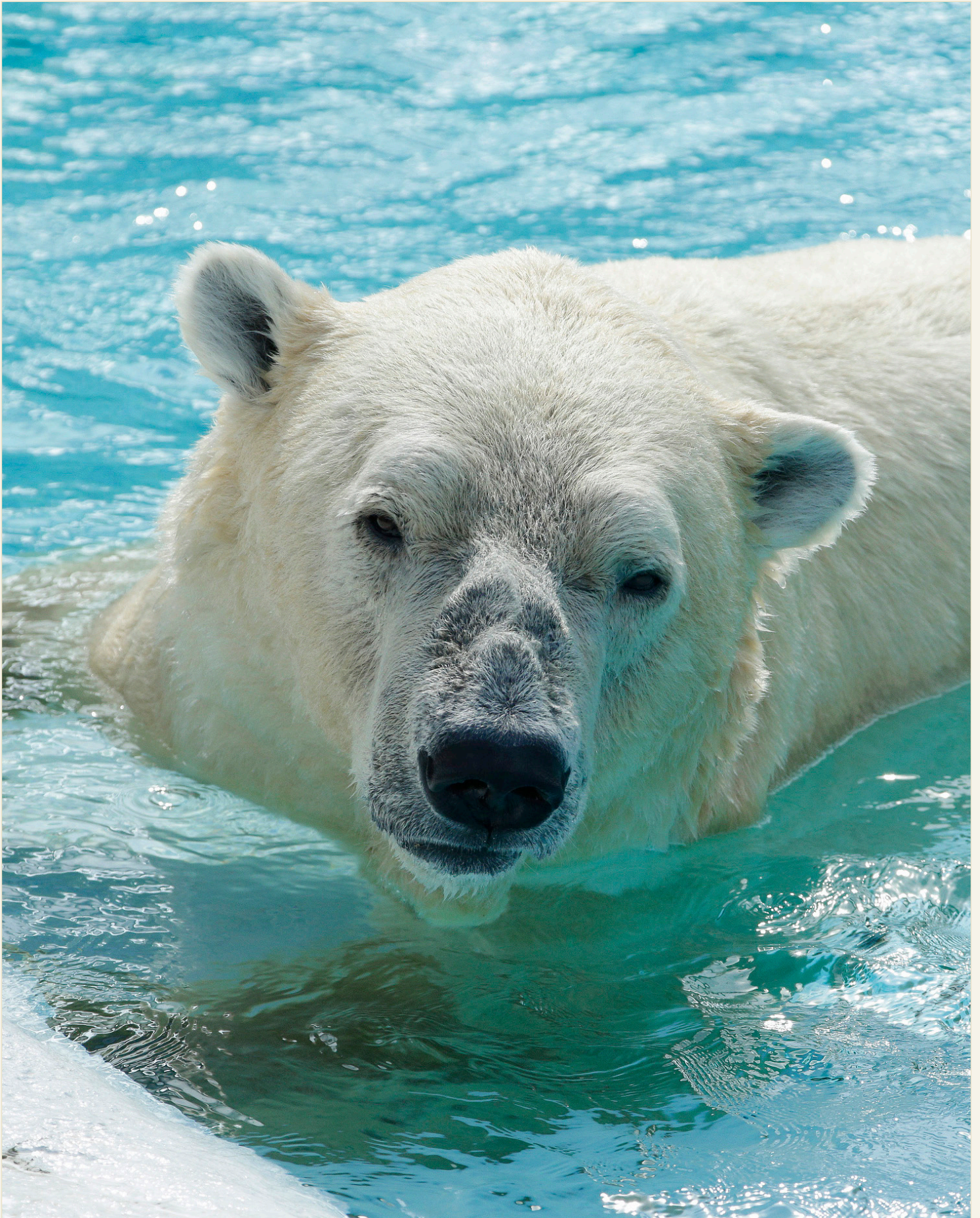


MANDAI PARK HOLDINGS
YEARBOOK
2018-2019



MANDAI PARK HOLDINGS

Mandai Park Holdings (MPH) is the parent company for Wildlife Reserves Singapore (WRS) and Mandai Park Development (MPD). WRS is the operating arm of MPH, and is responsible for Jurong Bird Park, Night Safari, Singapore Zoo and River Safari. WRS is dedicated to the management of world-class leisure attractions that foster conservation and research, while educating guests about animals and their habitats.

A self-funded organisation, WRS also collaborates with various partners, organisations and institutions aimed at protecting local and global biodiversity. In this financial year the four parks welcomed just over 5 million visitors for the first time, with Jurong Bird Park contributing 0.77 million, Night Safari 1.3 million, Singapore Zoo 2.1 million and River Safari just under 1 million.

MPD works on refreshing the Mandai district to become a world-leading nature and wildlife district. Once the project is completed, Mandai will feature five zoological parks, two indoor nature-themed attractions, a variety of accommodation options, an array of new restaurants, extensive public spaces and a wildlife bridge to allow animals safe passage across Mandai Lake Road.



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MESSAGE

from Chairman & Group CEO



S Dhanabalan
CHAIRMAN
MANDAI PARK HOLDINGS



Mike Barclay
GROUP CEO
MANDAI PARK HOLDINGS

The 2018/19 financial year commenced on a sombre note. We witnessed the rapidly declining health of Inuka, Singapore Zoo's beloved polar bear, despite the best efforts of his care team. The difficult decision to euthanise Inuka was made with the knowledge that his health issues had eroded his quality of life and seriously impacted his welfare. News of Inuka's ill health and passing triggered an outpouring of love and grief over the loss of one of Singapore's icons. We would like to thank everyone for their support as we came together to mourn the passing of this very special polar bear.

WRS became the first international member of the Zoo and Aquarium Association of Australasia (ZAA) and the first zoological institution to have double accreditation from both ZAA and the European Association of Zoos and Aquaria (EAZA). Undergoing these accreditation processes helps us to affirm that our animal care and operations are of the highest international standards. With the accreditations, we are now able to participate more fully in managed breeding programmes across the Australasian and European regions to ensure the long-term sustainability of animal populations in human care. We now participate in 77 species-specific breeding programmes.

Our primary conservation focus continues to be on threatened Southeast Asian species in need of

in-situ protection, supported by ex-situ management programmes. And there's no better place to start than our own backyard here in Singapore. To save one of our iconic native animals, the critically endangered Sunda pangolin, we contributed to the multi-party effort to develop a National Conservation Strategy and Action Plan, which was launched by Mr Desmond Lee, Minister for Social and Family Development and Second Minister for National Development. The highlight of the launch was the release of a rescued pangolin, Sandshrew. This pangolin became the first of his species to be hand-raised for the purpose of reintroduction back to the wild. His release process is a prime example of acting on the species-specific strategy plan and will help inform future pangolin rehabilitation and release protocols. We are confident the plan will help us coexist harmoniously with pangolins in our densely populated country.

Local wildlife research continued to benefit from the Wildlife Reserves Singapore Conservation Fund (WRSCF), which supported a total of 12 projects, up from nine last year. Beyond our shores, WRS funded 31 conservation projects, with a key focus on threatened Southeast Asian species such as the Sumatran elephant, orangutan, black crested macaque, freshwater turtles and songbirds.

At the same time, we have deepened our direct involvement in saving another endangered species. Nine months after they first flew to the Solomon Islands to care for 112 malnourished Santa Cruz ground-doves rescued from poachers, staff of Jurong Bird Park returned to the Islands to select 60 ground-doves and bring them back to Singapore to establish an ex-situ assurance colony. We are pleased to report that the doves are breeding well. Eventually, we hope to reintroduce the birds to their native habitat.

WRS also supported and hosted conservation strategy meetings, a key one being the first official meeting of the Asian Songbird Trade Specialist Group (ASTSG) since its inception in 2017 under the auspices of the International Union for Conservation of Nature, Species Survival Commission (IUCN/SSC). Another IUCN SSC initiative we hosted was the Asian Species Action Partnership (ASAP). With WRS' funding and help in capacity building, ASAP has grown to include 80 partners working to conserve 199 critically endangered land and freshwater

Southeast Asian species. By gathering researchers and conservationists from around the world, we hope we can collectively bring about the kind of evidence-based change and impact needed to save endangered species.

On the home front, the Mandai Rejuvenation Project is progressing well, with the new Bird Park and quarantine buildings beginning to take shape and a wildlife bridge being constructed across Mandai Lake Road. The bridge, as well as the new quarantine buildings, are slated for completion in late 2019. Meanwhile, work has started on the 10-year WRS Development Masterplan, which will ensure we continue to upgrade and enhance our operating zoological parks in parallel with developing the new Mandai offerings.

In celebration of Singapore Zoo's 45th birthday, we introduced Rainforest Lumina, a multimedia night walk through the Zoo that offers guests an immersive and interactive experience in a forest setting. The Lumina experience is the first of its kind in Southeast Asia, attracting over 200,000 guests in its first season of operations.

Lumina and other guest experience innovations helped us to attract a record 5.2 million guests to our parks. Singapore Zoo was named the world's third best zoo in the 2018 Travellers' Choice awards by TripAdvisor. Night Safari was once again crowned Best Attraction Experience at the 2018 Singapore Tourism Board (STB) Awards, while Mr Emmey Mohamed Bin Nenpari from Night Safari walked away with the STB Best Customer Service award in the Attractions category. Our guest satisfaction score hit a record high of 85.3% and we had a record 179 winners for the 2018 Excellent Service Awards (EXSA) organised by the Association of Singapore Attractions (ASA). Every year, ASA honours the best of the Star category winners with the EXSA Superstar award. Our congratulations go to Chandran A/L V P Kunhikannan from Night Safari for bagging this ultimate award.

On the environmental sustainability front, WRS was proud to receive the Singapore Packaging Agreement (SPA) Excellence Award in recognition of our efforts to eliminate single-use plastics from our operating parks. We have also made notable strides in green procurement and the adoption of best practices in water, energy and waste management.

Our annual Sustainability Campaign in October continues to be the flagship of our advocacy efforts. Last year, we introduced the concept of 'The Deadliest Monster' to cast a spotlight on plastic waste as the biggest danger to health of marine animals. Building on the success of this effort, we rallied our guests and community to join us to 'Fight the Deadliest Monster' by reducing their use of plastic disposables.

Apart from hosting some 7,000 beneficiaries from various Social Service Organisations, we enhanced engagement with guests from disadvantaged backgrounds to create inclusive and meaningful wildlife experiences for them. With the support of the World Association of Zoos and Aquariums (WAZA) Nature Connect grant, we launched a specially curated programme 'Let's Play Outside' for families with autistic children. This programme, co-created with the Autism Resource Centre, was greatly appreciated by the families as it allowed the children to explore nature in an assuring and inclusive environment.

In response to the extremely positive feedback received for our Wow Wild Learn (WWL) Programme in Chinese, a collaboration between the Committee to Promote Chinese Language Learning and WRS, we have expanded WWL to include the Malay and Tamil languages. We would like to thank the Ministry of Education for their generous support in the successful launch of this initiative.

Through our varied educational offerings, we engaged more than 398,000 school children, park guests and members of the public during the reporting period. This was made possible with the help of our volunteers who have worked tirelessly with us to raise public awareness and inspire people to do the right thing to protect biodiversity.

It has been a year of tremendous achievements. We would like to thank our board and committee members for their guidance, and our partners, members, adopters, donors and volunteers for their unwavering support. Last but not least, we would like to express our appreciation to our staff for their dedication and commitment. We look forward to your support in the coming year as the Mandai Rejuvenation Project takes shape and we continue to deliver world-class animal care, expand our conservation footprint and inspire people to protect wildlife.

our vision

To be a world-leading zoological institution that inspires people to value and conserve biodiversity.

our mission

We provide meaningful and memorable wildlife experiences with a focus on protecting biodiversity in Singapore and the region.

our values

ethics



excellence

We strive for the highest standards in all we do.



hospitality

We serve from the heart.



integrity

We are honest and fair in all our dealings.



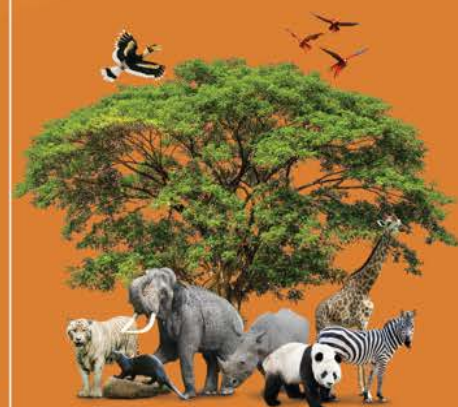
care for wildlife

We protect wildlife and provide excellent care for our Living Collection.



teamwork

We achieve more together.



sustainability

We embrace sustainable best practices.



The Triple Bottom Line, Strategic Thrusts & Sustainable Development Goals (SDGs)

3Ps STRATEGIC THRUSTS SDGs

PLANET

Provide World-class Care For Our Living Collection




Be A Regional Leader In Environmental Sustainability & Conservation




PEOPLE

Apply Leading Organisation & HR Practices




Forge A Strong National Love & Pride For Our Parks




PERFORMANCE

Create Exceptional Guest Experiences



Ensure Long-term Commercial Viability





OUR COMMITMENT TO KEY SUSTAINABLE DEVELOPMENT GOALS (SDGs)



QUALITY EDUCATION

Our parks are living classrooms that strengthen early childhood and multi-disciplinary learning, including the mother tongue languages, as well as 21st century competencies through volunteerism, work attachment and career guidance. Through our educational offerings, we empower guests, including those with special needs and from disadvantaged backgrounds, with the chance to learn about wildlife and connect with nature. Robust training for our staff facilitates lifelong learning and acquisition of specialist skills.



AFFORDABLE AND CLEAN ENERGY

We review energy consumption in our parks through comprehensive audits. We are converting to energy-saving electrical devices and solar panels. We have converted all trams at Jurong Bird Park to run on electricity. The principle of using clean energy through innovative solutions guides all development work in Mandai.



SUSTAINABLE CITIES AND COMMUNITIES

We galvanise the community to refuse single-use plastic and to choose sustainably-sourced products. We save 1.3 million single-use plastic bottles per year by providing water refill points in our parks. This year, we received the Singapore Packaging Agreement (SPA) Excellence Award, in recognition of our efforts to reduce, reuse and recycle packaging waste.



RESPONSIBLE CONSUMPTION AND PRODUCTION

We embrace sustainable best practices through a stringent procurement process for sustainable products. We use certified segregated sustainable oil for cooking and we serve sustainable seafood in all F&B outlets. We use paper packaging for drinking water, in place of plastic. Other than reducing energy consumption and single-use plastic, we also cut down on food waste in our operations by creating closed loop systems.



LIFE BELOW WATER

Through River Safari, we highlight the fragility of river ecosystems to our guests, and encourage them to take action to protect freshwater life forms, which are disappearing faster than those on land or in the sea. We support local and regional conservation projects to protect biodiversity in aquatic ecosystems. We spread the message on plastic pollution and rally our guests to join us in taking sustainable action.



LIFE ON LAND

We provide world-class care for the animals in our living collection, which serve as ambassadors to connect people with the natural world. Through conservation messaging with a strong call to action, we encourage people to do their part for wildlife. We work with other zoos through Managed Species Programmes to save threatened species. We support local and regional conservation and are directly involved in saving endangered wildlife such as the Santa Cruz ground-dove.



PARTNERSHIP FOR THE GOALS

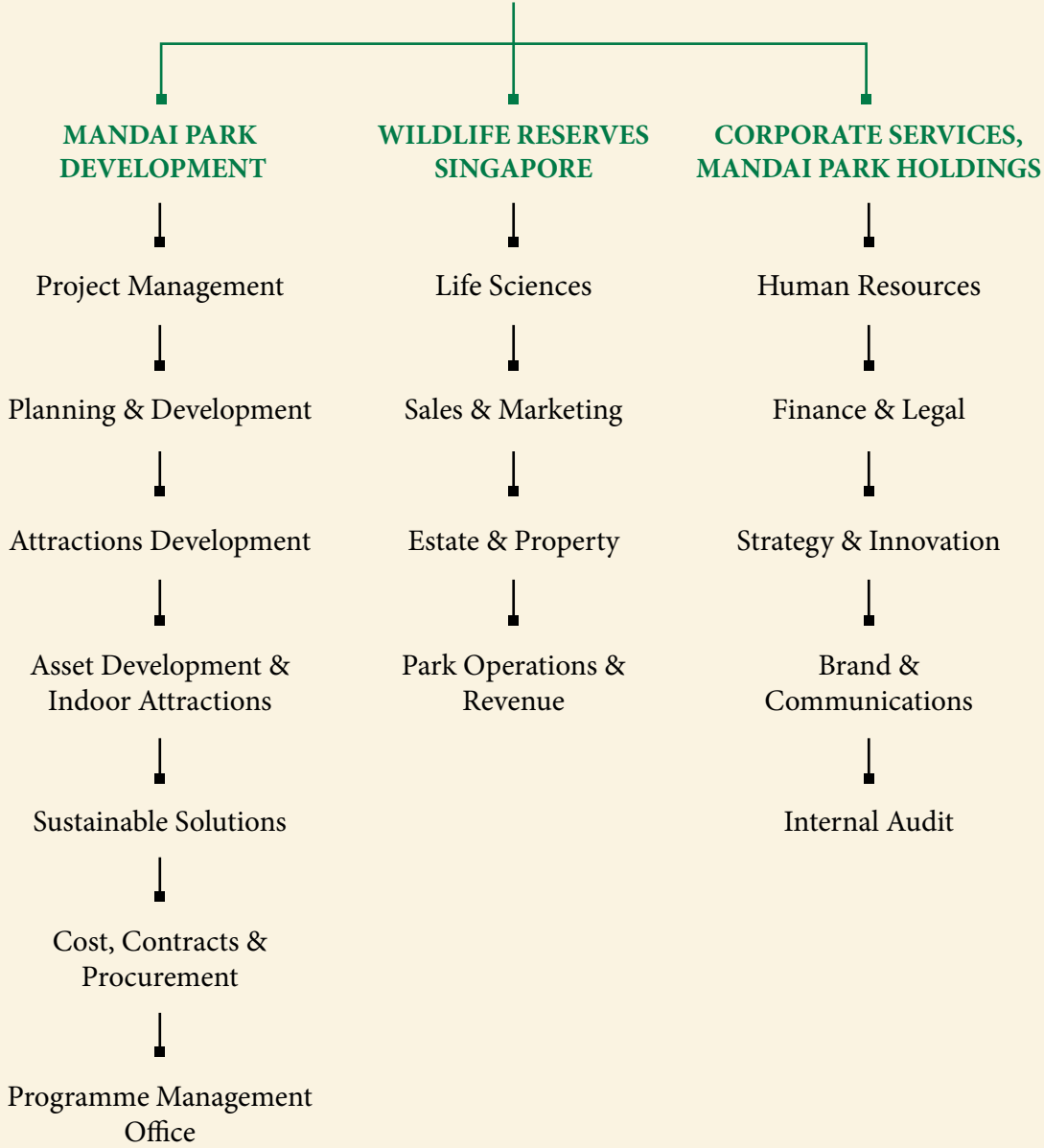
We forge strong partnerships, locally and globally, with wildlife institutions, conservationists, NGOs, governmental agencies, businesses, sponsors, donors, schools, volunteers and various communities to achieve our goals.



ORGANISATIONAL STRUCTURE

MANDAI PARK HOLDINGS

Mike Barclay
Group CEO
Mandai Park Holdings



BOARD OF DIRECTORS

MANDAI PARK HOLDINGS

CHAIRMAN

Mr S DHANABALAN

Mr S Dhanabalan is also Chairman of Temasek Trustees Pte Ltd, the philanthropic arm of Temasek. He serves on the board of GIC. He is a member of the Council of Presidential Advisers as well as the Presidential Council for Minority Rights. Mr Dhanabalan has been the Patron of the Singapore chapter of Habitat for Humanity since September 2003.

DEPUTY CHAIRMAN

Mr TAN Chuan-Jin

Mr Tan Chuan-Jin is the current Speaker of the Parliament of Singapore. He has served as the Minister for Social and Family Development, as well as the Minister for Manpower. He is currently Advisor to the National Council of Social Service, and also oversees SG Cares, the national movement that works towards building a more caring society. He is the President of the Singapore National Olympic Council and Chairman, Advisory Board of Healthway Medical Corporation Ltd. Mr Tan is also the Patron of SHINE Children and Youth Services, Club Rainbow and Centre for Fathering.



DIRECTORS

Mr Mike BARCLAY

Mr Barclay holds the position of the Group CEO of Mandai Park Holdings. He also serves on the Board of the Changi Airport Group, the Raffles Hospital Ethics Committee and the Governing Council of the World Association of Zoos and Aquariums.

Ms Claire CHIANG

Ms Claire Chiang is the co-founder of Banyan Tree Hotels & Resorts and the Chairperson for China Business Development, Banyan Tree Global Foundation, Wildlife Reserves Singapore Conservation Fund, Singapore Book Council and Shirin Fozdar Program in Singapore Management University. She is a director of ISS A/S, Denmark and Dufry AG, Switzerland. She is also a member in the Advisory Committee for Guilin Tourism University and School of Hotel and Tourism Management of Hong Kong Polytechnic University.

Mr KEE Teck Koon

Mr Kee is the Executive Director of NTUC Enterprise Co-Operative Limited, the holding entity of NTUC FairPrice, NTUC Income, NTUC Health and seven other social enterprises. He is also a director of two public listed companies, namely, CapitaLand Ltd and Raffles Medical Group Ltd. Mr Kee is the Chairman of Changi Airports International (CAI), Deputy Chairman of NTUC Income, and also sits on the boards of Fullerton Fund Management Company and Lien Foundation.

Ms NEO Gim Huay

Ms Neo Gim Huay is Managing Director, Sustainability of Temasek International Pte Ltd. She sits on the Boards of Surbana Jurong Pte Ltd, Singapore National Library and the Intellectual Property Office of Singapore. She is also the Secretary of Eisenhower Fellowships Singapore.

Mr Dilhan Pillay SANDRASEGARA

Mr Sandrasegara is Chief Executive Officer of Temasek International Pte. Ltd. He serves on the boards of the Singapore Management University, the National Research Foundation in Singapore, Singapore Innovate Pte. Ltd and Enterprise Singapore. He is also a member of the Future Economy Council and the Financial Centre Advisory Panel of the Monetary Authority of Singapore.

Mr LAM Yi Young

Mr Lam Yi Young is Deputy Secretary (Industry) in the Ministry of Trade and Industry. He serves on the boards of CapitaLand Commercial Trust Management Limited, EDB Investments Pte Ltd, JTC Corporation, Sentosa Development Corporation and Singapore GP Pte Ltd.

Professor TAN Chorh Chuan

Professor Tan is Executive Director of the Office of Healthcare Transformation as well as the Ministry of Health's Chief Health Scientist. He is on the Board of Directors of the Monetary Authority of Singapore, and of the Health Promotion Board. He is also a member of the Yale-NUS Governing Board and Senior Advisor to the Boards of the National University Health System and Duke NUS Medical School.

Mr SIM Hwee Cher

Mr Sim is a Council Member of Community Chest, Member of Duke-NUS Medical School Centre for Ageing, Research and Education (CARE) Advisory Board, Council Member of the National Youth Achievement Award Association, and Director of Mandai Park Holdings Pte Ltd, The Esplanade Co Ltd, NTUC Income and UOL Group Ltd.

Professor Leo TAN

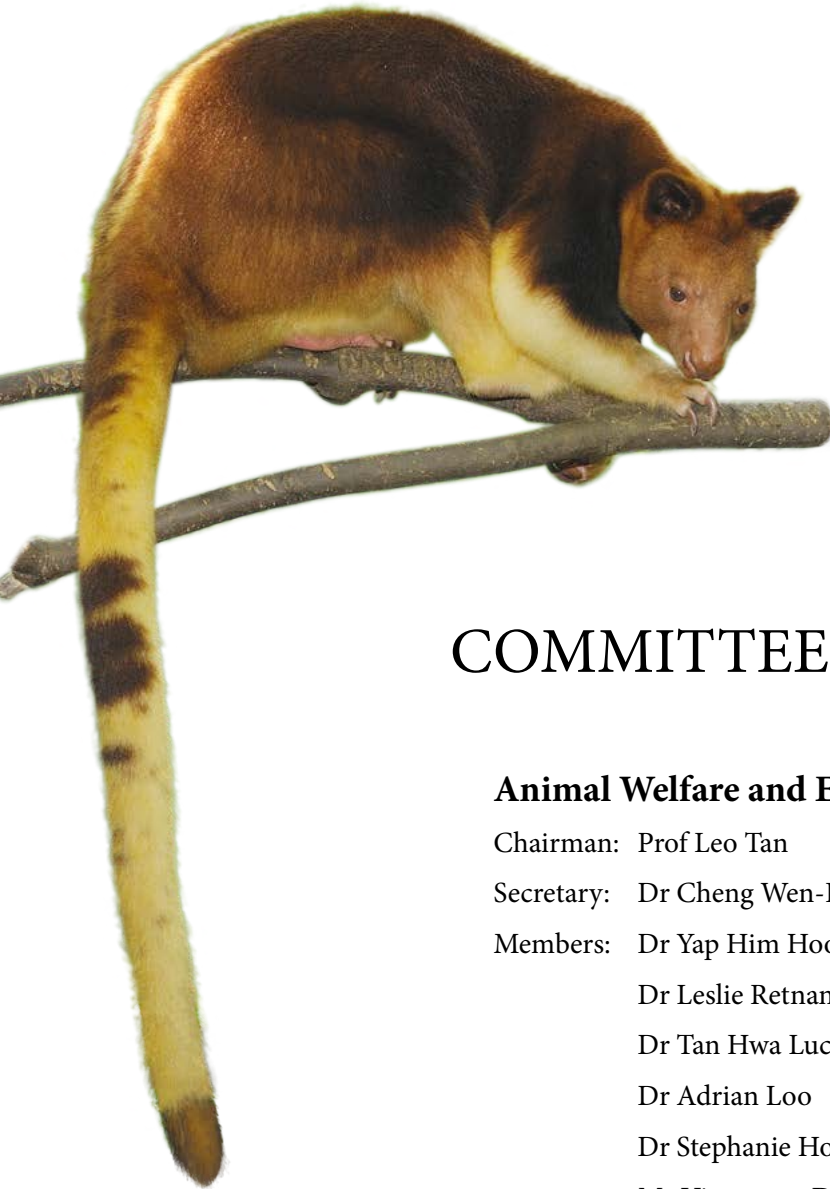
Professor Tan chairs the Temasek Foundation Innovates, and the Science Sub-Commission of the Singapore National Commission for UNESCO. He is Singapore Governor of Asia-Europe Foundation (ASEF), a Fellow of the Singapore National Academy of Science and Governing Member of the Singapore Environmental Council.

Mr Stephen FORSHAW

Mr Forshaw is the Head, Public Affairs and Managing Director, Australia and New Zealand for Temasek. He also serves on the board of the Real Pet Food Company.

Ms CHONG Siak Ching

Ms Chong Siak Ching is the Chief Executive Officer of National Gallery Singapore and Head of the Visual Arts Cluster (VAC) Singapore comprising the Singapore Art Museum, Singapore Tyler Print Institute and the National Gallery Singapore. She is a Director on the Board of Singapore Press Holdings and also a member of the Yale-NUS Governing Board. She is Singapore's Non-Resident Ambassador to the Republic of Chile.



COMMITTEE MEMBERS

Animal Welfare and Ethics Committee

Chairman: Prof Leo Tan

Secretary: Dr Cheng Wen-Haur

Members: Dr Yap Him Hoo

Dr Leslie Retnam

Dr Tan Hwa Luck

Dr Adrian Loo

Dr Stephanie Ho

Mr Vinayagan Dharmarajah

Prof Joseph Chun

Mr Mike Barclay

WRSCF Specialist Panel

Chairman: Dr Shawn Lum

Secretary: Dr Jessica Lee

Members: Dr Benjamin Lee

Dr Huang Danwei

Dr Cheng Wen-Haur

Dr Leong Tzi Ming

Dr Sonja Luz

Dr Norman Lim

SENIOR MANAGEMENT

- | | |
|----------------------------------|--|
| Mr Mike BARCLAY | ▪ Group Chief Executive Officer & Executive Director, Mandai Park Holdings |
| Dr CHENG Wen-Haur | ▪ Deputy Chief Executive Officer & Chief Life Sciences Officer |
| Mr Benjamin TAN | ▪ Deputy Chief Executive Officer & Chief Commercial Officer |
| Mr LEONG Yue Kheong | ▪ Deputy Chief Executive Officer Mandai Park Development |
| Mr Melvin TAN | ▪ Chief Estate and Property Officer |
| Ms LOW Wai Peng | ▪ Chief Financial Officer |
| Mr Marcus HENG | ▪ Chief Human Resources Officer |
| Ms Isabel CHENG | ▪ Chief Marketing Officer |
| Ms Sherri LIM | ▪ Chief Park Operations & Revenue Officer |
| Ms Belina LEE | ▪ Chief Strategy & Innovation Officer |
| Mr Marc CREMADES | ▪ Vice President, Attractions Development |
| Ms HO Hui Ching Suzanne | ▪ Vice President, Brand & Communications |
| Mr CHIA Gim Peng Chris | ▪ Vice President, Cost, Contracts & Procurement |
| Mr TANG Siew Wah Terrence | ▪ Vice President, Digital |
| Ms LOW Min Hwee | ▪ Vice President, Finance |
| Ms TAN Mui Tian Karen | ▪ Vice President, Internal Audit |
| Ms Jolene GOH | ▪ Vice President, Legal |
| Mr David TK GOH | ▪ Vice President, Project Management |
| Mr NG Kong Wey Kenneth | ▪ Vice President, Project Management |
| Dr LEE Hui Mien | ▪ Vice President, Sustainable Solutions |
| Ms Gail LAULE | ▪ Director Animal Presentation |
| Dr Sonja LUZ | ▪ Director Conservation, Research & Veterinary Services |
| Ms May LOK | ▪ Director Education |
| Mr CHAM Tud Yinn | ▪ Director Exhibit Design |
| Mr Donald TAN | ▪ Director Facilities Management |
| Mr Steven WONG | ▪ Director Finance |
| Mr Steven TAN | ▪ Director Food & Beverage |
| Mr George KYAW | ▪ Director Horticulture |
| Ms May YEO | ▪ Director Human Resources |
| Mr Thomas CHUA | ▪ Director Information Technology |
| Ms Daisy LING | ▪ Director Jurong Bird Park |
| Ms Sandy LEE | ▪ Director Marketing |
| Ms Kelly CHEW | ▪ Director Procurement |
| Ms Jean CHOI | ▪ Director Sales |
| Mr Kumar PILLAI | ▪ Director Special Projects |
| Mr Andrew CHAI | ▪ Director Technical Services |
| Dr Luis Carlos NEVES | ▪ Director Zoology |

ADOPTERS & DONORS

Jurong Bird Park

Goodwood Park Hotel Limited
 Hong Leong Foundation
 Lee Foundation Singapore
 M1 Limited
 M1 Limited
 SPH Foundation Ltd
 State Bank Of India (Singapore)
 The Shaw Foundation Pte

Brahminy Kite, Ronnie II
 Flamingoes from the High Flyers Show
 Penguin Coast
 Malayan Fish Owl, Tupa
 Great-Pied Hornbill
 High Flyers Show
 Flamingo Lake
 Fly Pass Macaws from the High Flyers Show

Night Safari

Goodwood Park Hotel Limited
 Haw Par Healthcare Limited
 JTB Pte Ltd
 JTB Pte Ltd
 JTB Pte Ltd
 Khoo Teck Puat Foundation
 M1 Limited
 Mitsui & Co. (Asia Pacific) Pte Ltd
 Mr. Martin Storey
 Singapore Refining Company Pte Ltd
 Starisland Travel Pte Ltd
 Thai Beverage Public Company Limited
 The Shaw Foundation Pte
 Trip.com

Fishing Cat Trail
 Malayan Tiger
 Lion
 Sambar Deer & Elephant
 Baby Elephant, Neha
 Fishing Cat Trail
 Hippopotamus
 African White Lion
 Babirusa
 Barasingha
 Indian Rhinoceros
 Asian Elephant, Chawang
 Slow Loris
 Asiatic Black Bear, Lance

River Safari

Arcadis Singapore Pte Ltd
 CapitaLand Limited
 Khoo Teck Puat Foundation
 M1 Limited
 Mitsui & Co. (Asia Pacific) Pte Ltd
 Starisland Travel Pte Ltd
 The Shaw Foundation Pte

Chinese Giant Salamander
 Presenting Sponsor & Conservation Donor of Kai Kai & Jia Jia
 Red Panda
 Jewel Tank
 Mekong Giant Catfish
 Alligator Snapping Turtle
 Manatee Feeding Program



Singapore Zoo

Alipay.com Co. Ltd
ams Sensors Singapore Pte Ltd
CTBC Bank Co. Ltd
DBS Bank Limited
Dimension Data Asia Pacific Pte Ltd
Gemini Travel N Tours Pte Ltd (SAEX)
Haw Par Corporation Ltd
Henkel Singapore Pte Ltd
Hong Leong Foundation
Hotel Properties Limited
House On The Hill Pte Ltd
Industrial And Commercial Bank Of China Limited
Jason's Pet Relocation (Singapore)
Kellogg Asia Marketing Inc.
Kentucky Fried Chicken Management Pte Ltd
Lee Foundation Singapore
Lee Foundation Singapore
M1 Limited
M1 Limited
Mitsui & Co. (Asia Pacific) Pte Ltd
Mrs Christina Ong
Ms Kay Kuok
Ms Nicola Barrett
Nomanbhoy & Sons Pte Ltd
NSL Ltd
Oiltanking Singapore Ltd
Peng Ya & Chen MuFeng
Petrochina International (Singapore) Pte. Ltd.
Samsung Asia Pte Ltd
SPH Foundation Ltd
Starbucks Coffee Singapore Pte Ltd
Starisland Travel Pte Ltd
State Bank Of India (Singapore)
Thai Airways International Public Co. Ltd
The Shaw Foundation Pte
Tour East Holdings Pte Ltd
Tradecom Services Pte Ltd
Trip.com
Wuthelam Holdings Pte Ltd

Elephant, Komali
Chimpanzee, Togo
Chimpanzee, Akinyi
Buddy Barn
White Rhinoceros
Cheetah
Leopard
Chimpanzee, Gangga
Fragile Forest
Orangutan, Adi
Giant Tortoise, Mahe
Cotton-Top Tamarin
Giant Tortoise, Astove
Primate Kingdom
Zebra
Orangutan, Chomel
Tropical Crops
Amhara Stone Village
Orangutan, Endah
Elephants at Work & Play Show
Orangutans, Binte & Saloma
Asian Elephant, Aprila
Memorial Bench
White Tiger, Keysa
Chimpanzee, Jengo
Giant Tortoise, Claude
Asian Elephant, Jati
Lion
White Tiger, Pasha
Celebes Crested Macaque at SPH Conservation Centre
Komodo Dragon
Gibbon Island
Asian Elephant, Gambir
Asian Elephant, Intan
The Shaw Foundation Amphitheatre
Jungle Breakfast with Wildlife
Chimpanzee, Ida
Giraffe, Marco
Rabbit

Wildlife Reserves Singapore - Event

DKSH Pte Ltd
Haw Par Healthcare Limited
HSBC Bank (Singapore) Limited
Lam Soon Singapore Pte Ltd
Pico Art International Pte Ltd
PT Bank Central Asia TBK

Singapore Zoo 45th Anniversary (May - June 2018)
Rainforest Lumina (July 2018 - Feb 2019)
Dragons and Beasts (Nov - Dec 2018)
Rainforest Lumina (July 2018 - Feb 2019)
Rainforest Lumina (July 2018 - Feb 2019)
Rainforest Lumina (July 2018 - Feb 2019)

YEAR IN REVIEW



Welcomed a record 5.2 million guests, a 4% increase over FY17/18.



Singapore Zoo was voted the world's third best zoo by TripAdvisor, while Night Safari was crowned the Best Attraction Experience by the Singapore Tourism Awards 2018.



Received accreditation from European Association of Zoos and Aquaria (EAZA).



Completed the schematic design for the Mandai Rejuvenation Project, while making significant progress on the construction of the new bird park and quarantine building.



Singapore Zoo launched new butterfly, fossa and Celebes crested macaque exhibits, while the Indian gharials were given a new home in Night Safari and Jurong Bird Park started to exhibit the iconic shoebill. River Safari launched a new animal presentation concept titled '*Once Upon A River*'.



Singapore Zoo turned 45; Rainforest Lumina night event launched to mark the occasion.



Received the Singapore Packaging Agreement Excellence Award for replacing all single-use plastic bottles in our parks with cans or paper cartons.



Contributed to the multi-party effort to save the Sunda pangolin in Singapore through the development of a National Conservation Strategy and Action Plan. This included releasing the Sunda pangolin Sandshrew back to the wild in Singapore, the first of his species to be hand-raised for reintroduction.



Supported 12 local and 31 regional/global conservation projects with funding and resources, while collaborating with other wildlife institutions to save 77 threatened species through Managed Species Programmes.



Engaged 398,000 children and adults on wildlife conservation and sustainability through in-park and outreach programmes with a strong call to action.





Caring for our Planet

Besides nurturing a highly-skilled team to deliver world-class care for our animals, we also drive conservation efforts by leading field conservation projects, supporting research and education, empowering people to take action, and building relationships with like-minded organisations.

FY18/19 HIGHLIGHTS

Provided care for **956** animal species, **25%** of which are threatened in the wild

Participated in **77** global managed species programmes to save these threatened species from extinction

Invested **\$2 million** in conservation projects and related work

Engaged and empowered **398,000** people through conservation and sustainability education

Replaced all single-use plastic bottles with **cans** or **paper cartons**

THE FUTURE OF MANDAI

The new Mandai precinct builds on our proud tradition of creating and managing world-class wildlife parks and experiences, and prepares the ground for us to continue in our leadership role in wildlife conservation, education and research well into the 21st century. Works for Rainforest Park and East Node commenced in early 2019, with construction for West Node and the new bird park well underway. The Mandai wildlife bridge and quarantine building are slated for completion by the next FY.

MORE PROTECTIVE MEASURES FOR WILDLIFE

The measures to protect wildlife along Mandai Lake Road are continually reviewed, and we regularly seek input from relevant stakeholders, including the nature community and wildlife experts. An added protective measure is the closure of Mandai Lake Road during non-operating hours

which coincides with the active hours for nocturnal animals.

We also obtained approval to decommission a pair of bus-stops along Mandai Lake Road. They may potentially impede to wildlife crossings due to their proximity to the temporary ground crossing, which local wildlife is known to use to cross Mandai Lake Road. Light curtains are also deployed at the temporary ground crossing

to discourage wildlife from crossing during Night Safari's operational hours.

In April 2018, we installed a rope bridge, the first in Singapore, to reconnect the two sides of the nature reserve divided by Mandai Lake Road since the 1970s. This is to facilitate safe crossings for tree-dwelling animals, while the wildlife bridge is being constructed.



Mandai Lake Road closure from 1.30am to 6.00am to facilitate wildlife crossings.



The rope bridge saw its first users – long-tailed macaques – within the first week of installation. A second rope bridge was put up across the water inlet near Mandai Lake Road in January 2019.

Temporary colugo poles were also erected along Mandai Lake Road, a first in Asia. Designed

to mimic tree trunks, the twelve poles are to help colugos glide with ease in the area.

In the longer term, as part of our re-greening strategy, we will be planting in many more native tree species which will go towards enriching local biodiversity and enhancing wildlife connectivity in the area.

1 & 2: Long-tailed macaques observed using the rope bridge along Mandai Lake Road.

3: A colugo settles on a high pole which mimics a tree trunk. These poles were specially designed with the gliding mammal in mind. 12 such poles have been installed along Mandai Lake Road to improve habitat connectivity.

4: Colugos glide from tree to tree using the skin flaps located along the sides of their body. These nocturnal creatures spend most of their waking hours foraging for leaves and young shoots.

DEVELOPING SENSITIVELY

We are committed to minimising impact to the surrounding environment during this development phase. Guided by the recommendations from our Environmental Impact Assessment, we continue to take in special consideration the flora and fauna in the area. This includes the restriction of construction hours to daylight hours to reduce disturbance to

the surroundings and mandatory biodiversity awareness training for all site workers to inculcate environmentally responsible practices on the project sites. Over 4,000 staff and workers received biodiversity training during the reporting period.

Regular site checks are also conducted to ensure contractors comply with our stringent environmental requirements. 250 environmental, health and safety inspections and more than

45 environmental compliance audits were carried out over the last FY.

To better understand the local biodiversity in the area where works are taking place, we continue to work with wildlife experts to conduct fauna and flora surveys. Analysis of the data collected allows us to respond quickly in the short-term and guides our long-term animal management plans and planting strategy.

A group of site workers undergoing biodiversity awareness training. Training is mandatory, and refresher sessions are conducted every six months, to ensure environmentally responsible practices on the project sites.



We work closely with our contractors to implement innovative best practices, as well as enhance existing measures. As part of capacity building efforts, we started to host Environmental Health and Safety Roundtable sessions where contractors of the different work sites came together to share effective measures, learnings and good practices that could be replicated across the work sites.



ENGAGING EXTERNAL STAKEHOLDERS

As we transform Mandai into an integrated wildlife and nature destination that will welcome even more guests, we stepping up external stakeholder engagement to develop meaningful partnerships.

To maintain open communications, we continue to engage regularly with members of the nature community. We have also introduced site visits

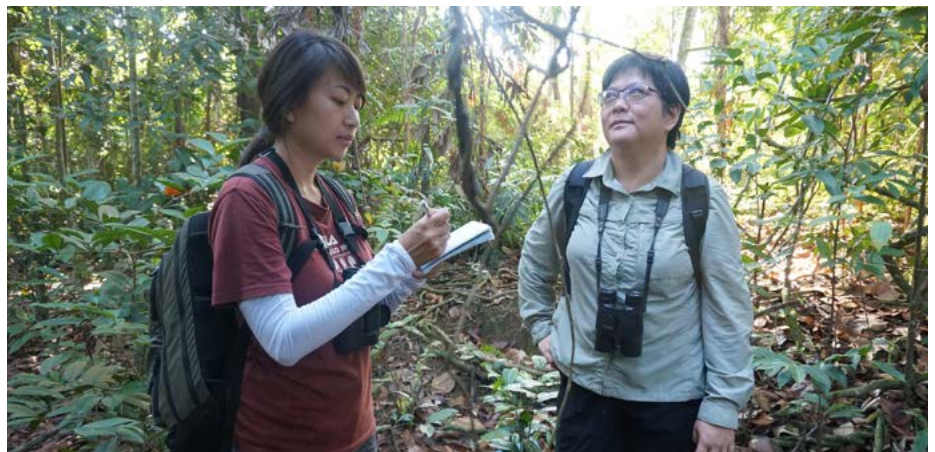
and small group sessions to create additional opportunities for interactions and robust discourse.

We launched our first series of workshops to extend our stakeholder engagement to individuals and organisations from the sustainability and research community. The two workshops were attended by more than 40 individuals and professionals

from private organisations, tertiary institutions, industry associations, environmental NGOs, community groups and government agencies. The workshops sparked discussions and generated an exchange of ideas around sustainability that could be implemented for the wildlife district, as well as research opportunities that could equip us with deeper understanding of local biodiversity.

Right (above):
Our Sustainable Solutions team conducting a work site audit. These audits are carried out monthly to ensure compliance with environmental and safety guidelines.

Right:
Our appointed ornithologists recording observations of birds based on sight and sound within the development's buffer zones, setback and retained forests.



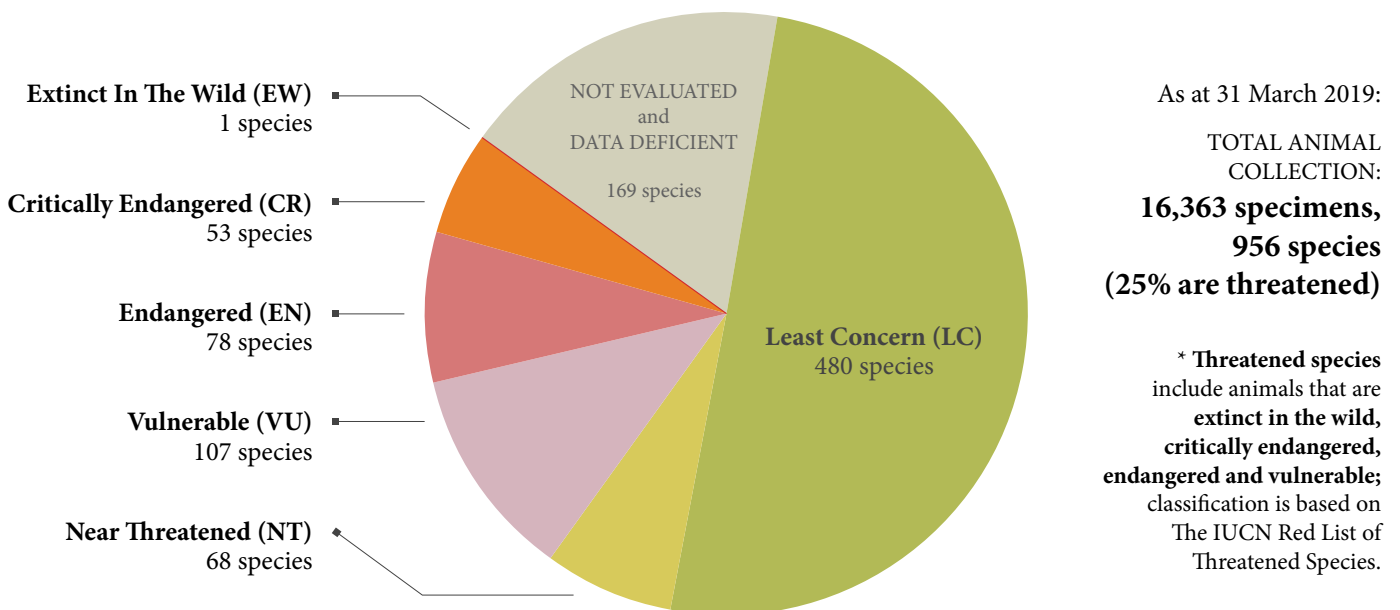
PROVIDING WORLD-CLASS ANIMAL CARE

Our accreditation by two of the top international regional zoo associations is testament to the fact that the standards of animal care and welfare in our four parks are on par with the top zoos in Europe and Australasia, and helped reaffirm our position as a world-leading zoological institution. With improved technology and scientific knowledge, we seek to enhance the quality of life of the animals in our care, through all stages of their life.

- Over the FY, we
- Provided care for **16,363** animals across **956** species
 - Participated in **77** global managed species programmes to save these threatened species from extinction
 - Bred **897** young across 123 species, 20% of which are threatened with extinction
 - Devoted **1,269** hours of veterinary care for **2,647** wild rescued animals brought in for treatment

OUR VALUABLE LIVING COLLECTION

Our living collection is one of the largest and most biologically diverse among zoos worldwide. A quarter of the 956 species we care for are threatened in the wild, according to The International Union for Conservation of Nature (IUCN) Red List. We coordinate with other like-minded zoological institutions to maintain healthy populations of these species under human care, to ensure their continued survival. Being stewards of such a valuable collection requires tremendous hard work and careful planning on the part of the Life Sciences team.



Saving Species At The Global Level

As accredited members of EAZA and ZAA, our four wildlife parks are now able to participate more fully in managed breeding programmes across the European and Australasian regions. This FY, we added another 26 of these programmes to our list, a 50% increase from last year's number. We now participate in 77 Managed Species Programmes (please refer to the Annex pg 84 for the complete list).

The Managed Species Programmes are aimed at conserving healthy populations of animals under human care while safeguarding their genetic health. They provide a future for some of the world's most vulnerable species, especially where natural habitats can be stabilised through education and in-situ conservation work to make reintroduction to the wild possible.

As a member of EAZA, we are now included in the EAZA Ex-situ Programme (EEP) for the white rhino and sloth bear. Our breeding successes in these two species during the reporting period are a welcome boost to their population.



White rhino calf

White rhinos

White rhinos in the wild are threatened by habitat loss and poaching. Through the breeding and exchange of white rhinos to zoos worldwide, we have long contributed to the sustainability of zoo rhino populations. To start a new bloodline, we brought in a new female, Nana, in 2014. She gave birth to her first calf, Baako, on 7th June 2018. On 19th August 2018, Maha, was born to Shova, one of our older females. Maha is the 23rd calf to be born in Singapore Zoo.



Sloth bear cubs

Sloth bears

Although still found scattered across much of its range in India, Nepal, Sri Lanka and possibly Bhutan, the overall population of the sloth bear is decreasing. Major threats are habitat loss or degradation due to urban expansion, poaching and retaliation from human-bear conflicts.

In September 2018, a pair of twins was born to one of the female sloth bears at Night Safari. As their mother was inexperienced, the pair were hand-raised by the care team, who provided round-the-clock care to ensure their survival.

Bundles Of Joy, Big And Small

One of the goals of breeding wildlife in our parks is to achieve sustainable populations in human care. Those of threatened species also double up as members of assurance colonies to safeguard against extinction in the wild. Ultimately, the hope is to return some of these animals to their natural habitat. Over the FY, 897 young across 123 species were born at our parks.



King penguin assisted hatching

This king penguin chick was having difficulties hatching by itself. It was in a breech position and intervention became necessary. The penguin care team helped by cracking a bit of the eggshell for fresh air to enter and so the chick could chip away at the rest of the shell. This delicate procedure is called assisted hatching, the closest equivalent to a caesarean section in the bird world.

The yolk was still largely intact, indicating that the chick was rather premature. A large, unabsorbed yolk poses a great risk of infection. In addition, it contains large vessels that connect to the chick's liver and other internal organs. If ruptured, the chick can bleed to death.

To complicate matters, the chick began defecating, which further increased the chances of infection. The care team had to speed up the hatching. They continued to remove parts of the shell and membrane, careful not to disturb the yolk. It took close to a week before the cord connecting the chick to the yolk sac could be severed and the chick 'officially' hatched.

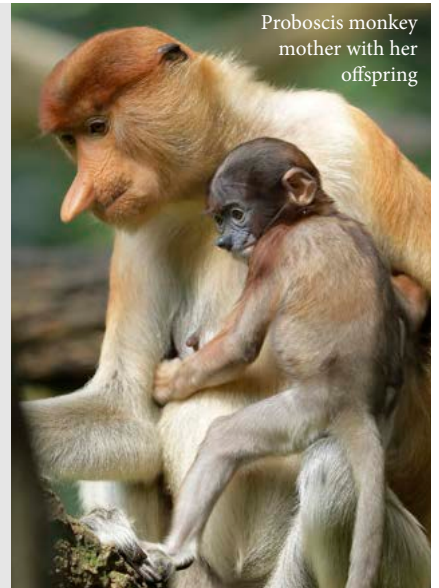


1. The chick in the process of assisted hatching. It is still attached to the yolk, which contains large vessels connecting to the chick's internal organs.
2. It took close to a week before the cord connecting the chick to the yolk sac could be severed and the chick 'officially' hatched.
3. The chick cuddling up for a snooze after its week-long ordeal.

Henkel's flat-tailed gecko young



Proboscis monkey mother with her offspring



Sloth bear cub



Santa Cruz ground-dove hatchling



Oriental small-clawed otter cub



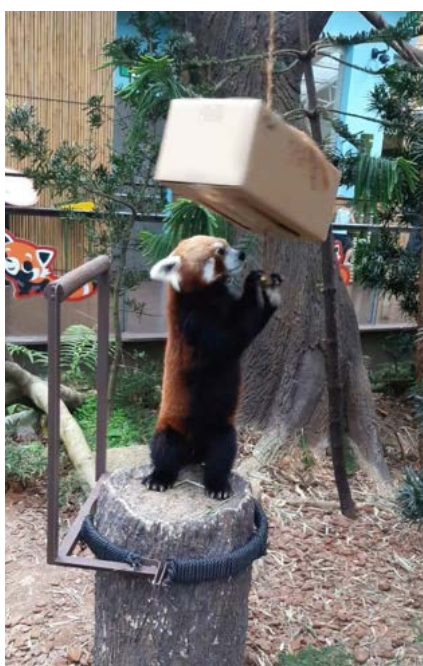
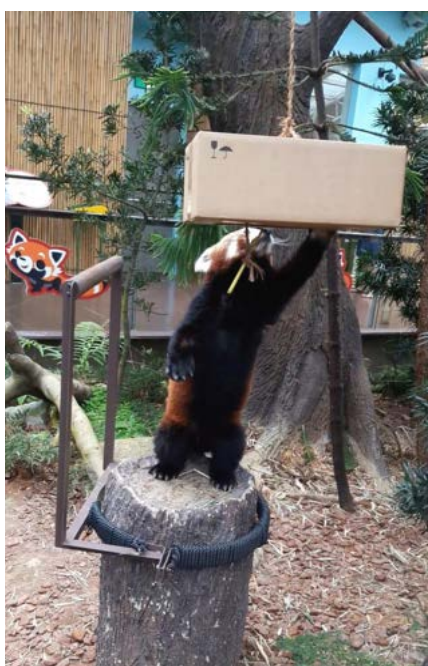
Electric blue gecko hatchling



Bottle-feeding of manatee calf

Enriching Our Animals' Lives

During the reporting period, our animal care team has expended much time and effort in preparing and implementing effective enrichment programmes. Enrichment is designed to add novelty and more importantly, elicit natural behaviour in animals under human care. To prevent the novelty from wearing off, keepers are tasked with coming up with new ideas for and designing purposeful enrichment activities. By scheduling these on a rotational basis into an enrichment calendar, the keepers ensure every animal under their care is offered a variety of enrichment options. In this way, our animals can demonstrate typical natural behaviour and get the opportunity to exercise control or choice over their environment, which enhances their physical and mental well-being.



Box surprise for the red pandas

To keep our red pandas busy, our keepers came up with a flap-box with treats within. This was hung from a branch in their enclosure: when the rope is pulled, the flap opens, releasing the food treats hidden in the box. The red pandas initially tried to retrieve the treat with brute force and destroyed the box. They eventually figured out the rope-pull mechanism by trial and error. The device kept them busy for several minutes.

Left:
Red panda investigating the flap-box and figuring out the rope-pull mechanism.

Toys for the hyacinth macaws

Macaws love to chew on stuff and they can wreak much damage on the furniture in their aviary. Feather plucking and excessive screeching are other common behavioural issues of macaws. Enrichment in the form of new toys that they can manipulate and tear apart keeps them occupied.

Only natural, non-toxic materials are used in the making of the enrichment devices. In this instance, various fresh fruits, nuts and metal wire were used to make food loops for the hyacinth macaws.



Photo credit: Anais Tritto

A pair of hyacinth macaws investigating a food loop of treats including apples and nuts.

Asian elephant enrichment

The elephant care team varies enrichment opportunities for their charges from day to day to elicit natural behaviour. They might be encouraged to break wooden stems, consume whole palm stems, or stretch for leaves in tall trees. The team also offers enrichment options that allow the elephants to express self-maintenance behaviours, by providing different substrate options. The elephants enjoy bathing in sand and mud, and even put aside their personality and age differences to play in sawdust as a herd.

The care team also taps on the elephants' enthusiasm for enrichment activities during the daily elephant presentations. These mentally-stimulating sessions serve as excellent cognitive enrichment for the elephants.



Sumatran elephant Intan stretches to access an overhanging coconut leaf. This enrichment setup doubles up as exercise for the elephants.



Asian elephants Tun (foreground) and Jamilah enjoying a morning sand bath.



Sri Lankan leopard Daisy eyeing the spherical popsicle ...



... before lunging in for the kill.

Melting spherical popsicles

The spherical popsicle consists of three frozen layers, each holding different amounts of meat. Depending on the ambient temperature, each popsicle can last approximately five hours. Multiple popsicles may be deployed and distributed all over an exhibit, working like timed feeders by releasing food at random times and random locations. This encourages the animals to 'work' for their food, just as their wild counterparts do.

For an arboreal animal like Daisy, our Sri Lankan leopard, the device is hung at an elevated position in the exhibit. A popsicle can keep her occupied for hours, till all the ice has melted and all the meat dispensed.

Other than the leopards, various other mammals in our collection also enjoy this icy treat and with its use, we have seen an increase in their activity levels.

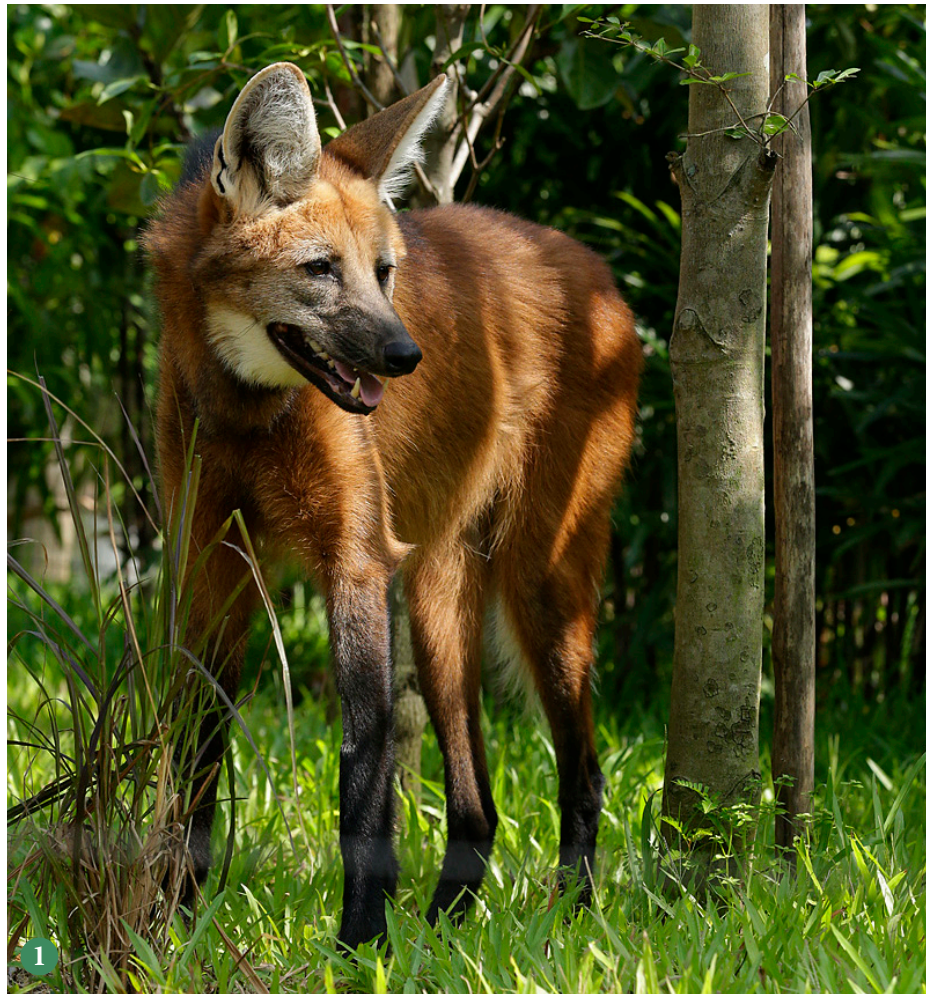
Diets Reviewed

Over the FY, the wildlife nutrition team continued to work closely with the animal care team to finetune the diets of the animals in our collection. Besides on-ground work with our animals, we have also documented and published our works to share information with the zoo community. Many of the studies jointly conducted by the nutrition and care teams, for example the ones on slow loris, bear and cobra nutrition, also directly benefit field conservation efforts we support.

Burgers for the maned wolf

Though often mistaken to be carnivores, maned wolves are omnivores. A large proportion of their natural diet in the wild is plants. A strictly carnivorous diet in maned wolves causes kidney disease, which could be fatal. Our maned wolf Samanta is fed a mix but she was only eating the meat portion of her diet, not her fruits or vegetables. She was severely underweight and her health was plagued by digestive and kidney-related issues.

After some trial and error, her keepers came up with a solution of putting all of Samanta's food in the blender and shaping it into 'burger' patties. She took to the patties and in this way, fibre and vitamin E were successfully added to her diet. Samanta gained 5kg in weight, her faeces became firmer and her coat took on a healthy, shiny sheen. Her blood values also normalised, and she has not had a kidney problem since.



1. Maned wolf

2. & 3. Some of the initial 'prototype' patties prepared for Samanta.



Medical Conditioning for Stress-free Health Checks

With the right training, animals can be conditioned to cooperate with medical checks. Doing away with the need for sedation or restraint significantly reduces the stress for both animals and staff involved while allowing for early detection of illness and timely treatment.

Toothbrushing for the sea lions

Our veteran sea lions Pedro and Philipp suffer from dental cysts, a condition associated with their age. To provide timely interventions, it is important to adopt a proactive care approach.

The veterinarians and other medical professionals need to be physically close to the sea lions to work on their teeth. This was especially challenging for Philipp as he was not comfortable with people touching him or getting too near.

The vets teamed up with the trainers to train the sealions, three to six times a day. It took one to two months to achieve complete competency in the target behaviours.

Below: Veterinarian Dr Guillaume Douay (left) and Senior Trainer/Presenter Mr Suwanchatri Pongthep placing a dental X-ray plate in Philipp's mouth. Before actual instruments are used, vets and keepers work together to familiarise the sealions with the positioning.



Pedro getting his teeth brushed by Senior Trainer/Presenter Mr Suwanchatri Pongthep. The toothbrush was slowly introduced in a positive manner, according to the following schedule:

- 1st week - Showing toothbrush to the sea lion
- 2nd week - Using toothbrush to touch the body and head area
- 3rd week - Putting the toothbrush into the mouth
- 4th week - Touching the teeth with the brush



Up in arms against EEHV in Asian elephants

EEHV-HD, which stands for elephant endotheliotropic herpes virus hemorrhagic disease, has become the single greatest cause of death in young Asian elephants between one and eight years of age. Our youngest elephant, Neha, is highly susceptible. Her training is therefore essential for the elephant care team to collect blood samples, monitor body temperature and look out for other symptoms of EEHV-HD.

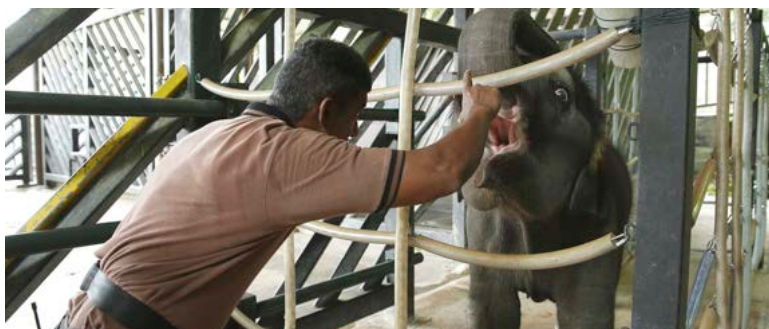
Training started at the tender age of ten months. It was a challenge to separate Neha from her mother and other herd members, whom she is very attached to. Also, her playful nature meant she sometimes does not want to concentrate and cooperate. Using methods of positive reinforcement, the care team took six months to train Neha for the basic behaviours, including voluntary blood draw. Sessions continue to be conducted two to three times daily. A flexible barrier separates her from her trainers and she could always choose to take part in the training or not.



Crowned hornbill nabbing a reward for cooperating with the weighing and visual check.



Neha up to her playful antics in the morning with mother Nandong (behind) and Tun (right of photo).



Senior Keeper Mr Arumugam Lachmana conducting an oral check for Neha. Cyanosis, which causes the tongue to turn blue, presents within 24 hours of the onset of EEHV. Once symptoms are detected, Neha must receive treatment immediately or risk losing her life.

Crowned hornbill weight-watching

When crowned hornbills Ian and Nikki were first housed in Jungle Jewels, it was a challenge to get them to come down for daily visual checks.

Keepers started the training process by bridging with a whistle, whenever the birds came down for feeding. This reinforces the target behaviour. It took at least a month to gain their trust and for keepers to come close during feeding. When that trust had been established, a special feeding stand that incorporates a weighing scale was introduced. This enables keepers to conduct weekly weighings of the hornbills.

Nikki is more sensitive and she took a long time to trust the keepers. Ian, on the other hand, has grown confident and can remain still for keepers to have a close look at him during daily checks, for any abnormalities.

Giant panda urine collection

Giant pandas go on heat (estrus) only once a year and the best chance of successful fertilisation is within 24 hours after the female's estrus peak. It is crucial she is inseminated within this time frame. Our panda care team needs to know the exact time Jia Jia's estrogen level peaks and urine samples are required to run hormonal tests. Hence, being able to train Jia Jia to urinate on command would ensure fresh and clean urine samples can be obtained. Training was, and still is, done at least once a day, and as frequently as every four hours, if she is responsive. It took about five months before Jia Jia started to urinate on cue occasionally, and another half a year for the keepers to get Jia Jia to urinate on cue, on a regular basis.

1. At the start of the conditioning process, a keeper would stand near the weighing scale and call for Jia Jia to come over.

The keeper would use an auditory cue for Jia Jia to pass urine into the drain. The keeper would then use a syringe to collect the urine.

2. Jia Jia is rewarded with her favourite food – carrots – when she urinates on cue.
3. As the urine might get contaminated in the drain, keepers introduced a small bottle for collection and conditioned Jia Jia to urinate directly into it.
4. The keepers needed a container that minimised spillage and could be easily manoeuvred through the den bars. They innovated a solution with a 5-litre PET bottle, some PVC piping and a length of rubber hose.



Keeper Research Initiatives

On top of their day-to-day work, many of our staff also dedicate time to research initiatives. From the natural moulting patterns of penguins to the effect of kidney stones on otters and even how food sizes impact behaviour and food intake in primates, keepers are involved in scientific work that will improve the health, husbandry, enrichment and welfare of our living collection. Other projects, like the ones that focus on aspects of animal visibility and activity as well as the assessment of guest perception on whole prey feeding aim to enhance the effectiveness of conservation communication and education activities.

Raising peculiar dragons

Dragon-headed katydids are a unique long-horned grasshopper originating from Borneo. As very little is known about their biology, they have proven to be a difficult species to breed under human care. One of the major challenges in their breeding process is a low egg hatch rate. Three different incubation methods were trialled, and results showed banana 'stem' to be the most suitable substrate for egg laying.

When the eggs successfully hatched, caring for the nymphs became a draconian task. The nymphs were provided with the same diet given to the adults, but most of the food were left unconsumed as the mandibles of nymphs are much smaller than that of an adult. A specialised diet catering to different mandible growth stages was developed. With the research conducted, we have managed to compile best practice guidelines for this species.

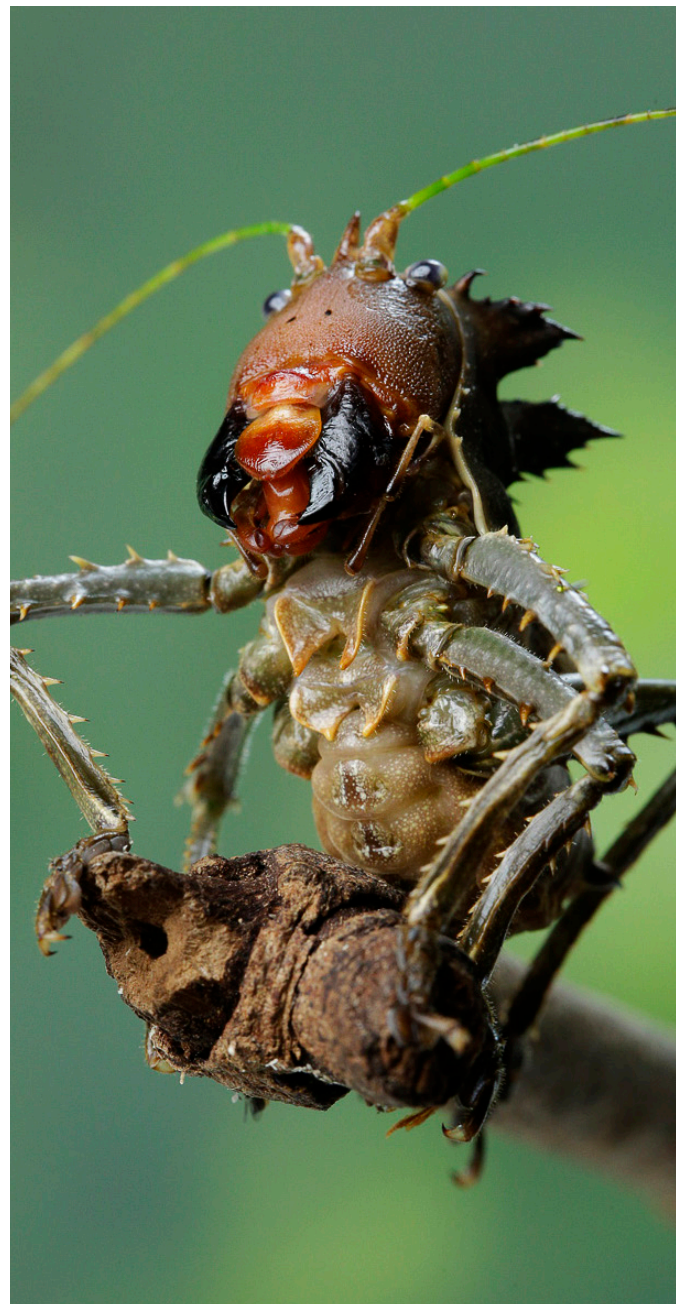
Right:

Dragon-headed katydid nymph displaying its mandibles. Keepers developed a specialised diet for the nymphs that catered to different mandible growth stages.

Eggs of the dragon-headed katydid



Photo credit: Delyinder Kaur



Suitable feeding regime for small cats

Little research has been done on the feeding regimes of small, undomesticated cats in human care. To find out if small cats should be fed the way big cats are, with fasting days between each large meal, the animal care team set out to test the effect of varied feeding regimes on the behaviour, body condition and stress metabolites on the small cats in our collection.

Data from 21 small cats ranging from servals to leopard cats was gathered for this study. It was observed that when fed large meals with fasting days, the small cats tended to forage less, with more uneven use of their enclosure space, an indication that daily feeding of our small cats is still the better arrangement.

Right:

For this study, data was collected from 21 small cats like this leopard cat. The research findings helped the team decide on the feeding regime most suited to these cats in an evidence-led way.



VETERINARY HIGHLIGHTS

Our veterinary team comprising clinicians, pathologists and technicians continued to work closely with the keepers in providing whole-of-life care for the animals in our collection, across their health span. This was achieved through a preventive programme consisting of examinations, vaccinations, parasite screenings, deworming and quarantine of new animals joining the collection, as well as proactive health management strategies like our geriatric animal plan. Our vets are also playing an expanded role in the rehabilitation of rescued wildlife, in close cooperation with local NGOs and the government.

Vets On The Case

In the FY, the veterinary team responded to a gamut of medical conditions arising in the animals, from cancer to overgrown teeth. We are very grateful for the enthusiastic support of a network of specialists like orthopaedic surgeons, dentists and ophthalmologists who generously lent us their expertise for the more complicated cases.

Jary the hornbill cancer warrior

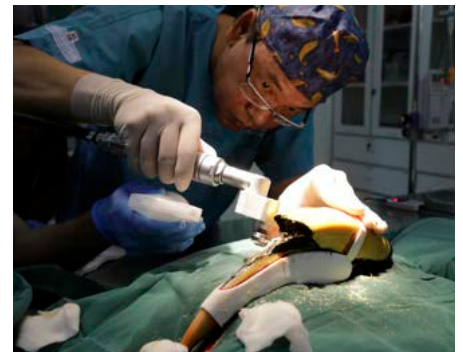
On 13 July 2018, keepers at Jurong Bird Park noticed that Jary, one of the great hornbills in their care, had an estimated 8cm-wide gash on its casque. Jary was sent to the Veterinary Emergency and Specialty Hospital for a CT-guided biopsy to extract a tissue sample from the affected area. Close examination of the sample confirmed that it was cancer. To give Jary the best chance of survival, the vets formulated a specialised approach involving high-tech engineering gadgetry.

The plan was to remove the cancerous part of the casque and put in a

3D prosthesis in its place. The vets engaged the help of Keio-NUS CUTE (Connective Ubiquitous Technology for Embodiments) Centre, NUS Smart Systems Institute, and NUS Centre for Additive Manufacturing to produce the prosthesis, harnessing their 3D-printing capabilities. Honorary Consultant Dr Hsu Li Chieh from The Animal Clinic was roped in to assess the 3D prosthetic models, and it took almost two months of designing and discussion before a model was deemed a perfect fit for the hornbill.

A day after the hour-long surgery, Jary was eating normally. After a short recovery, he also started rubbing his prosthetic casque on his preening gland, indicating that he has accepted the prosthesis as part of him.

On 30 January 2019, Jary underwent his first health check post surgery. His X-ray results revealed new, healthy tissue growth and no sign of recurrence of the tumour. The overall prognosis for him in the long term is positive and the team is hopeful for a complete remission.



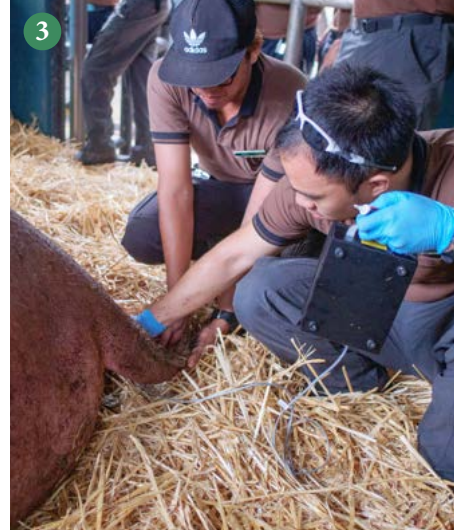
Honorary Consultant Dr Hsu Li Chieh from The Animal Clinic, in the process of removing part of Jary's casque with an oscillating saw.



Dr Xie Shangzhe (left), Assistant Director (Veterinary) and Honorary Consultant Dr Hsu Li Chieh (right) placing Jary's prosthetic casque in position. The prosthesis will stay on till a new casque grows out.



Jary the great hornbill



Hippo teething issues

Dental treatment was delivered to both the Nile and pygmy hippos over two consecutive days.

Due to the alignment of his jaws, Nile hippo Kassim's tusks require rather frequent trimming. Pygmy hippo Minah, on the other hand, had abscesses forming at the roots of some teeth, which were swelling to the point she could not open her jaw and causing her a great deal of discomfort.

Both animals recovered well after their treatment. Kassim went back to eating hay right after. As a number of teeth were affected in Minah's case, she had to go through a few follow-up rounds of dental extractions.



1. Kassim undergoing general anaesthesia in preparation for dental work. His tusk had just begun to perforate his upper lip and there was an infection was about to start.
2. Tooth trimming requires power tools, and very steady hands. Veterinary Nurse, Mr Nor Sham Bin Ab Wahab uses an industrial saw to trim Kassim's tusk.

3. Kassim's vital parameters were monitored by the team. The chest of hippos is so wide that listening to their heart is near impossible. Veterinarian Dr Heng Yirui (foreground), explores getting a pulse indicator from the artery under the tail. This is important to monitor how the animal responds to the drugs used, as well as the potentially painful procedures.
4. It took a big team to get two tonnes of hippo under anaesthesia. But Kassim probably still weighs more than their collective weight.

... Hippo teething issues

1. Dr Abraham Mathew (foreground), Assistant Director (Veterinary) puts Minah, who is significantly smaller than Kassim, under general anaesthesia. Radiographs confirmed the presence of decaying teeth and abscesses at the tooth roots. The challenge was keeping Minah's baby, Abina, occupied in the meantime.
2. The vets getting Minah's pulse from the artery at the back of her eye.
3. Veterinarian Dr Anwar Ali uses a head lamp to look inside Minah's swollen mouth. The affected teeth were removed and the purulent discharge drained from the cheek.



Geriatric Animal Plan

One of the few wildlife institutions in Asia to tackle the ageing issue head-on, we are into the second year of our dedicated senior animals' programme. Patients under the geriatric animal plan get a specialised diet, regular visits from an in-house vet and customised exercise regimes. We have 159 animals on this programme.

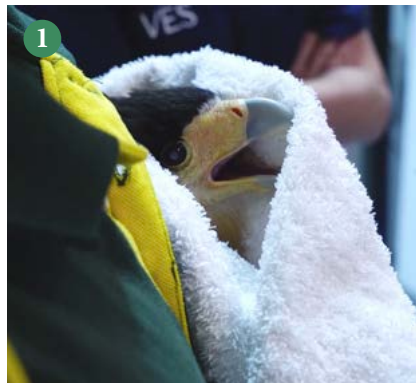
Caracara cataracts

Miguel, an elderly southern caracara and a star of the Kings of the Skies show became reluctant to perform. He would only fly short distances and had trouble landing accurately on his cues. When examined by the vets, he was found to be developing cataracts in both eyes.

Miguel was brought to the Veterinary Emergency and Specialty Hospital, where a specialist ophthalmologist performed a phacoemulsion procedure for him.

The surgery went well. A month later, Miguel was able explore his aviary with confidence, find food scattered around the aviary and fly up to the highest perches and land with accuracy. His trainers hope he can begin training for the show again. This will keep him occupied and interested in his surroundings, and keep him mentally and physically active in his geriatric years.

1. Miguel the southern caracara arriving at the Veterinary Emergency and Specialty Hospital (VES).
2. The VES team performing a phacoemulsion procedure for Miguel.
3. Veterinarian Dr Ellen Rasidi bringing Miguel out from the surgery room.



Rehabilitating Rescued Wildlife

WRS is the designated centre for rescued wildlife in Singapore. On top of looking after our living collection, our vets and keepers attend to and care for rescued animals brought in to our animal hospital.

Sandshrew the Sunda pangolin

*Length of rehabilitation:
January 2017 -
September 2018*

In January 2017, a young pangolin was found by members of the public and was brought to WRS. As he was too young to survive on his own, our staff decided to hand-raise him until he was ready to be released back to the wild.

He had to be bottle-fed initially, until he was weaned. Once he was eating solids, his rehabilitation for release started in earnest. This involved encouraging him to learn the skills he would need to survive in the wild, such as climbing, digging and looking for natural food. Working together with NParks, a release site was chosen and a soft release pen was built. The soft release pen allowed Sandshrew to acclimatise to the new location before the actual release. A final full health check was performed and a radio transmitter was attached before he was moved to the soft release pen. Mr Desmond Lee, Minister for



Mr Desmond Lee, Minister for Social and Family Development and Second Minister for National Development and Ade Kurniawan, Life Sciences Associate, checking on Sandshrew at his soft release site.

Social and Family Development and Second Minister for National Development officiated at the release, which coincided with the launch of the Sunda Pangolin National Conservation Strategy.

Sandshrew wandered out into the wild when the door of the soft release pen was finally opened. The radio transmitter enabled the team to track him in his new home. He was tracked for about two weeks before the transmitter dropped off. By all accounts, he appeared to have been doing well on his own.

Berani the Sunda pangolin

Length of rehabilitation: July 2018 - present

In July 2018, a juvenile pangolin that was walking with a limp was rescued by Animal Concerns Research and Education Society (ACRES) and brought to WRS. On a full physical check, it was discovered he had a complete fracture of this right thigh bone. The team decided to attempt a fracture repair.

Berani underwent two long surgeries to have his fracture fixed by Dr Hsu, our honorary consultant for veterinary surgeries. Because of the pangolin's anatomy - the presence of scales and short muscular legs with thick bones, the repair was very challenging. It is possibly the first time such an operation has been successfully performed on a pangolin. Berani is on the road to recovery. The process of his rehabilitation – building up his fitness and flexibility – is well underway while we allow time for his leg to heal completely.

Honorary Consultant Dr Hsu Li Chieh from the Animal Clinic and our veterinary team conducting a physical check for Berani on the day he was brought to WRS.



White-bellied sea eagle

*Length of rehabilitation:
April to October 2018*

In April 2018, ACRES rescued a white-bellied sea eagle at Upper East Coast. It was found on the ground, unable to fly.

The eagle was brought to Jurong Bird Park for veterinary attention. As it had multiple broken feathers, it was given time to moult and grow new feathers.

Four months later, the bird still had not moulted and its feathers were still broken. To help it fly again, our vets carried out a feather transplant (imping), where normal feathers are attached to the shaft of the broken feathers. The transplant was a success. The bird was then sent to the Sungei Buloh aviary for soft release. After a week's observation, it was finally released to fly free in the wild.

Right (Above):
The white-bellied sea eagle was found to have multiple broken primary and secondary feathers.

Right (Below):
A feather transplant in process.



PLAYING A LEADING ROLE IN CONSERVING BIODIVERSITY

To save threatened species in Singapore and the region, we have made good progress in our conservation work, establishing ourselves as thought leaders in biodiversity conservation. We continue to nurture wildlife and sustainability advocates to walk the talk together with us for sustainability.

- Over the FY, we
- Supported **12** local field projects with WRSCF funding
 - Funded **31** projects beyond our shores
 - Sponsored **8** conservation conferences, workshops and meetings

PROTECTING LOCAL WILDLIFE

We fund scientists working on studies of local species across land and marine habitats through the Wildlife Reserves Singapore Conservation Fund (WRSCF). These species range from banded langurs to swiftlets and pangolins; sharks to corals and seagrass. Over the FY, we invested \$300,000 to support these 12 projects in their work to protect wildlife in Singapore.

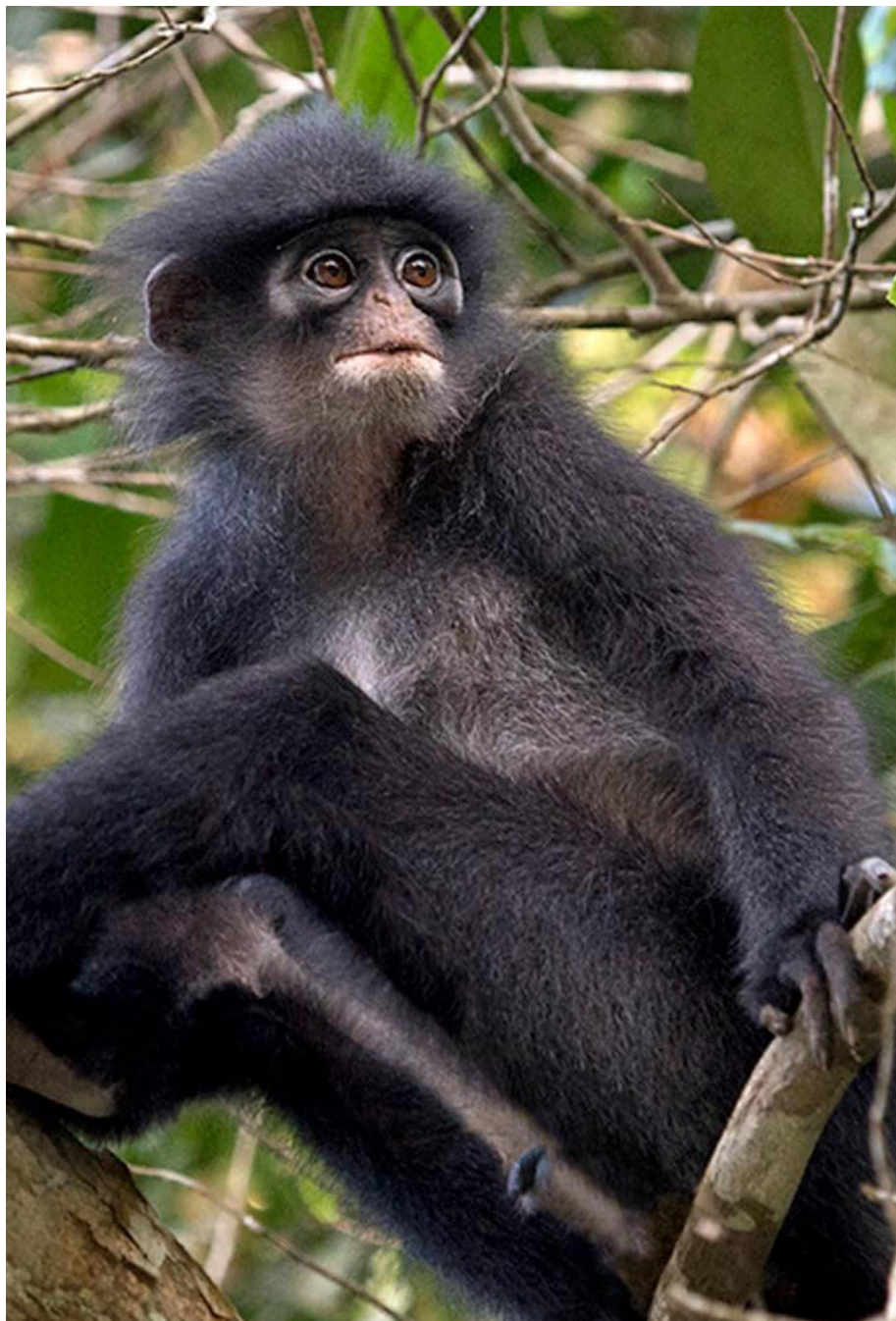


- 1 **Raffles' banded langur** species action plan: Partnerships with government agencies and organisations have led to improved efforts to safeguard Raffles' banded langur habitats, carry out research on their population, and conduct public outreach.
- 2 **Sunda pangolin** diet in human care: Adding chitin and soil were noted to aid digestibility of the diet, improving faecal condition and body weight of the pangolins.
- 3 **Sunda pangolin** movement, range and habitat: Pangolins found to use drains to cross beneath busy highways and move around urban areas. Also found to favour the edge of roads, footpaths and other urban structures like reservoirs as sleeping spots. These findings are useful for management and development plans.
- 4 **WRS biodiversity surveys**: 284 species recorded at parks at Mandai, including 21 locally threatened species and 59 species recorded at Jurong Bird Park, including 4 locally threatened species.
- 5 **Bamboo shark** biology and distribution: 72 sites sampled during 16 field trips; 59 adult sharks tagged. Increased public awareness through website and social media, public lectures and community engagement events.
- 6 Biodiversity of **shark and ray** catch at local fishery ports: Started on DNA sampling aspect of study, 79 DNA samples have been collected. Findings will help inform fishing policies to ensure sustainability of fish populations.
- 7 Biodiversity of marine fungi associated with **seagrass**: Significant differences found in fungi collected from varying locations and structures around Singapore, an indication that conservationists should consider fungi composition before proceeding with seagrass transplant or restoration programmes.
- 8 Competition between **corals** and seaweed in Singapore's urbanised reefs: Findings are that the frequency of interactions between corals and seaweed differed across months and that the chemical effects of seaweed on coral growth varied with the seaweed species in question, as well as chemical concentration levels.
- 9 **Yellow-crested cockatoo** population and ecological niche: Researchers are investigating population changes of this feral bird over time and its impact on the local ecosystem. The findings will help in the management of the species in Singapore and possibly that of populations in its native range.
- 10 Ecological and genomic studies of five **local songbird** species: Of the 54 sites surveyed for the ecological component, target species were sighted in 36 sites across 18 localities. For the genomic component, DNA samples of all five species except the white-rumped shama species complex have been acquired. The studies will provide updated data on the ecology and genetic health of birds threatened by the cagebird trade.
- 11 Demographic study of **local songbird** owners: 51 questionnaire responses were gathered from songbird owners at 30 pet bird shops and 19 bird hanging sites in Singapore. Preliminary results showed the majority songbird owners to be Chinese males, aged 40 years and older. The project is ongoing and more responses will be collected to obtain a more accurate representation, which will help in the crafting of more targeted communications to increase public awareness.
- 12 Activity and home range of two species of **edible-nest swiftlets**: This study sought to understand and differentiate the nesting habits, chick development, feeding ranges, as well as echolocation properties of the two species, with a view to inform future conservation measures.

Implementing the Raffles' banded langur species action plan

The Raffles' banded langur was on the verge of extinction in the 1990s. WRSCF supported the implementation of the species action plan, which has renewed hopes for the continued survival of this langur. The plan is executed by the Raffles' Banded Langur Working Group, the representatives of which include WRSCF researcher Ms Andie Ang, and experts from NParks and National University of Singapore. By working hand-in-hand, WRSCF researcher, government agencies, universities and NGOs have put in place safeguards for the langurs' habitats, consistent population monitoring efforts and increased public awareness.

A major breakthrough is the gazetting of part of the forest next to Old Upper Thomson Road as Thomson Nature Park. This green buffer zone will expand the langurs' current range, giving them a larger area in which to forage for food and creating "green corridors" that will allow the langurs to move between forest fragments. Along with this development, a park connector linking the Central Catchment Nature Reserve with Thomson Nature Park will be built over one lane of Old Upper Thomson Road. The closure of this lane would likely mean safer crossing for animals going between the two forests. Traffic noise and light will also be reduced, creating a more conducive environment for animals in the vicinity. There are also plans to install a rope bridge at Old Upper Thomson Road to enhance canopy connectivity.



Over the FY, the fifth and sixth rounds of citizen science surveys were completed. The data collected has provided important information on the langurs' group size, home range, behaviour and infant development.

Besides spurring public engagement, the surveys have also had the positive effect of connecting people with nature. Since the inception of the surveys, more than 230 members of the public have come forth as volunteers.

Yellow-crested cockatoo population and ecological niche

Exploited by the cagebird trade, the yellow-crested cockatoo has suffered substantial population declines. Experts estimate that just 2,000 individuals remain in its native range of Indonesia and Timor Leste. The bird was introduced to Singapore over the last century and researchers are investigating its population changes over time and its impact on the local ecosystem.

This project seeks to provide insight into the ecological conditions allowing for the yellow-crested cockatoo to establish itself in a new environment and grow. The information will help in the management of this species in Singapore and could subsequently help in the management of populations in its native range.



PHOTO: DAVID TAN

Yellow-crested cockatoo

Biodiversity of shark and ray catch at local fishery ports

Globally, a quarter of shark and ray species are threatened with extinction, with overfishing as their main threat.

WRSCF supports The Dorsal Effect in their sharks and rays monitoring programme, which entails bi-monthly trips to the Jurong Fishery and Senoko Fishery ports. The research involves the identification and measurement of thousands of sharks and rays, as well as interviews with fishermen about the origins of their catch. The results have been sobering. Almost all the rays imported were the white-spotted whipray, which is listed as 'Vulnerable' on the IUCN Red List of Threatened Species; even the trade-controlled hammerhead shark has been spotted. A large portion of the sharks were found to be immature - an indication that the adults have been depleted and the population exploited. These project findings help inform policies at the national and global levels, as well as shed light on shark biodiversity and potential protection measures.



Rays kept upside down in frozen layers, which makes it challenging to collect data on them.



The small size of many of the sharks in relation to their species indicates that they are immature.















Ms Kathy Xu (right) takes the measurements of a shark while Ms Naomi Clark-Shen (left) takes note. Both Ms Xu and Ms Clark-Shen are researchers with The Dorsal Effect.

PROTECTING WILDLIFE BEYOND OUR SHORES

Over the FY, we continued to ramp up our support for conservation work in biodiversity hotspots around Southeast Asia. All of the projects we fund work on the protection of threatened species, and nearly 7 out of 10 projects focus on critically endangered species in the region. Besides the conservation of these species in our region, we also continued to contribute to the research and conservation of the giant panda.



We supported the important conservation work that is being done in these projects to protect wildlife in and beyond the region.

 <p>PRIMATE 1 2 3 4 5 6</p>	 <p>BEAR 7</p>	 <p>ELEPHANT 8</p>	 <p>SAOLA 9</p>
 <p>TIGER 10</p>	 <p>SNAIL 20</p>	 <p>FOREST & RESERVE 21 22</p>	 <p>LAW ENFORCEMENT 23</p>
 <p>TORTOISE, TURTLE & TERRAPIN 11 12 13 14 15 16</p>	 <p>CROCODILE 17 18</p>	 <p>SNAKE 19</p>	 <p>BIRD 24 25 26 27 28 29 30 31</p>


MAMMALS

-  1 Developing a research-based conservation monitoring tool for the **Celebes crested macaque** in North Sulawesi, INDONESIA
- 2 Protecting the **Delacour's langur** in Kam Bang Forest, Ha Nam Province, VIETNAM
- 3 Protecting **Javan gibbon** habitats and promoting shade-grown coffee in Java, INDONESIA
- 4 Mitigating human-**orangutan** conflict in Sumatra, INDONESIA
- 5 Studying the Hepatitis B virus through faecal samples from wild **pileated gibbons** in Cardamom Rainforest, CAMBODIA
- 6 Conserving the **Sundaland tarsier** in Tanjung Puting National Park, Central Kalimantan, INDONESIA
-  7 Constructing a new sanctuary to rehabilitate **bears** rescued from bear bile farms in LAOS
-  8 Protecting **elephant** habitats and mitigating human-elephant conflict in Way Kambas National Park, INDONESIA
-  9 Saving **saolas** in LAOS
-  10 Engaging people to value and protect **tigers** and their habitat in MALAYSIA

REPTILES

-  11 Protecting the nests of the **Cantor's giant softshell turtle**, CAMBODIA
- 12 Surveying the range of the **Forsten's tortoise** and **Sulawesi forest turtle** in Sulawesi, INDONESIA
- 13 Researching diet and conditions conducive to fertility for the **Palawan forest turtle**, to successfully breed the species under human care, THE PHILIPPINES
- 14 Paving the path for repopulation of the **Roti Island snake-necked turtle**, INDONESIA
- 15 Saving **turtles** of SOUTHEAST ASIA by uncovering trade laundering routes of wild-caught turtles falsely sold as captive-bred
- 16 Conserving the **Southern river terrapin** in CAMBODIA
-  17 Recovering a **Siamese crocodile** population in Sre Ambel River, CAMBODIA
- 18 Securing the last known population of **Siamese crocodiles** in INDONESIA
-  19 Tracking and documenting **king cobra** movements and behaviour in Northeast THAILAND

INVERTEBRATES

-  20 Surveying distribution of two highly invasive **snail** species and investigating their effect on native snails in PENINSULAR MALAYSIA

NATURE RESERVES

-  21 Protecting species in **Nakai-Nam Theun National Protected Area** in LAOS
- 22 Protecting threatened species like the babirusa and anoa by conserving the **Nantu Forest** in Sulawesi, INDONESIA

LAW ENFORCEMENT

-  23 Enhancing **law enforcement** to protect threatened species in West Kalimantan, INDONESIA

BIRDS

-  24 Community breeding and release of the **Bali starling** in Melinggih Kelod, Bali, INDONESIA
- 25 Surveying the population of the **Edwards's pheasant**, VIETNAM
- 26 Involving coastal communities in **Philippine cockatoo** conservation, THE PHILIPPINES
- 27 Building capacity at the Kembali Bebas Avian Rescue, Rehabilitation and Release Centre in INDONESIA, which houses **Indonesian parrots** confiscated from the illegal trade and prepares them for release back to the wild
- 28 Preserving critically endangered **Indonesian songbirds** through breeding programmes in the Cikananga Conservation Breeding Centre, West Java, INDONESIA
- 29 Constructing a facilities complex for future breeding and release of the **Spix's macaw**, BRAZIL
- 30 Putting a stop to **vulture** poisoning in CAMBODIA through public awareness
- 31 Using research evidence from songbird markets to push conservation efforts for the **white-rumped shama** in SOUTHEAST ASIA
- ★ Our staff flew to THE SOLOMON ISLANDS to bring back 60 endangered **Santa Cruz ground-doves** for breeding. The doves were rescued from poachers. On 31 Dec 2018, the first chick hatched successfully. We have since welcomed numerous hatchlings. The goal is to reintroduce the birds back to their native Solomon Islands.



Protecting Sumatran elephant habitats and mitigating human-elephant conflict in Way Kambas National Park, Indonesia

Way Kambas National Park in Sumatra is home to nearly 200 wild Sumatran elephants, more than 10% of the entire remaining wild population. Illegal activities such as logging, poaching, land cultivation and cattle grazing threaten the integrity of the park and push the elephants closer to human settlement. Conflicts and the resulting damage to crops, homes and property often occur at the park border and farmlands, leading to local community hostility towards wild elephants.

To address this, four Elephant Response Units have been set up along the park boundaries to monitor wild elephant herds and prevent illegal activities. The units employ mahouts and their trained elephants from the park's elephant conservation centre to conduct regular forest patrols. The trained elephants are deployed to herd the wild ones away from the farmland and back into the park. The units also train local community groups to conduct regular night-time crop guarding along the park borders.

We have been supporting the operation of these units since 2015. Since the start of the project, the number of crop raids by wild elephants has gone down more than 70% while loss of crops has decreased more than 90%. Possibly due to an increase in income from crop yields, illegal activities within the park has fallen and there is less hostility towards the elephants.

Above: Night-time crop guarding along the park border at Rawa Panjang, assisted by trained ERU elephants.

Constructing a new sanctuary to rehabilitate bears rescued from bear bile farms in Laos

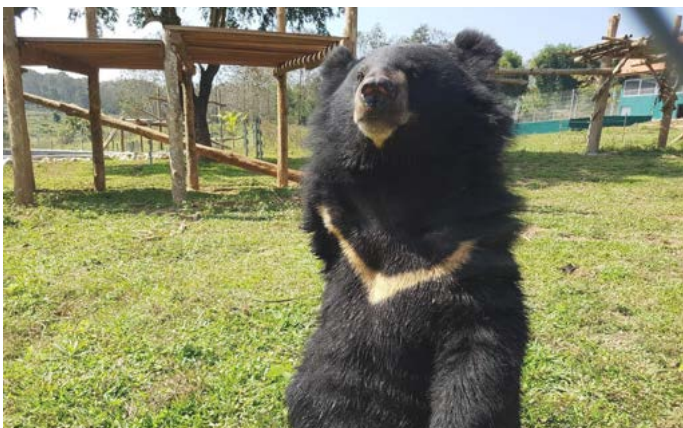
An estimated 120 bears are held in bile extraction facilities across Laos. We have been supporting Free the Bears since 2016 in their efforts to work with the Lao government and other international partners to end bear bile farming.

Last year, a new site of 25 hectares within Luang Prabang province was secured to be their second sanctuary, on top of the existing Tat Kuang Si Bear Rescue Centre. Free the Bears rescued 13 more bears over the course of the year, bringing the total number of bears under their care to more than 60.

Our funding over the FY went towards the construction of a new bear house with a capacity of 20 bears, as well as the salaries of two keepers. The funds also covered the costs of food and veterinary health checks for 20 bears.



Our group CEO Mr Mike Barclay (far right) planting trees within the new Bear House 3 complex at the Luang Prabang Wildlife Sanctuary. He is accompanied by his wife, Ms Isobel Barclay (second from right), Director of Conservation, Research and Veterinary Services Dr Sonja Luz (second from left) and Free the Bears Technical Advisor Ms Maddie Russman.



An Asiatic black bear looks around his new home. The new habitat features climbing poles and platforms, submerged caves and swimming pools to allow the bears to cool off during the warmer months.



A pair of Asiatic black bears face off in a play fight. The new bear house allowed for the transfer of a group of bears over from Tat Kuang Si Bear Rescue Centre to Luang Prabang Wildlife Sanctuary.

CONSERVATION LEADERSHIP AND PARTNERSHIP

We continued to play a pivotal role in the work of conservation planning and training, by offering a unifying platform for researchers in the field to collaborate with government agencies, non-government organisations (NGOs), the private sector, academia, the public and international organisations.



Regional Resource Centre for IUCN CPSG in Southeast Asia

The Conservation Planning Specialist Group (CPSG) of the IUCN aims to save threatened species by using scientifically sound, collaborative processes that bring together people with diverse perspectives and knowledge to catalyse positive conservation change.

WRS hosts CPSG's newest regional resource centre in Southeast Asia. Members of our Conservation and Research team hold the posts of co-covenantors, committing time and effort to lead and coordinate regional efforts to build conservation capacity. In alignment and support of the IUCN SSC Asian Species Action Partnership (ASAP), we seek to streamline and prioritise conservation action planning for critically endangered species in Southeast Asia. We also provide funding to achieve conservation targets that have been defined.



IUCN SSC Asian Species Action Partnership (ASAP)

The IUCN SSC Asian Species Action Partnership (ASAP) is a coalition working together to halt the extinction of critically endangered land and freshwater vertebrates in Southeast Asia. As the host organisation to the ASAP, we fund all operational costs and pay the salaries of two full-time staff that make up the ASAP Secretariat.

We are the major financial contributor to the initiative and with our support, ASAP has grown to include 80 partners, each delivering on the conservation of 199 critically endangered species. A new 5-year strategy was launched, to bring more attention to the needs of ASAP species.

To achieve the objectives and mandates of the CPSG and ASAP, we collaborated with our conservation partners on a range of activities to fight extinction, including species assessments and strategy planning workshops. Here are some of the key conservation planning activities we were involved in over the FY.

Species assessments



Sunda Basin Freshwater Fishes

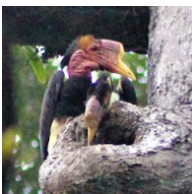
IUCN, WRS and ASAP co-organised the Sunda Basin Freshwater Fishes Red List Review Workshop at River Safari between 28 January and 1 February 2019. Assessments of the conservation needs of 400 freshwater fish species native to the region were reviewed and agreed upon at the workshop. The capacity development needs for this often-overlooked group of species were also evaluated. The assessment and reclassification process 'spotlights' species that need more protection, placing certain species in threatened categories to help them gain more conservation attention.



IUCN Hornbill Specialist Group

In August 2018, WRS supported the first meeting of the Steering Committee (SC) of the IUCN SSC Hornbill Specialist Group, held in Bangkok. The agenda was to prioritise actions for hornbill conservation, especially for seven threatened Asian species: the helmeted, Sulu, rufous-headed hornbill, Visayan, Mindoro, wrinkled and Narcondam. The group is also expecting to uplist the global conservation status of several Sundaic hornbill species, including the rhinoceros, black, wreathed, bushy-crested, white-crowned and great hornbills. The uplisting will spotlight the need for urgent conservation action for these species.

Strategy planning



Illegal Trade In Helmeted Hornbill

WRS supported a workshop to strengthen CITES implementation to eliminate illegal trade in the helmeted hornbill. The objective of the workshop was to discuss and decide on a strategy for further action to save the helmeted hornbill.

Sulu Hornbill Conservation Strategy And Action Plan Workshop

WRS supported the Sulu Hornbill Conservation Strategy and Action Plan Workshop in March 2019 held in the Philippines. During the IUCN SSC Hornbill Specialist Group First Steering Committee meeting in Bangkok, the development of a comprehensive Conservation Strategy and Action Plan was identified as a critical first step to halt the decline of the Sulu hornbill. Endemic to the Philippines, there are currently less than 40 Sulu hornbills in the wild.

SPREADING THE MESSAGE

To extend our conservation and sustainability messaging to different segments of the community, we continue to deepen partnerships and explore innovative platforms to raise awareness of the need to protect wildlife.

Over the FY, we have

- Engaged **398,000 park guests and members of the public** on conservation and sustainability messaging
- Offered a wide range of outdoor learning journeys at our parks to **131,900 students**
- Garnered the support of **1,900 volunteers** who devoted over **44,800 hours** to help us spread the conservation and sustainability message

LIVING CLASSROOMS

Leveraging on the increasingly strong emphasis on outdoor learning by the Ministry of Education (MOE), we stepped up efforts to create greater visibility of our programme offerings through teacher engagement sessions, conferences and various partnerships. Through the help of our animal ambassadors, programme offerings now better refreshed to facilitate early childhood development and cultivate the 21st century competencies. Guided by valuable feedback from educators and our strategic intent to inspire conservation and sustainability

champions, we designed age-appropriate programmes as a continuous thread to connect students from nursery to tertiary levels to the wonders of wildlife.

We worked closely with early childhood specialists, Early Childhood Development Agency (EDCA) and various pre-schools to revamp and co-create kindergarten programmes for better alignment with the Nurturing Early Learners (NEL) Framework.

Our new nursery programmes received very positive feedback from education practitioners and parents. We appreciate the wonderful partnership with the 10 PAP Community Foundation

kindergartens that offered us privileged access to an authentic environment to prototype and refine the programmes.

Thanks to the support of the Malay Language Learning and Promotion Committee (MLLPC) and the Tamil Language Learning and Promotion Committee (TLLPC), the popular Wow Wild Learn (WWL) Programme is now available not only in Chinese, but also in Malay and Tamil. The programme aims to engage and excite children in the learning of their mother tongue language by providing fun opportunities for parents to interact with their pre-school children and equipping preschool language teachers with the relevant knowledge

to conduct learning journeys in River Safari.

Apart from a range of learning journeys and overnight camps, we also engage youths through internship and work attachment, creating opportunities for them to gain social experience and to be future-ready.

We welcome to 5.2 million guests during the reporting period and seized every opportunity to spread the conservation and sustainability message. Themed activities that

encouraged a call to action and promoted guest interaction and family bonding were organised to enhance our signature Conservation, Sustainability and School Holiday Campaigns. To this end, appropriate training on family learning and facilitation skills was conducted to prepare staff and volunteers to deepen guest engagement.

Beyond our parks, we intensified outreach efforts in schools, tertiary institutions, community spaces, malls, welfare organisations and even the Istana to spread the

message and inspire people to protect biodiversity.

The Life Sciences team worked closely together to create content with powerful narratives to tug at the heartstrings of social media users. The digital platform allows us to reach out to the world to raise awareness of the plight of threatened animals and galvanise support for conservation and sustainability efforts.

Below:
Preschoolers learning about wildlife at the WRS booth at the Early Childhood Development Agency (ECDA) Conference.





Children listening rapt in attention during a Wow Wild Learn Tamil language storytelling by their mother tongue teacher.



Ms Syila Rokman, Senior Executive (Education) engaging preschool children with panda tales during the launch of the Malay Wow Wild Learn programme.

Children engaged in a puzzle activity during a Chinese Wow Wild Learn programme at River Safari.



PASSIONARTS FESTIVAL

In July 2018, the PASSIONArts Festival organised by People's Association saw us collaborating with students from Meridian Secondary, Yishun Town Secondary and Dunman High as well as beneficiaries of the Business Times Budding Artists Fund, to recreate a rainforest art installation using only recycled materials. Visitors to the installation at the Pasir Ris Beach Arts Festival also had the opportunity to create their own animal art pieces to add on to the installation. Through the installation, we turned the spotlight on five endangered inhabitants of the rainforest to increase awareness of the threats they face in the wild, and what people can do to ensure a safer future for them. Volunteer guides from the Little Arts Academy brought the art installation to life, sharing our conservation messages with the 8,000 visitors who attended the event.



A young participant adding her work of art, a model of the Singapore freshwater crab, to the art installation at PASSIONArts Festival.



VOLUNTEERS FOR WILDLIFE

Our engagement with different segments of the community deepened tremendously in the reporting year and this was made possible with the help of our committed volunteers.

We are grateful for their tireless dedication and can-do spirit – they devoted over 44,800 hours in helping us inspire people to protect wildlife, and assisting the Life Sciences team care for our living collection.

Tapping on a different skillset of the volunteers, we held two workshops to engage their help in making enrichment devices for our animals. Enrichment is an important part of animal welfare that allows animals to express their natural behaviour.

Left:
A volunteer interacting with guests at the RepTopia Ranger Station.

ENVIRONMENTAL SUSTAINABILITY

This year saw the development and adoption of the Environmental Sustainability Strategy, which is a holistic approach that takes us another step closer to becoming a regional leader in this area. The strategy guides the entire organisation towards sustainability best practices to optimise resource usage in our daily operations and development work. Additionally, we also advocate for sustainability to inspire and empower the community beyond our parks.

Over the FY, we

- **Converted all trams at Jurong Bird Park to run on electricity instead of fuel**
- **Replaced all single-use plastic bottles** with cans or paper cartons
- **Cut our water usage by almost 50%**
- **Won the Singapore Packaging Agreement (SPA) Excellence Award**

AWARDED FOR SUSTAINABILITY EFFORTS

In July 2018, we received the Singapore Packaging Agreement (SPA) Excellence Award, in recognition of our efforts in reducing, reusing and recycling packaging waste.

With the installation of 27 dispensers across four parks, we avoided an estimated 13 tonnes of plastic packaging waste that would have come from the consumption of bottled water. Around 2.33 tonnes of plastic packaging was also saved in a year, arising from our move to stop providing free carrier bags at our retail stores. We have also engaged our staff and vendors towards more sustainable practices. By collaborating with our F&B partner Curry Gardenn to serve food in reusable stainless steel containers instead of disposable styrofoam ones, approximately 1.08 tonnes of plastic packaging waste was avoided over the year.



Group CEO Mr Mike Barclay receiving the SPA Excellence Award from Minister for the Environment and Water Resources, Mr Masagos Zulkifli.

OUR CONTINUOUS JOURNEY TOWARDS SUSTAINABLE BEST PRACTICES

We continue to make notable strides in the adoption of sustainable best practices in water, energy, waste management and sustainable procurement through various initiatives.

In 2018, we significantly reduced water and energy consumption in our existing Mandai parks by undertaking several measures including detecting and repairing leaks from underground pipes, implementing time-based water operations, converting to LED lighting, and optimising equipment through the use of nozzles, valves, pumps and sensors. The concurrent completion of comprehensive water and energy audits will allow us to build on our efforts to realise further reductions moving forward.

Another priority area is the reduction of food waste in our operations by creating closed loop systems. We partner a landscaping company to compost all raw fruit and vegetable waste from our kitchens off-site. The composted product will be used as liquid fertiliser within and outside our parks.

To strengthen our commitment towards responsible buying, we implemented a Green Procurement Policy. The policy serves to improve the sustainability of our operations by reducing the negative impact to the environment and wildlife arising

Pruned branches and leaves gathered from around our parks are fed into this wood and leaf chipping cutter.



The shredded material is used as animal bedding. After around two months, it decomposes into excellent mulch for our plants.

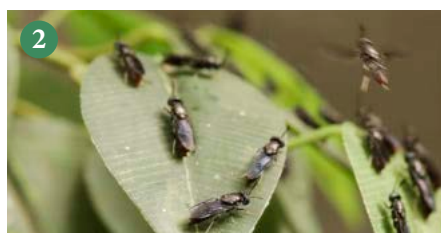


from our procurement activities, as well as providing sustainable purchasing guidelines for staff.

Our Life Sciences and Horticulture teams achieved great milestones this year testing sustainable, closed loops. Instead of just disposing of pruned branches, they are chipped and used as animal bedding. The animals enjoy their leaf and wood chip bedding - a natural substrate that encourages foraging behaviour. After the bedding has

been used for about two months, it decomposes into excellent mulch for our plants.

The Zoology team is breeding soldier flies to trial vermicomposting. Food waste is 'upcycled' as food for the larvae of soldier flies. The larvae are then harvested as food for some of the animals in our collection. As they feed on and digest the food waste, the larvae also generate rich compost, which is used as fertiliser for the plants in our parks.



1. A black soldier fly breeding station. After mating, females lay their eggs in the containers on the ground. When the larvae hatch, they feed on and decompose food waste.
2. Black soldier flies at the adult stage.
3. Black soldier fly larvae: a clean and nutritious food source for some of the insect-loving animals in our collection.

FIGHT THE DEADLIEST MONSTER CAMPAIGN 2018

The annual Sustainability Campaign continues to be the flagship of our sustainability advocacy efforts. In 2017, we introduced the concept of ‘The Deadliest Monster’ to cast a spotlight on plastic waste as the deadliest monster of our waters, one that kills over a million animals annually. Building on the success of this effort, we rallied our guests and community to join us to ‘Fight the Deadliest Monster’ by reducing their use of disposables.

We engaged our guests with in-park campaign messaging and programmes which included activity trails, pledging stations, educational booths and animal presentations.

Go Green For Wildlife (GGFW) animal ambassadors - Pedro and

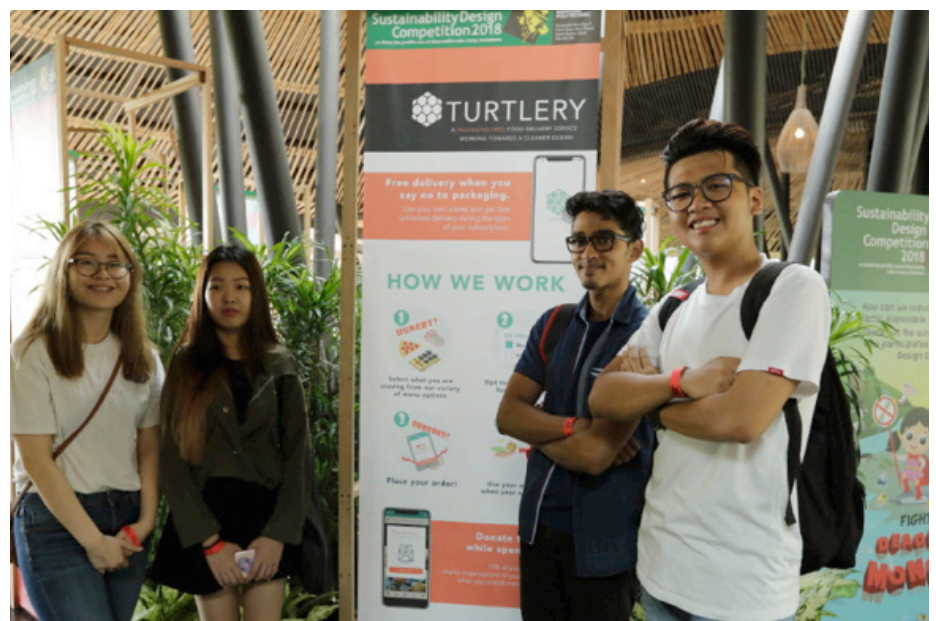
Philipp the sealions, Ippy the scarlet macaw and Luke the great white pelican delighted guests during animal presentations while rallying them to join our fight against the Deadliest Monster.

As part of the campaign and to deepen youth engagement, we collaborated with Temasek Polytechnic to organise a Sustainability Design Competition open to all polytechnic and ITE students in Singapore. We challenged the contestants to re-think the prolific use of disposable takeaway containers in Singapore and propose ways to change the way we live for a more sustainable future. The competition attracted over 30 creative and innovative entries.

Beyond our parks, we continued to engage the Singapore community on fighting ‘The Deadliest Monster’ at various outreach events.



Guests enjoying the ‘Fight the Deadliest Monster’ campaign activities.



The Sustainability Design Competition winning team from Nanyang Polytechnic.



Luke the great white pelican



Ippy the scarlet macaw



Pedro the Californian sea lion



Above:
Our Go Green For Wildlife animal ambassadors (clockwise from top left) Luke, Ippy and Pedro rally our guests to 'Fight the Deadliest Monster'.

Left:
Our staff engaging students at an outreach event outside our parks.



CHRISTMAS TREES FOR JUSTIN BEAVER

At the end of December 2018, our very own Justin Beaver put out a call to the public asking for donations of unwanted, live Christmas trees to be re-purposed for animal enrichment. Many of our animals enjoyed the scent of the trees and relished rubbing up against them, foraging for treats amongst the foliage or simply destroying them for fun. Leftover trees were sent for chipping, and the wood chips used for animal bedding and substrate.




This sustainability initiative was enthusiastically supported by the public, with many lauding our excellent sustainable practices and animal care. The response was overwhelming: we received 587 trees from nurseries and public drop-offs at the Zoo.

Top:
Close to 300 Christmas trees were dropped off at Singapore Zoo by the public.

Right:
Positive response from the media on our Christmas tree collection drive.

Plenty of post-Christmas pines and firs for beaver and friends

© Jan 07, 2019 06:00 am

The lucky animals at Singapore Zoo cannot see the wood for the trees these days, thanks to the hundreds of post-Christmas pines and firs that have been donated on Saturday.

The leafy deluge will give River Safari star Justin Beaver and his furry buddies plenty to bark about and it's all thanks to the many Singaporeans who heard the call of the Wildlife Reserves Singapore (WRS).

They had left 300 or so used trees at the Zoo's car park on Saturday from 9am until 2pm as part of an initiative by WRS to boost the animals' well-being.

Several WRS employees shared the appeal for Christmas trees informally in the past week.



Some 300 pines and firs were collected at the Singapore Zoo's carpark on Saturday after the Wildlife Reserves Singapore appealed to the public to donate Christmas trees so that beavers and other animals at the zoo and River Safari can have new objects to explore. ST PHOTO ALPHONSUS CHERN

Tree-mendous response to WRS' appeal



(Clockwise from top left) Our meerkats, Asian elephant and beaver were some of the animals who partook in the Christmas festivities, thanks to the ‘tree-mendous’ response from the public.

POLYTECHNIC FORUM

In September 2018, we hosted the opening ceremony of the annual Polytechnic Forum at Jurong Bird Park as part of our direct outreach efforts. With sustainability as a core theme of the forum, we shared our collective work in environmental sustainability and wildlife conservation with 400 student leaders and lecturers from Singapore’s five polytechnics. Over the course of the week-long forum,

80 students came to the Zoo for learning journeys where they gained first-hand experience and insights into our sustainability initiatives and wildlife conservation, as well as environmental mitigation measures under our development project. The interactions inspired 50 students to sign up as volunteers after the event.

Students from the polytechnics tried their hand at manning an educational booth in Singapore Zoo, where they shared conservation messages with visitors.





IN MEMORY OF INUKA

1990 - 2018

The only polar bear born and bred in the tropics, Inuka had a larger-than-life personality. He was a star who brought people together and touched their hearts in his own special way. He is dearly missed by all who knew and loved him. Here, we remember some of the times we had the privilege to share with him.





Inuka was born on 26 December 1990. He weighed only 350gms. He was the first polar bear to be born in the tropics.

'Inuka' means 'silent stalker' in the Inuit language. The name was selected from 10,000 entries.

Inuka enjoyed a close bond with his mother Sheba. At nine months, he had grown to an impressive size. He weighed over 500kg as an adult.

Singaporeans flocked to the Zoo to catch a glimpse of Inuka when he made his first public appearance at three months old.



Inuka celebrated his 10th birthday in style. SPH Foundation, his adopter, invited everyone to join in the birthday bash.

Inuka's birthdays were not only milestones of his development but also events that his fans looked forward to.



Inuka was the inspiration for a storybook, used as a teaching resource to encourage children to learn the Tamil language.



In 2013, Inuka moved into his new home in Frozen Tundra. He preferred to spend time in the outdoor area and pool instead of the ice cave.



Inuka will always have a special place in our hearts.





Building a People-focused Culture

We adopt forward-looking, best-in-class practices to develop our people to provide world-class animal care, to increase our conservation footprint and deliver exceptional guest experiences.

Strengthening our social sustainability pillar, we not only ensure that our parks are accessible to all segments of the society but also deepen engagement with those from disadvantaged backgrounds to provide specially curated wildlife experiences.

FY18/19 HIGHLIGHTS

Clocked **35,000 hours** of staff learning clocked

Launched **The Mandai Service Promise**

Launched **Life Sciences Associate Programme**

Launched **Zookeeper Development Programme**

Welcomed some **7,000 beneficiaries** from various Social Service Organisations

THE MANDAI SERVICE PROMISE

“Welcome. Let me bring you closer to wildlife.”

This is the Mandai Service Promise to every guest, a simple mantra that motivates and reminds our staff of the larger purpose they serve – to inspire people to value and conserve biodiversity in the service and experiences they provide. The Service Promise, rooted in the **3W pillars – willing, welcoming and well-versed** - was launched with a series of training to equip our staff with the necessary skills in fulfilling it. Specialised training on interaction with special needs guests and product knowledge of our parks were also covered to facilitate the promise delivery.



Ms Winnie Tan, Service Leader (Park Ops), attending to a guest's enquiry.

SERVICE RECOGNITION

To continue to nurture a strong service culture, we presented the Service Hero Award to service role models, applauding their efforts in delivering exceptional guest experiences. Adopting a holistic approach to encourage staff to serve from the heart, we also recognized, through the HEART Awards, those who have provided exemplary service to fellow colleagues.

Our efforts in cultivating a strong service culture earned industrial recognition. Mr Emmey Mohamed Bin Nenpari from Night Safari walked away with the coveted STB Best Customer Service award in the Attractions category at the 2018 Singapore Tourism Board (STB) Awards.

Every year, the Association of Singapore Attractions (ASA) presents Excellent Service Awards (EXSA) to celebrate service heroes in the industry. We had a record win, clinching 179 awards in the Silver, Gold and Star categories. Our congratulations go to Chandran A/L V P Kunhikannan from Night Safari for bagging the EXSA Superstar Award, which recognises the best of the Star category winners.

The winners of the HEART Awards 2018 taking a group shot with Group CEO Mr Mike Barclay (centre front, in green). The Awards serve as a big thumbs up to the excellent internal service shown by the winners to their colleagues.



Mr Chandran A/L V P Kunhikannan from Night Safari, bagging the EXSA Superstar Award.



Mr Emmey Mohamed Bin Nenpari from Night Safari receiving the STB Best Customer Service award in the Attractions category from President of Singapore Mdm Halimah Yacob at the 2018 Singapore Tourism Board (STB) Awards.

LEARNING AND DEVELOPMENT

During the reporting period, our staff attended some 350 different courses and conferences and spent 35,000 hours to enhance their work skills. 84% of the full-time workforce clocked at least 16 hours of training, up from 80% last year. Continuing education sponsorship was also made available for staff who aspire to further their studies.

7 HABITS OF HIGHLY EFFECTIVE PEOPLE

To forge a culture of excellence, we rolled out an organisational wide training programme to encourage the adoption of the *7 Habits of Highly Effective People*. The programme reached out to 70% of our staff, who spoke highly of its effectiveness.

ON-THE-JOB TRAINING

On-the-job training blueprints for new staff in Retail, F&B and Park Operations were also developed to facilitate and scaffold training in a structured manner in order to ensure consistency in service delivery and operational standards.

CHANGE MANAGEMENT

As the development of Mandai gathers pace, multi-dimensional changes impact everyone in the organisation. A change management workshop was conducted for the senior management team and other key stakeholders to bring forth open discussions and alignment so that we can rally as a team for the journey ahead.

LIFE SCIENCES ASSOCIATE PROGRAMME (LSAP)

We launched the *Life Sciences Associate Programme (LSAP)*, which is a 2-year accelerated learning programme aimed at nurturing aspiring individuals through knowledge enhancement and skills development for a fulfilling career in Life Sciences. Six employees were selected and they will be rotated across the various Life Sciences departments to gain exposure, insights and perspectives, in preparation for bigger roles.

MASTERCLASSES

Masterclasses on animal husbandry, animal behaviour, enrichment, conservation, early childhood outdoor learning, family learning and zoo operations provided platforms to learn from the best in the industry. The training empowers the various teams to provide world-class care for our living collection, increase our conservation footprint and strengthen conservation messaging through guest engagement.

ZOOKEEPER DEVELOPMENT PROGRAMME

The *Zookeeper Development Programme* was launched to map out a path to guide keepers in attaining different competencies. It also includes a framework for keepers to be trained as coaches and assessors to the junior keepers participating in the Development Programme. On-the-job training (OJT) blueprints were developed for the various skills within each competency category, and made available to all keepers.



HUMAN CAPITAL MANAGEMENT

Our people are our most important asset. To attract and retain talents, we continued to embrace HR best practices, offer best possible compensation packages and enhance our Employer Value Proposition.

PAY STRUCTURE REVIEW AND JOB RETITLING

To maintain our competitiveness, we conducted a review of pay structure through market benchmarking. Resulting from the initiative, we implemented a set of competitive new salary ranges and activated a job retitling exercise.

FLEXIBLE WORK ARRANGEMENTS

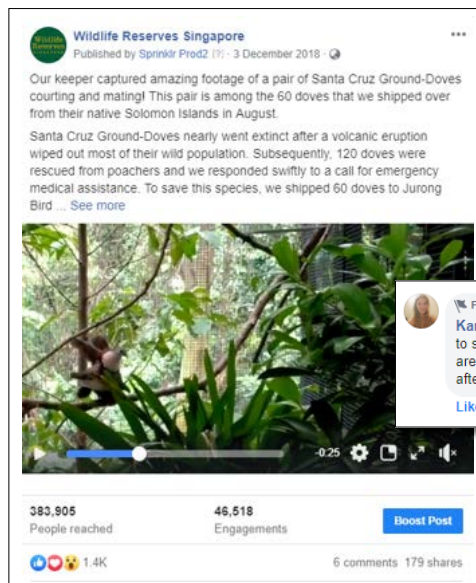
Flexible Work Arrangements (FWA) has been the subject of growing attention over recent years. As a progressive employer, we believe that the FWA enhances our Employer Value Proposition, and contributes to a supportive and conducive work environment for our people. This propelled us to be a forerunner in FWA in the Attractions Industry – we introduced three flexible work arrangement (FWA) options including staggered work hours, telecommuting and Blue Sky Friday. The scheme has been well received with 82 Employees on at least one FWA.

STAFF ENGAGEMENT

Our organisation is made up of dedicated team of over 1,000 full-time staff working hard to protect wildlife. The animal care team responsible for keeping our animals healthy and happy are vital contributors to the effort to protect and inspire love for wildlife among our guests.

The bond between our keepers and the animals they look after is profound and a source of countless behind-the-scenes moments that we would love to share with the

world. After a rigorous process involving user research and prototyping, the **Keepers' App** was born. The App is a content sharing platform that empowers our keepers to upload images and videos, which are used on social media to tell authentic stories that the public would otherwise not have access to. These stories tugged at many heartstrings, with social engagement ratings above the industrial average. Keepers' App bagged the Silver Award for Best Use of Advocates in the Loyalty and Engagement Awards 2019 by Marketing Interactive.



Images and videos uploaded by our zookeepers on Keepers' App were used on social media to tell authentic stories that the public would otherwise not have access to. These stories tugged at the heartstrings of our social media followers, garnering social engagement ratings above the industrial average.

SOCIAL SUSTAINABILITY

To ensure that our parks are accessible to all segments of the community, we offer complimentary admission to over 450 Social Service Organisations (SSOs). During the reporting period, we welcomed around 7,000 beneficiaries from various SSOs to our four parks and Rainforest Lumina.

‘Let’s Play Outside! Nature Learning for all Families’

As a recipient of the WAZA Nature Connect grant, we initiated ‘**Let’s Play Outside! Nature Learning for all Families**’, a four-part programme that reached out to families with autistic children. Working with our partner, the Autism Resource Centre (ARC), we created autism-friendly resources and conducted autism awareness training to equip our staff and volunteers with the necessary skills to engage the children and their families. The customised programme was greatly appreciated by the parents as it allowed their children to explore nature in an inclusive environment.



Junior Keeper Ms Noor Najilah Binte Anifah accompanying children with autism on their third visit: a walk with Pangolina the Sunda pangolin. Pangolina came to us with a severe spinal injury sustained in a hit-and-run accident. Because of the injury, she will never walk normally and must always be under our care.

DSA-MINDS FAMILY DAY

We worked with Movement for the Intellectually Disabled of Singapore (MINDS) and Down Syndrome Association Singapore (DSA)(S) to engage eight youths with intellectual challenges to co-design and co-facilitated the **DSA-MINDS Family Day**. The event turned out to be a great success with all enjoying a day of fun, animal interaction and family bonding.



‘Wild Adventures’

Another four-part programme, ‘**Wild Adventures**’, was designed to offer meaningful outings for families affected by incarceration. We partner Salvation Army and Candlelight Social Enterprise to train youths affected by incarceration to co-design and co-facilitate activities for the families. Apart from creating opportunities for the families to enjoy our parks and bond, the programme empowers the youths and boost their self-esteem.

STAFF VOLUNTEERING DAY

On 5 March 2019, we hosted 120 children from Asian Womens' Welfare Association (AWWA) School and their caregivers at Singapore Zoo. More than 50 staff served as volunteer guides to provide a memorable wildlife experience for the group. At Rainforest Kidzworld, the children mingled with our friendly zookeepers and enjoyed close encounters with rabbits and goats. The kids and their caregivers were also enthralled by the antics of our sea lion at the Splash Safari Show.



Mr Danny Tan, Assistant Vice President (Digital) is all smiles as he plays host to two guests from AWWA. Mr Tan is one of more than 50 staff who came forward to be volunteer guides.

HAIR FOR HOPE 2018

During the inaugural fundraising event for the Children's Cancer Foundation (CCF) on 2 July 2018, 50 staff shaved to raise a total sum of \$75,430 in support of children suffering from cancer.



Right (above):

(From left) Deputy Chief Executive Officer Mr Leong Yue Kheong, Senior Manager Ms Maxine Khoo (Sales) and Chief Human Resources Officer Mr Marcus Heng, relinquishing their locks for a worthy cause.

Right:

Our shavees making a bald statement together to raise funds for cancer-stricken children and their families.







Sustaining our Business Performance

To do good, we need to do well. In order to provide the best possible care for our animals, support field conservation work and offer innovative, immersive wildlife experiences that inspire people to take actions to protect wildlife, we are constantly seeking to grow and diversify revenue streams.

FY18/19 HIGHLIGHTS

Welcomed **5.2 million** attendance at our parks

Achieved **85%** guest satisfaction score, a record high

Singapore Zoo ranked **#3 in the world** by TripAdvisor

Night Safari bagged the **Best Attraction Experience Awards 2018** by Singapore Tourism Board (STB)

Launched **Rainforest Lumina**, the first multimedia, phygital night walk in Southeast Asia

RAINFOREST LUMINA

We have been redefining guest experiences since Singapore Zoo opened its doors to our guests in 1973. To mark the Zoo's 45th anniversary, we launched Rainforest Lumina, a multimedia night walk that facilitates a better appreciation of the rainforest and its inhabitants through an an immersive and interactive 'phygital' experience. The first of its kind in Southeast Asia,

Rainforest Lumina helped to increase footfall by attracting over 200,000 guests. It also drew people from non-traditional consumer segments and provided us a rare opportunity to connect them with nature.

Leveraging on technology, Rainforest Lumina addresses the need to re-engage guests beyond park visits. Using a wristband, they can scan

a QR code to retrieve their digital photos after the visit, offering us a digital platform to share nuggets of information on our living collection that inspired the characters (the Creature Crew) of Rainforest Lumina. To date, we have seen click-through rates doubling that of industry benchmarks for the post-experience electronic direct mails.



1. The entrance to Rainforest Lumina.
2. When night falls, the Zoo is transformed by well-choreographed lighting into a magical dreamscape.
3. An interactive game setup invites guest participation.

ENHANCING PARK EXPERIENCES

Frequent guest feedback on the need for higher interaction at River Safari fuelled the launch of *'Once Upon a River'*, a river life-themed show. Headlined by aquatic animals' natural prowess, the new show takes guests on an imaginative journey through riverine habitats to experience the natural behaviours of various aquatic species. The stars of the show: the capybaras, the great white pelican, the brahminy kite and the Asian small-clawed otters win over guests' hearts and nudge them towards conservation action.

River Safari Cruise was revamped and renamed Reservoir Cruise to better reflect the experience of the scenic ride on Upper Seletar Reservoir. This resulted in an increase in guest satisfaction by 100%.



1. Our capybara stars munch their way to their audience's hearts at the *'Once Upon a River'* animal presentation.
2. Photo-taking with a great white pelican after the show.
3. A young guest tries his hand at feeding a capybara.



Over at Singapore Zoo, the revamped Elephant Presentation allows the elephants to double up as ‘scriptwriters’ and ‘directors’ as they are given free rein to participate in enrichment activities of their choice, showing off their natural behaviours and personalities in the process. The idea is that elephants are amazing, engaging and interesting to watch just by being themselves. The reimagined elephant presentation is part of our continuing efforts to improve animal welfare and is also in line with the evolution of the care of our elephants towards the protected contact elephant management system.

For the first time ever, the fossa went on display at Singapore Zoo. The pair were brought in under the recommendation of the EAZA Ex-situ Programme (EEP). The EEP is a breeding programme by the European Association of Zoos and Aquariums (EAZA) of which Singapore Zoo is a member. Medical conditioning sessions are

conducted by the fossa care team, through an access window from the guest area. Guests can view the animals at close range and interact with the keepers during these sessions.

At the same time, the SPH Conservation Centre welcomed a troop of Celebes crested macaques. At this glass-fronted exhibit, guests can view the macaques up-close.

Earlier in the FY, Fragile Forest added a walk-in aviary where butterflies flutter freely. The Butterfly Aviary is home to 11 species of butterflies, including eight that are native to Singapore. Other than the plain tiger, common mormon, great eggfly, guests can also catch a glimpse of the clipper butterfly, a native species that is now extinct in the wild in Singapore.

Jurong Bird Park welcomed a pair of shoebills, making us the only wildlife park in Southeast Asia to display these impressive birds. Named after their shoe-shaped bills, there are only around 30 of them under human

care. The shoebills are currently at the park’s Wetlands exhibit.

The marsh bird exhibit at Fishing Cat Trail, Night Safari, was converted into an exhibit for the Indian gharials, as the reptiles were getting too big for their old home. This new exhibit, replete with 2-metre deep pools, is three times larger than the old Indian gharial exhibit. This move to improve animal welfare turned out to be a win-win, as the gharials are very active and display well at night, enhancing the walking trail experience for guests

To better manage the capacity challenges in Night Safari, improvements in the time-based admission system were made, cutting queue time by half.

1. Reimagined Elephant Presentation at Elephants of Asia
2. Butterfly Aviary at Fragile Forest
3. New Indian gharial exhibit at Fishing Cat Trail





1. A Celebes crested macaque and her young. Guests can view these charismatic primates up-close at their new glass-fronted exhibit.
2. A shoebill taking in its new surroundings at Jurong Bird Park's Wetlands.
3. The fleet-footed fossa at its newly-opened exhibit. This is the first time Singapore Zoo has brought in the fossa.

GETTING THE NOD FROM GUESTS

Collective efforts to improve overall park experiences have also reaped rewards for us. Guest satisfaction score hit a record high of 85%. At the same time, we received fewer complaints and more compliments from guests.

Night Safari was crowned Best Attraction Experience at the 2018 Singapore Tourism Board (STB)

Awards. This is the 13th time Night Safari has won the coveted award in the tourism industry.

On the global front, we did the nation proud again. The only Asian zoo to make it to the top ten zoos last year, Singapore Zoo moved up the ranks and was named the world's third best zoo in the 2018 Travellers' Choice[®] awards by TripAdvisor[®].



(From left) STB Chairman Mr Chaly Mah, Group CEO Mr Mike Barclay, Deputy Chief Executive Officer and Chief Life Sciences Officer Mr Cheng Wen-Haur, Chief Park Operations & Revenue Officer Ms Sherri Lim. It is the 13th time Night Safari has won Best Attraction Experience at the STB Awards.



DRIVING FOOTFALL

Sustained effort in marketing and travel agent engagement helped us stay ahead in the competitive landscape. Signature campaigns during the major school holidays and festive seasons, and attractive packages and promotions reeled in the crowd while extensive media

coverage allowed us to maintain the mindshare and heart share of consumers. Special targeted deals tying in with memorable dates like the Zoo's 45th birthday and Singapore's 53rd birthday found favour with the locals, as did our partnership with NTUC Link to

offer perks to their Plus! members. Besides tapping on the star power of celebrities like singers Jay Chou and JJ Lin, hobnobbing with the Arsenal football team and ONE Championship mixed martial arts fighters also helped us reach out to the sporty segments of the crowd.

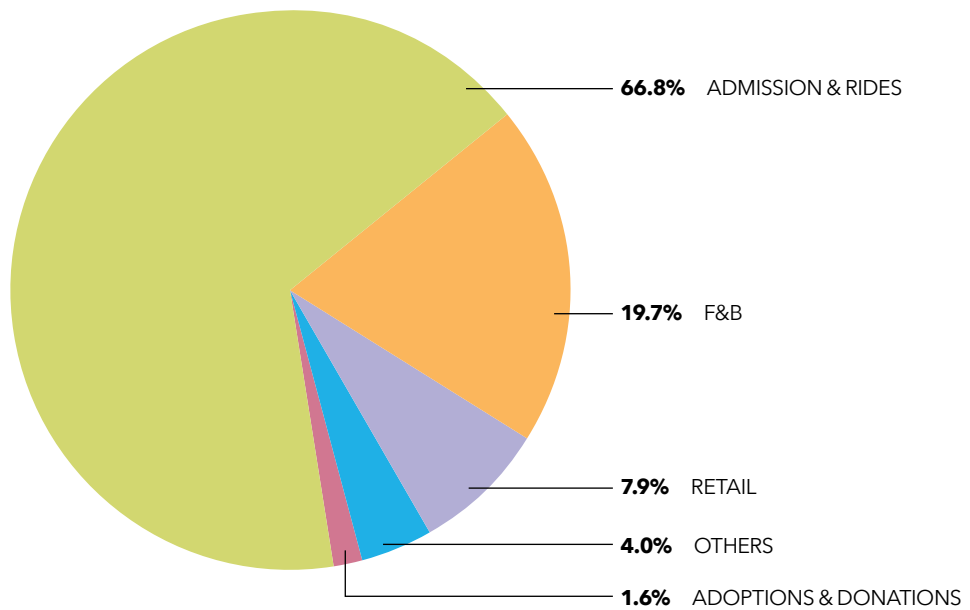


Seasonal exhibits that span over six to nine months encourage repeat visits to Singapore Zoo. Over the year end, we launched *Dragons and Beasts*, which featured life-like animatronic collection of 17 dragons and mythical beasts inspired by cultures and animals around the world. By linking these mythical beasts to the Zoo's animals, we hope to showcase how amazing living, breathing animals truly are and in turn instill a deeper sense of appreciation for wildlife.

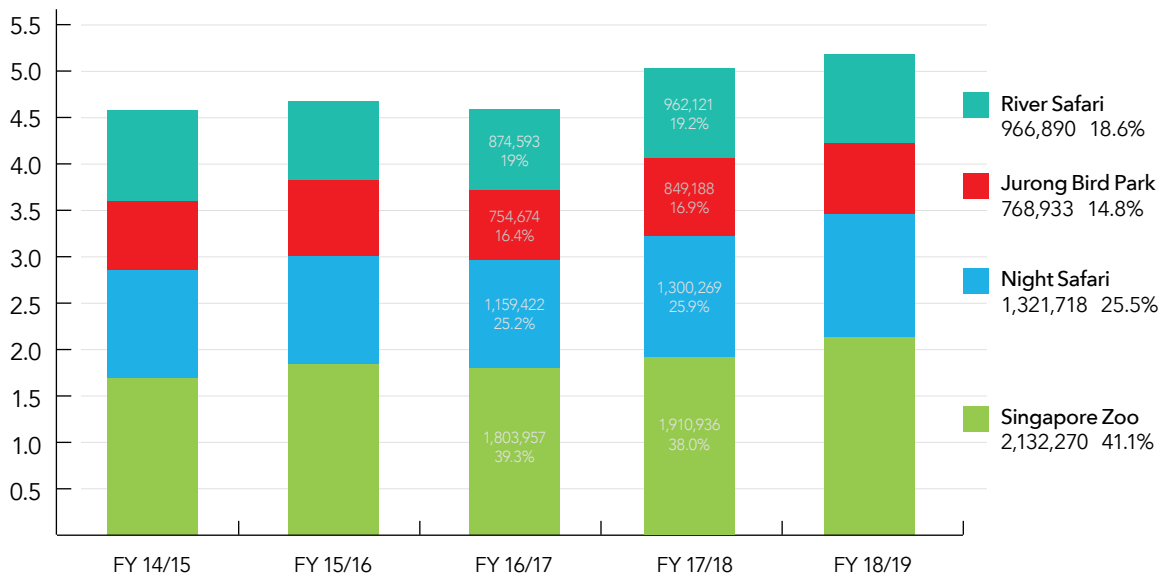


FINANCIAL & ATTENDANCE HIGHLIGHTS

REVENUE FOR FY18/19 **\$171,923,000**



TOTAL GUESTS **5,189,811**







THE YEAR AHEAD

As construction of the new Mandai precinct gathers pace and the 10-year WRS master plan unfolds, we are rallying as a team and working doubly hard to minimise impact on our living collection, guests and staff. In the face of the disruptions, we continue to innovate, redesign processes and leverage on technology to enhance our park offerings and service delivery.

The construction of East Node of the new Mandai precinct requires major works to be carried at the Zoo entrance plaza and Corporate Office. Guest services including ticketing, admission, membership registration, F&B and Retail will be affected. In preparation, our team is gearing up to relocate these services and the Corporate Office while reviewing operations to reduce the negative impact on guest experience and revenue.

The WRS Master Plan continues to unfold, focusing on capital projects that will deliver the Mandai service promise to bring guests even closer to wildlife, dramatically improve guest comfort, facilitate world-class animal care and enhance animal welfare. The first phase of the Master Plan includes a gamut of developments at our parks at Mandai, with key projects happening at Night Safari and Singapore Zoo.

The old giraffe exhibit at Night Safari is to be converted into a rhino exhibit, as part of tram ride enhancements to improve guest experience. Over at the Zoo, a new Elephant exhibit will be developed on a new site five times larger than the existing elephant exhibit at the Zoo. The development will provide more space for the pachyderms to play, forage and rest and at the same time allow guests to observe how they are cared for by their keepers in a way that is currently not possible at the existing exhibit.

A new KidzWorld will also be developed. The concept of the new KidzWorld is firmly rooted in consumer-centricity. Applying the process of design thinking, we undertook a deep dive to understand our customers better, through participant observation and focus group discussions with end-users including parents and children. Our aspiration is to develop a KidzWorld that combines animal interaction, play, F&B and retail in an integrated manner that is not seen in any other petting zoo in the world. We hope that children will grow up creating memories with their families in KidzWorld through discovery and play, and nurture the love for animals and nature through the experience.

With the passing of polar bear Inuka, the plan is to convert Frozen Tundra to a coastal-themed habitat for sealions and penguins.

ANNEX

Managed Species Programmes FY 18-19

SPECIES	SCIENTIFIC NAME	PROGRAMME	IUCN RED LIST STATUS
African Hunting Dog	<i>Lycan pictus</i>	EEP	EN
Asian Elephant	<i>Elephas maximus</i>	EEP	EN
Baer's Pochard	<i>Aythya baeri</i>	ESB	CR
Bali Myna	<i>Leucopsar rothschildi</i>	EEP	CR
Bar-pouched Hornbill	<i>Rhyticeros undulatus</i>	ESB	VU
Bat-eared Fox	<i>Otocyon megalotis</i>	EEP	LC
Black Hornbill	<i>Anthraceroceros malayanus</i>	ESB	NT
Black Howler	<i>Alouatta caraya</i>	ESB	LC
Black-winged Myna	<i>Acridotheres melanopterus</i>	ISB	CR
Blue-crowned Laughingthrush	<i>Garrulax courtoisi</i>	GSMP	CR
Blue-throated Macaw	<i>Ara glaucogularis</i>	ISB	CR
Bornean Orangutan	<i>Pongo pygmaeus</i>	SSMP / ISB	EN
Buff-cheeked Gibbon	<i>Nomascus gabriellae</i>	ESB	VU
Buffon's Macaw	<i>Ara ambiguus</i>	ISB	EN
Chimpanzee	<i>Pan troglodytes</i>	EEP	EN
Chinese Alligator	<i>Alligator sinensis</i>	EEP	CR
Common Squirrel Monkey	<i>Saimiri sciureus</i>	EEP	LC
Cuban Boa	<i>Chilabothrus angulifer</i>	ESB	NT
De Brazza's Monkey	<i>Cercopithecus neglectus</i>	EEP	LC
Ecuador Amazon	<i>Amazona lilacina</i>	EEP	EN
Emperor Tamarin	<i>Saguinus imperator</i>	EEP	LC
False Gharial	<i>Tomistoma schlegellii</i>	ESB	EN
Fossa	<i>Cryptoprocta ferax</i>	EEP	VU
Gaur	<i>Bos gaurus</i>	ISB	VU
Giant Anteater	<i>Myrmecophaga tridactyla</i>	ISB	VU
Giant Panda	<i>Ailuropoda menaloleuca</i>	China Wildlife Conservation Association / China Conservation & Research Centre for Giant Panda	VU
Giant Otter	<i>Pteronura brasiliensis</i>	EEP	EN
Goeldi's Monkey	<i>Callimico goeldii</i>	EEP	VU
Golden Cat	<i>Cattopuma temminckii</i>	EEP	VU
Golden Lion Tamarin	<i>Leontopithecus rosalia</i>	ISB	EN
Golden-headed Lion Tamarin	<i>Leontopithecus chrysomelas</i>	ISB	EN
Goodfellow's Tree Kangaroo	<i>Dendrolagus goodfellowi</i>	GSMP	EN
Great Hornbill	<i>Buceros bicornis</i>	EEP	NT
Hamerkop	<i>Scopus umbretta</i>	ESB	LC
Hooded Pitta	<i>Pitta sordida</i>	SSP	LC
Indian Rhino	<i>Rhinoceros unicornis</i>	ISB	VU
Jaguar	<i>Panthera onca</i>	EEP	LC
Javan Langur	<i>Trachypithecus auratus</i>	EEP	VU
King Bird-of-paradise	<i>Cicinnurus regius</i>	ESB	LC
Komodo Dragon	<i>Varanus komodoensis</i>	EEP	VU
Lear's Macaw	<i>Anodorhynchus leari</i>	ISB	EN
Lion-tailed Macaque	<i>Macaca silenus</i>	EEP	EN
Malayan Peacock-pheasant	<i>Polyplectron malaccense</i>	ESB	VU
Malayan Tapir	<i>Tapirus indicus</i>	SSMP	EN
Maned Wolf	<i>Chrysocyon brachyurus</i>	ISB / EEP	NT
Markhor	<i>Capra falconeri</i>	ESB	NT
Meller's Duck	<i>Anas melleri</i>	EEP	EN
Mexican Beaded Lizard	<i>Heloderma horridum</i>	EEP	LC
Minadao Bleeding-heart	<i>Gallcolumba criniger</i>	SSP	VU
Mountain Peacock-pheasant	<i>Polyplectron inopinatum</i>	ESB	VU
Northern Bald Ibis (Waldrapp)	<i>Geronticus eremita</i>	EEP	CR
Oriental Small-clawed Otter	<i>Aonyx cinereus</i>	ISB	VU
Palm Cockatoo	<i>Probosciger aterrimus</i>	EEP	LC
Papuan Hornbill	<i>Rhyticeros plicatus</i>	ESB	LC
Pileated Gibbon	<i>Hylobates pileatus</i>	EEP	EN
Ploughshare Tortoise	<i>Astrochelys yniphora</i>	ISB	CR
Purple-naped Lory	<i>Lorius domicellus</i>	ESB	EN
Pygmy Hippo	<i>Choeropsis liberiensis</i>	EEP	EN
Raggiana Bird-of-Paradise	<i>Paradisaea raggiana</i>	SSP	LC
Red Dhole	<i>Cuon alpinus</i>	EEP	EN
Red Panda	<i>Ailurus fulgens</i>	GSMP	EN
Red-bellied Tamarin	<i>Saguinus labiatus</i>	ESB	LC
Red-billed Toucan	<i>Ramphastos tucanus</i>	ESB	VU
Rhinoceros Hornbill	<i>Buceros rhinoceros</i>	EEP	NT
Sloth Bear	<i>Melursus ursinus</i>	EEP	VU
Southern Cassowary	<i>Casuarius casuarius</i>	ESB	VU
Southern Cheetah	<i>Acinonyx jubatus jubatus</i>	EEP	VU
Spix's Macaw	<i>Cyanopsitta spixi</i>	ISB	CR (EW)
Spotted Hyena	<i>Crocuta crocuta</i>	EEP	LC
Sri Lankan Leopard	<i>Panthera pardus kotiya</i>	EEP	VU
Sun Bear	<i>Helarctos malayanus</i>	ESB	VU
Swamp Wallaby	<i>Wallabia bicolor</i>	ESB	LC
Von Der Decken's Hornbill	<i>Tockus deckeni</i>	ESB	LC
White-backed Vulture	<i>Gyps africanus</i>	EEP	CR
White-headed Vulture	<i>Trigonoceps occipitalis</i>	EEP	CR
White-winged Duck	<i>Asacornis scutulata</i>	EEP	EN
Wrinkled Hornbill	<i>Rhabdotorhinus corrugatus</i>	EEP	EN

ABBREVIATIONS AND ACRONYMS

PROGRAMME

EEP

EAZA Ex-situ Programme

ESB

European Studbook

GSMP

Global Species Management Plan

ISB

International Studbook

SSMP

SEAZA Species Management Programme

IUCN RED LIST STATUS

EW

Extinct in the Wild

CR

Critically Endangered

EN

Endangered

VU

Vulnerable

NT

Near Threatened

LC

Least Concern

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