.uk

West Midlands Safari Park was first opened in 1973 and is 200 acre site split into three main areas. The 'Safari Adventure' is a drive through animal reserve divided into a number of sections housing a variety of different species including Southern white (1.4) and Greater one-horned rhino (1.2), the latter since 2010. The second area is the 'Discovery Trail' which has a sea lion theatre, penguin cove, reptile house and aquarium. The third area is the 'Adventure Theme Park', which encompasses a number of rides and amusements.

Pre-RKW Trip Includes:

- Ø Free Park Admission.
- Ø Operating Hours: 10am-4pm
- Ø One Meal Voucher for Lunch.
- Ø Behind the Scenes Tours: 10:15am or 12pm or 2pm or 4pm (14 passenger mini bus).
 - o Driving delegates around the animal reserves & a stop at the Asian Rhino House. Delegates can view the rest of WMSP at their leisure.
- Ø Limited to 56 delegates due to the capacity of the minibus tours.

www.wmssp.co.uk

RKW June 14th-18th, 2015 Chester Zoo

<http://www.chesterzoo.org/plan-your-visit/whats-on/irka-workshop>

Post- RKW Trips

Knowsley Safari Park, Friday, June 19th, 2015

Contact Person: Jonathan Moss, Rhino Keeper: J.Moss@knowsley.com

Knowsley Safari Park is a 5 mile long drive located near to Liverpool. Our Rhino enclosure is a mixed exhibit within 100 acres. We have 9 White rhino at the collection and have a very successful breeding program. We have had 14 calves in the last 10 years ranking us in the top 10 breeders worldwide and top 3 in Europe. We are currently trialing a new way of running our crash to see if we can get our 2nd Gen captive bred female pregnant.

Post-RKW Trip Includes:

- Ø Free Park Admission.
 - Ø Operating Hours: N/A
 - Ø Lunch at a discounted rate.
 - Ø Behind the Scenes Tours: You may arrive as early as 9am to explore the walk around area.
- Please meet at the picnic area at Knowsley Safari Park for the Tours beginning at 10am.

www.knowsleysafariexperience.co.uk

Flamingo Land, Saturday, June 20th, 2015.

Contact Person: Thijs van den Houten, Zoo Keeper: thijsvandenhouten@flamingoland.co.uk

Flamingo Land is the most visited zoo in the UK. Set in a 350 acre theme park and holiday resort the zoo houses 130 species. The zoo currently houses two bachelor white rhinos on behalf of the EEP, and has done so for the last 10 years, keeping six in total. In April 2014 the zoo will open its new Indian rhino facility and hopes to house a breeding group in the future.

Post-RKW Trip Includes:

- Ø Free Park Admission.
- Ø Operating Hours: N/A
- Ø Catered Lunch.
- Ø Behind the Scenes Tours: There will be behind the scenes tours of the rhino facilities & giraffes. Time: TBD

www.flamingoland.co.uk



Rhino Crate Training at the Tulsa Zoo

By Mike Connolly

Late summer 2014 presented the animal care staff at the Tulsa Zoo with a new and unique challenge. We needed to crate train our two white rhinos, Buzbie and Jeannie, to safely and effectively relocate them from the exhibit they had been housed in since the mid 80's to their new exhibit, the Mary K. Chapman Rhino Reserve. As soon as our operations department was wrapping up the finishing details on the crate that would be utilized for the transport, we began brainstorming on just how we would embark on this adventure.

As we all know, there are often several possibilities to accomplish a goal and crate training rhinos is no different. While we had confidence in both our abilities as rhino care professionals and our rhinos cooperativeness, we decided to initially stage the large crate just outside the rhinos access shift door leading from the barn to the exhibit. We also decided that we would limit the rhinos access to the crate during training sessions only as we had some concerns they might damage it if left access to it unsupervised and/or overnight. Therefore once training sessions were complete, we shifted the rhinos into an adjacent yard. Fortunately the weather cooperated for us during the majority of this timeframe.

Our crate was constructed with wood for the most part with steel reinforcement along the top, bottom, and sides of the crate. The front and back of the crate had vertical metal sliding pipes and two separate Dutch doors on each end. Staging the crate just outside the barn in an area that the rhinos were already familiar with shifting in and out of helped expedite the training. To introduce them to the crate for

the first time we decided to stage the crate outside the barn after shifting the rhinos in for the morning. While we speculated our rhinos would take to it fairly well, we were surprised that on the first day both approached, entered, and exited the crate very quickly. To begin with we left both ends of the crate wide open and were hoping each would pass through it and shift to an adjacent yard after passing through it. For this step, as one would expect, we coaxed them utilizing many different tools including diet and body positioning. Basically anything to get their initial focus on the crate and us was utilized to encourage them to head

in the direction we needed them to. Once the first rhino passed through the crate, we shifted them into a separate yard from where the crate was staged and kept a staff person assigned to this rhino so that the process could be repeated with the other rhino without the other interfering. During this process, we utilized their daily ration of Mazuri ADF-16 as well as a minimal amount of alfalfa hay, some alfalfa cubes, and on a couple of occasions fresh cut grass clippings to maintain their interest and keep their focus. Following sessions with each of the rhinos, we decided to restrict them to the lower adjacent yard minus the crate so that their only access to it was monitored. After they were both familiar passing through the crate, we decided to have the vertical slider pipes in place to the front end of the crate prior to shifting them in. This step did not faze them and they readily entered the crate and remained in the crate accepting primary reinforcement from animal care staff unless otherwise instructed. We then instructed them to back out of



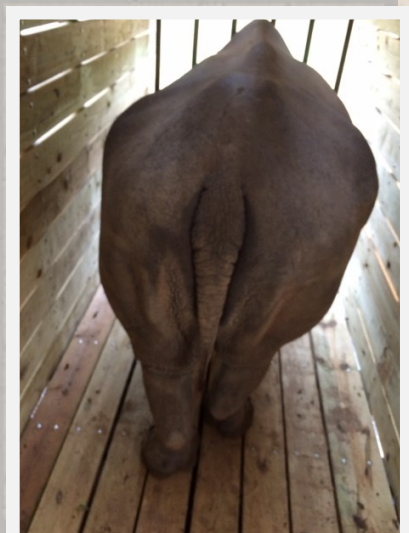
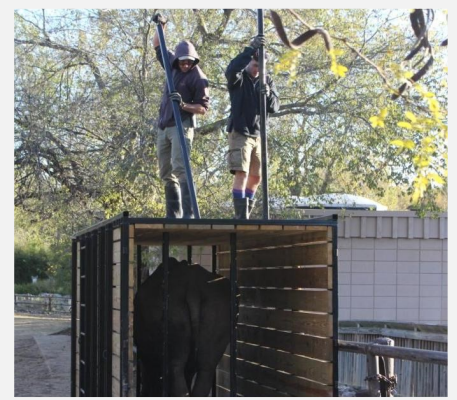
the crate and back into the barn stalls. This step was actually one that took the most encouragement and coaxing as they were a little uneasy about going backwards and making the 6-8 inch step downward out of the crate. We decided to remove the vertical sliding pipes at the front of the crate after the rhinos backed out of the crate and were secured in the barn. We thought this would be better than trying to remove the vertical slider pipes with them directly on the other side. Once the vertical slider pipes were removed, we then shifted them through the crate into the adjacent yard. Animal care staff stationed the first rhino worked with into the lower yard while the process was repeated with the second rhino. On most days, staff was able to work two sessions into a day but if staffing or time did not permit one session occurred. Our next step was to have staff on top of the crate when the



rhinos entered the crate as they would need to be there to place the rear vertical sliding pipes in place behind the rhino. Once again, this step was no big deal to the rhinos and we very quickly began placing vertical slider pipes behind them two at a time. Our crate was designed to have up to six of these vertical slider pipes in place in front of and behind the rhinos so two staff members could easily place these slider pipes in place and remove them quickly. Initially we just put the slider pipes in and almost immediately removed them. We started with just placing two in and removing them until we worked our way up to all of them. These steps took no time at all. Because of little to no response from our rhinos we were able to quickly increase the duration of time they remained in the crate. This was never an issue for us but we wanted to be diligent to release them only when calm and cooperative. Our next step was to get them acclimated to noise

and other activity in and around the crate. Staff on top of the crate became more and more active making more and more noise. While we were unable to completely mimic the equipment and activity that would occur on the actual day of the move we did what we could including driving a skid loader around the yard and right up to the crate with the rhinos secured in the crate all along reinforcing them for calm and cooperative behavior. We decided that because the rhinos were accepting this whole process so well that we did not need to add the Dutch doors to either end of the crate. It was our intention to put these in place the day of the move to minimize their vision and more effectively enclose them in hopes of keeping them calmer. We did not feel this step would be a big deal to them and needless to say, these Dutch doors were extremely heavy and cumbersome.

I can proudly say that our rhinos were fully crate trained in less than two weeks. Since the physical move of the rhinos kept getting delayed we decided to remove the crate from their exhibit as we were getting to the time of year when weather might necessitate us needing to give the rhinos access to the barn, shelter, and supplemental heat. Our management preferred for the crate to remain staged in the exhibit so we compromised by putting it back in the exhibit after a couple of weeks and placing it in another section of the exhibit parallel to their perimeter fence so that we could still allow the rhinos indoor access to the barn overnight without the crate becoming a bottleneck as we were concerned it could become a negative for them. For quite some time the crate remained in the exhibit with the rhinos and much to our surprise they did not really mess with it



much that we could ever tell. A few weeks out from the actual physical move, we decided to see how they would train with the crate in this different location from where previous sessions occurred. They amazed us again by picking right up where they left off. We were able to do sessions with both rhinos in the same yard by simply stationing one at the far end of the yard while the other rhino was trained.



Because of what I believe was a well thought out training plan, constant and continuous communication, as well as two incredibly cooperative and willing participants we were able to accomplish our goal without any issues on the morning of November 10, 2014. On the day of the actual move we did put three of the four Dutch doors in place but we decided to leave the front, lower Dutch door off so that we

could continue delivering primary reinforcement to the rhinos during the move. As soon as the first rhino was safe and secure in their new barn, we repeated the process with the second. As is usually the case, the second move went much quicker due to the fact that by moving the first one, the equipment (crane, flatbed truck, etc.) was familiar with what was needed for the second. Within minutes each rhino backed out of the crate and settled into their new home quickly and comfortably. We decided to back them out of the crate and into the new barn so that they would exit slower and not be as likely to injure themselves. All along verbal praise from those they know best was utilized. We also decided to broadcast some of their fecal matter in the new barn in hopes that it would help settle them if they were agitated.

I am extremely proud of the animal care staff's commitment to seeing this process through. Everything that was asked of them they delivered. Discussion was held between animal health and animal care staffs to evaluate the potential need for sedatives before and during the move. In the end, the decision was made to not administer any sedatives due to the short, on grounds, move as well as how well the rhinos had progressed in general during the training process. Many of us were more concerned that by administering anything ahead of time, that it might limit the rhinos capabilities and inadvertently make them more suspicious and leery. Animal health staff was present the entire time, however, and plans were in place in case we needed them to intervene.

We could not be more pleased with how well our rhinos crate trained. We realize they are white rhinos and much more relaxed and laid back than other species of rhinos. We also recognize that Buzbie and Jeannie are individually even more relaxed and laid back than many other white rhinos. However, they still have their moments and crate training in this manner was completely new to them and the staff that cares for them. What we were able to accomplish was only possible due to every member of our team understanding and executing their responsibilities. What worked for us may not work for others but I hope you are able to gain something from our experience. We certainly feel more confident in our abilities as animal care professionals and are pleased to have helped make this move one of little to no stress for our rhinos. The entire rhino training process and physical move required several departments working together. Animal care, animal health, operations, and security all played vital roles to see the entire process through and we are thankful for everybody's contributions. After all, we are here for the rhinos and always will be!



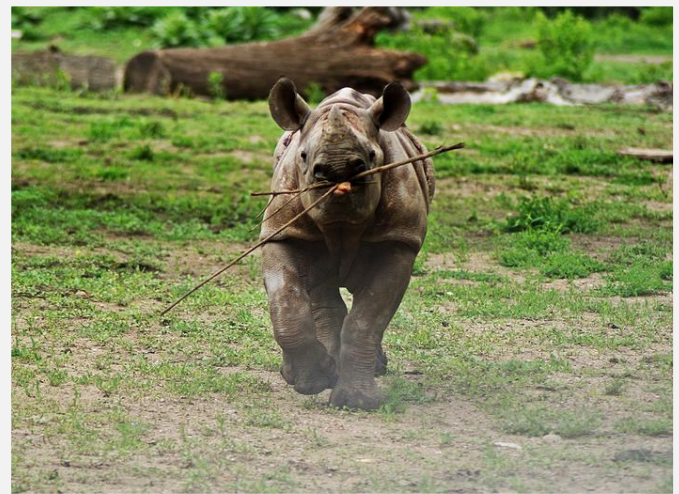
The IRKA is seeking a new Election Committee Chair!

Are you interested in becoming more involved in the IRKA? We are seeking a new Election Committee Chair! The Election Committee Chair is responsible for running the Board of Directors' election every July. This position is active from April – August with tasks such as: sending out the call for nominations, obtaining nominee biographies, advertising the election, preparing the ballot, and notifying the membership of the election results. This is a great, easy way to become more involved in the IRKA. It also provides you with the opportunity for professional development and to network with fellow rhino keepers worldwide. If you have any questions or would like more information please email Stephanie Richmond at srichmo41@gmail.com. If you are interested in becoming the new Election Committee Chair please email Jane Kennedy at janekenedy_rka@cox.net.

2015 Rhino Conservation Calendar

In 2014, we sold out of 600 Rhino Conservation Calendars in 12 weeks! The IRKA has produced the Rhino Conservation Calendar for three years now and we have raised close to \$30,000, all of which went directly to rhino conservation projects! The funds raised from the sale of the 2015 Rhino Conservation Calendar will go towards the resources needed for the Javan Rhino Conservation Program's Rhino Protection Units (RPUs) and the removal of the invasive Arenga palm. It is estimated that there are fewer than 50 Javan rhinos remaining in one population in the Ujung Kulon National Park (UKNP), Java's largest remaining lowland forest tract. The population is thought to be stable, but unlikely to grow without intervention as the UKNP is probably at carrying capacity.

The RPUs are highly trained anti-poaching teams that intensively patrol key areas within areas containing rhinos. RPUs deactivate traps and snares and apprehend illegal intruders, including poachers, and investigate crime scenes, thus preventing or reducing the loss of wildlife. RPU patrols have proven to be a successful deterrent to rhino poaching as there have been no reported rhino poaching deaths in UKNP for the past 15 years. An invasive palm (*Arenga obtusifolia*) is rampant in UKNP, and if not controlled, will continue to reduce the growth of Javan rhino food plants and have further serious impacts on plant and animal diversity in the park. An estimated 60% (18,000 hectare) of the Park is covered with *Arenga* palm. The UKNP currently manages a number of plots, no more than 5 contiguous hectares, to reduce *Arenga* palm and after the removal is completed, staff closely monitors plant density and distribution in the plots.



The UKNP does not have the resources to adequately fund proactive measures to prevent harm to its diverse, at-peril biodiversity. As human populations increase and threats from illegal activities, such as poaching and encroachment grow, the protection provided by the RPUs and trained locals remain crucial for the survival of Indonesian fauna and their habitat. 2015 Conservation Calendar Update Trans-abdominal examination Calendars on sale now for \$27 each (free shipping domestic and international) Go to www.internationalrhinokeeperassociation.org to order yours NOW!

Rhino Husbandry Manual

Lara Metrione and Adam Eyres
Editors

INTERNATIONAL RHINO FOUNDATION
Association of Zoos and Aquariums Rhino Advisory Group
Metrione, L. and Eyres, A. (Eds.) 2014.

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PREFACE

A rhinoceros husbandry manual is a dynamic document, representing our current understanding of the rhinoceros in managed settings, and presenting a diverse set of parameters and recommendations for managing this unique, iconic mammalian taxon in zoo collections. In 1996, the Association of Zoos and Aquariums Rhino Advisory Group (AZA RAG) and the International Rhino Foundation (IRF) collaborated to produce the first Rhinoceros Husbandry Resource Manual, published by the Fort Worth Zoo and edited by Michael Fouraker and Tarren Wagener. This excellent reference has weathered the times, and with great relevance to rhino husbandry in 2013, the historic document has formed the basis for this new edition.

Recognizing that the depth of our rhino management experience has improved, that our skills, tools and techniques have been refined, and that targeted research projects have shed new light on our base of knowledge, the RAG and IRF have worked to gather crucial new information and input to update the Rhinoceros Husbandry Manual. At the 2009 bi-annual working meeting of the AZA RAG, held at Fossil Rim Wildlife Center, the Steering Committee formed a working committee and developed the outline for the 2014 Rhinoceros Husbandry Manual. A second planning meeting was held at the San Diego Zoo Safari Park in 2010 to review progress and refine the production process.

Management of four rhinoceros species, white rhino, black rhino, greater one-horned rhino and Sumatran rhino, all established in zoological facilities in North America, is the focus of this manual. The life history and distribution of the Javan rhino is discussed in Part I and in Appendix A. This manual presents recommended guidelines for the successful maintenance of rhinos in the zoo setting given the scientific data currently available. These guidelines represent current optimal recommendations for participation in the AZA's Species Survival Plans (SSPs) and in no way reflect U.S. Department of Agriculture (USDA) minimum standards. Although necessary for participation in rhinoceros SSPs, the guidelines do not supersede USDA mandates for the exhibition of rhino species. Additional information concerning these recommendations may be gathered by contacting the respective SSP coordinators. It should also be emphasized that these recommendations are guidelines, and in all

cases common sense concerning enclosure design and routine zoo animal management should be used. Parameters exclusive to an individual institution also must be considered (e.g., climate, local and state laws, etc.). As a living document, the AZA RAG and IRF intend this information to be revised and updated on a regular basis. The electronic format provides opportunities for revision as new information comes forward and/or as new husbandry and management techniques are developed. While much data was compiled for this manual, many holes in the knowledge-base still exist. It is our intention that this manual be the catalyst for scientific inquiry into the management of rhinos in zoos and conservation centers. To that end, there have been updates made to this document over the years, and this DVD is the most up-to-date document available at this time. The goal is to be able to update the manual quickly and to keep the most relevant issues available to rhino managers and facilities that may decide to work with rhino species in the future. The format has been developed in anticipation of the inclusion of reports and projects developed through inter-national collaboration between SSPs, EEPs and TAGs in other zoo associations and regions. We hope you find this document to be an important resource for rhino management.

PART I CRISIS FOR RHINOS

In the middle of the last century, all five rhino species were widely distributed and most abundant throughout Asia and Africa. As of mid-2013 only about 29,000 rhinos of all kinds survive in the wild. Another 865 exist in captivity (Table 1.1). However, more than 80% of these rhinos, both in the wild and in captivity, are of a single species, the white rhino (*Ceratotherium simum*). The other four species combined comprise fewer than 8,500 individuals. Populations have been growing for the past several years for all but the Sumatran rhino (*Dicerorhinus sumatrensis*), which has rapidly decreased, and the Javan rhino (*Rhinoceros sondaicus*), which we believe has remained relatively stable (Fig. 1.1). Although there has long been a debate among conservationists as to whether subspecies are different enough that they should be conserved as separate units, in some cases, such as the Sumatran and Javan rhinos, subspecies issues are superseded by the species' severely limited numbers. This provides only a small number of management options—the least of which may be genetic in nature.

The Javan rhino is the rarest of the species, with a total population estimated at between 35 and 44 in the wild and none in managed breeding situations. The last individual of the Javan rhino subspecies *Rhinoceros sondaicus annamiticus* was declared extinct in Vietnam in 2010 by World Wildlife Fund and the International Rhino Foundation; now only one population remains in Indonesia's Ujung Kulon National Park (Brook et al., 2012). However, while the Javan rhino is fewer in number, the Sumatran rhino's rapid decline (roughly 75% over the last 20 yr) makes it the most critically endangered of all the rhino species and perhaps of any large mammal. The IUCN officially declared the northwestern black rhino (*Diceros bicornis longipes*) extinct in the wild in 2013, and the northern white rhino (*Ceratotherium simum cottoni*) became extinct in the wild in 2008.

There are, however, success stories in rhino conservation. With concerted government commitment and efforts by dedicated conservationists, including protection and consolidation of populations, three of the five rhinoceros species have slowly recovered from the brink of extinction. Southern white (*Ceratotherium simum simum*) and greater one-horned or Indian rhinos (*Rhinoceros unicornis*) have both come back from fewer than 100 animals in the early 1900s, now numbering more than 20,000 and 3,000 respectively. Black rhinos (*Diceros bicornis*) faced a serious poaching crisis in the early 1990s, which led to the loss of 97% of the population. Management measures, including consolidation of populations through targeted translocations, strategic dehorning, and active protection have helped the species recover to more than 5,000 animals, most living in fragmented populations. Significant black rhino populations now survive in only nine countries (South Africa, Namibia, Kenya, Zimbabwe, Tanzania, Zambia, Malawi, Swaziland and Botswana, in descending order of population size). Unfortunately, rhino poaching is now rampant again, with poaching losses threatening to overshadow previous conservation progress in population growth.

The Cause of the Crisis

Rhino species have faced many different challenges over the past few decades. As with many endangered species, fragmentation and loss of habitat is an important factor, but not the major cause of the rhino's decline. The greater global problem is overexploitation through poaching for rhino horn. Rhino horn has been used for centuries in traditional Chinese medicine as a fever reducer. China has been the primary consumer country until recently. Now, the burgeoning market is in Vietnam, where the economy has rapidly grown and purchasing power is increasing. In addition to traditional use, rhino horn also has been touted as a cancer cure and a purported hangover preventative in Vietnam. It also is given as a high-value gift item. In the Middle East, horn has been used to make dagger handles that confer social status, but this threat has paled in comparison to the growing consumption in Asia.

Africa

Rhino poaching is driven by crime syndicates that might have entered Africa as infrastructure (e.g., roads and building construction), and extractive industry (e.g., mining) contracts have been awarded to Asian companies operating in Africa. Poaching syndicates are highly systematic and strategic; poaching gangs are generally well-funded, well-equipped, and ruthless. From 2000-2007 there was a reduction in poaching in southern Africa, partly because of increased anti-poaching efforts. Since 2008, however, poaching has been on a steady increase. In South Africa alone, 333 rhinos were killed in known poaching events in 2010; by 2012, numbers had increased to 668 (about one rhino every 9 hr) and by the end of 2013, three rhinos were lost in South Africa to poaching each day (Fig. 1.2). The year 2013 may well prove to be the tipping point for African rhinos, with population growth unable to keep pace with poaching losses.

Asia

Nepal and India's greater one-horned or Indian rhino also is threatened by active and expanding poaching, but so far, to a lesser degree than African rhinos. In Malaysia, Sumatran rhinos have essentially been wiped out in the past ten years by poaching and habitat loss with recent information suggesting that only a handful of animals remain in one area in the state of Sabah.

Rapid decrease in numbers due primarily to poaching is the major, but not the only, problem encountered in the conservation of rhinos. Habitat loss and fragmentation is occurring in many areas, which leads to small isolated populations. Small and fragmented populations make it difficult for genetic exchange and adaptation to changing environmental conditions. This also may lead to long-term reproductive abnormalities as animals are less and less able to find each other to breed.

In Indonesia, rhinos are under greater threat from habitat fragmentation and loss to infrastructure development such as roads. Even with protection, with the exception of one national park (Way Kambas), Sumatran rhino numbers continue to slowly decline. Fortunately to-date, documented poaching has been rare in the last stronghold for Javan and Sumatran rhinos. If Indonesia's populations of rhino were to experience the poaching pressure seen in Africa, these two species would be wiped out within months.

Conservation of Rhinos

If rhinos are to survive long-term in the wild, they must be intensively managed and protected, with a spectrum of options to maximize options for the future need. These options represent a continuum with respect to intensive management required and range from management within protected areas or semi-free-ranging reserves to conservation centers to zoos.

Zoos and conservation centers may increasingly provide key portions to the available options within the conservation spectrum. Animals in these facilities can play a number of important roles, serving as: (1) ambassadors for their wild counterparts; (2) instruments for education for local communities and the general public-at-large, (3) research populations that allow scientists to learn as much as possible about the basic biology of species (which may be difficult to study in nature); (4) 'flagship species' to protect and call attention to other threatened wildlife that share their habitat; (5) an 'insurance' population that can be used to re-establish or revitalize wild populations that have been severely reduced or extirpated (provided that adequate protection measures can be put in place in former ranges); and (6) a means to attract attention and support, financial and otherwise. However, it must be emphasized that ex situ populations and programs are not a be-all and end-all in themselves; the prima-

ry purpose should be to support applied learning that can be used to assist the survival or recovery of the species in the wild.

As the rhino crisis intensifies, expertise in small population management may become more and more important. For some species, such as Sumatran, Javan and black rhinos, implementation of these principles may hold the only hope for future survival. Zoos and conservation centers are well-positioned to provide inputs using examples from highly-organized and scientific programs such as Species Survival Plans (SSPs). SSPs have traditionally been managed in the United States and Canada by Species Coordinators and Management Committees in cooperation with Taxon Advisory Groups (TAGs), which provide strategic perspectives and technical advice for SSPs and participating rhino-holding institutions.

Managed breeding, however, is not all genetics and demography. Basic husbandry, how to maintain healthy individuals and induce them to breed, is fundamental. There are major challenges for rhino husbandry in zoos and conservation centers, which may present some of the most formidable captive management challenges of any species. As a consequence, all taxa of rhinos maintained in zoos and conservation centers are in some degree of demographic difficulty. These demographic problems are causing genetic difficulties because some lineages are at risk of being lost as their representatives are not reproducing. Clearly, husbandry, demography and genetics interact; and all three are crucial to the conservation of rhinos, especially in managed breeding situations. Husbandry problems can impede intensive management of rhino species (Table 1.2). Specific problems include poor survivorship and high mortality, poor reproductive success and a fundamental lack of knowledge regarding basic rhino biology.

Species Status

Eastern black rhino

This species reproduces rather reliably in captivity, but management has not maximized the reproductive potential, and health/husbandry problems continue to negate the breeding success that has occurred. As a result, the species is in a demographic crisis; thus, it is imperative to increase reproduction through improved management and expanded capacity to grow the population.

Southern black rhino

Reproduction in this species has been moderate, with many of the initial births in captivity actually conceived in the wild. Captive reproduction is on the decline and mortality has been high (although much is probably due to toxin exposure in Africa). This species is now managed as a non-AZA population by the International Rhino Foundation, which is working with AZA facilities, private owners, and the native range countries.

Southern white rhino

Reproduction in this subspecies has been very uneven with only a few facilities, particularly those able to maintain larger social groups, propagating well. The majority of rhinos in institutions are not breeding at all; thus, the population is in demographic and genetic crisis. The age structure of the population is senescing, and not enough of the original wild-caught founders have reproduced. There have been numerous imports over the years, but many of those new imports continue to not breed. The demographics of the southern white rhino population are still in need of work, and hopefully some of the new imports will breed.

Northern white rhino

The program for this subspecies has been a failure to date. Only seven individuals survive, and reproduction in captivity has been limited (none in North America and none anywhere since 1989). (Corrected- female born in 2000.)

Intense efforts are in progress to induce reproduction, but the prospects are limited at best. Four of the last northern white rhinos in Dvur Kralove went to Ol Pejeta in Kenya and have been "released" with the southern white rhinos in the hope that even with hybridization, the northern white rhino genes may be maintained through offspring. All the wild northern white rhinos that had previously been in Garamba National Park, Demo-

cratic Republic of the Congo, were poached. There are no longer any wild northern white rhinos left in their former range.

(Corrected-There are now only 5 northern white rhino left on the planet. The only hope for this subspecies is assisted reproduction.)

Greater one-horned

This program has been relatively successful with the annual population growth rate about equal to what is occurring in the wild. However, much of the reproduction to date has been by a limited number of breeders; thus, the genetic diversity in the captive-born population is inadequate. Prospects do seem good for recruitment of more breeders from the existing captive population.

Sumatran rhino

This program has initially failed with numbers of individuals and founders low, no reproduction occurring and the death rate high (30% of those imported in the 1980's). However, in 2001, the Cincinnati Zoo was successful in breeding their pair of Sumatran rhinos and producing the first birth in captivity in 112 years. Since then, they have produced a total of three calves. One male was shipped back to Sumatra to join the managed breeding program at the Sumatran Rhino Sanctuary in Way Kambas National Park and has sired a calf there. Unfortunately, the adult female at Cincinnati has since died and the prospect of future zoo breeding in the U.S. is dependent on a sibling pairing at Cincinnati. (Corrected-only the male is left in Cincinnati.)

Poor Survivorship/High Mortality

The browsing rhinos, black and Sumatran, in particular have problems with poor survivor-ship/high mortality under intensive management. The black rhino has been afflicted with many health problems (e.g., hemolytic anemia, severe ulcers on skin and mucous membranes, liver dysfunction). Both species are affected by iron storage issues, which may lead to other complications.

Poor Reproductive Success

Reproduction in all four of the species that have been maintained in zoos and conservation centers is less than optimal. In general, greater one-horned, black and, to a lesser extent, white rhinos reproduce well in managed breeding situations if species-specific needs are met. Captive managers are still struggling to understand the spectrum of these needs. Although reproductive challenges have now been overcome for the Sumatran rhino, the learning curve was very steep before the species could be reliably maintained and bred. For no species of rhino in captivity is reproduction reliable or routine.

Poor Understanding of Basic Biology

Compared with many other groups of organisms under intensive management, aspects of the basic biology (e.g., nutritional, reproductive, behavioral) of rhinos is poorly known. Nutritional problems are suspected to be of particular significance to the health and perhaps the reproductive difficulties of rhinos, particularly the browsing species. Behavioral issues also may interfere with successful husbandry. Various physiological and psychological challenges are believed by some researchers and managers to be underlying causal factors for many of the specific disease syndromes in rhinos. In recognition of husbandry challenges, a major goal of SSPs and the TAGs that facilitate them is the production of husbandry manuals, which can lead to successful management and propagation of species in captivity.

The Future

In the coming decades, as rhino husbandry and small population management are refined in zoos and conservation centers, these techniques will undoubtedly have broader application to the intensive management of increasingly fragmented wild rhinoceros populations. Ex situ populations can contribute positively to the conservation of rhino species in nature, but only if we use these populations to gather as much information as possible that can be applied to proactive management in situ. Rhino-holding institutions also have the obligation to educate the public about the plight facing this magnificent taxonomic group, which grows more imperiled every day.

New and Renewing members

Natasha Ryles Walker	Monarto Zoo	Alisa Sandor	Cleveland Metro Park Zoo
Anita Scaff		Kristin Forker	Busch Gardens
Robyn Johnson	The Maryland Zoo	Kat Kleinschmidt	
Michael Burns	Lowry Park Zoo	Judy Stephens	Detroit Zoo
Matt James	Lowry Park Zoo	Tim Junker	Houston Zoo, Inc.
Allison Nall	Lowry Park Zoo	Susan (Lemley) Petrunio	Knoxville Zoo
Kate Ranos	Lowry Park Zoo	Louis Keeley	Blank Park Zoo
Kendra Stout	Lowry Park Zoo	Erin Carey	
Steve Crews	Lowry Park Zoo	Sara McGinnis	Rolling Hills Wildlife Adventure
Angela Belcher	Lowry Park Zoo	Candice Dymek	Tanganyika Wildlife Park
Christopher Massaro	Lowry Park Zoo	Melle van Iperen	Rotterdam Zoo
Patricia Metrione		Tony Smith	Dallas Zoo
Henry Opio	Uganda Wildlife Ed. Center	Daniel Ziegler	Rhino Resource Center
Jayne Hoffman	Little Rock Zoo	Robert Olmstead	Tanganyika Wildlife Park
Jennifer MacNaughton	Busch Gardens Tampa,		
Lisa Moore	ABQ BioPark Zoo		
Justin Smith	Fossil Rim Wildlife Ctr		
Sean Ramsdell	Busch Gardens,		
Sabrina Misesk	Lincoln Park Zoo		
Katherine Heffernan	Great Plains Zoo		
Sabrina Linn	University of Vet Medicine Hannover, Institute of Zoology		
Michele Huck			
Stephanie Reid	Columbus Zoo and Aquarium		
Amy Rose			
Mark Marquardt			
Roxane Losey			
Liah Etemad			
Karen Stiven			
Victoria Salmons			
Amanda Siegel			
Todd Schwenk			
Elizabeth Berkeley			
Michelle Mackenzie			

Congratulations on births at:

Blair Drummond Safari Park, Scotland
The Wilds
SDZ Safari Park

Condolences to :

Louisville Zoo
Ol Pejeta Conservancy
Werribee Open Range Zoo
SDZ Safari Park

Institutional Supporters

The Supporting Institutional Membership is for any conservation organization, or zoological institution which supports rhino conservation in accordance with the objectives and purpose of the IRKA. These memberships are available for \$100, \$500 and \$2000. Why should your zoo be interested in joining on this level? If your institution contributes on the \$500 level then all rhino keepers membership fees at your zoo are waived! It is important that as the IRKA grows that we continue to garner the support from all facilities that are responsible for the protection and management of all species of rhinoceros. We would like to extend our appreciation for this substantial support to the following institutions, and hopefully we can add your zoo to this growing list! If you have questions about institutional memberships or any other questions please contact us at

internationalrhinokeeperassoc@gmail.com.

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