PITTSBURGH ZOO
& PPG AQUARIUM

JUN 22 2018

14 June 2018

US Fish and Wildlife Service
Division of Management Authority
Branch of Permits, MS: IA
5275 Leesburg Pike
Falls Church, VA 22041-3803

Permit Specialist,

Please find enclosed the Captive-Bred Wildlife Registration application for the Pittsburgh Zoo & PPG Aquarium. We wish to submit the answers and supporting documentation for questions 10-14 electronically. Once we receive our electronic confirmation and application number we will submit our electronic files via email to Permits@fws.gov.

Thank you,

Heather W. Terrell

Heather Terrell
Registrar
Pittsburgh Zoo & PPG Aquarium
One Wild Place
Pittsburgh, PA 15206

Form 3-200-41

OMB Control No. 1018-0093
Expires 08/31/2020

JUN 22 2018

Department of Interior
U.S. Fish and Wildlife Service
Federal Fish and Wildlife Permit Application Form

U.S. Fish and Wildlife Service
Division of Management Authority
Branch of Permits, MS: IA
5275 Leesburg Pike
Falls Church, VA 22041-3803
1-800-358-2104 or 703-358-2104

Type of Activity

CAPTIVE-BRED WILDLIFE REGISTRATION (CBW)
(U.S. Endangered Species Act)

Complete Sections A or B, and C, D, and E of this application. U.S. address may be required in Section C, see instructions for details.
You may find instructions on how to make your application complete and help avoid unnecessary delays at the following link: .

Section A: Complete if applying as an individual

1.a. Last Name		1.b. First Name	1.c. Middle Name/Initial	1.d. Suffix
2. Date of Birth (mm/dd/yyyy)	**3. Telephone Number**	**3.a. Alternate Telephone Number**	**4. E-mail address**	

Section B: Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution

1.a. Name of business, agency, Tribe, or institution		1.b. Doing business as (DBA)	
Zoological Society of Pittsburgh		Pittsburgh Zoo & PPG Aquarium	
2. Tax identification no.		**3. Description of business, agency, Tribe, or institution**	
25-1418766		Zoological Institution	
4.a. Principal officer Last name	**4.b. Principal officer First Name**	**4.c. Principal officer Middle name/initial**	**4.d. Suffix**
Baker	Barbara	A	
5. Principal officer title	**6. Primary contact name**		
President & CEO	Heather Terrell, Registrar		
7.a. Business telephone number	**7.b. Alternate telephone number**	**7.c. Business fax number**	**7.d. Business e-mail address**
412-365-2581	412-365-2501	412-365-2583	hterrell@pittsburghzoo.org

Section C: All applicants complete address information

1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes)				
One Wild Place				
1.b. City	**1.c. State**	**1.d. Zip code/Postal code**	**1.e. County/Province**	**1.f. Country**
Pittsburgh	PA	15206	Allegheny	USA
2.a. Mailing address (include if different than physical address; include name of contact person if applicable)				
same as above, use Attn: Heather Terrell				
2.b. City	**2.c. State**	**2.d. Zip code/Postal code**	**2.e. County/Province**	**2.f.Country**

Section D: All applicants MUST complete

1. Attach check or money order payable to the U.S. FISH AND WILDLIFE SERVICE **in the amount identified on page 2, nonrefundable processing fee.** Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – *attach documentation of fee exempt status as outlined in instructions.* [50 CFR 13.11(d)]

2. Certification: I hereby certify that I have read and am familiar with the regulations contained in ***Title 50 Part 13 of the Code of Federal Regulations*** and the other ***applicable parts in subchapter B of Chapter I of Title 50***, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

Signature of applicant/Principal Officer for permit (No photocopied or stamped signatures) Date of signature (mm/dd/yyyy)

Dr. Barbara Baker 6/14/18

Please continue to next page

E. CAPTIVE-BRED WILDLIFE REGISTRATION (U.S. Endangered Species Act)

Please use the following application for all CBW requests: new or renewals.

X This is a new application.

This is an amendment or renewal application.

All applicants must complete **Part 1** of the application. A CBW Registration remains valid for five years and may be renewed once for a total validity of ten years, after which the CBW Registration number will be retired and you must apply for a new CBW Registration. If a renewal application is submitted thirty days or more prior to the CBW Registration expiration, the applicant may continue to conduct previously authorized activities during the renewal process. However, if the application is submitted fewer than thirty days prior to expiration, activities must cease at the time the registration expires until the renewal process is completed.

For New applications and amendments, complete **Part 2** of the application. You may renew your CBW once after 5 years, but after a CBW registration has been valid for 10 years, you must submit a complete new application responding to all questions.

To renew your CBW (it has been less than 10 years since you completed a completely new application), complete **Part 3** of this application.

Electronic submission of inventories, photographs, and receipts: Some applications contain extensive inventories and /or a large number of photographs or receipts. You may provide electronic versions of the documents. Such a submission will assist in expediting the processing of your application since it may reduce data entry by the U.S. Fish and Wildlife Service. If you wish to provide information electronically, please either include a disk containing your information or, once you have received an application number via the e-mailed acknowledgement letter, e-mail your information to Permits@fws.gov. Be sure to include the application number provided in the acknowledgement e-mail that will be sent to you when we receive your application.

X I will be submitting documents electronically.

Part 1: All Applicants Should Complete

The Division of Management Authority annually distributes a list of Captive-Bred Wildlife (CBW) Registration permittees to all CBW registration holders. The list facilitates the exchange of parental stock among registered breeders and includes permittees that operate as individuals, as well as those that are business entities. For businesses and other organizations holding CBW registrations, including sole proprietorships, the list includes name, permit number, address, and species held by each permittee. However, the records for individuals holding CBW registrations are contained in a Privacy Act (5 U.S.C. 552a) system of records. Therefore, only the name, species, permit number, and state of residence will automatically be included on the list. The complete address will be included only upon authorization from the individual permittees.

If you are **not** a business or organizational entity, and are applying for the CBW registration as an individual, please provide one of the following statements: (Note: if you collect funds for any wildlife purpose, you are a business)

I, [your name] of [facility name] authorize the U.S. Fish and Wildlife Service to include my complete address in its CBW registration list and to release this information to other CBW holders or the public, if requested. I would also like the Service to use the following address on the CBW registration list: [indicate either your mailing address or facility address as identified in your application].

Same address as on page one.

Different address:

Signed_____ Date_____

OR

I, [your name] of [facility name] DO NOT authorize the U.S. Fish & Wildlife Service to include my complete address in its CBW registration list. Since my contact information will not be made available to parties interested in cooperating with other CBW holders in breeding programs, I intend to use the following method to communicate and facilitate exchanges with other interested CBW holders:

Signed_____ Date_____

1. Name and address where you wish the permit to be mailed, if different from page 1. If you would like expedited shipping, please enclose a self-addressed, pre-paid, computer-generated, courier service airway bill. If unspecified, all documents will be mailed via the U.S. Postal Service.

   Same as page 1

2. Who should we contact if we have questions about the application (name, phone number, and e-mail)?

   Heather Terrell, registrar, 412-365-2581, hterrell@pittsburghzoo.org

3. Have you or your client (if a broker applying on behalf of your client), been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed; been convicted, or entered a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act; forfeited collateral; OR are currently under charges for any violation of the laws mentioned above?

   X No Yes

If you answered "Yes" to Question 3, provide: a) the individual's name; b) date of charge; c) charge(s); d) location of incident; e) court, and f) action taken for each violation. Please be aware that a "Yes" response does not automatically disqualify you from getting a permit.

4. Provide copies of any license or registration under the Animal Welfare Act regulations of the U.S. Department of Agriculture (9 CFR 2) (if required) and/or any State license or registration required to maintain or breed the species requested in Part 2 or Part 3 below. If available, provide a copy of your last two (2) USDA AWA inspection reports.

5. The exact location(s), including address(es), where the wildlife requested in this application will be maintained. If more than one location exists, list all that apply. NOTE: You must report any change in address or location of facilities to the Division of Management Authority within 10 days.

   Pittsburgh Zoo & PPG Aquarium, One Wild Place, Pittsburgh PA 15206
   International Conservation Center, 1487 Glen Savage Road, Fairhope, PA 15538

6. Provide a current inventory, including those out on loan, for each of the ESA-listed species you are requesting to include or have already been approved to hold (if currently holding a valid CBW registration) on your CBW registration.

   See appendix for current inventory

7. A description of the qualifications of the individuals who will care for the animals, including the number of years' experience with this species or similar species, and names of current caretakers.

   See appendix for staff qualifications

Part 2: New Application, Amendment, or Renewal of CBW which are older than 10 years:

FOR <u>EACH SPECIES BEING REQUESTED</u> for inclusion in a registration, whether a new application or amendment, complete each of the following questions. Signify that you have read each question by writing "N/A" if non-applicable. If submitting hard copy pages, please indicate the species and the application question number you are addressing.

8. The scientific name (genus, species and, if applicable, subspecies) and common name of the species.

   See appendix for species list

9. The name, address, and CBW registration number of the person(s) or institution(s) from whom you plan to acquire the wildlife. If currently unknown, state if there is an organized breeding program that you are involved with or if you have communicated with other breeding organizations.

   Individual animals have not been identified at this time. The Pittsburgh Zoo & PPG Aquarium participates with the yellow and red SSP programs for ESA listed animals and provides status updates to all green SSP listed species.

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of this species, **including your long-term goals for your breeding program and intended disposition of any progeny.**

See electronic appendix files for the answers for questions 10-14 for each species

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic viability of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

12. If your activities include the holding of surplus animals (i.e., no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the locations from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species, including:

    a. The number of years you or the facility has/have maintained the requested species or similar species.

    b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

    c. How many mortalities of requested species or similar species have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

    d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining each species requested.

14. Provide a detailed description, including size, construction materials, and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your existing facilities, including space for future progeny, where the wildlife will be maintained.

Part 3: Applications to Renew CBW registrations that are 5 years old or less: N/A

All CBW registrants are required to submit an annual report on activities conducted at the facility over the previous year, as well as a current inventory of all species covered under the registration. If you have already responded to the following questions in your annual report, please note that in your answer to the question.

15. Have there been any changes to your operation such as reconstruction or new construction, new facilities, or other physical changes? If yes, please describe them.

16. Have there been any changes to senior staff or personnel changes that would affect how your operation handles the species included in the registration? If yes, please describe these changes.

17. Have there been any changes to your inventory that have not been reflected in your annual reports or the current inventory list provided to the Service? If yes, please describe these changes.

18. Is there any additional information that you believe the Service should be aware of in regards to your operation, facilities, inventory, or business model?

*** **Please note:** If you have a change of mailing address, you must notify the Service within 10 days. If your facilities move, you will need to apply for an amendment.

3-200-41

4. Copy of Animal Welfare Act license expiring October 10, 2018

USDA Inspection Reports

Site: 001

18-APR-2017

13-DEC-2017

Site: 002

3-JAN-2017

23-MAR-2016

USDA

United States Department of Agriculture

Marketing and Regulatory Programs

Animal and Plant Health Inspection Service

Animal Care

EXPIRATION DATE: OCTOBER 10, 2018

This is to certify that

ZOOLOGICAL SOCIETY OF PITTSBURGH

is a licensed under the CLASS C EXHIBITOR

Animal Welfare Act

(7 U.S.C. 2131 et seq.)

Certificate No. 23-C-0009

Customer No. 2241

Deputy Administrator

APHIS FORM 7007 (NOV 99) *Previous editions are obsolete.*

United States Department of Agriculture
Animal and Plant Health Inspection Service

MNEAFSEY

2016082568205023 Insp_id

Inspection Report

Zoological Society Of Pittsburgh
One Wild Place
Pittsburgh, PA 15206

Customer ID: **2241**
Certificate: **23-C-0009**
Site: 001
THE PITTSBURGH ZOO

Type: ROUTINE INSPECTION
Date: 18-APR-2017

No non-compliant items identified during this inspection.

The elephants inspected were "Nan","Tash","Angeline","Victoria", "Zuri", and "Umasai"

This inspection and exit interview were conducted with animal management staff.

Additional Inspectors

Campitelli Kathryn, Veterinary Medical Officer

[redacted]

United States Department of Agriculture
Animal and Plant Health Inspection Service

KCAMPITELLI

2016082568986698 Insp_id

Inspection Report

Zoological Society Of Pittsburgh
One Wild Place
Pittsburgh, PA 15206

Customer ID: **2241**
Certificate: **23-C-0009**
Site: 001
THE PITTSBURGH ZOO

Type: ROUTINE INSPECTION
Date: 13-DEC-2017

No non-compliant items were identified during this inspection.

This inspection and exit interview were conducted with the curatorial staff.

Elephants inspected during this inspection were: Tash 38, Nan 35, Victoria 18, Angeline 9, and Zuri 9.

Additional Inspectors

Sebera Shannon, Animal Care Inspector

[redacted]

United States Department of Agriculture
Animal and Plant Health Inspection Service

MNEAFSEY

2016082568055143 Insp_id

Inspection Report

Zoological Society Of Pittsburgh
One Wild Place
Pittsburgh, PA 15206

Customer ID: **2241**
Certificate: **23-C-0009**
Site: 002
INTERNATIONAL CONSERVATION CENTER

Type: ROUTINE INSPECTION
Date: 03-JAN-2017

No non-compliant items identified during this inspection.

This inspection and exit interview were conducted with animal management staff.

The elephants inspected were Bette, Sukiri, Seeni, Thandi, and Jackson.

[redacted]

United States Department of Agriculture
Animal and Plant Health Inspection Service

INSPECTION REPORT

Customer #:2241
Certificate #: 23-C-0009

Site #: 002

Zoological Society of Pittsburgh
Pittsburgh Zoo & Ppg Aquarium
One Wild Place
Pittsburgh, PA 15206

INSPECTION:
Type: Routine
Date: 03/23/2016

NARRATIVE

No non-compliant items were identified during this inspection.

The inspection and exit interview was completed with animal management staff and Veterinary Medical Officers, Kathy Campitelli and Michael Neafsey.

[redacted]

3-200-41

6. Current Inventory of ESA listed species that we are requesting to be included and are approved to hold on our current CBW registration.

Copy of current Inventory Report

Copy of current CBW included

Report Start Date
6/1/2018

Detailed Inventory Report for

Report End Date
6/1/2018

Taxonomy	Beginning	Births	Acquisitions	Change	Deaths	Dispositions	Ending Status
Loxodonta africana		**CITES: II,A/IUCN: Vulnerable (VU)**					**African elephant**
Owned And Onsite	1.8.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.8.0
In On Loan	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
Out On Loan	1.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.1.0
Varecia rubra		**CITES: I,A/IUCN: Endangered (EN)**					**Red ruffed lemur**
Owned And Onsite	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Varecia variegata variegata		**CITES: I,A/IUCN: Critically Endangered (CR)**					**Black-and-white ruffed lemur**
Owned And Onsite	1.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.0.0
In On Loan	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Nomascus leucogenys		**CITES: I,A/IUCN: Critically Endangered (CR)**					**White-cheeked gibbon**
Owned And Onsite	1.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.0.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Symphalangus syndactylus		**CITES: I,A/IUCN: Endangered (EN)**					**Siamang**
Owned And Onsite	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
In On Loan	1.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.1.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Gorilla gorilla gorilla		**CITES: I,A/IUCN: Critically Endangered (CR)**					**Western lowland gorilla**
Owned And Onsite	4.2.0	0.0.0	0.0.0	0	0.0.0	0.0.0	4.2.0
In On Loan	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Pongo pygmaeus pygmaeus		**CITES: I,A/IUCN: Endangered (EN)**					**Northwest Bornean orangutan**
Owned And Onsite	1.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.1.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Acinonyx jubatus		**CITES: I,A/IUCN: Vulnerable (VU)**					**Cheetah**
Owned And Onsite	0.2.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.2.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	2.3.0	0.0.0	0.0.0	0	0.0.0	0.0.0	2.3.0
Neofelis nebulosa		**CITES: I,A/IUCN: Vulnerable (VU)**					**Clouded leopard**
Owned And Onsite	1.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.1.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Panthera leo krugeri		**CITES: II,B/IUCN: Vulnerable (VU)**					**African lion**
Owned And Onsite	2.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	2.0.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Panthera tigris altaica		**CITES: I,A/IUCN: Endangered (EN)**					**Amur tiger**
Owned And Onsite	2.2.0	0.0.0	0.0.0	0	0.0.0	0.0.0	2.2.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.3.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.3.0
Nanger dama ruficollis		**CITES: I,A/IUCN: Critically Endangered (CR)**					**Addra gazelle**
Owned And Onsite	1.2.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.2.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0

DEPARTMENT OF THE INTERIOR
U.S. FISH AND WILDLIFE SERVICE

FEDERAL FISH AND WILDLIFE PERMIT

2. AUTHORITY-STATUTES
16 USC 1533 (d)
16 USC 1539 (a)

REGULATIONS
50 CFR 17.21 (g)

1. PERMITTEE

PITTSBURGH ZOO
ONE WILD PLACE
PITTSBURGH, PA 15206
U.S.A.

3. NUMBER
MA840690-0

4. RENEWABLE
☒ YES
☐ NO

5. MAY COPY
☒ YES
☐ NO

6. EFFECTIVE
07/18/2013

7. EXPIRES
07/18/2018

8. NAME AND TITLE OF PRINCIPAL OFFICER *(If #1 is a business)*
BARBARA BAKER
PRESIDENT & CEO

9. TYPE OF PERMIT
CAPTIVE-BRED WILDLIFE REGISTRATION

10. LOCATION WHERE AUTHORIZED ACTIVITY MAY BE CONDUCTED
WITHIN THE UNITED STATES

11. CONDITIONS AND AUTHORIZATIONS

A. GENERAL CONDITIONS SET OUT IN SUBPART D OF 50 CFR 13, AND SPECIFIC CONDITIONS CONTAINED IN FEDERAL REGULATIONS CITED IN BLOCK #2 ABOVE, ARE HEREBY MADE A PART OF THIS PERMIT. ALL ACTIVITIES AUTHORIZED HEREIN MUST BE CARRIED OUT IN ACCORD WITH AND FOR THE PURPOSES DESCRIBED IN THE APPLICATION SUBMITTED. CONTINUED VALIDITY, OR RENEWAL, OF THIS PERMIT IS SUBJECT TO COMPLETE AND TIMELY COMPLIANCE WITH ALL APPLICABLE CONDITIONS, INCLUDING THE FILING OF ALL REQUIRED INFORMATION AND REPORTS.

B. THE VALIDITY OF THIS PERMIT IS ALSO CONDITIONED UPON STRICT OBSERVANCE OF ALL APPLICABLE FOREIGN, STATE, LOCAL, TRIBAL, OR OTHER FEDERAL LAW.

C. VALID FOR USE BY PERMITTEE NAMED ABOVE.

D. Acceptance of this permit serves as evidence that the permittee is registered under 50 CFR 17.21 (g), and that the permittee understands and agrees to abide by the 'Special Conditions for Captive-bred Wildlife Registrations' as specified by the Division of Management Authority (copy attached).

E. Authorized to take for normal husbandry practices deliver, receive, carry, transport or ship in interstate commerce, for the purpose of enhancement of propagation or survival, any Endangered or Threatened wildlife that is bred in captivity in the United States, that has a natural geographic distribution not including any part of the United States and that is taxonomically included in the families: Cercopithecidae, Felidae (does not include Jaguar, Ocelot or Margay), Hominidae, Lemuridae, Crocodylidae and species **black rhinoceros** (*Diceros bicornis*), **dama gazelle** *(Nanger dama)*, **African wild dog** (*Lycaon pictus*), **white-cheeked gibbon** (*Nomascus leucogenys*), **cotton-top tamarin** (*Saguinus oedipus*), **Komodo monitor** (*Varanus komodoensis)* and **Aruba Island rattlesnake** *(Crotalus durissus unicolor)*.

☒ ADDITIONAL CONDITIONS AND AUTHORIZATIONS ALSO APPLY

12. REPORTING REQUIREMENTS

ANNUAL REPORT DUE: 03/31
SEE "SPECIAL CONDITIONS FOR CAPTIVE-BRED WILDLIFE REGISTRATIONS"
SEE "SPECIAL CONDITION 11" FOR ANNUAL REPORTING REQUIREMENTS.

ISSUED BY

TITLE
CHIEF, BRANCH OF PERMITS, DMA

DATE
07/18/2013

7. Staff qualifications

Dr. Ginger Sturgeon, DVM, Director of Animal Health

Dr. Sturgeon received her veterinary degree from the University of Tennessee in 2005. She finished an internship at Purdue University from June 2005-June 2006. She completed a residency at the Kansas City Zoo and the University of Missouri from 2006-2009. In February 2010 she accepted the Associate Veterinarian position at the Pittsburgh Zoo & PPG Aquarium. In May 2011, Dr. Sturgeon accepted the position of interim Director of Animal Health and in October she was promoted to the Director of Animal Health. Dr. Sturgeon is responsible for all aspects of veterinary care for ~4000 animals at the zoo, aquarium and International Conservation Center. She is responsible for the leadership and management oversight of the Animal Health department.

Dr. Alicia Hahn, DVM, Associate veterinarian

Dr. Hahn received her veterinary degree from Kansas State University (2009). Prior to this she completed a 3 year residency in Zoo medicine at the Oklahoma City Zoo. She passed the zoological medicine board exam to become a diplomate of the American College of Zoo Medicine in 2014. Dr. Hahn accepted the associate veterinary position at the Pittsburgh Zoo & PPG Aquarium in 2014. Dr. Hahn is responsible for carrying out the preventative health care program, medical and surgical case management, emergency treatments, enrichment evaluations, post-mortem exams and collaborating on research projects.

Ken Kaemmerer, Curator of Mammals

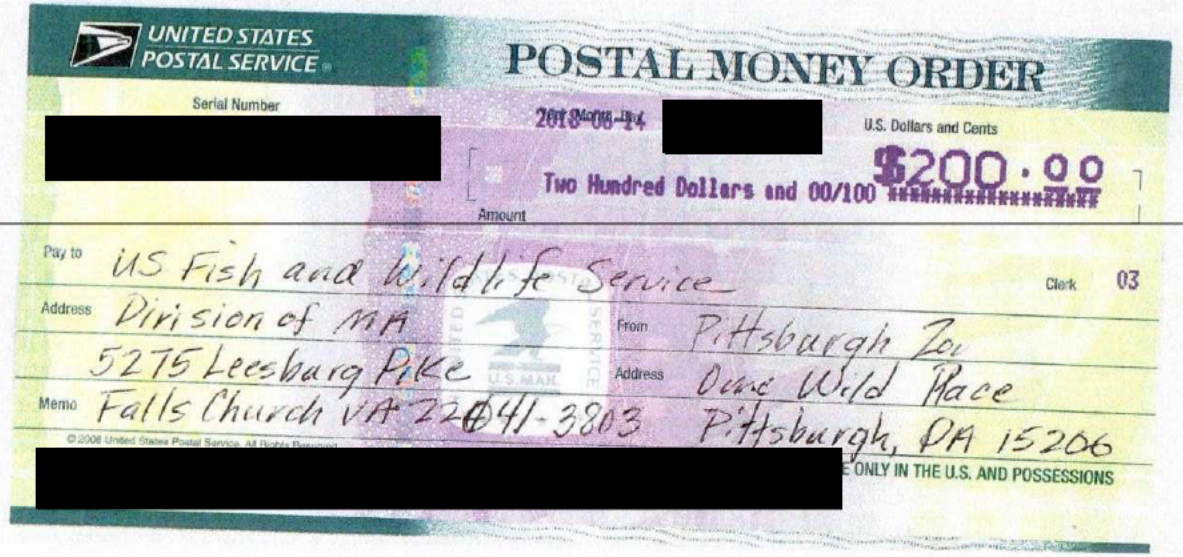
Mr. Kaemmerer received a BS in Biology from Purdue University in 1974 and an MA in Zoology from Southern Illinois University in 1978. Mr. Kaemmerer began his zoo career in the mid 1970's and has spanned over 40 years at five zoos. He spent 21 years as the Curator of Mammals at the Dallas Zoo. He was responsible for all mammals in the collection, which included primates, pachyderms, carnivores, hoofstock, insectivores, chiropterans, rodents and edentata. He has been the curator of mammals at the Pittsburgh Zoo & PPG Aquarium since February 2010. At the Pittsburgh Zoo he oversees the primates, rhinos and carnivores.

Karen Vacco, Assistant Curator of Mammals

Mrs. Vacco received a AS in Wildlife technology from Penn State University in 1992. She started her career at the Pittsburgh Zoo & PPG Aquarium following graduation. She has worked in every area of the zoo and aquarium at one point in her career. In 2002 she was promoted to lead keeper of the primates and African painted dogs. She was promoted to Assistant Curator of Mammals in 2009. Her responsibilities include overseeing the daily operations for the mammal department's animal collection and personnel. She oversees the primates, rhinos and carnivores.

8. The scientific name and common name of the species included in the application.

Loxodonta africana	African elephant
Varecia rubra	Red ruffed lemur
Varecia variegata variegata	Black and white ruffed lemur
Hylobates leucogenys	White cheeked gibbons
Symphalangus syndactylus	Siamang
Gorilla gorilla gorilla	Western lowland gorilla
Pongo pygmaeus	Orangutan
Acinonyx jubatus	Cheetah
Neofelis nebulosi	Clouded leopard
Panthera leo melanochaita	African lion
Panthera tigris	Amur tiger
Gazella dama	Dama gazelle



UNITED STATES POSTAL SERVICE

POSTAL MONEY ORDER

Serial Number [redacted]

2018-06-14 [redacted]

U.S. Dollars and Cents

$200.00

Amount Two Hundred Dollars and 00/100

Pay to US Fish and Wildlife Service

Clerk 03

Address Division of MA
5275 Leesburg Pike
Falls Church VA 22041-3803

From Pittsburgh Zoo
Address One Wild Place
Pittsburgh, PA 15206

Memo [redacted]

3-200-41

E. Captive-bred Wildlife Registration

Bornean Orangutan (*Pongo pygmaeus pygmaeus*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium provides data and updates to the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for Bornean orangutans. We currently have a 39 year old female and her 12 year old son. As these two animals are considered surplus animals we will hold them at our facility.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The genes of the Bornean orangutan population at the Pittsburgh Zoo & PPG Aquarium are being managed by the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for orangutans. As of the August 2014 Population Viability Analyses the orangutan population was at 84 individuals. In the previous 10 years the population averaged 2.7 births/year and the gene diversity was 97.2% with an inbreeding coefficient of F=0.0004.

The orangutan population currently has 45 hybrid individuals. The SSP does not recommend that these animals be bred and that they should be managed via attrition. Therefore the hybrid population can be expected to age out of zoos in approximately 32 years, which will increase spaces for the two orangutan managed populations. If the AZA Bornean orangutan population continues with the current birth rate it is expected to have 16 individuals remaining in 100 years. To maintain the population at its current size, it would need to produce an average of 4 births per year over the next 10 years. If the population produces ~5 birth/year, it could fill 115 potential spaces (the current spaces and half of the spaces currently held by hybrids) in approximately 32 years.

The AZA Orangutan Animal Programs should therefore re-allocate spaces currently occupied by hybrids as they come available between the two orangutan managed populations. They should also increase the breeding rates from the current ~3 births/year to ~5 births/year to fill spaces currently occupied by hybrid orangutans.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation

that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

At this time our two animals are considered surplus animals to the AZA. In August 2015 the Pittsburgh Zoo & PPG Aquarium decided to terminate its membership with the AZA. As a result the SSP has declared our orangutans to be surplus animals. The genetics of our animals are part of this managed population. By holding these animals and not breeding them we are freeing up space for other facilities to breed. Oral contraceptives are used on the dam to prevent inbreeding.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The earliest written record of orangutans occurring at the Pittsburgh Zoo & PPG Aquarium was in 1943. Our first family group was established with the opening of our Tropical Forest Complex (TFC) building in 1991 and some of those original troop members are still here today. We also maintain a troop of gorillas at our facility that was also established in 1991 but the earliest records of gorillas at the Pittsburgh Zoo was in 1953.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

Western lowland gorilla – one male infant born 11 April 2013 – Still alive today

Western lowland gorilla – one male infant born 25 May 2018 – Still alive today

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

There have been no mortalities in our large primates in the last 5 years.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The indoor orangutan exhibit is 1135 SF. It varies in height from 22' to 30'. There are 3 holding rooms for orangutans that total 408 SF. The building is constructed out of masonry walls and poured concrete floors in the basement and precast concrete plank on the first floor. There is 2" x 2" galvanized mesh used in the interior holding rooms of the basement. The orangutan viewing windows are 3 ply – ½" glass laminated with 2-90 mil polyvinyl butyral interlayers with tempered glass on the visitor's side. The indoor exhibit contains skylights throughout the high roof area and artificial trees made of textured epoxy on steel pipe. There are gunite painted and textured concrete simulating rocks, boulders, riverbanks, pools and waterfalls in the indoor exhibit. The indoor temperature is maintained by 2 roof mounted air conditioning units with in-line hot water duct heaters designed to maintain a temperature of 70-85 degrees with a relative humidity of 50%. The building also contains smoke detectors throughout and a sprinkler system in the basement. See attached for photos and diagrams.

Orangutan (*Pongo pygmaeus + Pongo abelii*)

August 2014

Population Biologist: Brent Johnson, bjohnson@lpzoo.org
Studbook Keeper: Megan Elder, megan.elder@ci.stpaul.mn.us
Animal Program Leader: Lori Perkins, lperkins@zooatlanta.org
AZA Ape TAG Chair: Tara Stoinski, tstoinski@zooatlanta.org
AZA Ape TAG Vice-Chair: Tracy Fenn, fennt@jacksonvillezoo.org

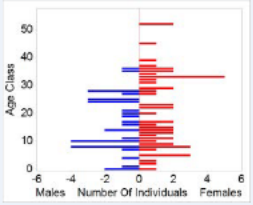
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years

	Sumatran	Bornean		
WITHOUT potential changes:	**Low Risk**	**Vulnerable**	Endangered	Critical
	Both			
WITH potential changes:	**Low Risk**	Vulnerable	Endangered	Critical

Bornean Population Status

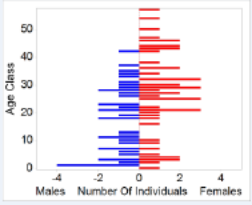
- 84 orangutans (33 males, 51 females) are housed at 25 AZA institutions
- The population has increased at 0.6% annual growth over the last decade, with an average of ~3 births/year
- 97% of the founding gene diversity (GD) has been retained
- Average inbreeding (F) is 0.0004
- IUCN status: Endangered



Age pyramid of the Bornean orangutan population

Sumatran Population Status

- 85 orangutans (36 males, 48 females, 1 unknown) are housed at 28 institutions
- The population has decreased at -0.4% annual growth over the last decade, with an average of ~3 births/year
- 98% of the founding gene diversity (GD) has been retained
- Average inbreeding value (F) is 0.0056
- IUCN status: Critically Endangered



Age pyramid of the Sumatran orangutan population

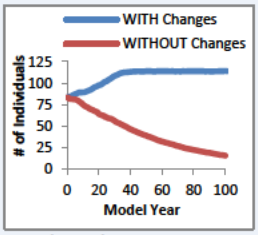
Program Challenges

- Managers intend to move toward a standard of parent rearing with a minimum of 8-year interbirth intervals among females, which allows for proper social development of offspring but lowers the breeding potential of each population

Model Results

Projected Status WITHOUT Potential Changes

- If the Bornean population continues its current breeding rate, it would have a 4% chance of extinction or ~16 individuals in 100 years
- 84.4% (± 8.8%) gene diversity and low inbreeding (F: 0.055 ± 0.003) would be maintained
- Status: **Vulnerable** in zoos in 100 years
- For additional details, see page 10 in the main report



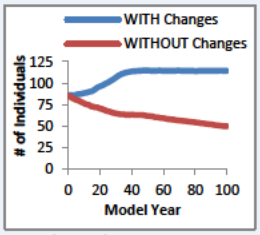
Projected size of the Bornean orangutan population

Projected Status WITH Potential Changes

- The Bornean population could fill available spaces if the breeding rate is increased to ~5 births/year
- High gene diversity (GD: 95.1% ± 0.2%) and low inbreeding (F: 0.039 ± 0.007) would be maintained
- Status: **Low Risk** in institutions in 100 years
- For additional details, see pages 11-12 (scenario D) in main report

Projected Status WITHOUT Potential Changes

- If the Sumatran population continues its current breeding rate, it would have decline to ~50 individuals in the next 100 years
- High gene diversity (GD: 92.2% ± 2.1%) and low inbreeding (F: 0.049 ± 0.015) would be maintained
- Status: **Low Risk** in zoos in 100 years
- For additional details, see page 17 in the main report



Projected size of the Sumatran orangutan population

Projected Status WITH Potential Changes

- The Sumatran population could fill available spaces if the breeding rate is increased to ~5 births/year
- High gene diversity (GD: 95.3% ± 0.2%) and low inbreeding (F: 0.040 ± 0.008) would be maintained
- Status: **Low Risk** in institutions in 100 years
- For additional details, see page 18-19 (scenario G) in main report

Essential Management Actions

- Re-allocate spaces currently occupied by hybrids as they become available over the next 32 years
- Increasing breeding rates to produce ~5 births/year in each population to fill spaces as they become available

How Institutions Can Help

- Pursue breeding recommendations given to your institution
- Report breeding challenges and successes to the Program Leader

Please see the 2014 Orangutan AZA Animal Programs full PVA report on the AZA website for further details.

Contact Brent Johnson at bjohnson@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) are being conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team uses ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Ape Taxon Advisory Group (TAG) during summer of 2014.

POPULATION HISTORY/CURRENT STATUS

Bornean orangutans (*Pongo pygmaeus*) have been consistently held in AZA institutions since 1940. Through a combination of importations of animals from outside of AZA and zoo births, the population grew to a size near 75 individuals by 1969. The population currently includes 84 individuals. In the past 10 years, the population has had an average of 2.7 births/year. Current gene diversity is high (97.2%) and inbreeding is low (average inbreeding coefficient of 0.0004).

Sumatran orangutans (*Pongo abelii*) have been consistently housed in North American institutions since 1928, although the population size remained low (<30 individuals) until 1960. After that year, the population grew through a combination of importations of animals from outside of the formally managed population and zoo births to a peak size of 105 individuals in 1997. The population averaged 2.8 births/year in the past 10 years and currently includes 85 individuals. At present, the Sumatran orangutan population has high gene diversity (97.6%) and low inbreeding (average inbreeding coefficient of 0.0056).

For each orangutan population, managers have been moving toward a standard of parent rearing and more prolonged time that offspring spend with their mother. They intend to maintain a minimum of 8-year interbirth intervals among females (except when infant mortalities occur) to allow them to fully raise their young.

PVA RESULTS

Model results indicate that hybrid orangutans will age out of AZA institutions in approximately 32 years, which could increase spaces for the other orangutan populations. If the AZA Bornean orangutan population continues its current breeding rate (2.7 births/year in the past 10 years), it is expected to have a 4% chance of extinction or approximately 16 individuals remaining in 100 years. However, **increasing breeding is predicted to allow the AZA Bornean orangutan population to remain stable over the next 100 years**. For the population to maintain its current size, it would need to produce an average of ~4 births per year over the next 10 years. If the population produces ~5 births/year, it could fill 115 potential spaces (including half of those currently occupied by hybrids) in approximately 32 years.

Under its current breeding rate (2.8 births/year in the past 10 years), the formally managed Sumatran orangutan population is predicted to decline to an average of 50 individuals over the next 100 years. **Increasing breeding is predicted to also allow the Sumatran orangutan population to remain stable over the next 100 years**. To maintain its current size, the population should produce an average of ~4 births per year over the next 10 years. By producing ~4 births/year over the next decade and ~5 births every following year, the population could fill 115 potential spaces in approximately 33 years. Increasing breeding rates (to either maintain the current population size or fill potential spaces) is also expected to maintain the genetic health of each orangutan population over the next century.

MANAGEMENT ACTIONS

The AZA Orangutan Animal Programs should consider the following changes to current management strategies:

- **Re-allocate spaces currently occupied by hybrids as they become available:** Because spaces are expected to become available as hybrid orangutans age out of AZA institutions, managers should ensure that these spaces are allocated to Bornean and Sumatran orangutans to maintain each of these populations at a larger, stable size with the best possible genetic health.

- **Increase breeding rates:** For each orangutan population, breeding should be increased from ~3 births per year to a minimum of ~4 births each year to maintain the current population size. To fill spaces currently occupied by hybrid orangutans as they become available, the Bornean population should produce ~5 births per year. The Sumatran population, however, should produce ~4 births each year for the next decade and ~5 births every following year in order to do so. To achieve these higher breeding rates, it may not be possible to immediately implement the recommended 8-year interbirth intervals. If higher breeding rates could be maintained, each population may become demographically stable and maintain its genetic health.

Pittsburgh Zoo & PPG Aquarium

Bornean Orangutan

Tropical Forest Complex (TFC)

TFC interior

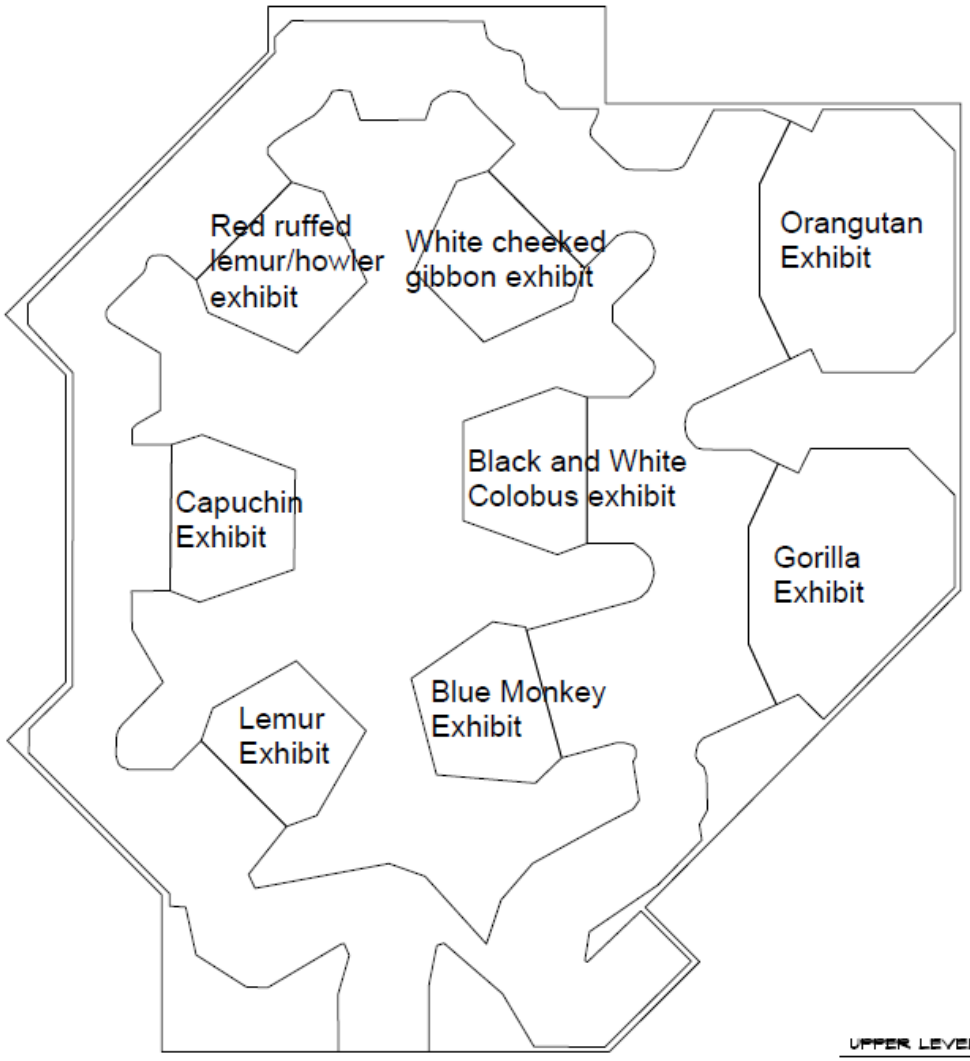
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

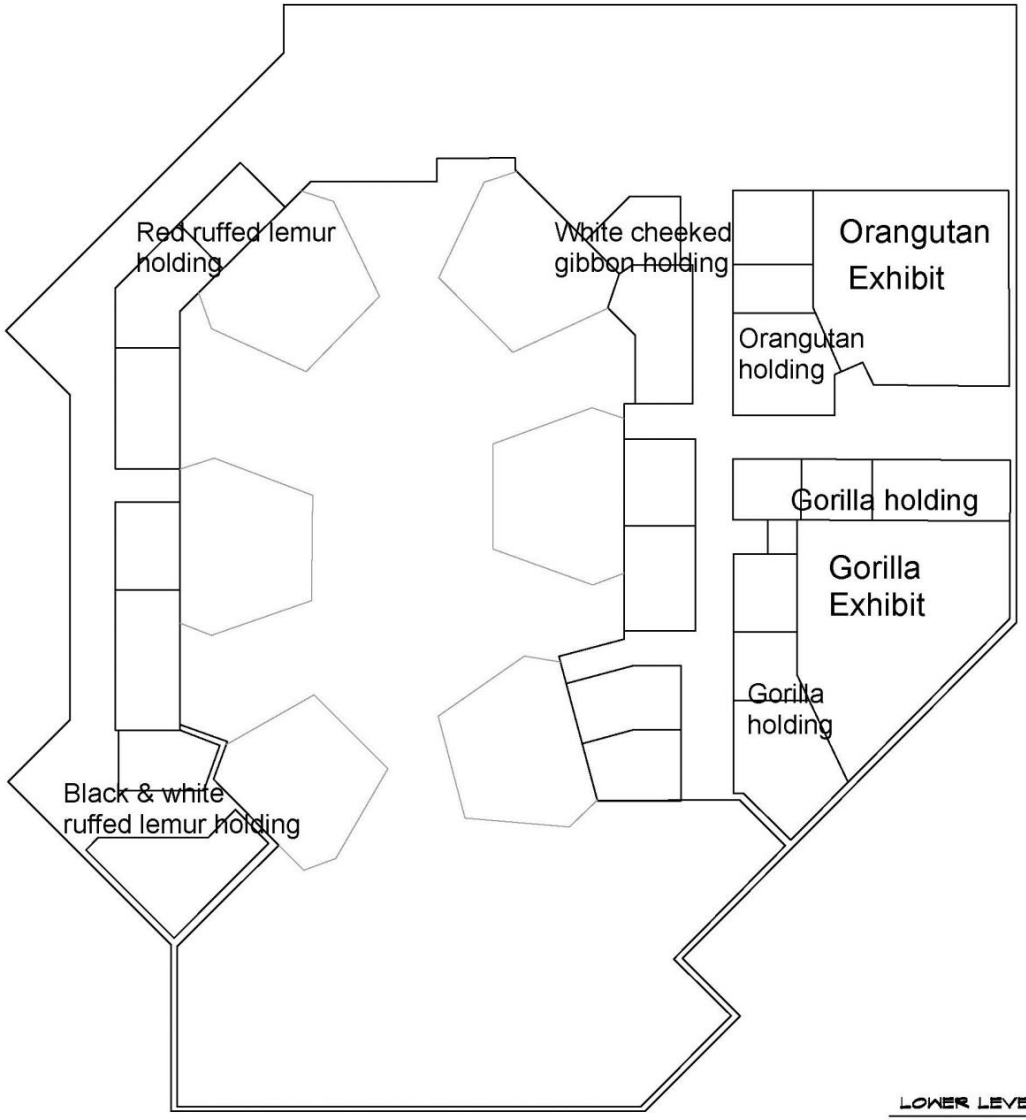
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level



LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

Orangutan exhibit

Artificial trees and fabricated vines provide enrichment and structure.

Orangutan exhibit

Artificial trees and fabricated vines provide enrichment and structure.

Orangutan holding room

Fire hose hammocks provide nesting sites. Exhibit door located on the far wall.

Orangutan holding room

Fire hose hammock and shelves provide nesting sites. The door on the far wall leads to the exhibit.

Orangutan holding room

Handles in the walls provide climbing structure.

3-200-41

E. Captive-bred Wildlife Registration

Cheetah (*Acinonyx jubatus*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for cheetah. We currently have a 6 year old female and her 1.5 year old daughter. We plan to follow the SSP breeding and transfer plan and will acquire and disposition as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the cheetah SSP. As of the January 2017 AZA Population Viability Analyses for cheetah (Appendix), the cheetah SSP population consisted of 309 individuals. These individuals retain 97.5% of the founding gene diversity and have an average inbreeding value of F=0.0032. Of those 309 individuals, 50 are currently ambassador or education animals and 69 individuals are excluded for being older than reproductive age, medical reasons or unknown pedigrees, leaving a potential breeding population of 190 individuals. An average of 31.8 births was born per year over the past decade and 4 animals on average were placed in education programs. To improve breeding and reduce the need to import individuals a Breeding Center Coalition (BCC) was formed by facilities with cheetah husbandry expertise and ample holding space. There are 9 BCC members that hold 70% of the potentially breeding population and produced 93% of the births within the past decade.

For modeling purposes, 259 “reproductively managed” individuals (190 potential breeders and 69 non-breeding) were considered. If the average birth rate of 31.8 births/year is used and with the transfer of 2 males and 2 females to the education population, the population is predicted to decline to approximately 221 individuals in 100 years. This decline will become more severe if the number of cheetahs allocated to the education program increases or if the sex ratio deviates from being even. If breeding is increased to 35-36 births/year, the reproductively managed population could support the allocation of 3 males and 3 females annually to education and remain near its current size.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be

obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

At this time the 2 female cheetahs that we have at our facility are considered part of the non-breeding population and are surplus. The dam has produced several litters and the cub is one of many of her offspring so their genes have been represented in the population. Since 93% of cheetah breeding occurs at the BCC facilities it is important for the remaining facilities to house the offspring so that they can continue to concentrate on breeding to reach the goal of 36 births/year. We will continue to support this program by following the SSP recommendations and hold these animals. Since both of these animals are female there is no need for contractives.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has maintained large felid species at our facility since it's opening in 1898.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has had 6 litters of large felids born in the last five years.

Amur Leopard – One male cub born 2 Feb 2014 – was still born
Amur Leopard – One female cub born 4 Feb 2016 – still alive today
Clouded Leopard – Two cubs, unknown sex born 28 Feb 2017 – consumed by dam
Amur Tiger – One female cub born 23 May 2017 – survived 3 days
Amur Tiger – One male and one female cub born 25 Sept 2017 – still alive today
Canada Lynx – Litter of 1.4.1 kittens born 9 May 2018 – 1.4 still alive, 0.0.1 did not survive 30 days

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The Pittsburgh Zoo & PPG Aquarium has had 12 deaths of large felids in the last five years.

African Lion – Female was euthanized for declining health 26 Dec 2013 at the age of 24
Amur Leopard – male cub was stillborn on 2 Feb 2014
African Lion – Female was euthanized for declining health 25 June 2015 at the age of 14
Cheetah – Female was euthanized for declining health 1 July 2015 at the age of 14
Snow Leopard – Female was euthanized, she had a tongue squamous cell carcinoma, 20 Dec

2016 at the age of 17

Clouded Leopard – 2 cubs were consumed by their dam moments after birth 28 Feb 2017

Amur Tiger – Female cub died 26 May 2017 at 3 days old, necropsy revealed life ending abnormalities

Amur Tiger – Male died post immobilization on 31 Aug 2017 at the age of 18

Amur Tiger – Female was euthanized for declining health on 3 Dec 2017 at the age of 19

African Lion – Female was euthanized on 6 Feb 2018 at the age of 17, necropsy revealed a tumor of the spleen that had metastasized to multiple locations.

Canada Lynx – cub went missing from nest box around day 18, presumed to have been consumed by the dam

No measures have been taken to prevent future mortalities as 7 of these animals lived long happy lives and the 5 cubs were either stillborn, consumed by the dam or had abnormalities that couldn't have been prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

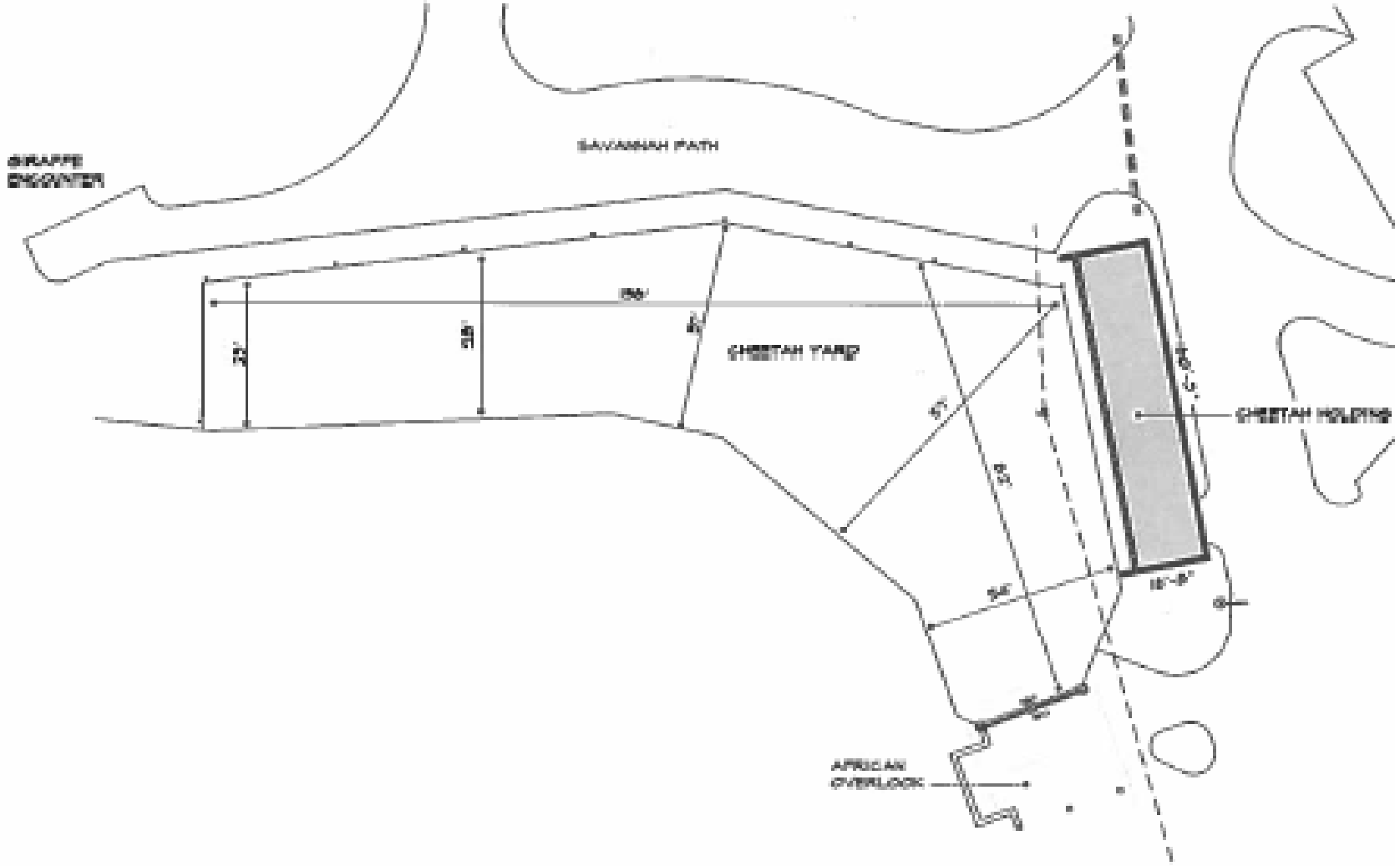
See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

The cheetah exhibit at the Pittsburgh Zoo & PPG Aquarium exists of an outdoor yard that is approximately 7500 SF and an indoor building that is 60'8" x 14'8". The outdoor yard is a long narrow exhibit perfect for allowing cheetahs to run. It is enclosed by woven wire mesh on three sides and the holding building across the fourth side. There is a cave structure, trees and a grass in the exhibit. The holding building was recently constructed and contains a family den that is 18' x 14'8" and will contain three holding stalls each measuring 8'9" x 8'8" when the chain link fencing arrives. The building was constructed out of cement block walls and poured floors. There is a visitor window into the family den that allows cold weather viewing and glass block windows down one side of the building as well as skylights above each animal holding area that provide natural light into each area. The building is heated with hydronic floor heat which is supplied by a gas fired boiler.

Pittsburgh Zoo & PPG Aquarium

Cheetah exhibit


SAVANNAH PATH
CHEETAH YARD
CHEETAH HOLDING
AFRICAN OVERLOOK

SITE PLAN

Cheetah holding building

This is the back view of the cheetah holding building. This building has several windows on this side to let in natural light.

Cheetah viewing window

This window allows viewing into a holding room in the cheetah building. This provides light for the cheetah while indoors and provides viewing from the public during the colder months.

Cheetah exhibit viewing window

This window allows the public to view the cheetah outdoor exhibit.

Cheetah outdoor exhibit

This is the view of the cheetah outdoor exhibit from the viewing window.

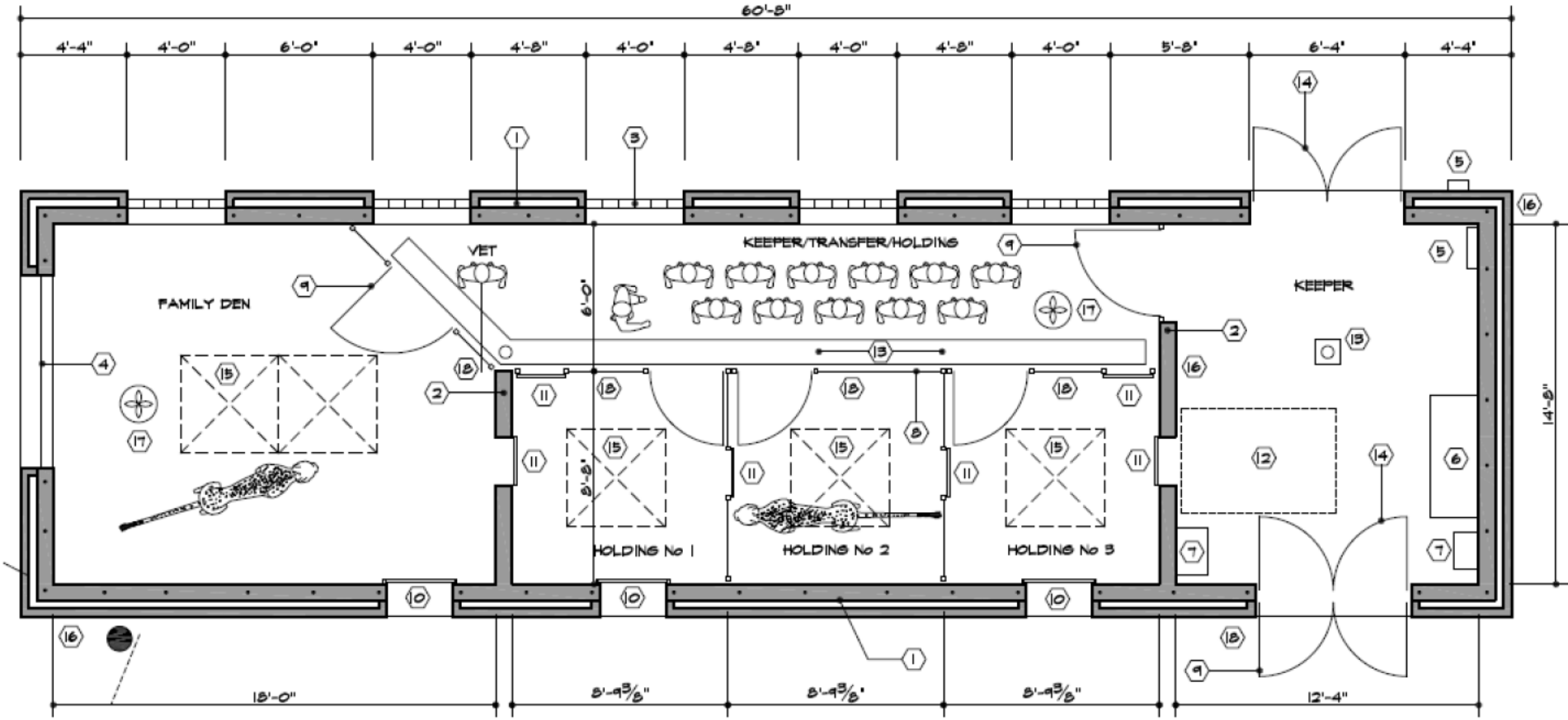
Cheetah exhibit

This exhibit was built as a long narrow exhibit to allow the cheetah to build up speed while running.

Cheetah on exhibit

The exhibit is enclosed with woven wire mesh.

Cheetah Holding



Cheetah indoor family den

Raised firehose beds and straw provide sleeping space. Visitors can view the cheetah all year round when they are in this family room.

Cheetah (*Acinonyx jubatus*)

January 2017

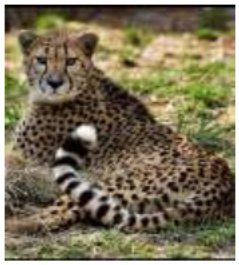


Photo courtesy of Meghan Murphy, National Zoological Park

Population Biologists: Lauren Terwilliger, lterwilliger@lpzoo.org
Sarah Long, slong@lpzoo.org
Brent Johnson, bjohnson@lpzoo.org
Animal Program Leader: Adrienne Crosier, CrosierA@si.edu
Studbook Keeper: Erin Moloney, Erin.Moloney@BuschGardens.com
AZA Felid TAG Chair: Don Goff, dgoff@beardsleyzoo.org

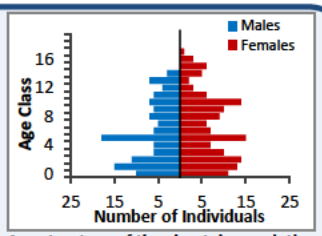
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected breeding population status in 100 years

WITHOUT potential changes:	Low Risk	**Vulnerable**	Endangered	Critical
WITH potential changes:	**Low Risk**	Vulnerable	Endangered	Critical

Current Population Status

- 309 cheetahs (145 males, 164 females) are housed at 57 institutions
- 50 cheetahs (28 males, 22 females) are in education/animal ambassador programs and are non-breeding
- The population increased over the last decade at an average rate of 2.4%, and averaged ~32 births, 4.1 imports and 1.9 exports per year
- 97.5% of the founding gene diversity (GD) has been retained
- The population's average inbreeding value (F) is 0.003
- IUCN status: Vulnerable in the wild



Age structure of the cheetah population

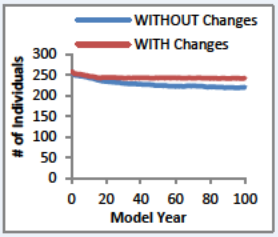
Program Challenges

- The potentially breeding population is presently limited to 190 individuals (91 males, 99 females) which is ~61% of the total population
- 69% of the potentially breeding population is concentrated at 9 Breeding Center Coalition institutions with husbandry expertise and breeding success; these institutions have produced 93% of births over the last decade, but limited space or resources could limit future reproduction at these facilities
- Interest in cheetahs for education/animal ambassador programs is increasing and these animals typically do not contribute to breeding
- Space may limit reproduction, as holding spaces for program animals may be interchangeable with that for exhibit animals, but is rarely interchangeable with that for breeding animals

Reproductively Managed Population Results

Projected Status WITHOUT Potential Changes

- If the population continues to produce ~32 births/year and allocate 4 cheetahs/year to education, it would have a 7% chance of extinction or ~221 individuals in 100 years
- 89.1% (± 3.8%) gene diversity and moderate inbreeding (F: 0.119 ± 0.022) would be maintained
- Status: **Vulnerable** in zoos in 100 years
- For additional details, see page 8-9 (Scenario A) in the main report



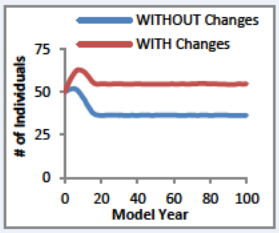
Projected Status WITH Potential Changes

- The population could maintain its size and support 6 animals/year to education only if breeding is increased to 35-36 births/year
- 90.8% ± 1.7% gene diversity and moderate inbreeding (F: 0.102 ± 0.013) would be maintained
- Status: **Low Risk** in institutions in 100 years
- For additional details, see page 10 (Scenario E) in main report

Education Population Model Results

Projected Status WITHOUT Potential Changes

- If the non-breeding education population continues to draw 4 animals/year from the reproductively managed population, it would decrease and stabilize at ~36 individuals in 100 years
- For additional details, see pages 12-13 in the main report



Projected Status WITH Potential Changes

- The education population needs 6 cheetahs/year to maintain its current size
- For additional details, see pages 11-12 (scenario D) in main report

Management Actions

- Increase breeding to 35-36 births/year and allocate 6 cheetahs/year to education to maintain the cheetah population near 300 individuals

How Institutions Can Help

- Pursue breeding recommendations given to your institution by the Program Leader
- Help the SSP meet the needs of education programs and the breeding population by balancing the number of new program animals with annual births

Please see the 2017 Cheetah AZA Animal Program PVA report update on the AZA website for further details.

Contact Lauren Terwilliger at lterwilliger@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) have been conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team used ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Felid Taxon Advisory Group (TAG) in 2012 and with the SSP and Population Advisor in 2015-2016.

POPULATION HISTORY/CURRENT STATUS

As of 1 January 2016, the cheetah (*Acinonxy jubatus*) Species Survival Plan© (SSP) population (at 57 AZA and partner institutions) included 309 individuals, that retain 97.5% of founding gene diversity and have an average inbreeding value of F = 0.0032 (F = 0.0625 is equivalent to mating between first cousins). Over the past decade, the total population has increased by approximately 2.4%, with annual rates varying from -3.5% to 8.7%. At the same time, there has been increasing interest in the use of cheetahs in education/animal ambassador programs. Due to differences in rearing, handling, and housing, and reluctance to remove animals from education/ambassador programs, it is generally assumed that program cheetahs are not part of the breeding population. Currently, 50 individuals are considered education animals/animal ambassadors. An additional 69 animals are excluded from breeding (due to age, health, unknown pedigree, etc.), limiting the potentially breeding population to 190 individuals. The population averaged 31.8 births/year over the past decade. Also during the past decade, individuals were placed in education programs at an average rate of 4 animals (2 males and 2 females) annually, and managers anticipate that the allocation of cheetahs to these programs will continue at a rate at least that of the past decade.

PROGRAM CHALLENGES

Following a series of workshops (2010-2012) aimed to focus programmatic research and management goals and increase offspring production led by the Conservation Centers for Species Survival, the Cheetah SSP re-focused its efforts on improving breeding to meet population goals and institutional demand for this popular species. To improve breeding, and reduce the need to import individuals, a Breeding Center Coalition (BCC) was formed by facilities with cheetah husbandry expertise and ample holding space. Currently, the potentially breeding population is distributed among 32 institutions, although only nine of these institutions are members of the BCC, which collectively holds ~70% of the potentially breeding population and produced 93% of births within the past decade. In addition to ongoing demand for exhibit animals, there is increasing interest in using cheetahs as non-breeding education animals/animal ambassadors. Space availability may also challenge the population, as holding space for program animals may be interchangeable with that for exhibit animals, but is rarely interchangeable with that for potentially breeding animals. Furthermore, space at breeding centers is often occupied by post-reproductive animals that are difficult to place at other institutions.

PVA RESULTS

For the purposes of the PVA model, all 190 potentially breeding animals and 69 non-breeding, excluded animals were considered part of a single "reproductively managed" population of 259 individuals, occupying and moving between breeding and exhibit spaces. The 50 animals presently in education/animal ambassador programs were considered to be members of a separate "education" population that serves as a "sink" to which the reproductively managed population exports and permanently loses potential breeders. If we consider only the reproductively managed population (starting N = 259), under the average breeding rate of the past 10 years (31.8 births/year) and the transfer of 2 males and 2 females per year to the education population, the population is predicted to decline to approximately 221 individuals and have a ~7% likelihood of extinction over the next century. This population decline is predicted to be more extreme if the number of cheetahs allocated to education increases or deviates from an even sex ratio. However, if allocation to education programs is reduced, the reproductively managed population could remain near 250 individuals with fewer births annually. Alternatively, if breeding is increased from ~32 births/year to 33-34 births/year, the reproductively managed population could maintain its present size and support the transfer of 2 males and 2 females annually to the education population. If breeding is increased further to 35-36 births/year, the reproductively managed population could support the allocation of 3 males and 3 females annually to education and remain near its current size. With increased breeding, the reproductively managed population is estimated to have ~91% gene diversity and inbreeding above that of a first-cousin mating (F = 0.0625) in 100 years. Projections of the education population (starting N= 50) indicate that it could stabilize at a smaller size of ~36 individuals over the next century with the addition of 2 males and 2 females annually from the reproductively managed population; the addition of 3 males and 3 females annually could allow the education population to stabilize near 55 individuals over the next 100 years. In summary, the cheetah population could maintain a demographically stable reproductive population and support a consistent number of program animals into the future if the breeding rate is increased to ~35-36 births/year.

MANAGEMENT ACTIONS

Given current challenges for the cheetah SSP population, PVA results indicate that the following changes in management, pertaining to the use of animals for education/ambassador programs, should be considered in an effort to improve this population's sustainability. Note that the PVA allows us to compare between hypothetical changes, but cannot evaluate whether achieving these changes is feasible, practical, or desirable given the program's constraints.

- **To maintain the demographic stability of the reproductively managed population:**
  - **Increase breeding:** If breeding is increased from an average of ~32 births/year to ~33 births/ year in the next decade and 34-35 births/year thereafter, the reproductively managed portion of the population could remain near its current size and support the current rate of allocation to education/animal ambassador programs (2 males and 2 females per year). Any breeding rate below this would cause the population to decline. Furthermore, allocating uneven numbers of males and females to education/animal ambassador programs may make it challenging to achieve the recommended breeding rate by limiting the number of potential breeding pairs that can be formed.
  - **Reduce allocation to (non-breeding) education programs:** The reproductively managed population could maintain its current size with fewer births annually if allocation to education/animal ambassador programs is reduced in the future.
- **To maintain both the reproductively managed population and the education population near their current sizes, increase breeding to support an increase in the rate at which individuals are allocated to education programs:** If breeding in the reproductively managed portion of the population is increased to an average of ~35-36 births/year and 6 animals (3 males and 3 females) are transferred into the education population annually, both the reproductively managed and education populations could remain near their current sizes for the next century.

Please see the 2017 Cheetah AZA Animal Program PVA report update on the AZA website for further details.

Contact Lauren Terwilliger at lterwilliger@lpzoo.org with questions

3-200-41

E. Captive-bred Wildlife Registration

Clouded Leopard (*Neofelis nebulosa*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for clouded leopards. We currently have a breeding pair. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the clouded leopard SSP. As of the April 2013 AZA Animal Program Population Viability Analysis Report (appendix) there were 72 clouded leopards in the population. The current holding availability is 82 individuals. The modeling results indicate that if the conditions stay the same the AZA population faces an annual decline of 2% over the next 25 years. The model is predicting an average of 6 births per year and an average of 8 deaths per year in the first 10 years. If the population could raise its average number of births to 8 births per year then the population could sustain its current size in the next 100 years. If the population could increase its average number of births to 11 births per year, the population could reach the number of available spaces in approximately 6 years.

When looking at the genetic viability of this population the inbreeding levels are very high at the end of 100 years under the baseline scenarios. Improved reproduction and importations improve the populations genetic outlook the most at the end of 100 years but the genetics remain a concern as many of the animals in the current population are related to one another resulting in low gene diversity and high inbreeding levels. Therefore the AZA Clouded Leopard Animal Program will need to apply several management strategies to counteract the projected demographic decline, low gene diversity and high inbreeding levels. They will need to increase reproduction; import young, unrelated, reproductively viable individuals; recruit new institutions to increase holding space and research pairing options such as creating trios at early ages.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

As per the final breeding recommendations for 2017-2018 (appendix) we are to breed the pair of clouded leopards at our facility so we have not been asked by the SSP to hold surplus animals at this time.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has maintained large felid species at our facility since it's opening in 1898. We received our first pair of clouded leopards into our collection in December 2014.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has had 6 litters of large felids born in the last five years.

Amur Leopard – One male cub born 2 Feb 2014 – was still born
Amur Leopard – One female cub born 4 Feb 2016 – still alive today
Clouded Leopard – Two cubs, unknown sex born 28 Feb 2017 – consumed by dam
Amur Tiger – One female cub born 23 May 2017 – survived 3 days
Amur Tiger – One male and one female cub born 25 Sept 2017 – still alive today
Canada Lynx – Litter of 1.4.1 kittens born 9 May 2018 – 1.4 still alive, 0.0.1 did not survive 30 days

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The Pittsburgh Zoo & PPG Aquarium has had 12 deaths of large felids in the last five years.

African Lion – Female was euthanized for declining health 26 Dec 2013 at the age of 24
Amur Leopard – male cub was still born on 2 Feb 2014
African Lion – Female was euthanized for declining health 25 June 2015 at the age of 14
Cheetah – Female was euthanized for declining health 1 July 2015 at the age of 14

Snow Leopard – Female was euthanized, she had a tongue squamous cell carcinoma, 20 Dec 2016 at the age of 17
Clouded Leopard – 2 cubs were consumed by their dam moments after birth 28 Feb 2017
Amur Tiger – Female cub died 26 May 2017 at 3 days old, necropsy revealed life ending abnormalities
Amur Tiger – Male died post immobilization on 31 Aug 2017 at the age of 18
Amur Tiger – Female was euthanized for declining health on 3 Dec 2017 at the age of 19
African Lion – Female was euthanized on 6 Feb 2018 at the age of 17, necropsy revealed a tumor of the spleen that had metastasized to multiple locations.
Canada Lynx – cub went missing from nest box around day 18

No measures have been taken to prevent future mortalities as 7 of these animals lived long happy lives and the 5 cubs were either stillborn, consumed by the dam or had abnormalities that couldn't have been prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

The Clouded leopards share a building with Visayan Warty Pigs. The Clouded leopards have two holding rooms each measuring 8' x 8'1" and an indoor day room that is 11' x 10'. The building is constructed with concrete slab-on-grade, masonry walls and metal roof decks. Holding rooms have masonry walls on three sides and galvanized steel 2"x 2" mesh on the 4th side. Holding room 1 has two wooden nest boxes each measuring 30" x 30" x 24". Heating is in-floor hydronic heating sourced by natural gas boilers with mechanical ventilation. Plumbing includes gas fires instantaneous water heaters, sinks, hose connections, and catch basin style floor drains. Electrical involves general power distribution and LED lighting.

The outdoor enclosure is netted with woven wire mesh and covers 750 SF in area and 10,000 CF in volume. The netted enclosure is 10' high at the perimeter and 16' high at the center. The outdoor exhibit has 2 handcrafted trees that support the leopards climbing and perching and a water feature for drinking water and enrichment. See attached for photos and diagrams.

Clouded Leopard *(Neofelis nebulosa)*

Population Biologist: Katelyn Marti, kmarti@lpzoo.org
AZA SSP Coordinator & AZA Studbook Keeper:
Bonnie Breitbiell, bonnieb@centralfloridazoo.org
AZA Felid Chair: Don Goff, dgoff@beardsleyzoo.org

Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years WITHOUT potential changes:

Low Risk | Vulnerable | Endangered | **Critical**

Projected zoo & aquarium population status in 100 years WITH potential changes:

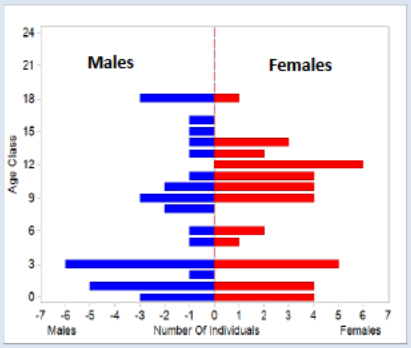
Low Risk | Vulnerable | **Endangered** | Critical

Status as of 2012

- 72 (32.40) total clouded leopards at 22 AZA institutions
  Population trend over last 10 years: slightly decreasing (λ = 0.962)
- Gene diversity (GD) = 87.77%
- Potential Space in model = 82
- IUCN status = Vulnerable

AZA Animal Program Challenges:

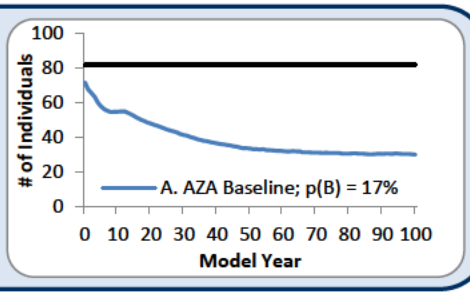
- Unique breeding system (pair young animals)
- Older, non-reproductive population
- High inbreeding levels



Projected Status WITHOUT Potential Changes

CRITICAL AZA institutions

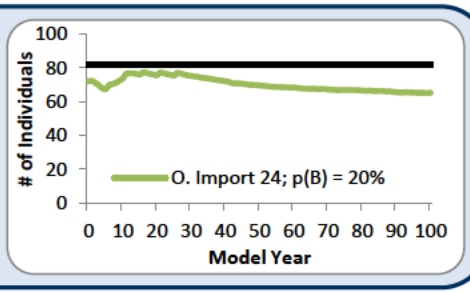
- Baseline Scenario = 6 births/year
- 57% chance of reaching extinction in 100 yrs
- Median time to extinction = 70 yrs
- 44 ± 20 (SD) average leopards in 25 yrs
- 30 ± 33 (SD) average leopards in 100 yrs
- 55% ± 14% (SD) projected GD in 100 yrs
- 0.38 ± 0.11 (SD) projected F in 100 yrs



Projected Status WITH Potential Changes

ENDANGERED in AZA institutions

- Increased female breeding at p(B)= 20% (~8 births/year) and potential space at 82
- 3% chance of reaching extinction in 100 yrs
- Median time to extinction = 83 yrs
- 65 ± 20 (SD) average leopards in 100 yrs
- 78% ± 7% (SD) projected GD in 100 yrs
- 0.20 ± 0.05 (SD) projected F in 100 yrs



Essential Actions

- Increase reproduction
- If possible, import young, unrelated animals in accordance with federal and international regulations

How to Help

- Pursue breeding recommendations given to your institution
- Research alternative paring options for current or future individuals
- Discuss husbandry challenges and successes with the SSP Coordinator
- Work with the SSP Coordinator and TAG to import young, unrelated animals

Please see the 2013 AZA Clouded Leopard Animal Program full PVA report on the AZA website for further details.

EXECUTIVE SUMMARY

Clouded Leopard AZA Animal Program Population Viability Analysis

Population Viability Analysis (PVA) model scenarios were developed with members of the Association of Zoos and Aquariums (AZA) Felid Taxon Advisory Group (TAG) and Clouded Leopard Animal Program in July 2012. The PVA is being conducted under the support of a two-year grant to Lincoln Park Zoo researchers from the Institute of Museum and Library Services (IMLS) to analyze AZA population's long-term viability. The project team is using ZooRisk 3.80 (Earnhardt et al., 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remained the same (the baseline scenario), and then assess the impact of changes such as increasing reproduction, importation strategies, and not utilizing genetic management (alternative scenarios). The current AZA clouded leopard total population size is 72 (32 males, 40 females) individuals at 22 institutions.

MODEL RESULTS

Model results indicate that if conditions remain the same, the AZA clouded leopard population faces an **annual 2% decline over the next 25 years.** The projected population decline occurs because the number of deaths exceeds the number of births in the population. The baseline AZA model produces, on average, 6 births per year in comparison to an average of 8 projected deaths per year in the first 10 years of the model. The declining population has an only 27% probability of reaching its number of potential space of 82 individuals under current conditions.

The clouded leopard population is able to improve its trajectory with reasonable improvements in reproduction. For instance, an increase from the current average of 6 births per year to 8 births per year (p(B) = 20% scenario), would allow the population to roughly sustain its current size in the next 100 years. If the population can reach an average of 11 births per year, the population will reach the number of potential spaces in approximately 6 years with 100% of model iterations meeting the space goal.

If appropriate, young, reproductively-viable clouded leopards may be available from outside the AZA population and imported in accordance with federal and international regulations. These individuals would benefit the population demographically, but more importantly genetically as inbreeding levels are very high at the end of 100 years under the baseline scenarios (higher than sibling relationship). Model scenarios with both improved reproduction and importations improve the population's demographic and genetic outlook the most at the end of 100 years; however, genetics remain a concern as many of the animals in the current population are related to one another resulting in low gene diversity retention and higher inbreeding levels than desired.

MANAGEMENT ACTIONS

The AZA Clouded Leopard Animal Program should apply several management strategies in combination with one another to counteract the projected demographic decline, low gene diversity, and high inbreeding levels in the future, and to accommodate institutional interest.

- **Increase reproduction:** The Animal Program should focus on breeding more reproductively viable females to increase the number of offspring produced per year. Any number of births in excess of the current level (6 births per year) will assist the population in growing towards its potential space of 82 animals. All breeding recommendations received are important to the long-term future of this population; institutions should work to get males and females into appropriate breeding situations quickly and work on husbandry to improve breeding success.
- **Importation of young, reproductively viable individuals:** In some cases importation could offset the decline the population is facing in the next several years and increase the long-term gene diversity. However, importations will have less of a positive impact on genetics if the imported individuals are related to the current population or each other, which may be challenging for this population as the source of many of the imports is a population with some animals already related to the AZA population. In addition, it would increase the capacity of the population to produce offspring, which is limited currently by an aging population with many animals unable to breed for medical, behavioral, or age. Imports must be coupled with increased reproduction to successfully grow the population in the long-term and increase gene diversity. Even though modeled levels of imports assisted the population demographically, ultimately this population under most model scenarios had lower-than-desired levels of gene diversity in 100 years.
- **Recruit new institutions and allocate additional spaces:** Space and institutional interest are a main concern for this population if reproduction is increased. If additional spaces are not available it will complicate the placement of offspring or imported individuals. If reproduction and or/importation is successful in improving the population's trajectory, it will quickly be hampered by its small number of potential spaces. As a long-term goal, an increased number of potential spaces for the population will allow for a healthier age structure, a more stable population size, and better long-term genetic health.
- **Research pairing options**: Institutions should work to form alternate pairing situations to provide more flexibility in breeding opportunities, thus increasing the number of females breeding. Forming trios (1.2.0) at early ages could allow for the rotation of males between familiar females and may provide additional breeding opportunities for the AZA population. This management strategy could also provide more genetic variation and reduce the issue of long-term bonded pairs that are unable to be managed with other individuals.

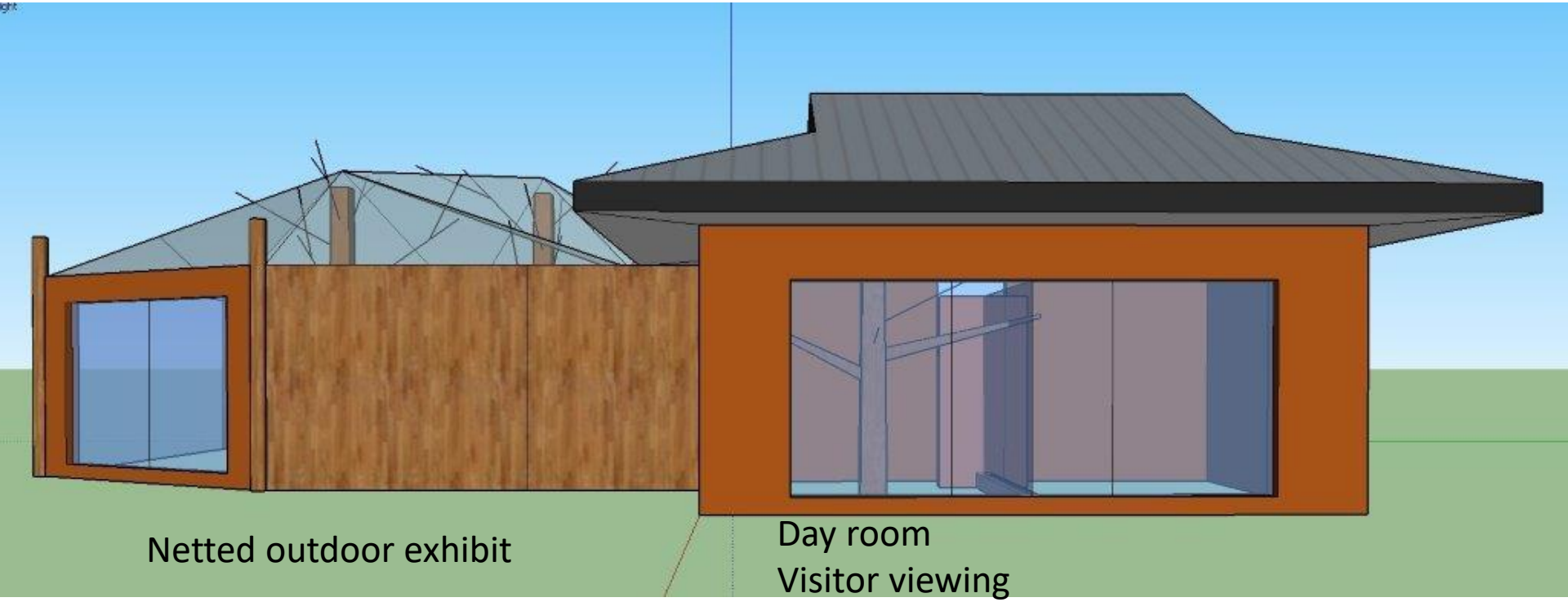
Please see the 2013 AZA Clouded Leopard Animal Program full PVA report on the AZA website for further details.

Pittsburgh Zoo & PPG Aquarium

Clouded leopard

Clouded Leopard

Visayan Warty Pig



Clouded leopard building

The window in this photo is visitor viewing into the day room. The Clouded leopard viewing is on the left and the Visayan warty pig is on the right.

Clouded leopard building

Outdoor netted enclosure is located on the left. Visitor viewing window is also visible.

Clouded leopard outdoor exhibit

Woven wire mesh encloses the outdoor exhibit. One of two visitor viewing windows into the outdoor exhibit.

Clouded leopard exhibit

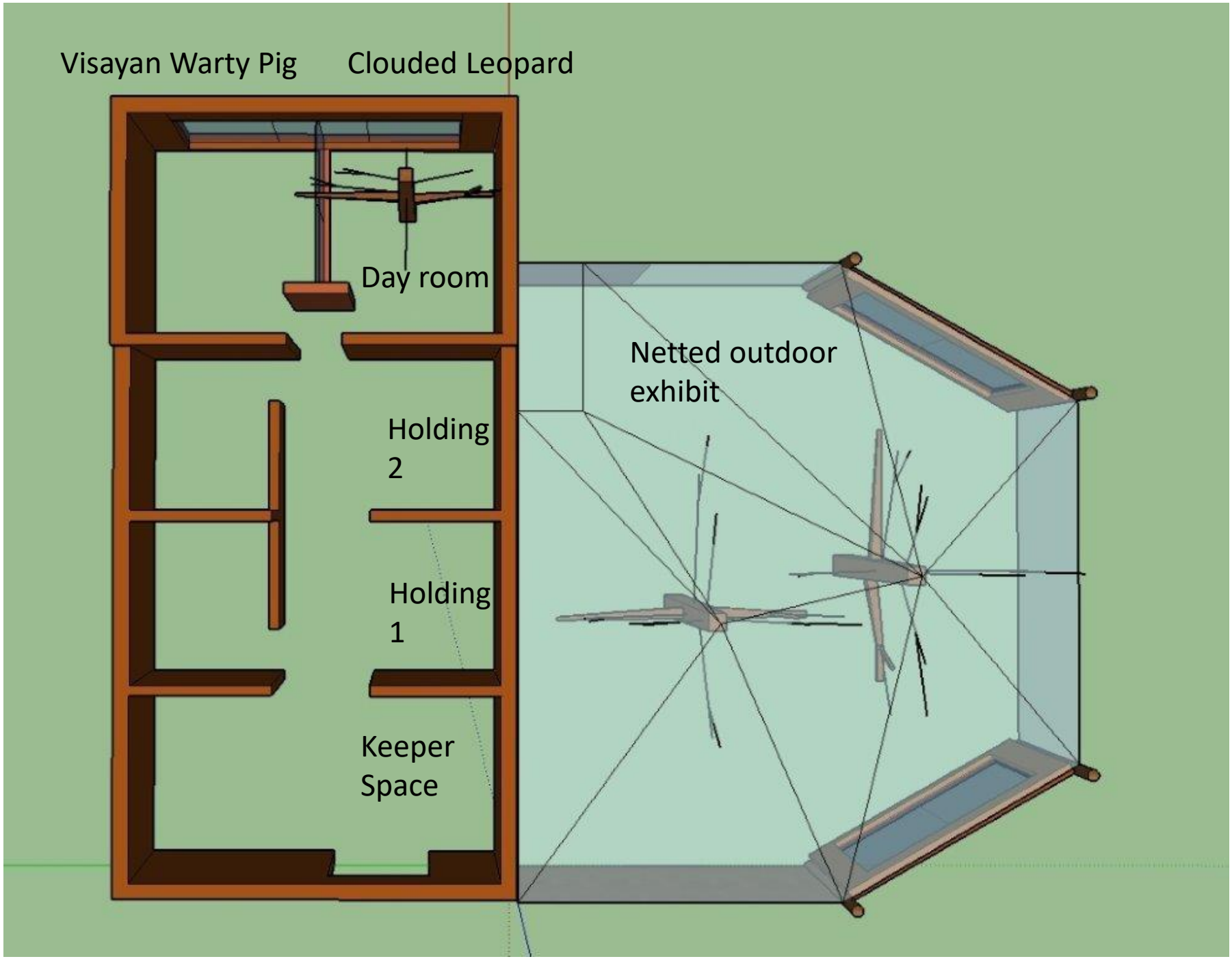
Artificial tree provides climbing structure. Shade cloth over exhibit provides shade.

Clouded leopard exhibit

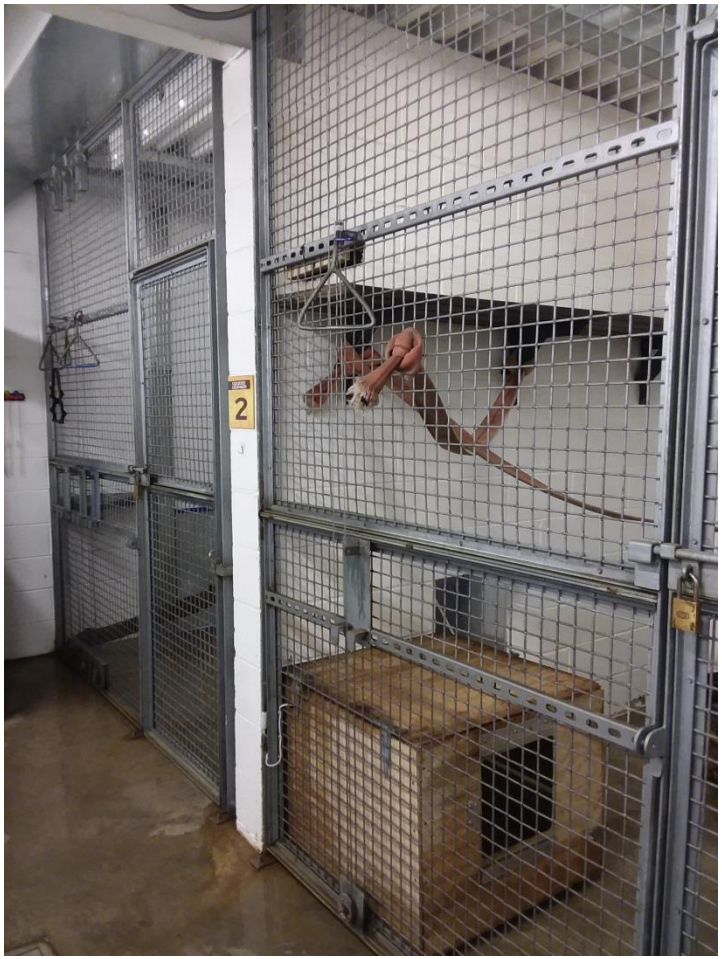
This water feature provides fresh water and enrichment.

Clouded leopard

Limbs on artificial tree structure are wide enough for lounging in the sun.


Visayan Warty Pig
Clouded Leopard
Day room
Holding 2
Holding 1
Keeper Space
Netted outdoor exhibit

Clouded leopard holding



- There are two holding rooms for clouded leopards
- The first stall contains nesting boxes.

Clouded leopard holding 1

- The door on the back wall leads to the outdoor exhibit.
- The door on the left leads to the 2nd holding room.
- Shelves and rope provide climbing structure.

Clouded leopard holding 2

- The door on the back wall leads to the outdoor exhibit.
- The door on the left leads to the indoor day room.
- Shelves and logs provide climbing structure.

Population Analysis & Breeding and Transfer Plan

Red Ruffed Lemur (*Varecia rubra*)

AZA Species Survival Plan®
Yellow Program

AZA Species Survival Plan® Coordinator
Christie Eddie, Omaha's Henry Doorly Zoo & Aquarium
(christiee@omahazoo.com)

AZA Studbook Keeper
Mylisa Whipple, Saint Louis Zoo
(whipple@stlzoo.org)

AZA Adjunct Population Advisor
Gina M. Ferrie, Disney's Animal Kingdom®
(Gina.M.Ferrie@disney.com)

9 February 2017

PMC
Population Management Center
Lincoln Park Zoo
Association of Zoos & Aquariums

Disney's Animals, Science and Environment

Executive Summary
Species Survival Plan® for Red Ruffed Lemur (*Varecia rubra*)

The current SSP population of red ruffed lemurs is N = 187 animals (104 males; 83 females; 0 unknown sex) at 48 AZA institutions and 4 non-member participating institutions. This Population Analysis and Breeding and Transfer Plan was prepared November 2016 at Disney's Animal Kingdom®. The last Breeding and Transfer Plan for this species was finalized 8 December 2015. Analyses were based on the North American data of the International *Varecia rubra* Studbook (current to 30 June 2016) and were performed using PopLink 2.4 and PMx 1.4.20160831.

The target population size designated by the Prosimian Taxon Advisory Group 2014 Regional Collection Plan is 225. This population currently qualifies as a Yellow SSP.

Genetic diversity in this population is currently 91.61%. When gene diversity falls below 90% of that in the founding population, it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights and greater infant mortality. Gene diversity in 100 years is projected to be 84.2% (based on current statistics, assuming a target population for projections of 225 and lambda = 1.05). Gene diversity in 10 generations (83 years) is projected to be 85.4%. Equalizing the founder representation by breeding individuals from underrepresented lineages and increasing the effective size, and target population size could extend gene diversity retention.

Demography	
Current size of population (N) – Total (Males.Females.Unknown Sex)	187(104.83.0)
Number of individuals excluded from the potentially breeding population	27 (14.13)
Population size following exclusions	160(90.70.0)
Target population size (Kt) from the Prosimian TAG's 2014 RCP	225
Mean generation time (T; years)	8.3
Historical population growth rate (λ; life table lambda 1973-present) / 5 – year from Poplink census / Projected growth rate from PMx stochastic 20 yr projections	1.050 / 0.979 / 1.028 <> 1.042 <> 1.055

Genetics		
	Current	***Potential***
Founders	12	0
Founder genome equivalents (FGE)	5.96	9.24
Gene diversity (GD %)	91.61%	94.59%
Population mean kinship (MK)	0.0839	-----
Mean inbreeding (F)	0.0430	-----
N_e/N (Effective population size/census size ratio)	0.3200*	-----
% Pedigree Known prior to assumptions and exclusions	92.0%	-----
% Pedigree Known after assumptions and exclusions	100%	-----
% Pedigree Certain after assumptions and exclusions	98.0%	-----
Projections		
	[a]Historical/Projected λ = 1.05	
Years to 90% GD	20	-----
Years to 10% loss of GD	124	-----
Gene Diversity at 100 Years (%)	84.2%	-----
Gene Diversity in 10 Generations (%)	85.4%	-----
Generation time (*T*) and Target population size used in projections	*T*=8.3 x 10 = 83 Target = 225	

*Value includes founders in calculations.
[a]Projected/Historical λ is growth rate from PMx stochastic 20 yr projections and historical λ from demographic window (1973-2015) from life table calculated in PMx.

Demographic analyses indicated that to increase the population size to 225 in 4 years, approximately 22-24 births are required (λ = 1.048). To remain at the current size (λ = 1.00), approximately 14 births are needed in the next year. As with most SSP populations, pairings are prioritized to maintain or increase gene diversity through considerations of mean kinship, avoidance of inbreeding, differences in sire and dam mean kinships, and the degree of uncertainty within a pedigree.

Summary Actions: The SSP recommends 18 breeding males and 16 breeding females, as well as 11 transfers for this period. Approximately 22-24 births per year are required to grow this population to a size of 225 in the next 4 years.

This Animal Program is currently a Yellow SSP Program and recommendations proposed are non-binding – Participation is voluntary. Dispositions to non-AZA institutions should comply with each institution's acquisition/disposition policy.

3-200-41

E. Captive-bred Wildlife Registration

Red ruffed lemur (*Varecia rubra*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for red ruffed lemurs. We currently have a 14 year old female that recently lost her companion. She is an over-represented female in the population but had a breeding recommendation with a valuable male. The male died at the age of 28 years old. Currently we are holding for the SSP to make a decision. We would like to bring in a male for breeding. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the red ruffed lemur SSP. As of the February 2017 Population Analysis & Breeding and Transfer Plan (see Appendix), there are 187 red ruffed lemurs in the population. The target population size is 225 according to the 2014 Regional Collection Plan. The genetic diversity of the population is currently 91.61%. The gene diversity in 100 years is projected to be 84.2%. To extend the gene diversity retention, individuals from underrepresented lineages need to be breed and the population size needs to be increased to the target population. To increase the population size to 225 individuals in 4 years, approximately 22-24 births are required each year.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

Since we do participate in the SSP, we follow the recommendations set forth by the Breeding and Transport Plan. We are currently to hold our female as they hopefully look for a male of breeding age or at least a companion animal.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has had red ruffed lemurs in their collection from 1990 to 2009 and then received a breeding pair in 2014 to present. We have had Ring-tailed lemurs since 1990 and Black and White ruffed lemurs since 1993.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has not had any lemur births in the last 5 years.

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

Our male red ruffed lemur was euthanized on 5 Dec 2017. He was 28 ½ years old and was being treated for heart failure for several years. The median life expectancy for red ruffed lemurs is 19.9 years. No measures have been taken as she lived a long happy life.

The only other death of a lemur was the euthanasia of a male ring-tailed lemur on 29 September 2015. He was a four year old male that had idiopathic chylothorax. This is a random disease where the animal has a fluid filled chest cavity and it prevents proper breathing. There was no apparent cause for the disease. We performed a thoracic duct ligation surgery in an attempt to correct but he developed post-surgical lung lobe torsion. This is a rare disease that can't be predicted or prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The red ruffed lemur has access to a public viewing enclosure that is 445 SF with a varying height of 18' to 30'. The indoor exhibit has a cement floor with gunite textured concrete simulating rocks, boulders, riverbanks and a waterfall. This

exhibit also has an artificial tree structure in the middle that is made from painted, textured epoxy on steel pipe and is surrounded by 2” x 2” woven wire mesh on three sides and a viewing window in the front. The viewing windows are 2 ply 3/16” glass laminated with 60 mil polyvinyl butyral interlayer, both plies tempered.

The red ruffed lemur is housed downstairs in two 279 SF holding rooms with cement block sides and poured cement floors. There are shelves on the walls and enrichment items hanging from the ceiling. One side of the holding area is 1” x 1” Galvanized aluminum chain link. Any progeny that would be born would be housed in these three areas. See attached for photos and a diagram. The red ruffed lemur alternates into the public exhibit space with the black howler monkeys. The exhibit is marked “howlers” on the attached diagram.

Pittsburgh Zoo & PPG Aquarium

Red ruffed lemur

Tropical Forest Complex (TFC)

TFC interior

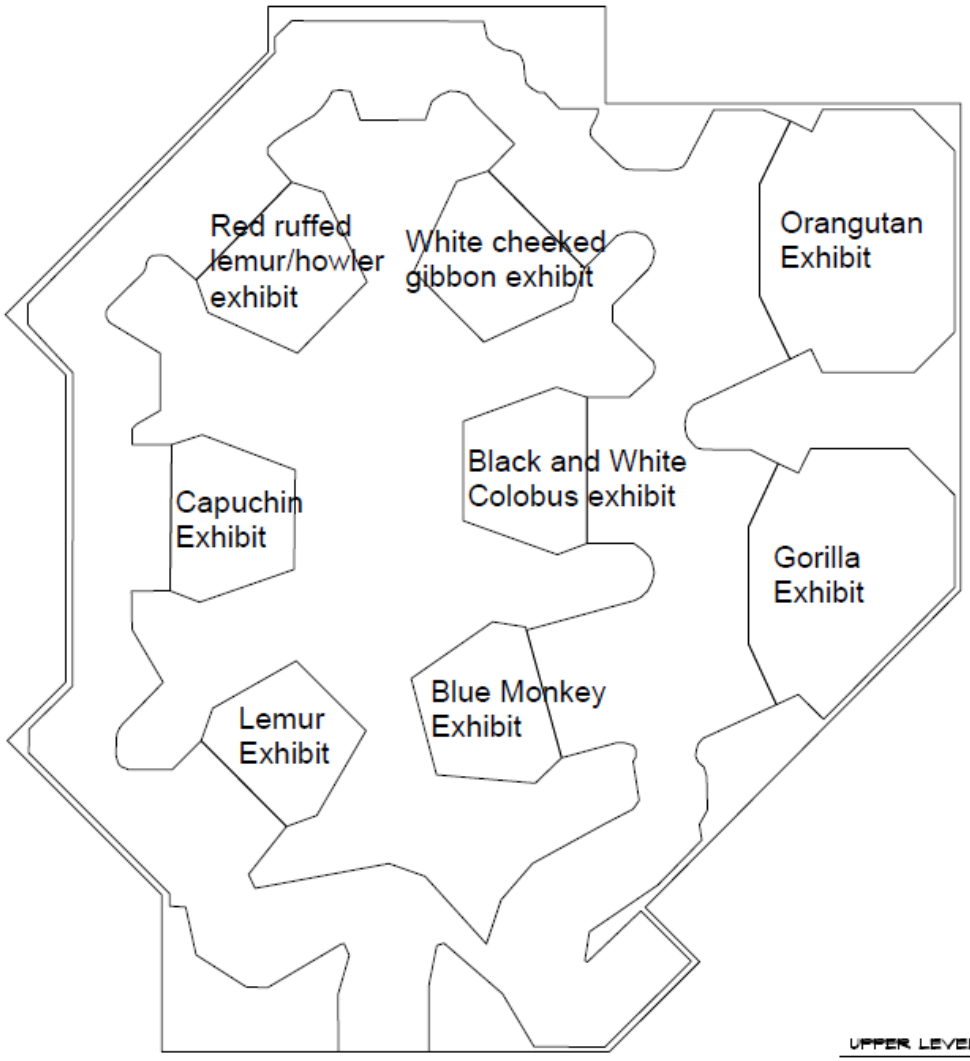
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

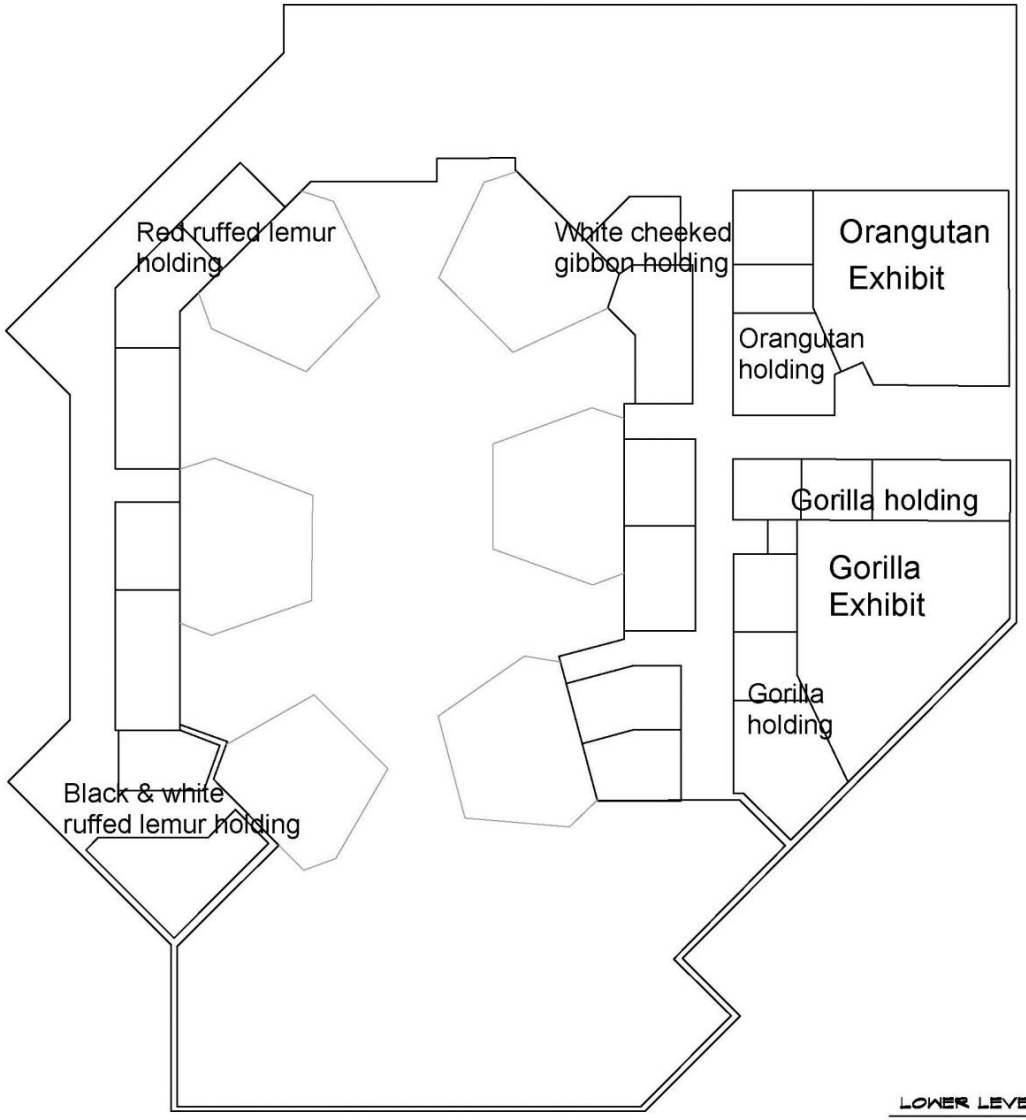
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level



LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

Red ruffed lemur exhibit

- Photo taken from the viewing window
- Waterfall feature for fresh running water
- Artificial trees and vines provide climbing structures
- Gunite rockwork

Red ruffed lemur holding

- Door on back wall leads to the exhibit.
- Branches and hanging platforms provide structure and enrichment

Red ruffed lemur holding

- Door on the right connects this holding room to another holding room

Red ruffed lemur holding

- Handles along the back wall provide climbing structure.

Red ruffed lemur holding

- She alternates time on exhibit and in holding with the howler monkeys.
- Door along the back wall leads onto the exhibit.

3-200-41

E. Captive-bred Wildlife Registration

Siamang (*Symphalangus syndactylus*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for siamang. In 2015 we opened an Islands exhibit at the zoo and included siamangs. This was a new species for us. We had maintained several species of gibbons in the past but wished to increase our conservation efforts with primates by including a new species. We obtained a breeding pair. In 2017 they gave birth to a female offspring. We are currently looking into bringing in a young male companion animal and future mate to this young female. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium currently has 1.2 siamang in their collection. This is a breeding pair with their offspring. Since we do not house enough animals to maintain genetic vitality we participate in the AZA SSP for siamang. As of the 2017 SSP Population Analysis the current gene diversity of the captive population of siamang is just over 97%. Based on current population parameters, the SSP population is projected to retain 90% gene diversity for over 100 years. Approximately 7 births are needed in the upcoming year and 8-9 births are needed each year for the next 3 years to reach the recommended target of 130 individuals. There are two program challenges. The first is that the population is near space capacity thus making placement of offspring difficult. The second is that breeding rates have declined recently because new breeding pairs are being established. See appendix for PVA summary.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

Since we participate in the SSP, we follow the recommendations set forth by the Breeding and Transport Plan. We are currently to hold the pair of siamangs that we have and not breed them since they bred last year. The female is currently being contracepted until we are asked to breed again.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

We have maintained two hylobatid species at our facility, White-cheeked gibbons (*Nomascus leucogenys*) and White-handed gibbons (*Hylobates lar*). The first White-handed gibbon arrived in 1969 and we maintained them in our collection until 1994. In 1990 we received White-cheeked gibbons which we currently house in our collection and Siamangs were added in 2015.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

In the past five years we had one successful birth of a siamang. She is currently 8 months old. The pair of white-cheeked gibbons that we have was not slated to breed as the female was 44 years old and had an amputated left arm.

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The only mortality of hylobatid that we have had in the last five years was of our elderly female white-cheeked gibbon. According to the studbook keeper, she was the 4th oldest living white-cheeked gibbon in the population. She died of liver disease. No measures have been taken as she lived a long happy life.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See attached staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

The siamangs are housed in a 3,800 SF building with 2 holding rooms (246 SF and 140 SF), a public viewing day room that is 320 SF with a vertical height of 14' which gives a room volume of 877 CF and an outdoor 1730 SF island. Siamang Island is surrounded by a filtered fresh water lagoon containing 60,000 gallons. There are five hand crafted artificial trees that support siamang brachiating activity. These animals are currently housed in holding rooms with 3 cement block sides with windows

for ambient light, one side with chain link for interaction with the keepers and poured cement floors. There are ropes, tire swings and hammocks hanging from the ceiling for enrichment. The public viewing day room has a cement floor, a cement tree structure in the middle and is surrounded by cement block sides and a viewing window in the front. From the day room they also have rope access to an outdoor island that has several cement trees and ropes for swinging. See appendix for photos

Siamang *(Symphalangus syndactylus)*

August 2016

Photo Credit:
Meghan Murphy,
Smithsonian's National Zoo

Population Biologist: Lauren Mechak, lmechak@lpzoo.org
AZA Studbook Keeper: Becky Malinsky, malinskyb@si.edu
Former Animal Program Leader: Jay Petersen
Vice-Program Leader: Janet Steele, jsteele@palmbeachzoo.org
AZA TAG Name TAG Chair: Tara Stoinski, tstoinski@gorillafund.org
AZA Ape TAG Vice Chair: Tracy Fenn, fennt@jacksonvillezoo.org

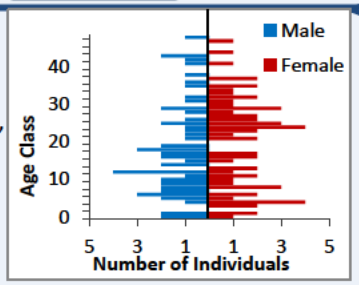
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years

WITHOUT potential changes:	Low Risk	**Vulnerable**	Endangered	Critical
WITH potential changes:	**Low Risk**	Vulnerable	Endangered	Critical

Current Population Status

- 115 siamangs (55 males, 60 females) are housed at 48 AZA institutions and 1 non-AZA holder
- The population size has remained stable over the last decade, with an average ~4 births per year
- 97.6% of the founding gene diversity (GD) has been retained
- The population's average inbreeding value (F) is 0.0034
- IUCN status: Endangered in the wild



Age structure of the siamang SSP population

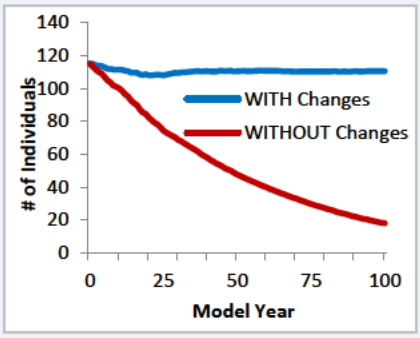
Program Challenges

- The population is currently near space capacity, which may make it difficult to place offspring
- Recent breeding rates have declined slightly because the population is in the process of establishing new breeding pairs

Model Results

Projected Status Without Potential Changes

- If the population continues to produce ~4 births/year, it would decline to ~18 individuals in 100 years without future imports. With future imports, more individuals may remain
- The remaining individuals would retain 84% ± 8% GD, with inbreeding levels of F = 0.077 ± 0.038 in 100 years
- Status: **Vulnerable** in zoos and aquariums due to its declining gene diversity
- For additional details, see page 8 in the main report



Projected size of the siamang SSP population

Projected Status With Potential Changes

- If breeding is increased to produce 5-6 births per year, the population could maintain approximately its current size over the next century
- Gene diversity is expected to be high (94% ± 0.4% GD), with low inbreeding levels (F = 0.055 ± 0.010) in 100 years
- Status: **Low Risk** in zoos and aquariums
- For more information, see page 11 (Scenarios D) in the main report

Management Actions

- Increase breeding from ~4 births per year to ~5-6 births per year to remain near the current population size for the next century and avoid a population decline

How Institutions Can Help

- Pursue breeding recommendations given to your institution by the Program Leader
- Report breeding challenges and successes to the Program Leader

Please see the 2016 Siamang AZA Animal Program full PVA report on the AZA website for further details.
Contact Lauren Mechak at lmechak@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) are being conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team uses ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Ape Taxon Advisory Group (TAG) in 2016.

POPULATION HISTORY/CURRENT STATUS

Siamangs (*Symphalangus syndactylus*) have been consistently held in AZA zoos since 1950. The population grew primarily through imports until regular breeding began in the 1960s. It reached a peak size of 135 individuals in 1987, but subsequently declined due to reduced breeding. In recent years, the population has maintained approximately its current size of 115 individuals. Over the past 10 years, the population averaged 3.9 births, 0.4 imports, and 0.2 exports per year. A small number (~2 per decade) of imports are expected to continue, but exports are not expected to occur. The population currently retains 97.6% of founding gene diversity and has low inbreeding (average inbreeding coefficient [F] of 0.0034).

PROGRAM CHALLENGES

The population is currently near space capacity, which may limit the ability to place young offspring. In recent years, breeding rates have declined as managers are in the process of establishing many new breeding pairs.

PVA RESULTS

Model results indicate that under its average breeding rate from the past 10 years (~4 births/year), the siamang population would decline to a minimum of 18 individuals, with no risk of extinction in zoos and aquariums during the next century. The remaining individuals would retain ~91% of the founding gene diversity with unrelated imports, or ~84% without. However, **increasing breeding is predicted to allow the siamang population to stabilize over the next 100 years**. With or without regular imports, the population could have a low risk of extinction and maintain approximately its current size (~115 individuals) in 100 years by producing an average of 5-6 births/year. A stable population would retain approximately 94% of the founding gene diversity, with inbreeding levels (F = 0.055) below those expected from mating between first cousins (F = 0.063). With the addition of ~2 genetically unique potential founders each year, gene diversity may be slightly higher (~96% GD), and inbreeding levels may be slightly lower (F = 0.038) in 100 years. If managers are able to add more potential spaces to hold a total of 125 siamangs, the population could gradually grow to fill these spaces over the next three decades by producing an average of ~6 births/year over the next decade and 6-7 births/year thereafter. However, the larger population size would not substantially alter genetic metrics in 100 years.

MANAGEMENT ACTIONS

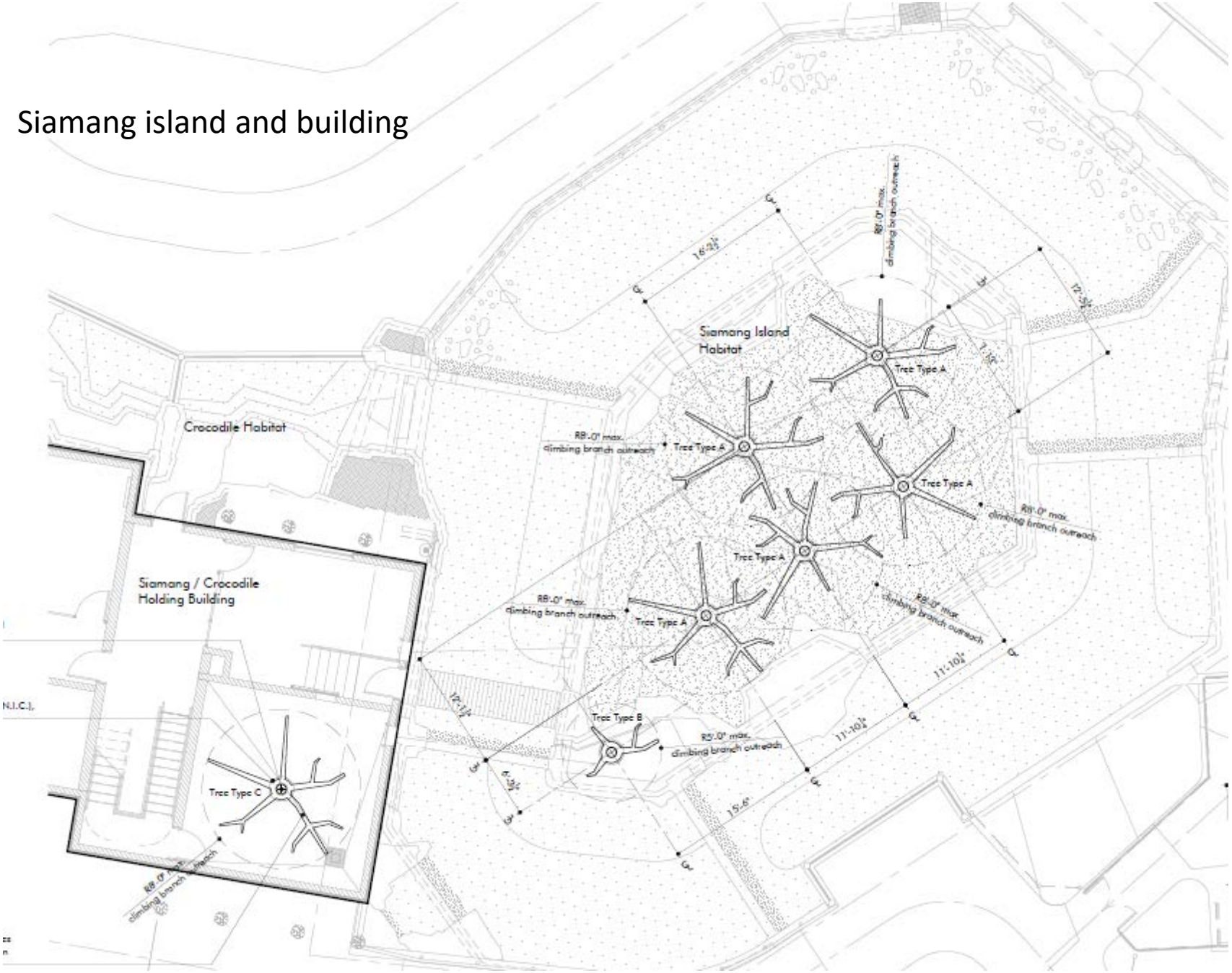
Given the current challenges for the AZA siamang population, PVA results indicate that the following changes in management should be considered in an effort to improve this population's sustainability. Note that the PVA allows us to compare between these hypothetical changes, but cannot evaluate whether achieving these changes is feasible, practical, or desirable given the program's constraints.

- **To maintain the population near its current size, increase breeding:** If breeding is increased from ~4 births per year to an average of ~5-6 births each year, the siamang population could maintain a low risk of extinction, maintain its current size, and retain 94% of the founding gene diversity in 100 years. Any lower rate of breeding would cause the population to decline over the next century. Additional holding space may be necessary to place offspring, as this population is close to its holding capacity.

Pittsburgh Zoo & PPG Aquarium

Siamang

Siamang island and building



Siamang outdoor exhibit

Upper siamang holding room

Currently being used as the nursery holding for our young siamang. This room contains straw padding on the floor, ropes and climbing structures and a nighttime sleeping space.

Downstairs holding room

Contains ropes and shelves for climbing. Note the animal and keeper doors that lead to the outdoor island exhibit. The opening on the right opens into the day room. Windows to allow ambient light are located on the left.

Siamang day room

This photo is taken through the visitor viewing window. The upper opening on the back wall opens into the upper holding room and the lower opening into the lower holding room. There is also a door on the right that opens to the outdoor island exhibit. The door to the left opens into the keeper space.

3-200-41

E. Captive-bred Wildlife Registration

Western lowland Gorilla (*Gorilla gorilla gorilla*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium provides data and updates to the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for Western lowland gorillas. We currently have a troop of 7 gorillas. As these 7 animals are considered surplus animals we will hold them at our facility.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The genes of the Western lowland gorilla population at the Pittsburgh Zoo & PPG Aquarium are being managed by the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for Western lowland gorillas. As of the July 2016 AZA Animal Program Population Viability Analysis Report there are 351 animals in the population that retain 98.9% gene diversity and have a low inbreeding coefficient of F = 0.003. The target population size is 350 individuals. With an average breeding rate of 12 to 13 births/year, the western lowland gorilla population can remain stable at approximately 350 individuals over the next 100 years. In 100 years, the gorilla population is predicted to retain approximately 98.3% gene diversity and to have an inbreeding coefficient of F=0.014.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

At this time our seven animals are considered surplus animals to the AZA. In August 2015 the Pittsburgh Zoo & PPG Aquarium decided to terminate its membership with the AZA. As a result the SSP has declared our animals to be surplus animals. The genetics of our animals are part of this managed population. By holding these animals and not breeding them we are freeing up space for other facilities to breed gorillas that are not as represented genetically in the population. Breeding management in gorillas is obtained through oral contraception of the female.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The earliest written record of gorillas occurring at the Pittsburgh Zoo & PPG Aquarium was in 1953. Our first troop was established with the opening of our Tropical Forest Complex (TFC) building in 1991 and some of those original troop members are still here today. We also maintain a group of Orangutans at our facility that was also established in 1991 but the earliest records of Orangutans at the Pittsburgh Zoo was in 1943.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

Western lowland gorilla – one male infant born 11 April 2013 – Still alive today

Western lowland gorilla – one male infant born 25 May 2018 – Still alive today

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

There have been no mortalities in our large primates in the last 5 years.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The indoor gorilla exhibit is 1036 SF. It varies in height from 22' to 30'. The outdoor gorilla exhibit is 15,339 SF and has a 14' W and 14' H dry moat that surrounds the raised exhibit. The building is constructed out of masonry walls and poured concrete floors in the basement and precast concrete plank on the first floor. There are 6 holding rooms for the gorillas that total 768 SF. There is 2" x 2" galvanized mesh used in the interior holding rooms of the basement. The gorilla viewing windows are 3 ply – ½" glass laminated with 2-90 mil polyvinyl butyral interlayers with tempered glass on the visitor's side. The indoor exhibit contains skylights throughout the high roof area and artificial trees made of textured epoxy on steel pipe. There are gunite painted

and textured concrete simulating rocks, boulders, riverbanks, pools and waterfalls in both the indoor and outdoor exhibits. The indoor temperature is maintained by 2 roof mounted air conditioning units with in-line hot water duct heaters designed to maintain a temperature of 70-85 degrees with a relative humidity of 50%. The building also contains smoke detectors throughout and a sprinkler system in the basement. See attached for photos and diagrams.

Western Lowland Gorilla (*Gorilla gorilla gorilla*)

July 2016

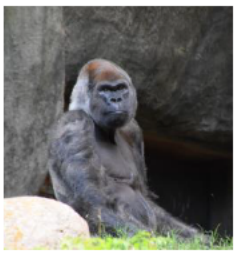


Photo courtesy of Kristen Lukas, Cleveland Metroparks Zoo

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Studbook Keeper: Roby Elsner, robyelsner@msn.com
Animal Program Leader: Kristen Lukas, kel@clevelandmetroparks.com
Vice Animal Program Leader: Rachel Daneault, rachel.b.daneault@disney.com
AZA Ape TAG Chair: Tara Stoinski, tstoinski@gorillafund.org
AZA Ape TAG Vice-Chair: Tracy Fenn, fennt@jacksonvillezoo.org

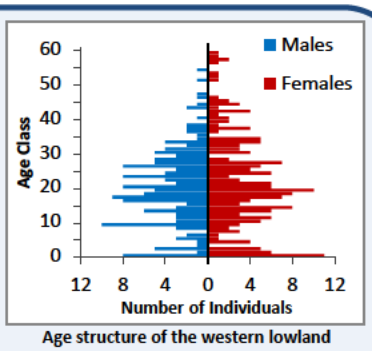
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years

WITHOUT potential changes: **Low Risk** | Vulnerable | Endangered | Critical

Current Population Status

- 351 gorillas (164 males, 187 females) are housed at 49 AZA institutions and 2 non-AZA partners
- The population decreased at -0.4% annually over the last decade, with several years of reduced breeding, and produced an average of ~12.5 births per year among other years
- 99% of the founding gene diversity (GD) has been retained
- The population's average inbreeding value (F) is 0.003
- IUCN status: Critically Endangered in the wild

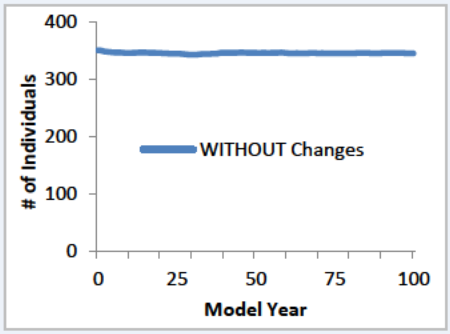


Age structure of the western lowland gorilla population

Model Results

Projected Status WITHOUT Potential Changes

- The population could remain near its current size by continuing to produce 12 to 13 births/year
- 98% ± 0% gene diversity and low inbreeding (F: 0.014 ± 0.002) could be maintained for 100 years
- Status: **Low Risk** within zoos
- For additional details, see pages 8-9 (Scenario A) in the main report
- As the population maintains its current size and high gene diversity, no alternate "With Changes" scenario was selected



Projected size of the western lowland gorilla population

Management Actions

- Continue to produce 12 to 13 births/year to maintain the population near its current size

How Institutions Can Help

- Pursue breeding recommendations given to your institution by the Program Leader
- Report breeding challenges and successes to the Program Leader
- Transfer males and females as recommended by the Program Leader to promote socialization

Please see the 2016 Western Lowland Gorilla AZA Animal Program full PVA report on the AZA website for further details.
Contact Brent Johnson at bjohnson@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) are being conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team uses ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Ape Taxon Advisory Group (TAG) in 2015 and 2016.

POPULATION HISTORY/CURRENT STATUS

Western lowland gorillas (*Gorilla gorilla gorilla*) have been consistently held in North American institutions since 1927. Through a combination of zoo births and importation from other populations, the Species Survival Plan® (SSP) population (at AZA and two non-AZA partner institutions) grew to a peak size of approximately 368 individuals in 2002. Following four decades of very high growth, in 2005 program managers and advisors recognized a need to accommodate the growing number of non-breeding males and therefore reduced breeding recommendations to maintain the population at its current size. Over the past decade, years of reduced breeding (2007-2011) averaged 5.0 births/year. In the years before and after (2005-2006, 2012-2014), the population averaged 12.4 births/year. Currently, the population includes 351 individuals (164 males, 187 females), which retain 98.9% gene diversity and have low inbreeding (average inbreeding coefficient [F] = 0.003).

PROGRAM CHALLENGES

Program managers intend to maintain the gorilla population near a target size of 350 individuals. In 2005, program managers initiated a significant restructuring of the gorilla population in which they recommended the formation of many new bachelor groups and mixed-sex groups comprised of one male and three females in order to place more solitary males in social situations. The program purposefully reduced breeding recommendations in order to stem the increase in additional non-breeding males projected through 2020. Since 2011, however, managers have increased breeding recommendations and subsequently increased births to adjust for low breeding success rates and to stabilize the population size.

PVA RESULTS

Model results indicate that under an average breeding rate of 12 to 13 births/year, the western lowland gorilla population could stabilize at approximately 350 individuals. Therefore, **the western lowland gorilla population is predicted to remain stable under current management over the next 100 years**. Within the next 25 years, the sex ratio of the population could become slightly more female-biased, with 1.2 females per male as opposed to 1.1 females per male currently. This change in sex ratio is projected to occur because of slightly higher mortality and short life expectancy for males. In 100 years, the gorilla population is predicted to retain approximately 98.3% gene diversity and to have inbreeding (F = 0.014) below that of offspring produced by mating between first cousins (F = 0.063).

MANAGEMENT ACTIONS

Given the current challenges for the western lowland gorilla population, PVA results indicate that the following management action should be considered in an effort to maintain this population's sustainability. Note that the PVA allows us to compare between hypothetical changes, but cannot evaluate whether achieving these changes is feasible, practical, or desirable given the program's constraints.

- **To remain demographically stable, maintain a consistent breeding rate:** If 12 to 13 births continue to be produced each year, on average, the western lowland gorilla population could stabilize near 350 individuals and retain ~98% gene diversity over the next 100 years. Any lower breeding rate would cause the population to decline during the next century.

Pittsburgh Zoo & PPG Aquarium

Western lowland gorilla

Tropical Forest Complex (TFC)

TFC interior

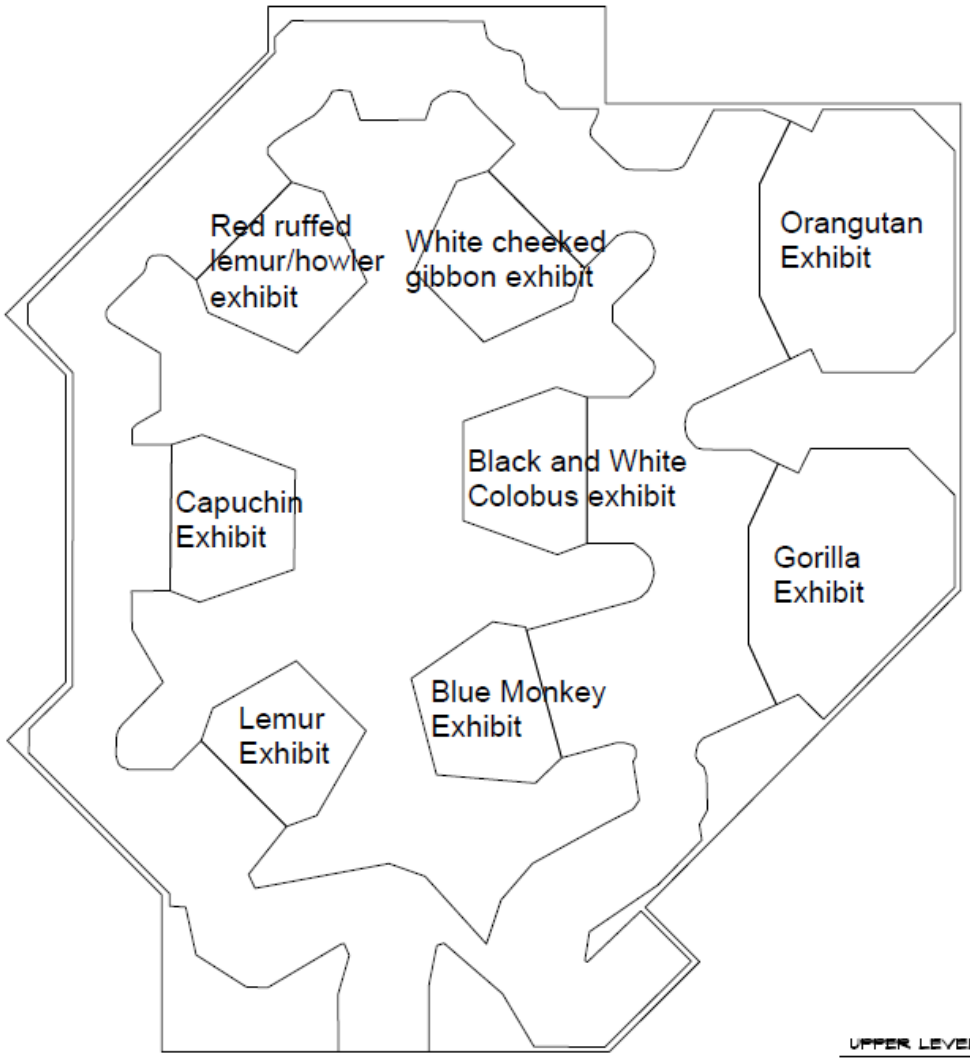
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

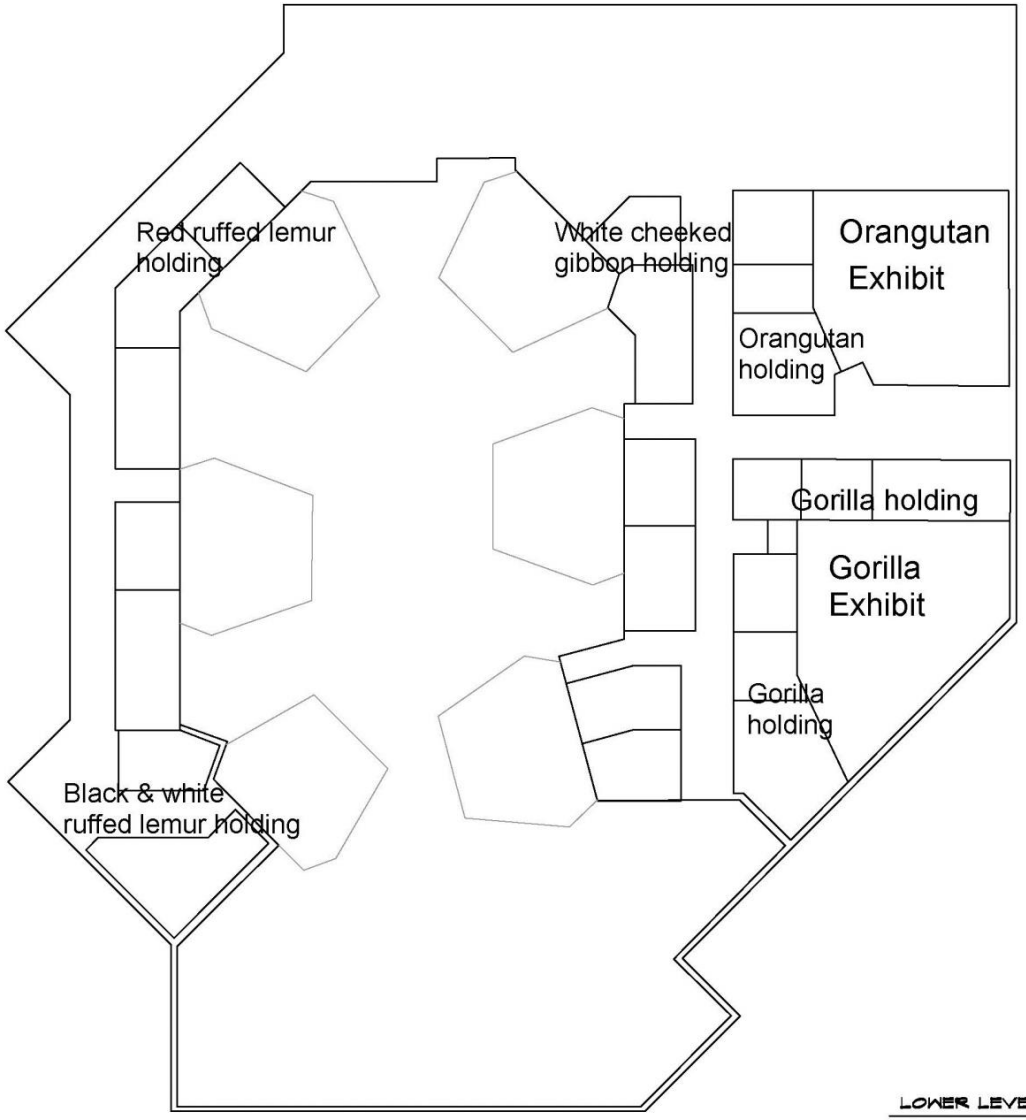
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level

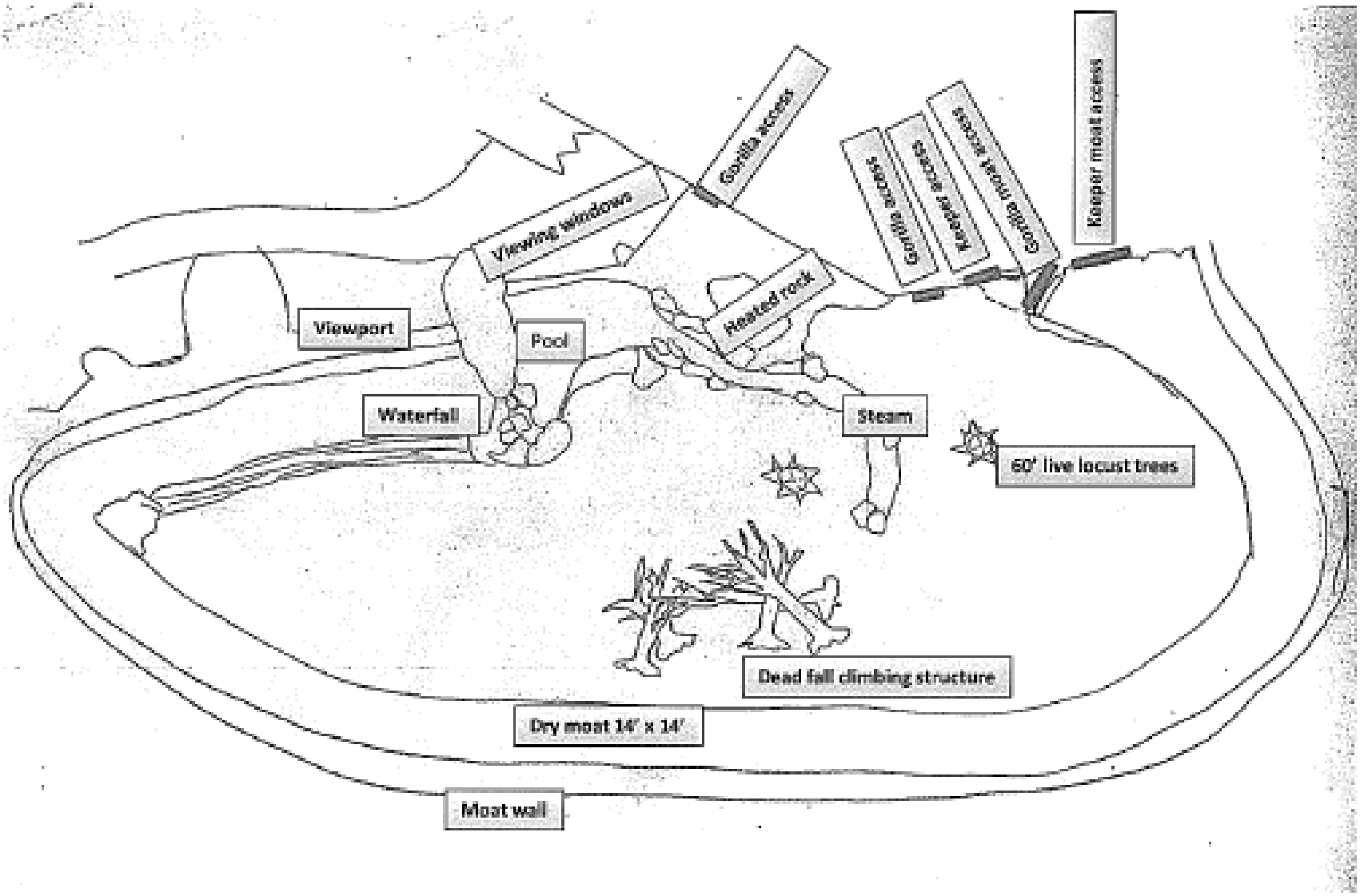


LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

Pittsburgh Zoo & PPG Aquarium
Outdoor Gorilla Habitat 1/3 Acre



Outdoor gorilla exhibit

This photo is taken from the visitor overlook across the exhibit. The large tree in the yard provides shade.

Gorilla outdoor exhibit

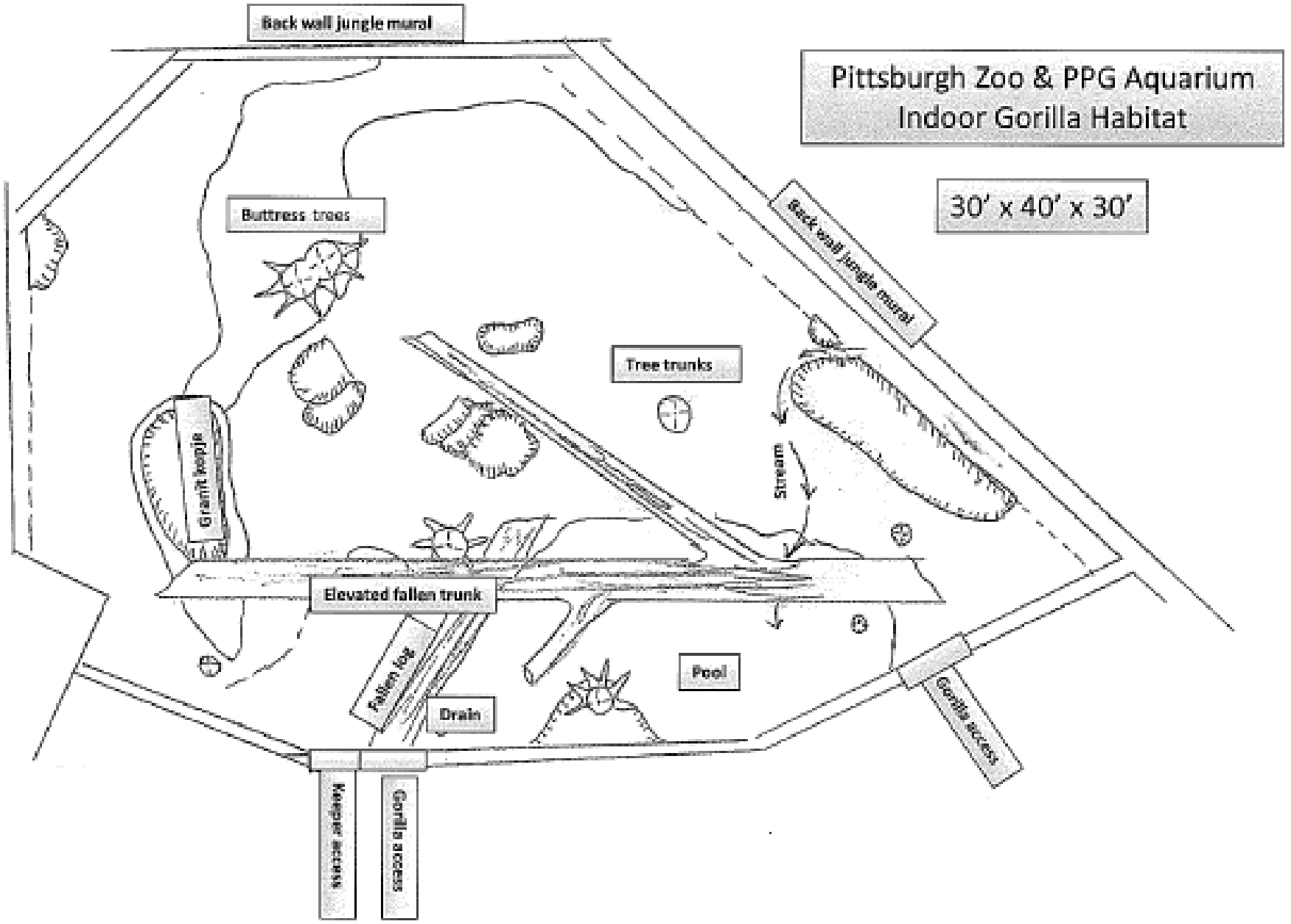
This photo is taken from the visitor viewing window. The pool in the foreground provide fresh water for drinking and playing. The stacked logs in the background provide climbing structure.

Gorilla outdoor exhibit

This is a photo of the dry moat that surrounds the exhibit. It is 14’ high and 14’ wide. The gorillas have access to the moat and use it for shade and physical separation.

Gorilla outdoor exhibit

This is another view of the gorilla exhibit .

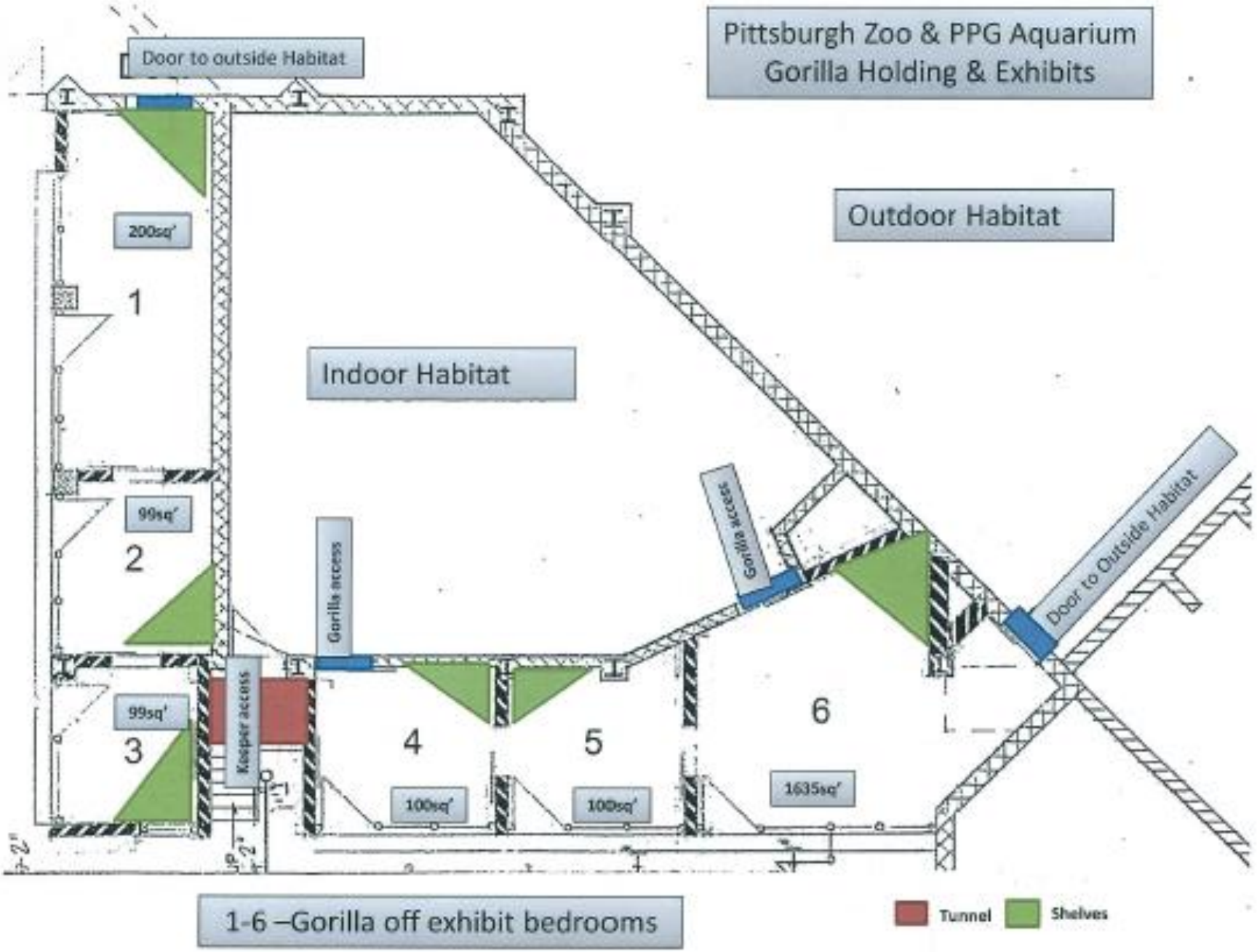

Back wall jungle mural
Pittsburgh Zoo & PPG Aquarium
Indoor Gorilla Habitat
30' x 40' x 30'
Buttress trees
Back wall jungle mural
Tree trunks
Granit loopje
Stream
Elevated fallen trunk
Fallen log
Drain
Pool
Gorilla access
Keeper access
Gorilla access

Gorilla indoor exhibit

This photo shows the graphics above the viewing windows.

Gorilla indoor exhibit

This photo is taken from the viewing window and shows the artificial trees in the exhibit.


Pittsburgh Zoo & PPG Aquarium
Gorilla Holding & Exhibits
Door to outside Habitat
Outdoor Habitat
200sq'
1
Indoor Habitat
99sq'
2
Gorilla access
Gorilla access
Door to Outside Habitat
99sq'
3
Keeper access
4
5
6
100sq'
100sq'
1635sq'
1-6 –Gorilla off exhibit bedrooms
Tunnel
Shelves

Gorilla holding room 1

Hammocks and shelves provide nesting places and climbing structure. Door on left leads to the outdoor exhibit moat.

Gorilla holding room 2

Fire hose and shelves provide climbing structure

Door on the left leads to Gorilla holding room 1

Gorilla holding room 3

Door in the center of the photo leads to room 2. Photo shows how all three holding rooms in this row are connected. Door on the right leads to room 4. Ladder on far left and fire hose on the right provide climbing structure.

Gorilla holding room 4

- The door on the wall leads to the indoor exhibit
- The door to the left leads into room 3
- Shelves and hay provide nesting space

Gorilla holding room 5

Shelves and hay provide nesting places. Door to the right leads into holding room 6.

Gorilla holding room 6

- The door on the left leads to the gorilla indoor exhibit.
- Shelf and hay provide nesting space
- Fire hose in foreground and wall ladders provide climbing structure

Gorilla holding room 6

- Wall ladder on the right leads to the outdoor exhibit
- The blue ladder was added for ease of exit for our geriatric gorilla

Gorilla holding

- The layout of gorilla holding prevents animals from being cornered.
- Animals can pass from room 1 all the way thru to room 6.
- Animals can get to the outdoor exhibit from rooms 1 and 6.
- Animals can get to the indoor exhibit from
- rooms 4 and 6.

3-200-41

E. Captive-bred Wildlife Registration

White-cheeked gibbons (*Hylobates leucogenys*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for gibbons. We currently have a 20 year old male that recently lost his companion. We would like to bring in a female for breeding. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the White-cheeked gibbon SSP. As of the October 2016 AZA Population Viability Analyses for White-cheeked Gibbon (Appendix), there are 88 gibbons in the population and the population size has increased at a rate of 1.2% annually over the last decade with an average of ~3.3 births, 0.2 imports and 0.1 exports per year. The founding gene diversity has been retained at 95.1%. The goal of this SSP is to increase breeding to ~ 4 births/year to remain near its current size over the next 100 years. This will give a gene diversity of 91.6% over 100 years. If the population continues to produce ~3.3 births/year the population would decline to ~41 individuals in 100 years without any future imports or exports and have a gene diversity of 87.6% +/- 4.4%. There are three challenges to this goal. There is a slight male bias in this population. There is limited space available making it difficult to re-pair individuals and to place offspring. Importing and exporting to other managed populations is difficult because those populations are managed at the subspecies level.

12. If your activities include the holding of surplus animals (i.e., no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

Since we do participate in the SSP, we follow the recommendations set forth by the Breeding and Transport Plan. We are currently to hold our male as they hopefully look for a female of breeding age or

at least a companion animal. If they request that we hold this animal and others as surplus animals then we will comply as that opens up room at other facilities to set up breeding pairs and family groups.

9. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

We have maintained White-cheeked gibbons in our collection since 1990. We have also maintained two other hylobatid species at our facility, White-handed gibbons (*Hylobates lar)* and Siamang (*Symphalangus syndactylus)*. The first White-handed gibbon arrived in 1969 and we maintained them in our collection until 1994. Siamang arrived in 2015 and are currently still in our collection.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

In the past five years we had one successful birth of a siamang. She is currently 8 months old. The pair of white-cheeked gibbons that we have was not slated to breed as the female was 44 years old and had an amputated left arm. So we have not had any white-cheeked gibbon births in the last five years.

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The only mortality of a hylobatid that we have had in the last five years was of our elderly female white-cheeked gibbon. According to the studbook keeper, she was the 4th oldest living white-cheeked gibbon in the population. She died of liver disease. No measures have been taken as she lived a long happy life.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The white-cheeked gibbons have access

to a public viewing enclosure that is 445 SF with a varying height of 18’ to 30’. The indoor exhibit has a cement floor with gunite textured concrete simulating rocks, boulders, riverbanks and a waterfall. This exhibit also has an artificial tree structure in the middle that is made from painted, textured epoxy on steel pipe and is surrounded by 2” x 2” woven wire mesh on three sides and a viewing window in the front. The viewing windows are 2 ply 3/16” glass laminated with 60 mil polyvinyl butyral interlayer, both plies tempered.

The white-cheeked gibbons are housed downstairs in two 279 SF holding rooms with cement block sides and poured cement floors. There are shelves on the walls and enrichment items hanging from the ceiling. One side of the holding area is 1” x 1” galvanized chain link. Any progeny that would be born would be housed in these three areas. See attached for photos and a diagram.

White-cheeked Gibbon (*Nomascus leucogenys*)

October 2016

Photo courtesy of Sue Margulis

Population Biologist: Lauren Terwilliger, lterwilliger@lpzoo.org
Former Studbook Keeper: Sue Margulis, Margulis@canisius.edu
Former Animal Program Leader: Jay Petersen
Vice Animal Program Leader: Janet Steele, jsteele@palmbeachzoo.org
AZA Ape TAG Chair: Tara Stoinski, tstoinski@gorillafund.org
AZA Ape TAG Vice-Chair: Tracy Fenn, fennt@jacksonvillezoo.org

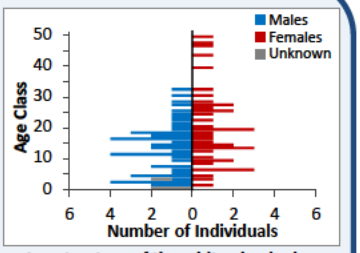
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years

WITHOUT potential changes:	Low Risk	**Vulnerable**	Endangered	Vulnerable
WITH potential changes:	**Low Risk**	Vulnerable	Endangered	Critical

Current Population Status

- 88 white-cheeked gibbons (46 males, 39 females, 3 unknown) are housed at 26 AZA institutions and 2 non-AZA partners
- The population size increased at 1.2% annually over the last decade, with an average of ~3.3 births, 0.2 imports and 0.1 exports per year
- 95.1% of the founding gene diversity (GD) has been retained
- The population's average inbreeding value (F) is 0.0043
- IUCN status: Critically Endangered in the wild



Age structure of the white-cheeked gibbon population

Program Challenges

- Slight male bias in the standing sex ratio and male-biased birth sex ratio may require same sex and contracepted sibling pairs to manage bachelor males and solitary animals.
- Limited space availability makes it difficult to re-pair individuals or place offspring.
- Genetic testing is needed to determine the extent of hybridization in the population between *N. leucogenys leucogenys* and *N. leucogenys siki*, which may limit exchanges with other zoo regions that manage the subspecies separately.

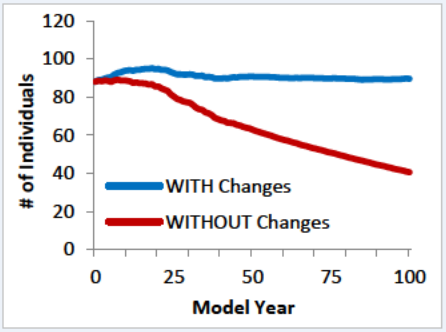
Model Results

Projected Status WITHOUT Potential Changes

- If the population continues to produce ~3.3 births/year, it would decline to ~41 individuals in 100 years without future imports and exports. With future exchanges more individuals may remain in 100 years
- 87.6% ± 4.4% gene diversity and low inbreeding (F = 0.086 ± 0.023) would be maintained in 100 years
- Status: **Vulnerable** within zoos and aquariums due to declining gene diversity
- For additional details, see pages 9-10 in the main report

Projected Status WITH Potential Changes

- If breeding is increased to produce ~4 birth/year, the population could remain near its current size over the next century
- 91.6% gene diversity and low inbreeding (F = 0.075) would be retained in 100 years without future exchanges
- Status: **Low Risk** within zoos and aquariums
- For more information, see page 11 (Scenario D) in the main report



Projected size of the white-cheeked gibbon population

Management Actions

- Pursue breeding recommendations given to your institution by the Program Leader
- Report breeding challenges and successes to the Program Leader

How Institutions Can Help

- Increase breeding to an average of ~4 births/year to maintain the population near its current size and avoid a population decline

Please see the 2016 White-cheeked Gibbon AZA Animal Program full PVA report on the AZA website for further details.

Contact Lauren Terwilliger at lterwilliger@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) are being conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team uses ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Ape Taxon Advisory Group (TAG) in 2016.

POPULATION HISTORY/CURRENT STATUS

White-cheeked gibbons (*Nomascus leucogenys*) have been consistently held in North American zoos since 1966, but the population grew via imports from other populations until regular breeding began in the late 1970s. Predominantly through births, the Species Survival Plan© (SSP) population (at AZA and partner institutions) has continued to grow, and is currently at its peak size of 88 individuals. Over the past decade (2006-2015) the population has averaged 3.3 births/year. Managers expect to continue importing 1 male and 1 female per decade, and plan to export 2 genetically over-represented males per decade. Currently, the population retains 95.1% of founding gene diversity and has low average inbreeding (average inbreeding coefficient [F] of 0.0043).

PROGRAM CHALLENGES

The population is slightly male-biased, particularly the potentially breeding population, and has a significantly male-biased birth sex ratio. Since white-cheeked gibbons are held in pairs, to maximize the number of females in breeding situations, eliminate individually housed individuals, and manage bachelor males, managers anticipate the need to establish brother-brother and father-son pairs. However, a lack of available holding space often limits the program's ability to move animals into optimal social or reproductive groupings. While the program expects future import rates to match that of the past decade (2006-2015), the export of an individual female occurred based on institutional needs, and the program plans to export only males in the future. However, due to concerns about hybridization between Northern white-cheeked gibbons (*N. leucogenys leucogenys*) and Southern white-cheeked gibbons (*N. leucogenys siki*) in the SSP population, European managers may be unwilling to exchange with the SSP population, as these subspecies are managed separately in Europe. Presently, the program is pursuing phylogenetic testing to examine the extent of hybridization in the current population.

PVA RESULTS

Model results indicate that under the average breeding rate from the past 10 years (3.3 births/year) the white-cheeked gibbon population would decline during the next century either with or without future imports and exports. However, **increasing breeding would allow the population size to stabilize over the next 100 years**. If breeding is increased from ~ 3 births/year to ~4 births/year, the population could maintain its current size (~88 individuals) over the next 100 years with or without regular exchanges. With future imports and exports, including the export of two over-represented males and the import of two genetically unique individuals per decade, a stable population could retain 94.7% gene diversity and develop inbreeding levels (F = 0.044) below that expected from mating between first cousins. In the absence of exchanges, the population would retain slightly less gene diversity (91.6%) and develop inbreeding levels (F = 0.075) in 100 years above that of a first-cousin mating. If additional potential space to hold 125 white-cheeked gibbons is acquired by the program, the population could grow to fill those spaces, either with or without future exchanges, in approximately 30 years if breeding is further increased to 4-5 births/year over the next decade and 5-6 births/year thereafter. However, managing the population at a larger size would provide only minor improvements in the population's genetic metrics in 100 years.

MANAGEMENT ACTIONS

Given the current challenges for the white-cheeked gibbon population, PVA results indicate that the following changes in management should be considered in an effort to improve this population's sustainability. Note that the PVA allows us to compare between hypothetical changes, but cannot evaluate whether achieving these changes is feasible, practical, or desirable given the program's constraints.

- **To remain demographically stable, increase breeding:** If breeding is increased from ~3 births per year to ~4 births per year, the white-cheeked gibbon population could maintain a low risk of extinction, remain near its current size of 88 individuals, and retain approximately 95% or 92% gene diversity over the next 100 years, with or without exchanges, respectively. Any lower breeding rate would cause the population to decline over the next century.

Pittsburgh Zoo & PPG Aquarium

White-cheeked gibbon

Tropical Forest Complex (TFC)

TFC interior

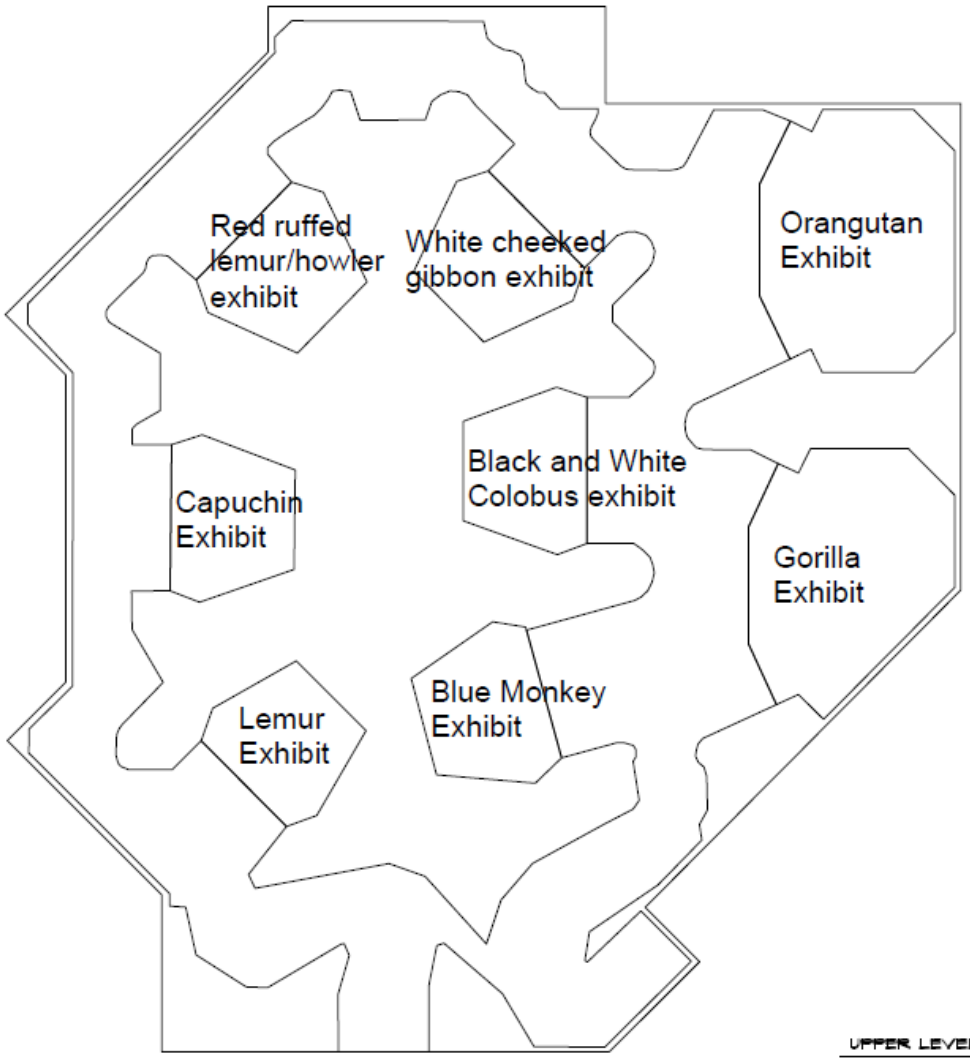
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

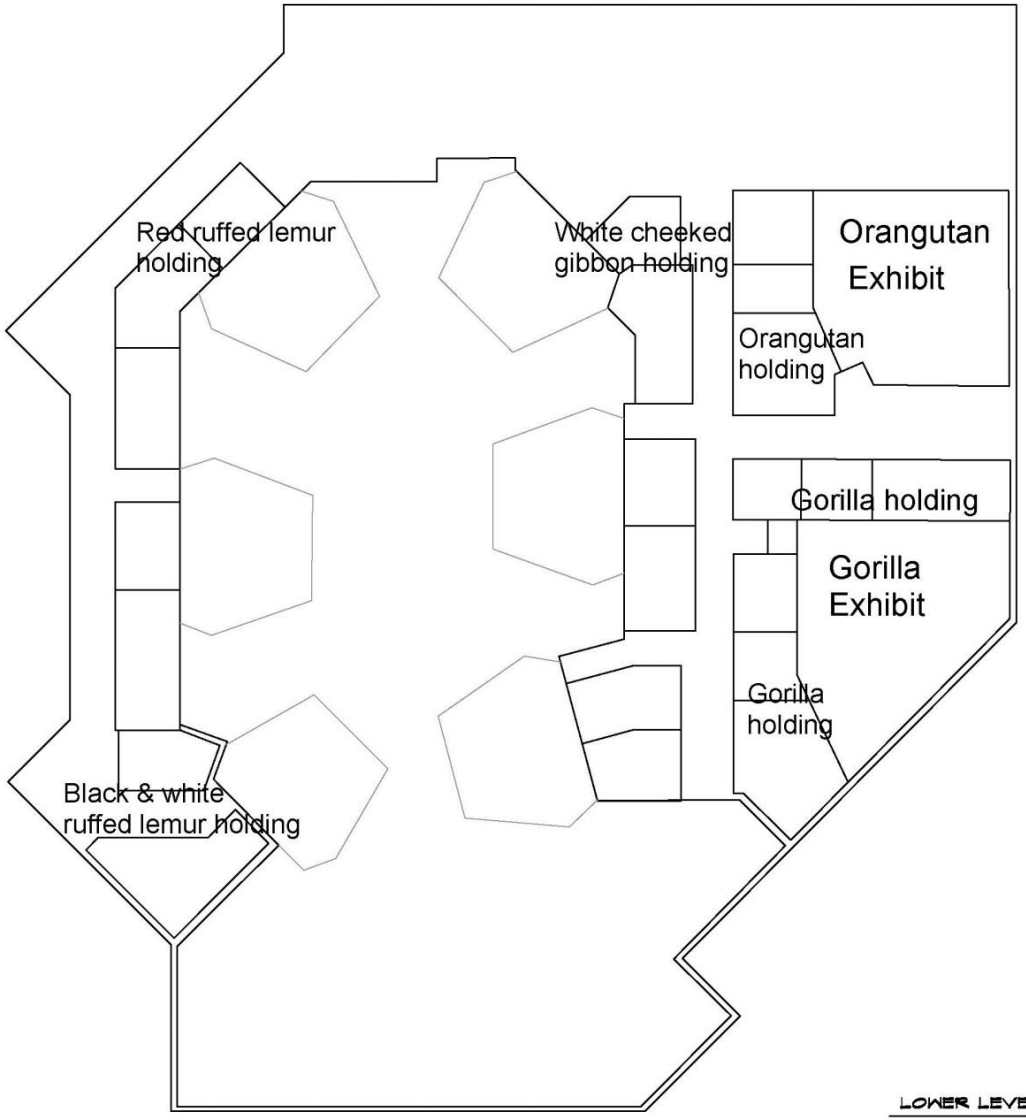
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level



LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

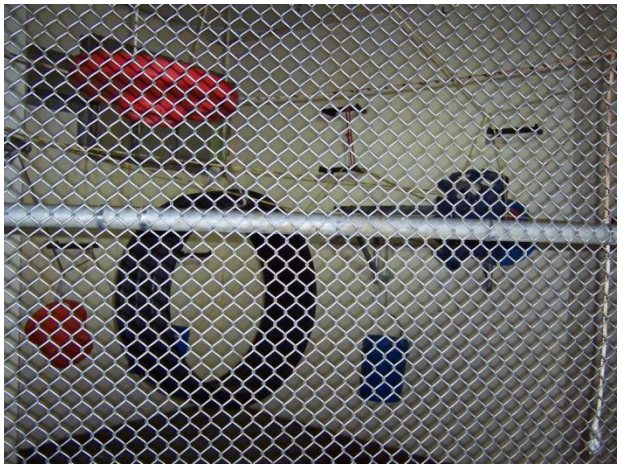
White-cheeked gibbon

- Artificial trees and fabricated vines provide enrichment and structure.
- Note the translucent roof in the background that allows ambient light

White-cheeked gibbon

- There are two Gibbon holding rooms. These pictures show one of those rooms.
- Walls are made of cement block and the floor is poured cement. One side is made of chain link.

White-cheeked gibbon



- The top is a view of the second White-cheeked Gibbon holding room.
- The bottom picture is of some of the enrichment provided for the Gibbons.

Nelson, Emma <emma_nelson@fws.gov>

Your Captive-Bred Wildlife Registration Request - 98224C

5 messages

Nelson, Emma <emma_nelson@fws.gov> Mon, Oct 29, 2018 at 1:50 PM
To: hterrell@pittsburghzoo.org

Dear Ms. Terrell,

We received your application to renew your registration under the Captive-bred Wildlife (CBW) program for the African elephant (*Loxodonta africana*), red-ruffed lemur (*Varecia rubra*), black-and-white ruffed lemur (*Varecia variegara*), white-cheeked gibbons (*Hylobates leucogenys*), siamang (*Symphalangus syndactylus*), gorilla (*Gorilla gorilla*), Bornean orangutan (*Pongo pygmaeus*), cheetah (*Acinonyx jubatus*), clouded leopard (*Neofelis nebulosi*), African lion (*Panthera leo melanocaita*), tiger (*Panthera tigris*), and dama gazelle (*Gazella dama*) . The processing of your application cannot be completed because:

- You indicate in your application that you will be submitting additional information through permits@fws.gov. Unfortunately, I was unable to locate this additional information. As such, please submit the additional documents as attachments to your reply to this email so that I can evaluate your application in full.
- Can you confirm the scientific name of the tiger species you are looking to have on your CBW? On the Species360 list, it's listed as the subspecies "altaica" but under question 8. just the species "Panthera tigris" is listed.

Please provide the information and documentation indicated. **Any response must be in written form.**

If we do not receive the information requested above within **45 days** from the date of this e-mail, your application will be abandoned and administratively closed. Once the file is closed, you would need to submit a new application and all required fees. If you have questions, you may contact me at Emma_Nelson@fws.gov or at 703-358-2296. Please reference your file number, **PRT-98224C.**

Best,
Emma

Emma Nelson
Senior Biologist
U.S. Fish and Wildlife Service
Division of Management Authority
5275 Leesburg Pike,
Falls Church, VA 22041
(703) 358-2296

Heather Terrell <hterrell@pittsburghzoo.org> Mon, Oct 29, 2018 at 4:18 PM
To: "Nelson, Emma" <emma_nelson@fws.gov>

Emma,

Here is part 2 of 2.

If you need any addi onal informa on please let me know.

Heather

Heather Terrell, MS

Registrar, IACUC Deputy Chair

One Wild Place
Pi sburgh, PA 15206
Phone: 412-365-2581

Fax: 412-365-2583

hterrell@pittsburghzoo.org

http://www.pittsburghzoo.org

From: Nelson, Emma [mailto:emma_nelson@fws.gov]
Sent: Monday, October 29, 2018 1:50 PM
To: Heather Terrell
Subject: Your Captive-Bred Wildlife Registration Request - 98224C

[Quoted text hidden]

MA98224C-0 Pittsburgh Zoo CBW Submission part 2 of 2.zip
16111K

Heather Terrell <hterrell@pittsburghzoo.org> Mon, Oct 29, 2018 at 4:17 PM
To: "Nelson, Emma" <emma_nelson@fws.gov>

Emma,

Here is part 1 of 2 that was send in to be a ached to our applica on back in July. I'll send a second email with part 2.

In the applica on details we list Amur ger (*Panthera gris altaica*). Sorry I missed the subspecies in the ques on 8 answer.

Heather

Heather Terrell, MS

Registrar, IACUC Deputy Chair

One Wild Place
Pi sburgh, PA 15206
Phone: 412-365-2581

Fax: 412-365-2583

hterrell@pittsburghzoo.org

http://www.pittsburghzoo.org

From: Nelson, Emma [mailto:emma_nelson@fws.gov]
Sent: Monday, October 29, 2018 1:50 PM
To: Heather Terrell
Subject: Your Captive-Bred Wildlife Registration Request - 98224C

Dear Ms. Terrell,

[Quoted text hidden]

MA98224C-0 Pittsburgh Zoo CBW Submission part 1 of 2.zip
17727K

Heather Terrell <hterrell@pittsburghzoo.org> Fri, Nov 2, 2018 at 10:04 AM
To: "Nelson, Emma" <emma_nelson@fws.gov>

Can you confirm that you received my email from Monday with our a achments?

Heather

Heather Terrell, MS

Registrar, IACUC Deputy Chair

One Wild Place
Pittsburgh, PA 15206
Phone: 412-365-2581

Fax: 412-365-2583

hterrell@pittsburghzoo.org

http://www.pittsburghzoo.org

From: Nelson, Emma [mailto:emma_nelson@fws.gov]
Sent: Monday, October 29, 2018 1:50 PM

To: Heather Terrell
Subject: Your Captive-Bred Wildlife Registration Request - 98224C

Dear Ms. Terrell,

[Quoted text hidden]

Nelson, Emma <emma_nelson@fws.gov> Mon, Nov 26, 2018 at 11:08 AM
To: hterrell@pittsburghzoo.org

Good morning Heather,

Yes, I've received your emails with zip attachments.

Best,
Emma

Emma Nelson
Senior Biologist
U.S. Fish and Wildlife Service
Division of Management Authority
5275 Leesburg Pike,
Falls Church, VA 22041
(703) 358-2296

[Quoted text hidden]

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4 attachments

image001.jpg
5K

image002.jpg
2K

image002.jpg
2K

image001.jpg
5K

Department of Interior
U.S. Fish and Wildlife Service

Federal Fish and Wildlife Permit Application Form

U.S. Fish and Wildlife Service
Division of Management Authority
Branch of Permits, MS: IA
5275 Leesburg Pike
Falls Church, VA 22041-3803
1-800-358-2104 or 703-358-2104

Type of Ac ivity

CAPTIVE-BRED WILDLIFE REGISTRATION (CBW)
(U.S. Endangered Species Act)

Complete Sections A or B, and C, D, and E of this application. U.S. address may be required in Section C, see instructions for details.
You may find instructions on how to make your application complete and help avoid unnecessary delays at the following link: .

Section A: Complete if applying as an individual

1.a. Last Name		1.b. First Name	1 c. Middle Name/Initial	1.d. Suffix
2. Date of Birth (mm/dd/yyyy)	3. Telephone Number	3.a. Alternate Telephone Number	4. E-mail address	

Section B: Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution

1.a. Name of business, agency, Tribe, or institution		1 b. Doing business as (DBA)	
Zoological Society of Pittsburgh		Pittsburgh Zoo & PPG Aquarium	
2. Tax identification no.		3. Description of business, agency, Tribe, or institution	
25-1418766		Zoological Institution	
4.a. Principal officer Last name	4.b. Principal officer First Name	4.c. Principal officer Middle name/initial	4.d. Suffix
Baker	Barbara	A	
5. Principal officer title	6. Primary contact name		
President & CEO	Heather Terrell, Registrar		
7.a. Business telephone number	7.b. Alternate telephone number	7.c. Business fax number	7.d. Business e-mail address
412-365-2581	412-365-2501	412-365-2583	hterrell@pittsburghzoo.org

Section C: All applicants complete address information

1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes)				
One Wild Place				
1.b. City	1.c. State	1 d. Zip code/Postal code	1 e. County/Province	1.f. Country
Pittsburgh	PA	15206	Allegheny	USA
2.a. Mailing address (include if different than physical address; include name of contact person if applicable)				
same as above, use Attn: Heather Terrell				
2.b. City	2.c. State	2 d. Zip code/Postal code	2 e. County/Province	2.f.Country

Section D: All applicants MUST complete

1. Attach check or money order payable to the U.S. FISH AND WILDLIFE SERVICE **in the amount identified on page 2, nonrefundable processing fee**. Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – *attach documentation of fee exempt status as outlined in instructions.* [50 CFR 13.11(d)]

2. Certification: I hereby certify that I have read and am familiar with the regulations contained in ***Title 50 Part 13 of the Code of Federal Regulations*** and he other ***applicable parts in subchapter B of Chapter I of Title 50***, and I certify that the information submitted in this applica ion for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

Signature of applicant/Principal Officer for permit (No photocopied or stamped signatures) Date of signature (mm/dd/yyyy)

Please continue to next page

E. CAPTIVE-BRED WILDLIFE REGISTRATION (U.S. Endangered Species Act)

Please use the following application for all CBW requests: new or renewals.

X This is a new application.

This is an amendment or renewal application.

All applicants must complete **Part 1** of the application. A CBW Registration remains valid for five years and may be renewed once for a total validity of ten years, after which the CBW Registration number will be retired and you must apply for a new CBW Registration. If a renewal application is submitted thirty days or more prior to the CBW Registration expiration, the applicant may continue to conduct previously authorized activities during the renewal process. However, if the application is submitted fewer than thirty days prior to expiration, activities must cease at the time the registration expires until the renewal process is completed.

For New applications and amendments, complete **Part 2** of the application. You may renew your CBW once after 5 years, but after a CBW registration has been valid for 10 years, you must submit a complete new application responding to all questions.

To renew your CBW (it has been less than 10 years since you completed a completely new application), complete **Part 3** of this application.

Electronic submission of inventories, photographs, and receipts: Some applications contain extensive inventories and /or a large number of photographs or receipts. You may provide electronic versions of the documents. Such a submission will assist in expediting the processing of your application since it may reduce data entry by the U.S. Fish and Wildlife Service. If you wish to provide information electronically, please either include a disk containing your information or, once you have received an application number via the e-mailed acknowledgement letter, e-mail your information to Permits@fws.gov. Be sure to include the application number provided in the acknowledgement e-mail that will be sent to you when we receive your application.

X I will be submitting documents electronically.

Part 1: All Applicants Should Complete

The Division of Management Authority annually distributes a list of Captive-Bred Wildlife (CBW) Registration permittees to all CBW registration holders. The list facilitates the exchange of parental stock among registered breeders and includes permittees that operate as individuals, as well as those that are business entities. For businesses and other organizations holding CBW registrations, including sole proprietorships, the list includes name, permit number, address, and species held by each permittee. However, the records for individuals holding CBW registrations are contained in a Privacy Act (5 U.S.C. 552a) system of records. Therefore, only the name, species, permit number, and state of residence will automatically be included on the list. The complete address will be included only upon authorization from the individual permittees.

If you are **not** a business or organizational entity, and are applying for the CBW registration as an individual, please provide one of the following statements: (Note: if you collect funds for any wildlife purpose, you are a business)

I, [your name] of [facility name] authorize the U.S. Fish and Wildlife Service to include my complete address in its CBW registration list and to release this information to other CBW holders or the public, if requested. I would also like the Service to use the following address on the CBW registration list: [indicate either your mailing address or facility address as identified in your application].

Same address as on page one.

Different address:

Signed_____Date_____

OR

I, [your name] of [facility name] DO NOT authorize the U.S. Fish & Wildlife Service to include my complete address in its CBW registration list. Since my contact information will not be made available to parties interested in cooperating with other CBW holders in breeding programs, I intend to use the following method to communicate and facilitate exchanges with other interested CBW holders:

Signed_____ Date_____

1. Name and address where you wish the permit to be mailed, if different from page 1. If you would like expedited shipping, please enclose a self-addressed, pre-paid, computer-generated, courier service airway bill. If unspecified, all documents will be mailed via the U.S. Postal Service.

   Same as page 1

2. Who should we contact if we have questions about the application (name, phone number, and e-mail)?

   Heather Terrell, registrar, 412-365-2581, hterrell@pittsburghzoo.org

3. Have you or your client (if a broker applying on behalf of your client), been assessed a civil penalty or convicted of any criminal provision of any statute or regulation relating to the activity for which the application is filed; been convicted, or entered a plea of guilty or nolo contendere, for a felony violation of the Lacey Act, the Migratory Bird Treaty Act, or the Bald and Golden Eagle Protection Act; forfeited collateral; OR are currently under charges for any violation of the laws mentioned above?

   X No Yes

If you answered "Yes" to Question 3, provide: a) the individual's name; b) date of charge; c) charge(s); d) location of incident; e) court, and f) action taken for each violation. Please be aware that a "Yes" response does not automatically disqualify you from getting a permit.

4. Provide copies of any license or registration under the Animal Welfare Act regulations of the U.S. Department of Agriculture (9 CFR 2) (if required) and/or any State license or registration required to maintain or breed the species requested in Part 2 or Part 3 below. If available, provide a copy of your last two (2) USDA AWA inspection reports.

5. The exact location(s), including address(es), where the wildlife requested in this application will be maintained. If more than one location exists, list all that apply. NOTE: You must report any change in address or location of facilities to the Division of Management Authority within 10 days.

   Pittsburgh Zoo & PPG Aquarium, One Wild Place, Pittsburgh PA 15206
   International Conservation Center, 1487 Glen Savage Road, Fairhope, PA 15538

6. Provide a current inventory, including those out on loan, for each of the ESA-listed species you are requesting to include or have already been approved to hold (if currently holding a valid CBW registration) on your CBW registration.

   See appendix for current inventory

7. A description of the qualifications of the individuals who will care for the animals, including the number of years' experience with this species or similar species, and names of current caretakers.

   See appendix for staff qualifications

Part 2: New Application, Amendment, or Renewal of CBW which are older than 10 years:

FOR <u>EACH SPECIES BEING REQUESTED</u> for inclusion in a registration, whether a new application or amendment, complete each of the following questions. Signify that you have read each question by writing "N/A" if non-applicable. If submitting hard copy pages, please indicate the species and the application question number you are addressing.

8. The scientific name (genus, species and, if applicable, subspecies) and common name of the species.

   See appendix for species list

9. The name, address, and CBW registration number of the person(s) or institution(s) from whom you plan to acquire the wildlife. If currently unknown, state if there is an organized breeding program that you are involved with or if you have communicated with other breeding organizations.

   Individual animals have not been identified at this time. The Pittsburgh Zoo & PPG Aquarium participates with the yellow and red SSP programs for ESA listed animals and provides status updates to all green SSP listed species.

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of this species, **including your long-term goals for your breeding program and intended disposition of any progeny.**

See electronic appendix files for the answers for questions 10-14 for each species

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic viability of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

12. If your activities include the holding of surplus animals (i.e., no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the locations from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species, including:

    a. The number of years you or the facility has/have maintained the requested species or similar species.

    b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

    c. How many mortalities of requested species or similar species have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

    d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining each species requested.

14. Provide a detailed description, including size, construction materials, and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your existing facilities, including space for future progeny, where the wildlife will be maintained.

Part 3: Applications to Renew CBW registrations that are 5 years old or less: N/A

All CBW registrants are required to submit an annual report on activities conducted at the facility over the previous year, as well as a current inventory of all species covered under the registration. If you have already responded to the following questions in your annual report, please note that in your answer to the question.

15. Have there been any changes to your operation such as reconstruction or new construction, new facilities, or other physical changes? If yes, please describe them.

16. Have there been any changes to senior staff or personnel changes that would affect how your operation handles the species included in the registration? If yes, please describe these changes.

17. Have there been any changes to your inventory that have not been reflected in your annual reports or the current inventory list provided to the Service? If yes, please describe these changes.

18. Is there any additional information that you believe the Service should be aware of in regards to your operation, facilities, inventory, or business model?

*** **Please note:** If you have a change of mailing address, you must notify the Service within 10 days. If your facilities move, you will need to apply for an amendment.

Detailed Inventory Report for

Taxonomy	Beginning	Births	Acquisitions	Change	Deaths	Dispositions	Ending Status
Loxodonta africana		**CITES: II,A/IUCN: Vulnerable (VU)**					**African elephant**
Owned And Onsite	1.8.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.8.0
In On Loan	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
Out On Loan	1.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.1.0
Varecia rubra		**CITES: I,A/IUCN: Endangered (EN)**					**Red ruffed lemur**
Owned And Onsite	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Varecia variegata variegata		**CITES: I,A/IUCN: Critically Endangered (CR)**					**Black-and-white ruffed lemur**
Owned And Onsite	1.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.0.0
In On Loan	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Nomascus leucogenys		**CITES: I,A/IUCN: Critically Endangered (CR)**					**White-cheeked gibbon**
Owned And Onsite	1.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.0.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Symphalangus syndactylus		**CITES: I,A/IUCN: Endangered (EN)**					**Siamang**
Owned And Onsite	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
In On Loan	1.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.1.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Gorilla gorilla gorilla		**CITES: I,A/IUCN: Critically Endangered (CR)**					**Western lowland gorilla**
Owned And Onsite	4.2.0	0.0.0	0.0.0	0	0.0.0	0.0.0	4.2.0
In On Loan	0.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.1.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Pongo pygmaeus pygmaeus		**CITES: I,A/IUCN: Endangered (EN)**					**Northwest Bornean orangutan**
Owned And Onsite	1.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.1.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Acinonyx jubatus		**CITES: I,A/IUCN: Vulnerable (VU)**					**Cheetah**
Owned And Onsite	0.2.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.2.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	2.3.0	0.0.0	0.0.0	0	0.0.0	0.0.0	2.3.0
Neofelis nebulosa		**CITES: I,A/IUCN: Vulnerable (VU)**					**Clouded leopard**
Owned And Onsite	1.1.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.1.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Panthera leo krugeri		**CITES: II,B/IUCN: Vulnerable (VU)**					**African lion**
Owned And Onsite	2.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	2.0.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Panthera tigris altaica		**CITES: I,A/IUCN: Endangered (EN)**					**Amur tiger**
Owned And Onsite	2.2.0	0.0.0	0.0.0	0	0.0.0	0.0.0	2.2.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.3.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.3.0
Nanger dama ruficollis		**CITES: I,A/IUCN: Critically Endangered (CR)**					**Addra gazelle**
Owned And Onsite	1.2.0	0.0.0	0.0.0	0	0.0.0	0.0.0	1.2.0
In On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0
Out On Loan	0.0.0	0.0.0	0.0.0	0	0.0.0	0.0.0	0.0.0

Form 3-200-41

OMB Control No. 1018-0093
Expires 08/31/2020

Department of Interior
U.S. Fish and Wildlife Service

Federal Fish and Wildlife Permit Application Form

U.S. Fish and Wildlife Service
Division of Management Authority
Branch of Permits, MS: IA
5275 Leesburg Pike
Falls Church, VA 22041-3803
1-800-358-2104 or 703-358-2104

Type of Activity

CAPTIVE-BRED WILDLIFE REGISTRATION (CBW)
(U.S. Endangered Species Act)

Complete Sections A or B, and C, D, and E of this application. U.S. address may be required in Section C, see instructions for details.
You may find instructions on how to make your application complete and help avoid unnecessary delays at the following link: .

Section A: Complete if applying as an individual

1.a. Last Name		1.b. First Name	1.c. Middle Name/Initial	1.d. Suffix
2. Date of Birth (mm/dd/yyyy)	3. Telephone Number	3.a. Alternate Telephone Number	4. E-mail address	

Section B: Complete if applying on behalf of a business, corporation, public agency, Tribe, or institution

1.a. Name of business, agency, Tribe, or institution		1.b. Doing business as (DBA)	
Zoological Society of Pittsburgh		Pittsburgh Zoo & PPG Aquarium	
2. Tax identification no.		3. Description of business, agency, Tribe, or institution	
25-1418766		Zoological Institution	
4.a. Principal officer Last name	4.b. Principal officer First Name	4.c. Principal officer Middle name/initial	4.d. Suffix
Baker	Barbara	A	
5. Principal officer title		6. Primary contact name	
President & CEO		Heather Terrell, Registrar	
7.a. Business telephone number	7.b. Alternate telephone number	7.c. Business fax number	7.d. Business e-mail address
412-365-2581	412-365-2501	412-365-2583	hterrell@pittsburghzoo.org

Section C: All applicants complete address information

1.a. Physical address (Street address; Apartment #, Suite #, or Room #; no P.O. Boxes)				
One Wild Place				
1.b. City	1.c. State	1.d. Zip code/Postal code	1.e. County/Province	1.f. Country
Pittsburgh	PA	15206	Allegheny	USA
2.a. Mailing address (include if different than physical address, include name of contact person if applicable)				
same as above, use Attn: Heather Terrell				
2.b. City	2.c. State	2.d. Zip code/Postal code	2.e. County/Province	2.f.Country

Section D: All applicants MUST complete

1. Attach check or money order payable to the U.S. FISH AND WILDLIFE SERVICE in the amount identified on page 2, nonrefundable processing fee. Federal, Tribal, State, and local government agencies, and those acting on behalf of such agencies, are exempt from the processing fee – *attach documentation of fee exempt status as outlined in instructions.* [50 CFR 13.11(d)]

2. Certification: I hereby certify that I have read and am familiar with the regulations contained in ***Title 50 Part 13 of the Code of Federal Regulations*** and the other ***applicable parts in subchapter B of Chapter I of Title 50***, and I certify that the information submitted in this application for a permit is complete and accurate to the best of my knowledge and belief. I understand that any false statement herein may subject me to the criminal penalties of 18 U.S.C. 1001.

Signature of applicant/Principal Officer for permit (No photocopied or stamped signatures) Date of signature (mm/dd/yyyy)

Dr. Barbara Baker 6/4/18

Please continue to next page

8. The scientific name and common name of the species included in the application.

Loxodonta africana	African elephant
Varecia rubra	Red ruffed lemur
Varecia variegata variegata	Black and white ruffed lemur
Hylobates leucogenys	White cheeked gibbons
Symphalangus syndactylus	Siamang
Gorilla gorilla gorilla	Western lowland gorilla
Pongo pygmaeus	Orangutan
Acinonyx jubatus	Cheetah
Neofelis nebulosi	Clouded leopard
Panthera leo melanochaita	African lion
Panthera tigris	Amur tiger
Gazella dama	Dama gazelle

3-200-41

7. Staff qualifications

Dr. Ginger Sturgeon, DVM, Director of Animal Health

Dr. Sturgeon received her veterinary degree from the University of Tennessee in 2005. She finished an internship at Purdue University from June 2005-June 2006. She completed a residency at the Kansas City Zoo and the University of Missouri from 2006-2009. In February 2010 she accepted the Associate Veterinarian position at the Pittsburgh Zoo & PPG Aquarium. In May 2011, Dr. Sturgeon accepted the position of interim Director of Animal Health and in October she was promoted to the Director of Animal Health. Dr. Sturgeon is responsible for all aspects of veterinary care for ~4000 animals at the zoo, aquarium and International Conservation Center. She is responsible for the leadership and management oversight of the Animal Health department.

Dr. Alicia Hahn, DVM DACZM, Associate veterinarian

Dr. Hahn received her veterinary degree from Kansas State University (2009). Prior to this she completed a 3 year residency in Zoo medicine at the Oklahoma City Zoo. She passed the zoological medicine board exam to become a diplomate of the American College of Zoo Medicine in 2014. Dr. Hahn accepted the associate veterinary position at the Pittsburgh Zoo & PPG Aquarium in 2014. Dr. Hahn is responsible for carrying out the preventative health care program, medical and surgical case management, emergency treatments, enrichment evaluations, post-mortem exams and collaborating on research projects.

Ken Kaemmerer, Curator of Mammals

Mr. Kaemmerer received a BS in Biology from Purdue University in 1974 and an MA in Zoology from Southern Illinois University in 1978. Mr. Kaemmerer began his zoo career in the mid 1970's and has spanned over 40 years at five zoos. He spent 21 years as the Curator of Mammals at the Dallas Zoo. He was responsible for all mammals in the collection, which included primates, pachyderms, carnivores, hoofstock, insectivores, chiropterans, rodents and edentata. He has been the curator of mammals at the Pittsburgh Zoo & PPG Aquarium since February 2010. At the Pittsburgh Zoo he oversees the primates, rhinos and carnivores.

Karen Vacco, Assistant Curator of Mammals

Mrs. Vacco received an AS in Wildlife technology from Penn State University in 1992. She started her career at the Pittsburgh Zoo & PPG Aquarium following graduation. She has worked in every area of the zoo and aquarium at one point in her career. In 2002 she was promoted to lead keeper of the primates and African painted dogs. She was promoted to Assistant Curator of Mammals in 2009. Her responsibilities include overseeing the daily operations for the mammal department's animal collection and personnel. She oversees the primates, rhinos and carnivores.

Kathy Suthard, Lead Mammal Keeper

Ms. Suthard has a certificate in Animal Health Technology and an AAS degree in Biology. She has been a keeper at the Pittsburgh Zoo & PPG Aquarium since 1980 holding positions of increasing responsibility such as Keeper, Keeper II and Lead Keeper. In the years she has been at the zoo she has worked with all of the zoo's collection including fish, birds and mammals. Ms. Suthard specializes in the cat area currently working with 4 Amur tigers, 4 Amur leopards, 2 African lions, 6 Canada lynx, 2 Cheetah and 2 Clouded leopards. Under her care the zoo has successfully had 6 litters of Amur tigers, 3 litters of Amur leopards and a litter of Canada Lynx. In the past she has had experience in hand rearing Amur tiger cubs, 4 Lion cubs, 2 cougars, a spider monkey, siamang and a white handed gibbon along with various exotic birds. Ms. Suthard is also in charge of the Black Rhinoceros and was part of the team that oversaw the successful births of two rhinos in the past 5 years. Kathy has been involved in the transport of several cats to various zoos in the United States all of which involved crating and driving to and from Pittsburgh with the animals including African lions, Amur leopards and Snow leopards. She also was the groom aboard a FedEx flight transporting an Andean Bear. Kathy has written and presented research papers at AAZK conferences which detailed White Rhino Estrus Cycles and Using Operant Conditioning to Manage a Diabetic Tiger. Additionally, Kathy is a committee member and frequent contributor to Zoo Explorer, the Pittsburgh Zoo & PPG Aquarium publication.

Wayne (Willie) Theison, Elephant and Ungulate Manager

Mr. Theison has been at the Pittsburgh Zoo & PPG Aquarium since 1993. He has been an Elephant Handler / Manager for over 40 years at several zoos including Kansas City, Jacksonville, Atlanta, Denver, Miami, Pittsburgh and Wuppertal, Germany. He is an elephant consultant with zoos including Providence, RI; Colorado Springs, CO; Grant's Farm, MO; Wuppertal, Germany and Pretoria, South Africa. Taking on a program with just two elephants, Mr. Theison has built the Zoo's program into a conservation, breeding, and research program which currently houses 10 elephants; five at the Zoo and five at the Zoo's International Conservation Center (ICC).

The Pittsburgh Zoo has a long standing commitment to the African elephant, which began in 1994 shortly after his arrival. Mr. Theison has extensive expertise in the management of bull elephants and cows during natural breeding, collection of semen for AI, management of pregnant cows, the birthing process, neonatal elephant care, and introduction of babies to herd members. He is also responsible for the management of the ungulates, including the Nyala, Addra gazelle, Giraffe and Zebra.

Lisa Caruso, Elephant and Ungulate Lead Keeper

Mrs. Caruso is an elephant handler at the Pittsburgh Zoo & PPG Aquarium since 2002 and Lead Elephant keeper at the Pittsburgh Zoo & PPG Aquarium since 2012. Lisa attended the AZA Principles of Elephant Management School and has attended the Parelli training workshops. She has worked with both bull and cow elephants and has been trained in both free and protected contact techniques. She has participated in several elephant transports, bull semen collection, AI procedures, births and hand raising an infant calf. Mrs. Caruso attended the EMA Conference in 2010 and 2016 and the Elephant Rhino Symposium in 2013. She participated in project Frozen Dumbo in South Africa in 2010 and has

participated in a keeper exchange program with Wuppertal Zoo, Germany in 2006, 2013, 2014 and 2015. She has a Bachelor's degree in Biology with a minor in Psychology from Penn State, Behrend and a teaching certification for high school Biology from Mercyhurst College.

3-200-41

E. Captive –bred Wildlife Registration

Addra Gazelle (*Nanger dama ruficollis*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the AZA species survival plan for addra gazelle. We have a successful breeding history with addra gazelle. We currently have a breeding recommendation to breed the pair that we have and will continue to breed as recommended by the SSP. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

We currently have 1.2 addra gazelle, a breeding pair and a female offspring. Since we do not house enough gazelle to maintain the genetic vitality of the species we participate in the AZA SSP for addra gazelle. According to the 2018 Population Analysis & Breeding and Transfer Plan, the current gene diversity of this population is 84.80%. If no actions are taken it is expected to drop to 70.0% after 100 years. The current population size is 183 with a target population size of 200. A growth rate of 2.6% can be obtained if ~38 offspring are produced next year. Therefore 74 pairings were recommended for 2018 with the expectation that 50% of the pairs would reproduce. The recommended pairings were prioritized to maintain if not increase the gene diversity of the population. The gene diversity of this population has the potential to reach 91.60% which would put it over the goal of 90% gene diversity.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

The Pittsburgh Zoo & PPG Aquarium does participate with the SSP for addra gazelle and will follow the recommendations set forth in the Breeding and Transport plan and breed the pair that we have. The young female is too young to breed at this time and the male is her sire so contraceptive measures will be taken to prevent in-breeding with her sire when she comes of age.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

We have maintained addra gazelle in our collection since 1997 and have maintained other hoofstock species such as impala, blesbok, springbok, Thomson's gazelle, common eland, beisa oryx, nyala and bongo.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

In 2017 we had one still born female addra gazelle calf born and one calf that is still alive today. We also had the live birth of a female springbok in 2013 that survived beyond 30 days.

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

We have had two deaths of addra gazelle in the last five years. The first death was a still born calf in September 2017. The calf appeared full term; gross necropsy determined it did not take a breath. The cause of death was not identified but dystocia was suspected. The second death occurred in December 2017 and was an adult female that had severe bronchopneumonia that did not respond to treatment. Humane euthanasia was elected. There are no preventative measures that could have taken to prevent future deaths like these.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

Willie Theison manager - See staff qualifications attachment.

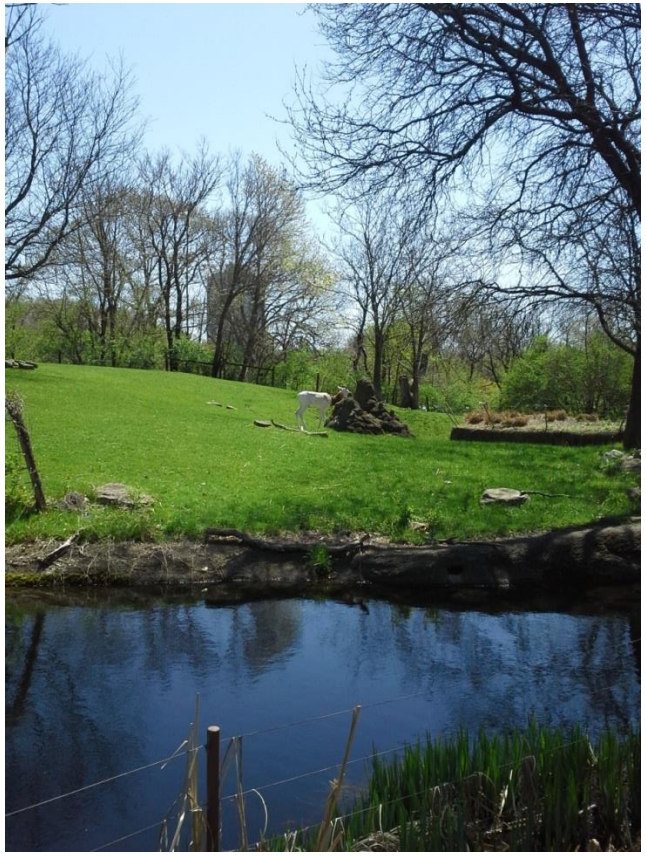
10. Provide a detailed description, including size, construction materials and protection from the elements, and photographs and detailed diagrams (no blueprints, please) clearly depicting your existing facilities where the wildlife will be maintained.

The addra gazelle are housed in our ungulate barn. The barn is 27 x 77 ft. long and has cement block exterior walls and a poured concrete floor. The stalls are divided with wood slats and can be configured into as many as 13 potential stalls that are 7 x 10 ft. There are 2 seasonal outdoor patios (rear patio 16' x 26'6" and front patio 18' x 14') that are attached to the exterior of the building. The exhibit area is approximately 1 acre of grass pasture. Photos are attached.

Addra Gazelle exhibit

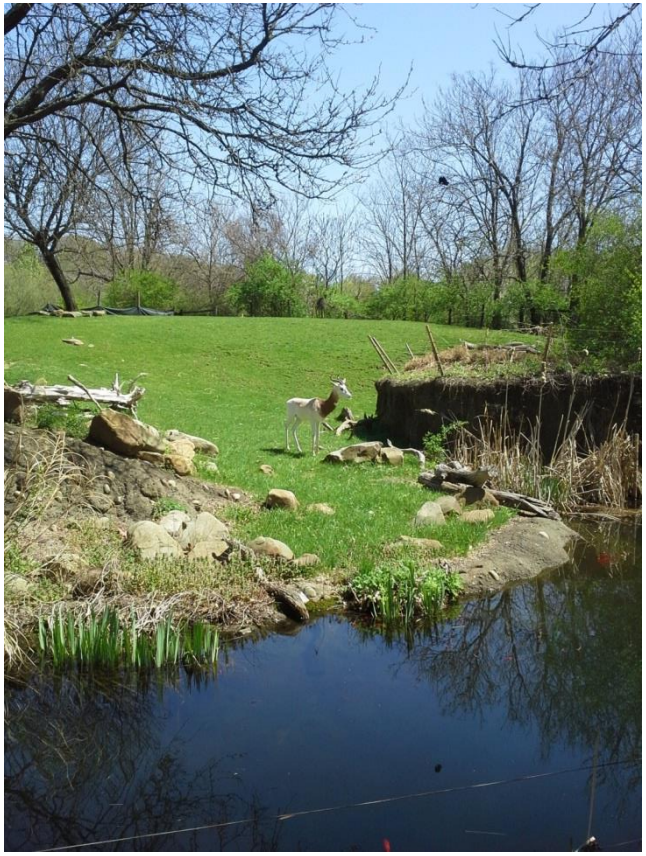
- The view from the observation deck.
- Note the signage in the foreground.

Addra Gazelle Exhibit



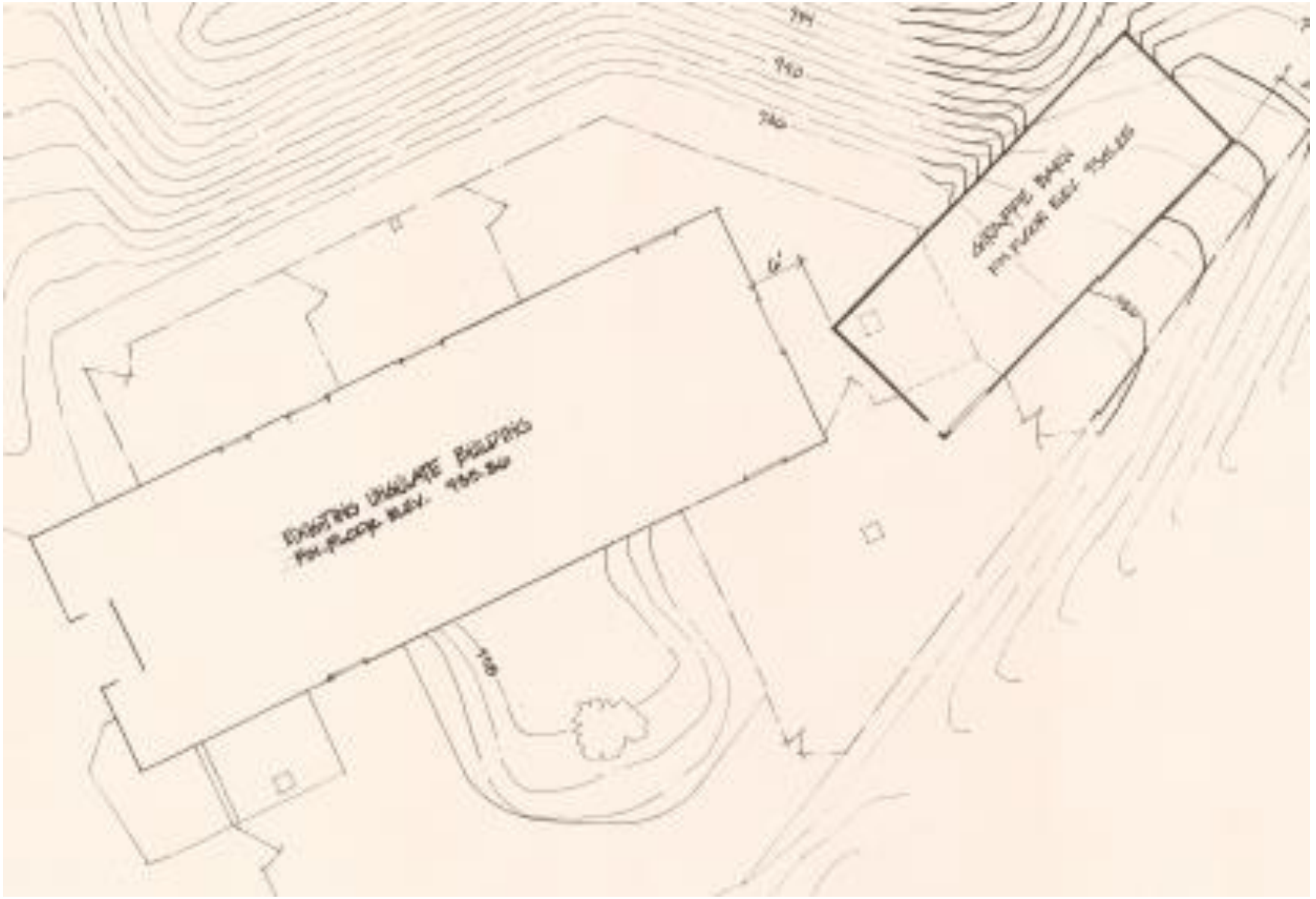
- The view from the front of the exhibit.
- Note water feature in foreground

Addra Gazelle Exhibit



- Another view of the outdoor exhibit.

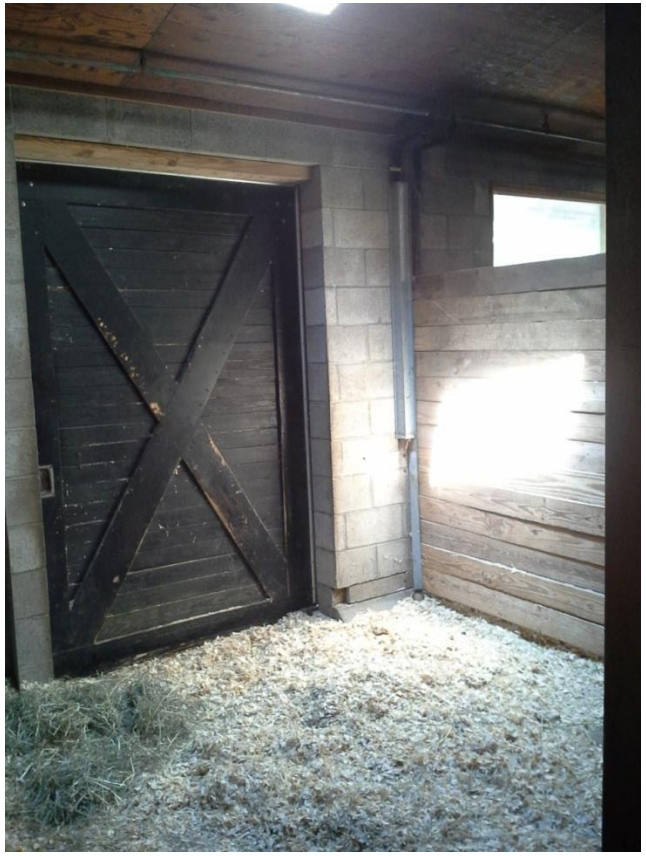
Ungulate Building



Ungulate barn

- This is a view of the interior of the ungulate barn.
- This is the center runway. Each stall opens into this runway.

Ungulate barn stall



- This photo shows the cement block exterior walls, poured concrete floor and slat dividing walls.
- This stall also has a window to let in light and an exterior door that opens onto the outdoor patio.

Ungulate barn

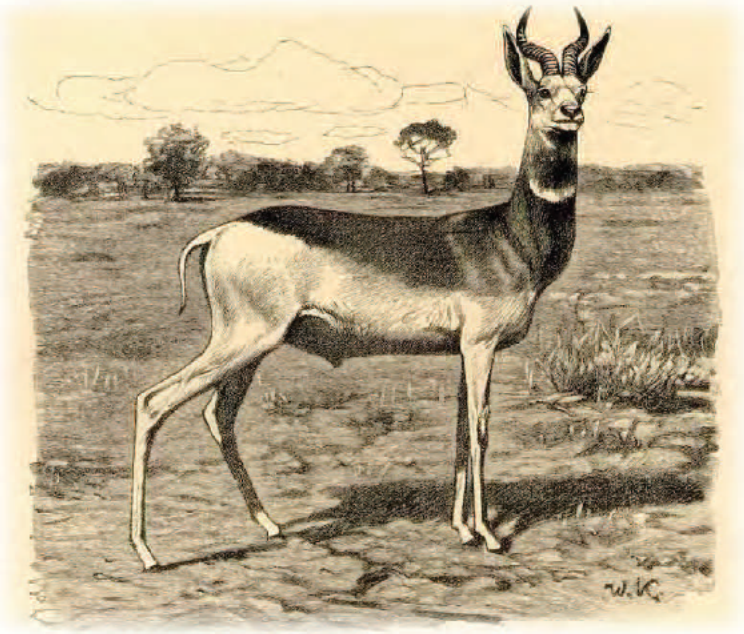
- These are pictures of the outdoor patio at the ungulate barn.
- These are used weather permitting.
- Patio is 16’ x 26’6”

Ungulate barn

- This a second patio attached to the ungulate barn.

Population Analysis & Breeding and Transfer Plan

Addra Gazelle (*Nanger dama ruficollis*)
AZA Species Survival Plan®
Yellow Program



AZA Species Survival Plan® Coordinator and North American Regional Studbook Keeper
Tim Thier, Saint Louis Zoo (tthier@stlzoo.org)

Adjunct Population Advisor
Edward Spevak, Ph.D. Saint Louis Zoo (spevak@stlzoo.org)

January 17, 2018

PMC Population Management Center
LINCOLN PARK ZOO. ASSOCIATION OF ZOOS & AQUARIUMS
Saint Louis Zoo Animals Always®

Executive Summary
Addra Gazelle (*Nanger dama ruficollis*) SSP

The AZA Antelope and Giraffe Taxon Advisory Group has currently designated a target population of 200 specimens for this species. The current population is 183 (83.100) individuals distributed among 21 institutions (18 AZA, 3 non-AZA). Two institutions will be joining the program over the coming year.

The current gene diversity of this population is 84.80% with a potential of 91.60%. When gene diversity falls below 90% of that in the founding population, reproduction may be increasingly compromised by among other factors, lower birth weights and greater neonatal mortality. This population is descended from 13 founders, however, there are a great many unknown lineages within the population and additional investigation may allow for the addition of more founders whether actual or hypothetical. As of now no additional founders are slated for acquisition from other institutions overseas or from the wild. Currently this population would be expected to maintain 70.0% after 100 years. Gene diversity can be maintained and improved by mating individuals with similar kinships, maximizing reproduction of under-represented individuals, avoidance of inbreeding, and by minimizing reproduction of over-represented individuals.

Demography

Current Population Size (N)	183 (83.100)
Specimens Excluded from Analyses	1.1 (sterile)
Target Population Size	200
Mean Generation Time (T, in years)	4.6
Projected Population Growth Rate	1.0762

Genetics

	Current	**Potential**
Number of Founders	13	0 additional
Founder Genome Equivalents (FGE)	3.29	5.93
Gene Diversity (GD) Retained (%)	84.80	91.60
Population Mean Kinship (MK)	0.1520	
Mean Inbreeding (F)	0.1186	
% Pedigree Known	91.9*	
N_e/N	0.2856	
Years to 90%	Below	
Gene Diversity at 100 years from Present	70.0	

*Many assumptions built into 'true' studbook so actual % known is uncertain.

As with most managed populations, pairings are prioritized to maintain or increase gene diversity through considerations of mean kinship, avoidance of inbreeding, differences in sire and dam mean kinships, and the degree of uncertainty within a pedigree. In addition to these genetic criteria, the SSP also considered other factors such as social group needs, age, health, and reproductive status when making pairings and transfers.

This population would benefit by recruiting additional institutions.

Summary Actions 2017-2018: The SSP has recommended 75 breeding pairs and 16 transfers for the next breeding season. Sixteen (16) animals are available for placement outside the SSP. Recommendations contained in this master plan supersede those made by earlier plans.

Table of Contents

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ADDRA GAZELLE SSP
DESCRIPTION OF POPULATION STATUS

Introduction: The Addra gazelle is the lightest in coloration and the most eastern subspecies of the three currently recognized subspecies of *Nanger dama*. There is still debate as to the historic distribution of this subspecies. They are known to have been found in Sudan and eastern Chad but the eastern and western limits are still unclear. The status of the Addra gazelle in the wild is unknown but as the species *Nanger dama* is Critically Endangered (IUCN, 2016) and disappearing across its entire range it is fairly certain that this subspecies is endangered if not extinct in the wild.

In 1967, 20 Addra gazelle were captured in eastern Chad near the Sudan border. Twelve were sent to the San Antonio Zoo and eight sent to the Catskill Game Farm. The SSP population, as well as the entire North American population, is descended from five males and fifteen females (5.15). However, records of these original animals, regarding reproduction and transfers, are poor to non-existent and how many animals actually contributed to the current SSP population is currently unknown.

Comprehensive genetic and demographic analyses of the captive Addra Gazelle SSP population was performed at the Saint Louis Zoo on September 29, 2017 and attended by Tim Thier and Ed Spevak, who also prepared this report and analyses resulting in the current master plan. Recommendations contained in this masterplan supersede those made by earlier plans. Masterplan analyses of the Regional Addra Gazelle Studbook (current to 07 September 2017 along with additional information supplied by holding institutions) were performed using PopLink 2.4, PM2000 1.213 and PMx 1.3.20150713.

Managed Population: The current population size is 183 (83.100) (TAG recommended size =200) distributed among 21 institutions (18 AZA, 3 non-AZA). Two institutions will be joining the program over the coming year.

Demography: The Addra gazelle has a history of successful breeding in North America since the 1960s. The first birth of an Addra gazelle in North America occurred in 1967 at the San Antonio Zoo. Addra gazelles can live up to 19 years of age. The oldest Addra gazelle currently in the population is over 13 years of age. Over the period 01 January 1986 – 29 September 2017 (Figures 1 and 2) the Addra gazelle population has shown growth rate of 1.192% annually. The population is currently below its carrying capacity of 200 Addra gazelle as determined in the Antelope and Giraffe TAG Regional Collection Plan (2014).

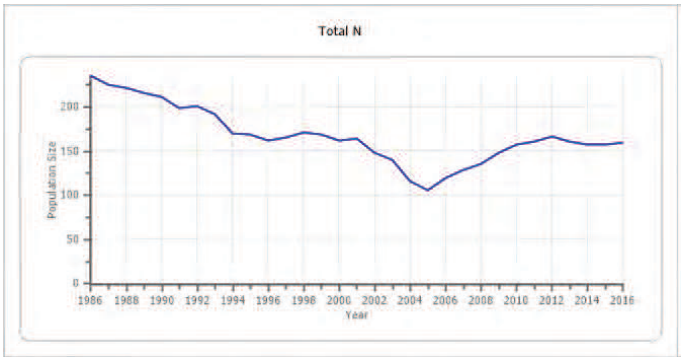

Figure 1. Census of addra gazelle in the SSP.

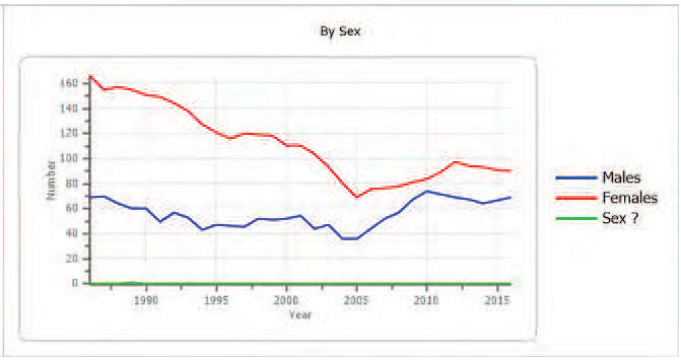

Figure 2. Census of addra gazelle by sex in the SSP.

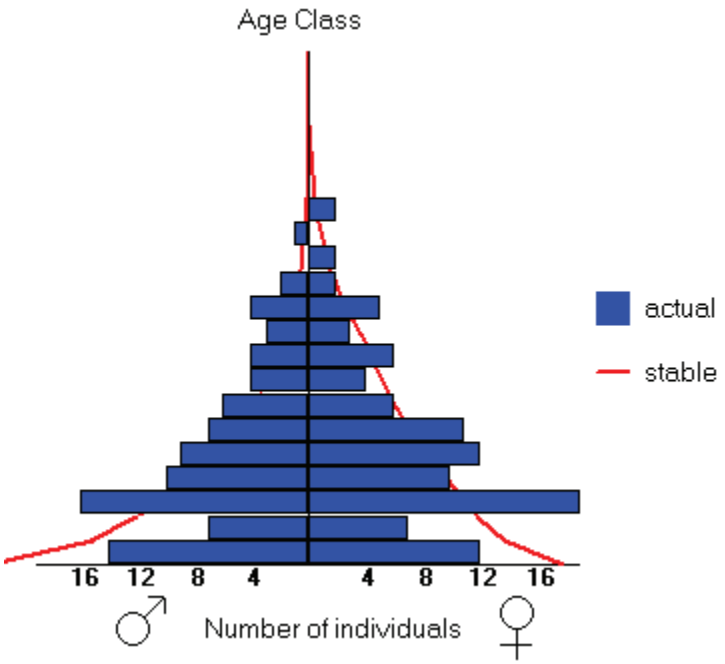

Figure 3. Age structure of addra gazelle SSP population.

The age structure of the population approximates a stable distribution, with individuals occupying all age classes (Figure 3). First year mortality is 31% for males and 25% for females, with 17% and 10% mortality within the first 30 days for males and females, respectively. During the majority of their lifespan the annual mortality is fairly low. Males and females reach sexual maturity at a little over one year of age, though first reproduction often does not occur until they are around two years of age. Both males and females are able to breed up to 14 years of age.

Genetics: The managed population is descended from 13 founders, none of which are still alive. This may be an underestimate as pedigrees had to be reconstructed using a worse-case scenario. Due to lack of individual identification and records in some of the larger herds, hypothetical animals were created to replace the UNK dams and sires

Twenty gazelles from the eastern Chad were captured and sent to the United States in 1967. The regional population is descended from five males and fifteen females that were wild caught. In 1967, 3.9 animals were sent to the San Antonio Zoo and 2.6 animals sent to the Catskill Game Farm. The North American population is descended from these twenty animals, none of which are still alive. There are currently no additional founders in North America. There may be additional founders in the Middle East, but this still needs to be established. Establishing the actual number of founders in the North American population, establishing their relationships and increasing founder representation from the underrepresented lineages in the SSP could extend and possibly increase gene diversity and retention. (Figure 4)

When gene diversity falls below 90% of that in the founding population, reproduction may be increasingly compromised by, among other factors, lower birth weights, and greater neonatal mortality. The current gene diversity of this population is 84.8% with a potential of 91.60. This population is descended from 13 founders; however, there are a great many unknown lineages within the population and additional investigation may allow for the addition of more founders whether actual or hypothetical. As of now no additional founders are slated for acquisition from other institutions overseas or from the wild. Currently this population would be expected to maintain 70.0% after 100 years. Gene diversity can be maintained and improved by mating individuals with similar kinships, maximizing reproduction of under-represented individuals, avoidance of inbreeding, and by minimizing reproduction of over-represented individuals.

Genetics

	Current	Potential	2016	2012	2010	2009
Number of Founders	13	0 additional	13	13	13	13
Founder Genome Equivalents (FGE)	3.29	5.93	3.36	3.51	3.63	3.81
Gene Diversity (GD) Retained (%)	84.80	91.6	85.10	85.77	86.21	86.8
Population Mean Kinship (MK)	0.1520		0.1490	0.1423	0.1379	0.132
Mean Inbreeding (F)	0.1186		0.1120	0.1111	0.1122	0.1166
% Pedigree Known*	91.9*		87.9*	97.2*	97.3*	95.5*
N_e/N	0.2856		0.2948	.2431	.3709	.3667
Years to 90%	Below		Below	Below	Below	Below
Gene Diversity at 100 years from Present	70.0		71.41	68.26%	70.94%	74.95%

*Many assumptions built into 'true' studbook so actual % known is uncertain.

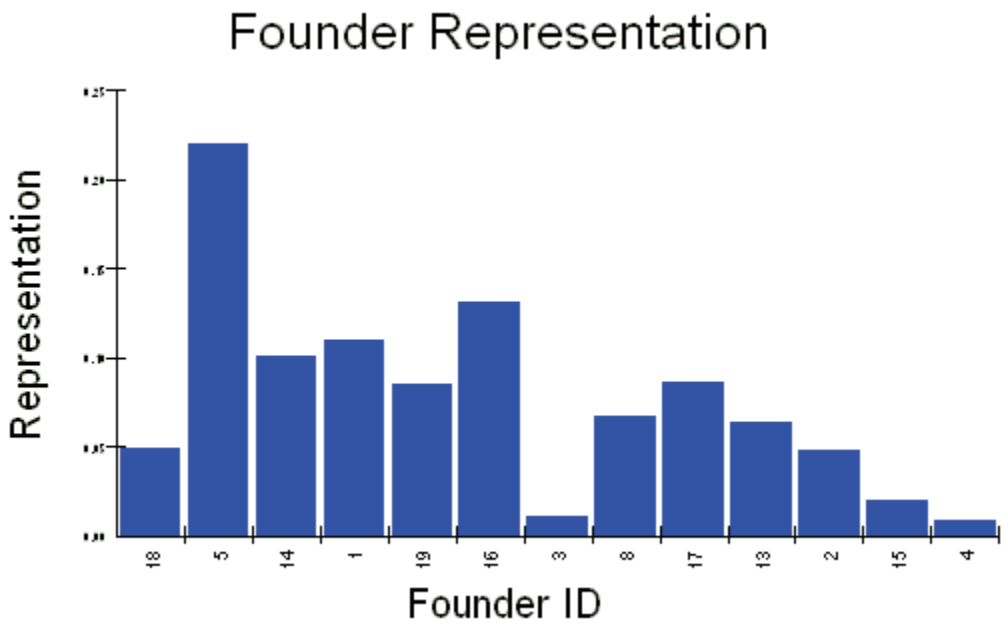

Figure 4. Founder representation of Addra gazelles illustrating the inequality of representation between lineages.

Management Plan Strategy and Goals: The current genetically managed population is 183 individuals with a target size of 200. Demographic analysis indicates that a 2.6% growth rate (λ = 1.026) can be maintained with around 38 offspring produced in the next year to reach a target population of 200 in two years. Assuming that 50% of pairs will reproduce, 76 pairings would be needed. Seventy four (74) pairings are recommended.

As with most managed populations, pairings are prioritized to maintain or increase gene diversity through considerations of mean kinship, avoidance of inbreeding, differences in sire and dam mean kinships, and the degree of uncertainty within a pedigree. In addition to these genetic criteria, the SSP also considered other factors such as social group needs, age, health, and reproductive status when making pairings and transfers.

1. The SSP has planned 75 breeding pairs for the next breeding season.
2. The SSP has planned 16 transfers.
3. Sixteen (16) animals are available for placement outside the SSP.

Recommendations contained in this master plan supersede those made by earlier plans.

Population Analysis & Breeding and Transfer Plan

African Elephant (*Loxodonta africana*) AZA Species Survival Plan® Yellow Program

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22 October 2014

PMC Population Management Center

Lincoln Park Zoo

ASSOCIATION OF ZOOS & AQUARIUMS

Executive Summary
African Elephant (*Loxodonta africana*)

At the time of analyses, the African Elephant Species Survival Plan® (SSP) population consists of 162 individuals (37.125) distributed among 38 AZA institutions and 1 non-AZA institution. The Elephant Taxon Advisory Group (TAG) designated this population as a SSP and set a target population size of 221 in their 2011 Regional Collection Plan (RCP). Under AZA's new sustainability designations, this population currently qualifies as a Yellow SSP Program.

One goal of population management is to prevent the loss of gene diversity, and the standard SSP goal is the maintenance of at least 90% gene diversity for 100 years. Decreases in gene diversity below 90% of that in founding populations have been associated with problems such as lower birth weights and greater neonatal mortality. The potentially breeding African Elephant SSP population is descended from 38 founders, with 23 additional potential founders remaining in the population. The population has retained 96.53% gene diversity, equivalent to about 14 unrelated animals (FGE=14.40). This population can increase its gene diversity (in both the short- and long-term) by breeding under-represented (low mean kinship) animals and the 23 unrepresented potential founders and by breeding males and females of similar genetic value (similar mean kinship), which will at the same time improve the population growth rate.

Demographic Summary

Current size of population (N) – Total (Males.Females.Unknown Sex)	162 (37.125)
Number of individuals excluded from the potentially breeding population	78 (4.74)
Population size following exclusions	84 (33.51)
Target population size (Kt) from Elephant TAG/SSP's 2011 RCP	221
Mean generation time (years)	24.9
Population growth rates (λ,lambda)*: Historical / 5-year / Projected	0.941 / 1.029 / 0.943

*Historical from life tables (SSP, 1960 – 2014); 5-year from PopLink census report; Projected from PMx stochastic 20 – yr projections
SSP population = AZA + TNEC

Genetic Summary

	Current	Potential
Founders	38	23 additional
Founder genome equivalents (FGE)	14.40	52.42
Gene diversity (GD %)	96.53	99.05
Population mean kinship (MK)	0.0347	-
Mean inbreeding (F)	0.0032	-
Percentage of pedigree known before exclusions and assumptions	99.0	-
Percentage of pedigree known after exclusions and assumptions	100	-
Effective population size / census size ratio (Ne / N)	0.2390	-
Projections		
Years to 90% Gene Diversity	41	64
Years to 10% Loss of Gene Diversity	56	106
Gene Diversity at 100 Years From Present (%)	67.2	86.7
	Assuming λ = 0.98, Target size = 221	Assuming λ = 1.00, Target size = 221

Ne/N ratio includes founders in the calculations.

The TAG/SSP has prioritized breeding recommendations to meet both demographic and genetic goals. Within the potentially breeding subset of the African elephant population, all reproductively viable females have been recommended to breed. **However, demographic projections indicate that the population will be seriously hampered by a demographic bottleneck for the next 2-3 decades as older females age out of the population resulting in a shortage of animals; institutions with new exhibits or older individuals may have challenges in finding replacement animals.**

Summary Actions:

1. **The TAG/SSP recommends 39 females for breeding.**
    a. Offspring are to be held indefinitely by natal institution.

This Animal Program is currently a Yellow SSP and recommendations proposed are non-binding – Participation is voluntary. Dispositions to non-AZA institutions should comply with each institution's acquisition/disposition policy.

b. Institutions should use their own discretion in deciding whether or not to breed females over 24 that have never reproduced.

2. **The TAG/SSP recommends 6 transfers to make breeding pairs or to meet institutional/animal needs.**

3. **The TAG/SSP recommends that all male elephants eight years of age and older be trained and available for semen collection by the end of 2016.** It is critical for optimum gene diversity retention that efforts are made to recruit all unproven males and that all males have equal access to breeding opportunities.

    a. **The TAG/SSP recommends that all male elephants currently providing semen for artificial inseminations, or potentially will in the future, get a sample banked as soon as possible for future paternity testing.** See Appendix G or contact the SSP Coordinator for more information.

4. **The TAG/SSP encourages institutions to reduce interbirth intervals in order to increase the overall birth rate for this population.** Reducing the interbirth interval can be accomplished by breeding recent dams once they start cycling again.

5. **The TAG/SSP encourages institutions to recruit additional breeding animals into the AZA Elephant TAG/SSP managed population from outside of the SSP.**

6. SSP facilities should contact the SSP if they need assistance meeting the elephant social group composition standards by the September 2016 deadline. As per the AZA Standards for Elephant Management and Care (Approved March 2011, Revised April 2012):

    > Each zoo holding elephants must hold a minimum of three females (or the space to hold three females), two males or three elephants of mixed gender. If a zoo cannot meet this standard, they must apply for a variance. Before the variance can be issued by the Accreditation Commission the zoo (a) must describe their plan to obtain additional elephants or describe their plan for deacquisitioning their elephants and (b) must describe what will occur if they experience the loss of one elephant. In most cases where an institution has one remaining elephant, the remaining elephant will receive a recommendation for relocation at another AZA institution from the Elephant TAG/SSP. By 1 September 2016, no further variances will be issued.

3-200-41

E. Captive-bred Wildlife Registration

African elephant (*Loxodonta africana*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for African elephants. We have 10 elephants in our collection (1 male and 9 females), 5 at the zoo and 5 at our International Conservation Center (ICC). Our bull elephant is trained for semen collection and contributes sperm often for Artificial Inseminations (AI) across the country. Of our 9 females, 3 are post reproductive age, 3 are of reproductive age, 1 is being excluded and 2 will come of age in the next 3 years. We are currently watching the hormone cycles of one of the zoo females for the right timing of an AI procedure. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP, which the current recommendation is to hold indefinitely at the natal institution.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the African elephant SSP. As of the October 2014 AZA Population Analyses and Breeding Transport Plan for African elephants (Appendix), there are 162 individuals in the population and the target population size is 221. To reach this target population the TAG/SSP recommended the breeding of 39 females and made 6 transfer recommendations. All reproductively viable females have been recommended to breed. The demographic projections indicate however that the population will be seriously hampered by a demographic bottleneck for the next 2-3 decades as older females age out of the population resulting in a shortage of animals. This will mean that institutions with new exhibits or older individuals may have challenges in finding replacement animals. It was also recommended that all male elephants 8 years of age or older should be trained and available for semen collection. The recommendations also encouraged institutions to reduce the interbirth intervals in order to increase the overall birth rate for this population. The final recommendation was to encourage institutions to recruit additional breeding animals into the AZA elephant TAG/SSP from outside the SSP.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be

obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

Since we do participate in the SSP, we follow the recommendations set forth by the Breeding and Transport Plan. We are currently to hold our 3 post reproductive females. If they request that we hold these animals then we will comply but as we have a facility dedicated to breeding elephants our focus will be on breeding not holding surplus animals.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has maintained African elephants at its facility since 1951. We have built up our herd to 10 members and have solidified our commitment to African elephants through the construction of the International Conservation Center (ICC). The ICC is a 924 acre facility located in Somerset County Pennsylvania that focuses on breeding threatened and endangered species and specifically focuses on the African elephant. This facility opened in December of 2008 when our male was moved to the facility. Now we have 1.4 elephants at the ICC and 0.5 at the zoo.

Our first successful birth was in 1999 with a female calf, Victoria, then a second birth followed in 2000 with a male calf, Callie. In 2008 we had 2 more successful births with females Zuri and Angeline. In 2017 we had another female calf born prematurely, but it only survived for 3 months. In addition to these births, semen from our male, Jackson, has been collected and used in several artificial inseminations across the country. Our staff has even attended several African elephant births to provide their support and technical experience to facilities that had little birthing experience.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

2017 – one female that survived 3 months

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

2017 – two deaths

A bull elephant was euthanized due to multi-year long battle with arthritic autoimmune disease.

A 3 month old premature calf was euthanized due to a failure to thrive, poor nutritional status and body condition despite appropriate nutrition offered.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

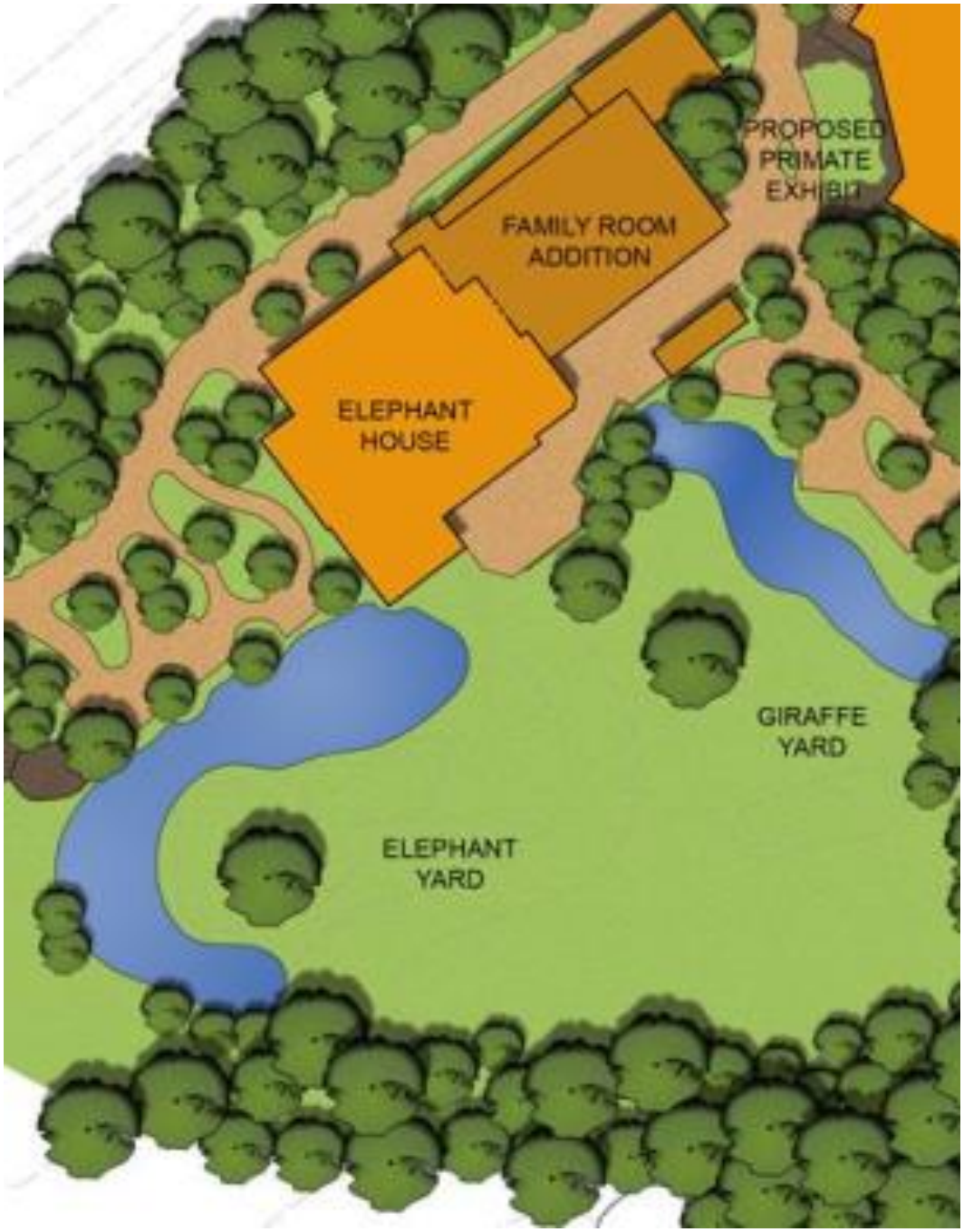
14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your existing facilities, including space for future progeny, where the wildlife will be maintained.

The elephant barn at the Pittsburgh Zoo & PPG Aquarium is a 13,500 SF facility, of roughly 130' by 70' and has outside exhibit yards of roughly 3/4 acres. The barn is divided into two stalls (30' x 22' and 19' x 25'), a family room (26' x 25'), a bull barn (34' x 33') and a day stall (65' x 45'). There is an outdoor bull pen (40' x 65') and an elephant restraining device (ERD). The building is constructed out of cement block with poured concrete floors and has a rubber membrane roof over the elephant barn and asphalt shingles over the public area. Photos and diagrams of the building are attached.

The zoo also maintains an off-exhibit International Conservation Center (ICC) located in Somerset County, PA. This facility is only used currently for breeding elephants and is not open to the public. The ICC has 924 acres of forest and pasture. There are two elephant barns on the property a 10,000 SF Bull barn and a 37,000 SF Cow/calf barn with 23 acres of paddocks surrounding it. The bull barn has 3 stalls (55' x 20', 40' x 30' and 40' x 30') and an indoor sand yard (45' x 85'). The Cow/calf barn can be divided into 6 stalls that are 32' x 30'8" and another stall that can be divided in half for 8 stalls. There is an elephant restraining device (ERD) and a large sand arena that is 80' x 208'8". This building is constructed with steel beams and insulated metal siding. There are poured concrete floors, cement block interior walls and concrete filled pipe bollards that separate the stalls. Photos and diagrams of the buildings are attached.

Pittsburgh Zoo & PPG Aquarium

African elephant exhibit


PROPOSED
PRIMATE
EXHIBIT
FAMILY ROOM
ADDITION
ELEPHANT
HOUSE
GIRAFFE
YARD
ELEPHANT
YARD

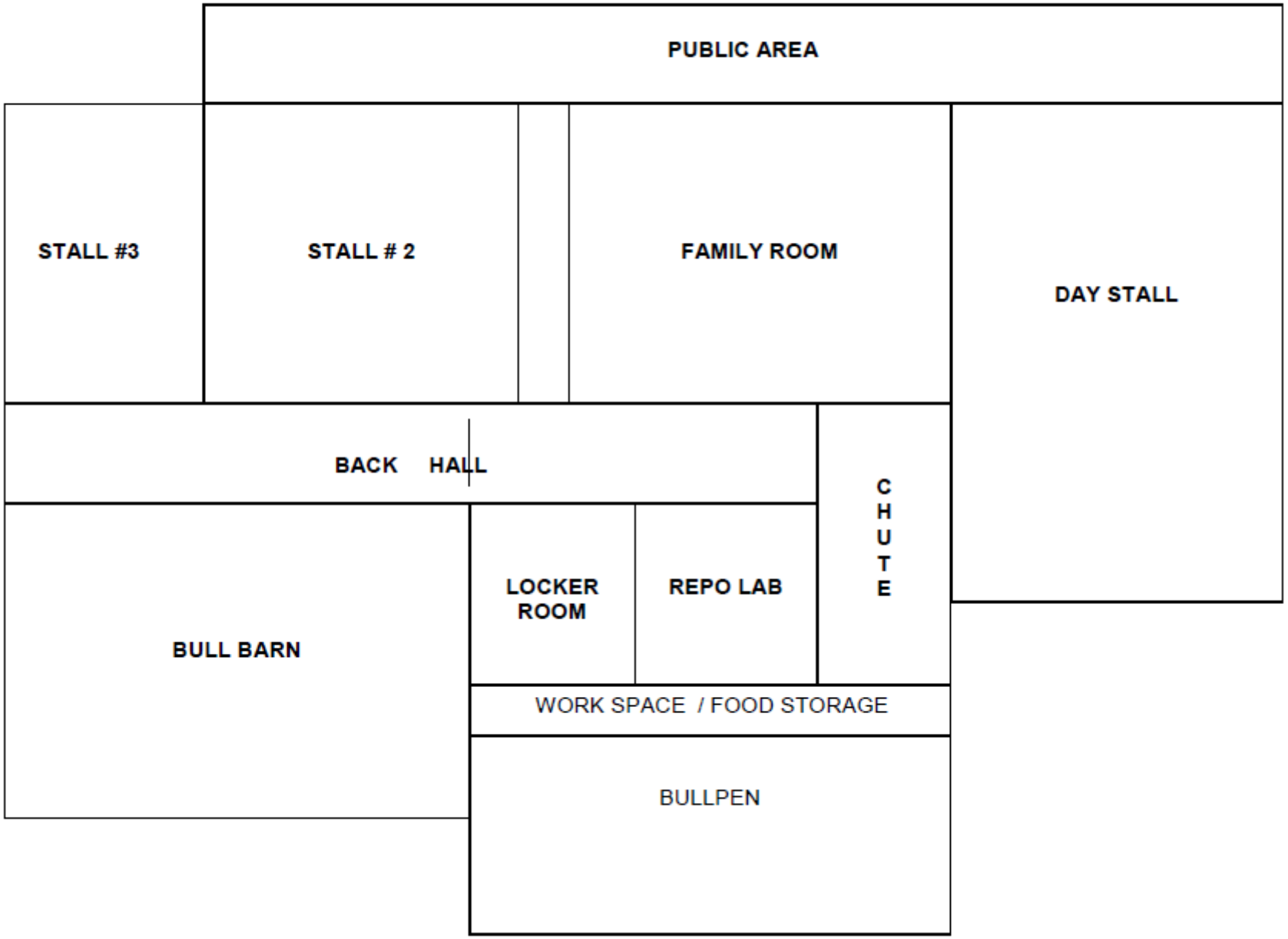
Outdoor exhibit

This is a view of the outdoor exhibit from the public viewing area.

Outdoor exhibit

This is another view of the outdoor exhibit from the animals perspective. Notice the public viewing area in the distance and the pool used for bathing and playing.

Pittsburgh Zoo & PPG Aquarium Elephant Barn Sketch



Pittsburgh Zoo & PPG Aquarium – Elephant Care Center Stall 2

This is a view of stall 2 from the visitors side. The door opening on the back wall leads to the back hall and the door opening on the right wall leads to stall 3.

Family room

This is a view of the family room from the visitor side. The door on the back wall leads to the back hall. The door on the left wall leads to the day stall and the exit door on the far left allows the public to view the day stall.

Back hall

This is a view of the back hall leading into the day stall.

Day stall

This is a view of the day stall from inside the stall. Note the public viewing windows and Willie using the free contact method of management.

Day stall

One of the babies interacting with the public in the day stall.

ERD

This is a view of the Elephant Restraining Devise. The ERD is used for elephant procedures including semen sample collecting.

Bull pen

This is a view of the bull pen. This area is not viewable by the public.

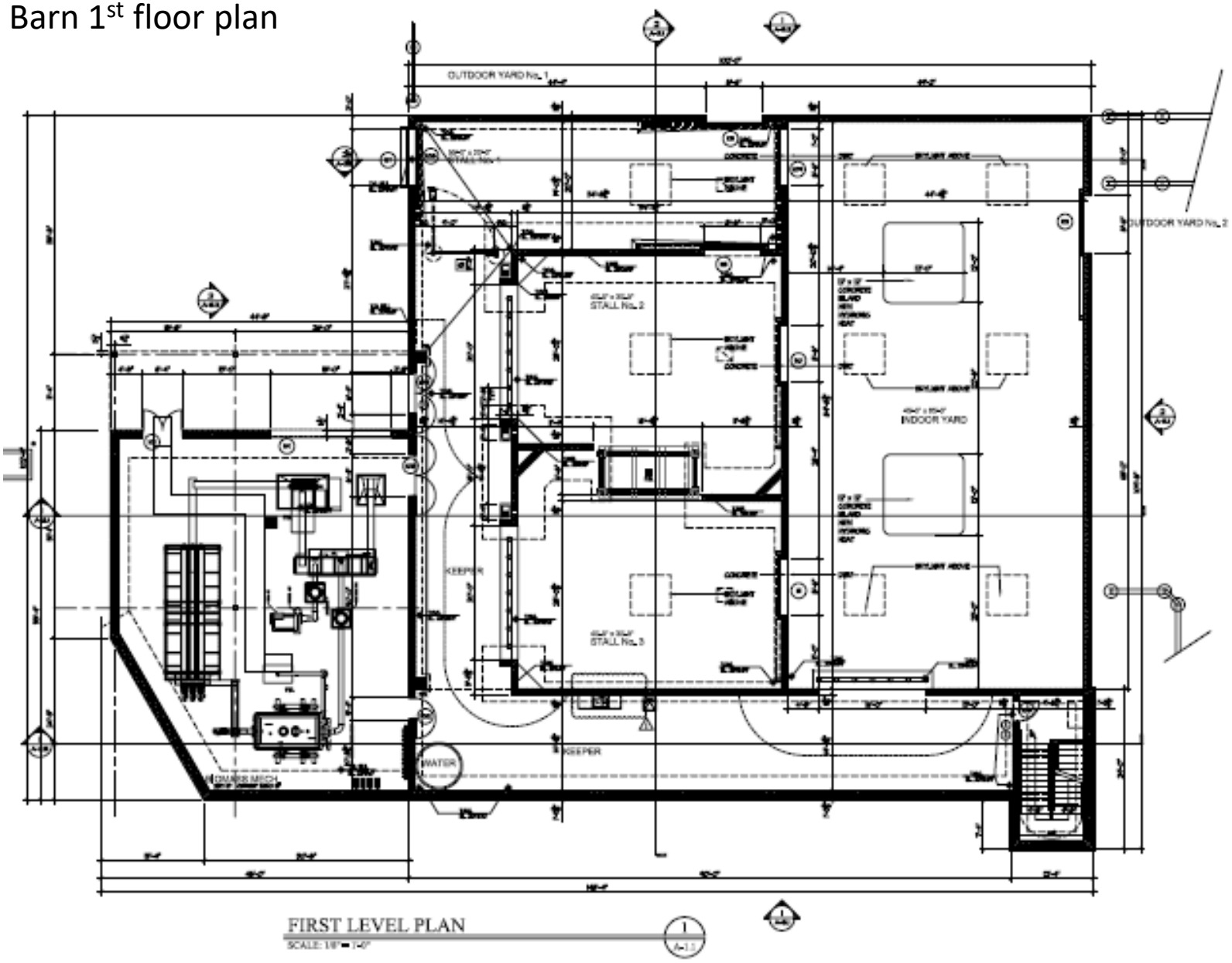
International Conservation Center (ICC)

A 924 acre facility in Somerset County, PA. It is the site of the Pittsburgh Zoo & PPG Aquarium's elephant breeding program.

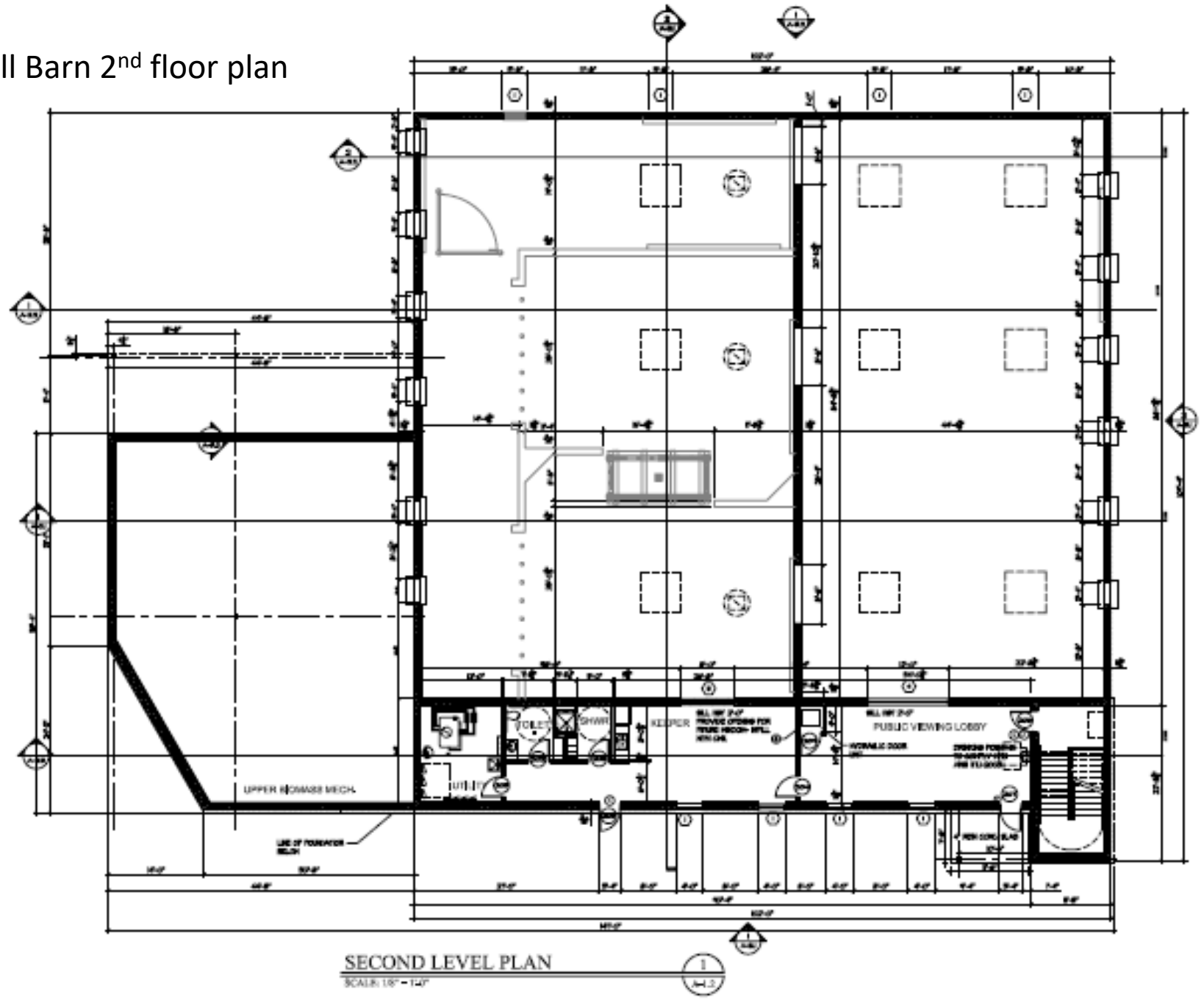
ICC

This photo shows the Conference Center, maintenance buildings and staff housing.

Bull Barn 1st floor plan



Bull Barn 2nd floor plan

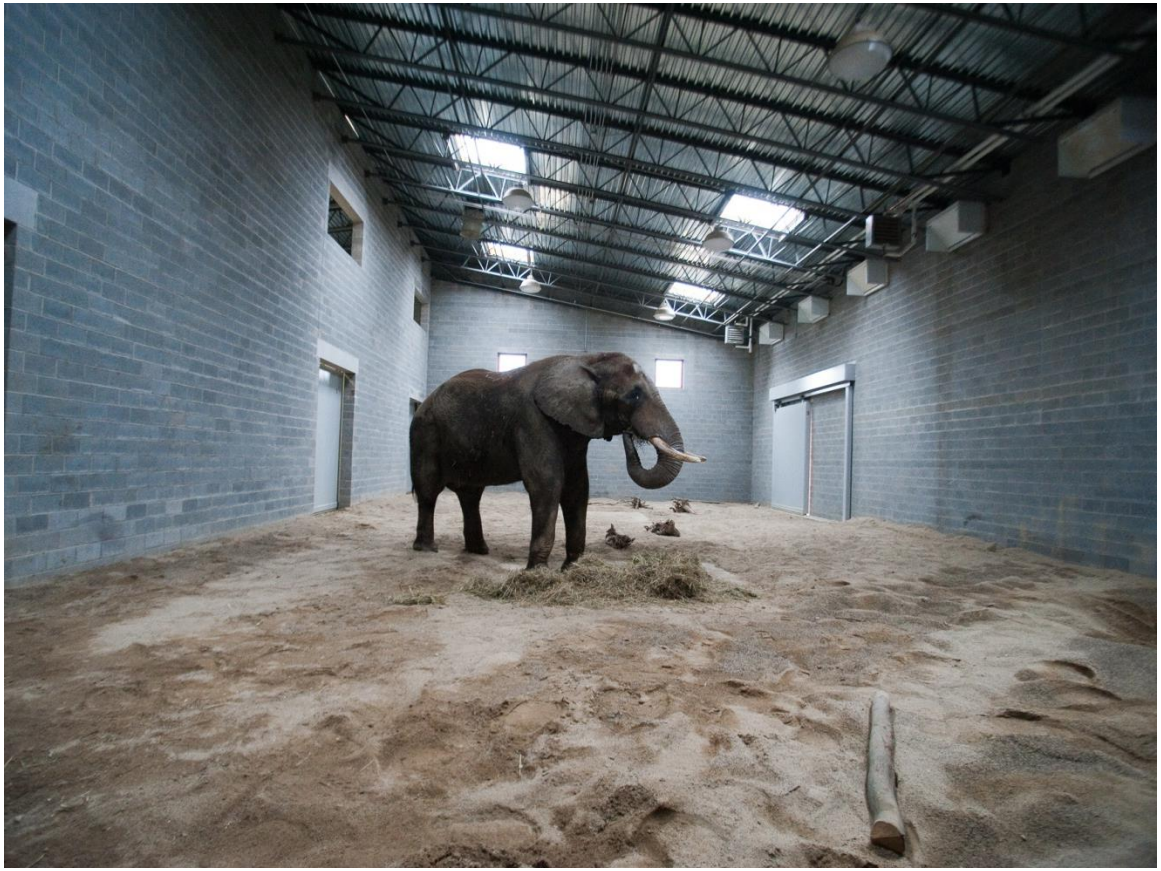


Bull Barn

10, 000 square foot building with 3 elephant stalls and a sand room.
It was completed in 2008.

Bull Barn stall and ERD

This is one of the three stalls in the bull barn. Note the Elephant Restraining Device (ERD) on the right.



Bull Barn sand room

Jackson in the sand room of the bull barn. The doors on the left lead to the stalls and the door on the right leads to the outdoor paddocks. Note the sky lights in the ceiling.

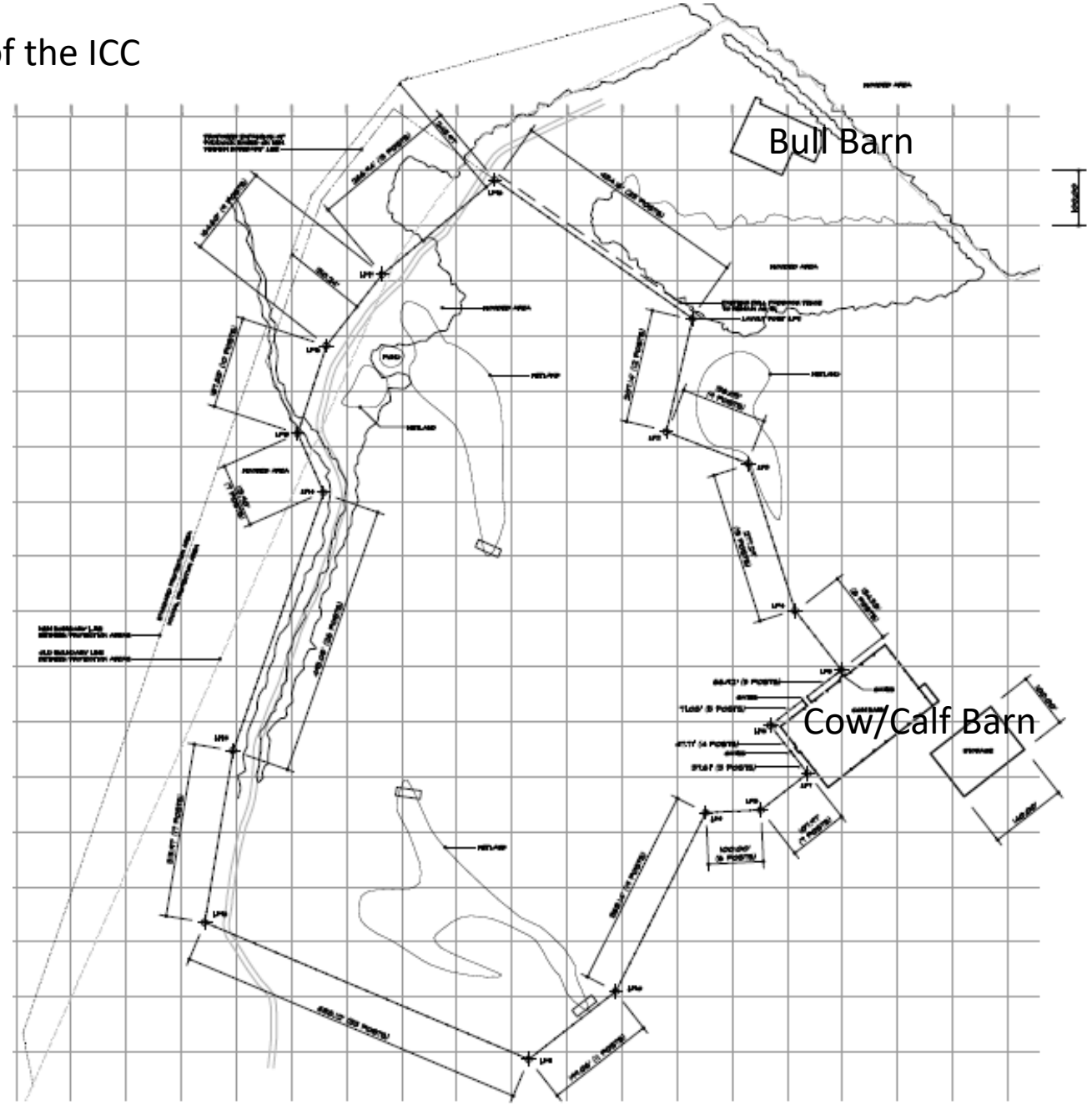
Bull Barn sand room

From this second floor view you can see the heated concrete pads in the center of the room.

Paddocks of the Bull Barn

There are two paddocks that are located off the Bull Barn.

Paddocks of the ICC



Bull Barn paddock

This photo shows the containment fence for one of the bull barn paddocks. Note the wooded area inside the paddock that provides the animals shade and enrichment.

Elephants in wooded paddock

These two cows are enjoying the wooded Bull Barn paddock at the ICC.

Elephants using the paddocks at the Bull Barn

Jackson the bull elephant is in the upper paddock and two cows are in the lower paddock. Note the gates between the two paddocks can be opened to create one large paddock for the elephants to enjoy the varied topography.

Cow/calf Barn at the ICC

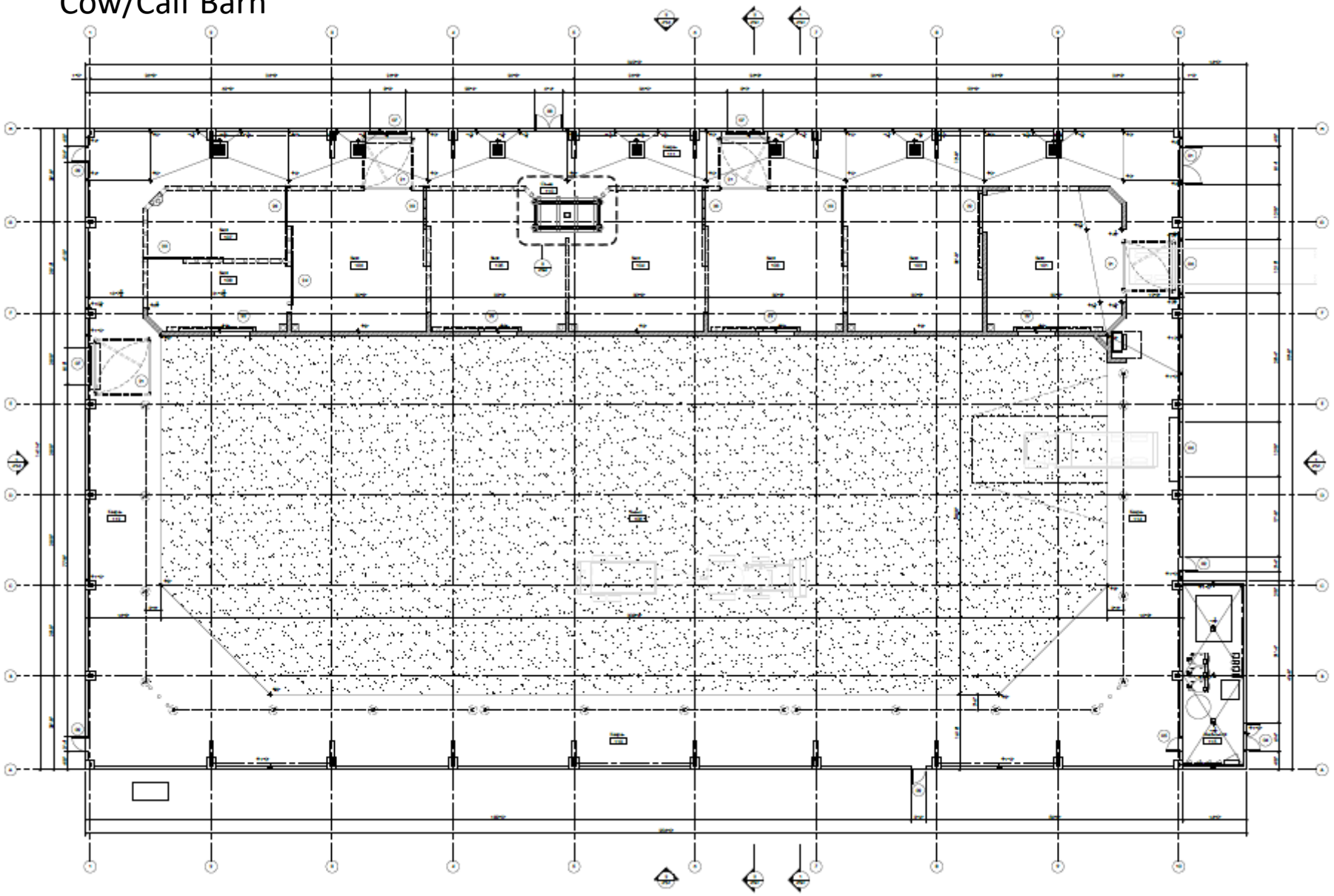
Completed in 2017, this cow/calf barn is 37,000 square feet.

Note the paddock to the right and rear of the building. This paddock is roughly 23 acres.

Paddock gates

The Bull barn and Cow/Calf barn paddocks contain gates that connect the two paddocks for ease of moving animals between the two barns and giving the animals large areas to roam.

Cow/Calf Barn



Cow/Calf Barn stalls

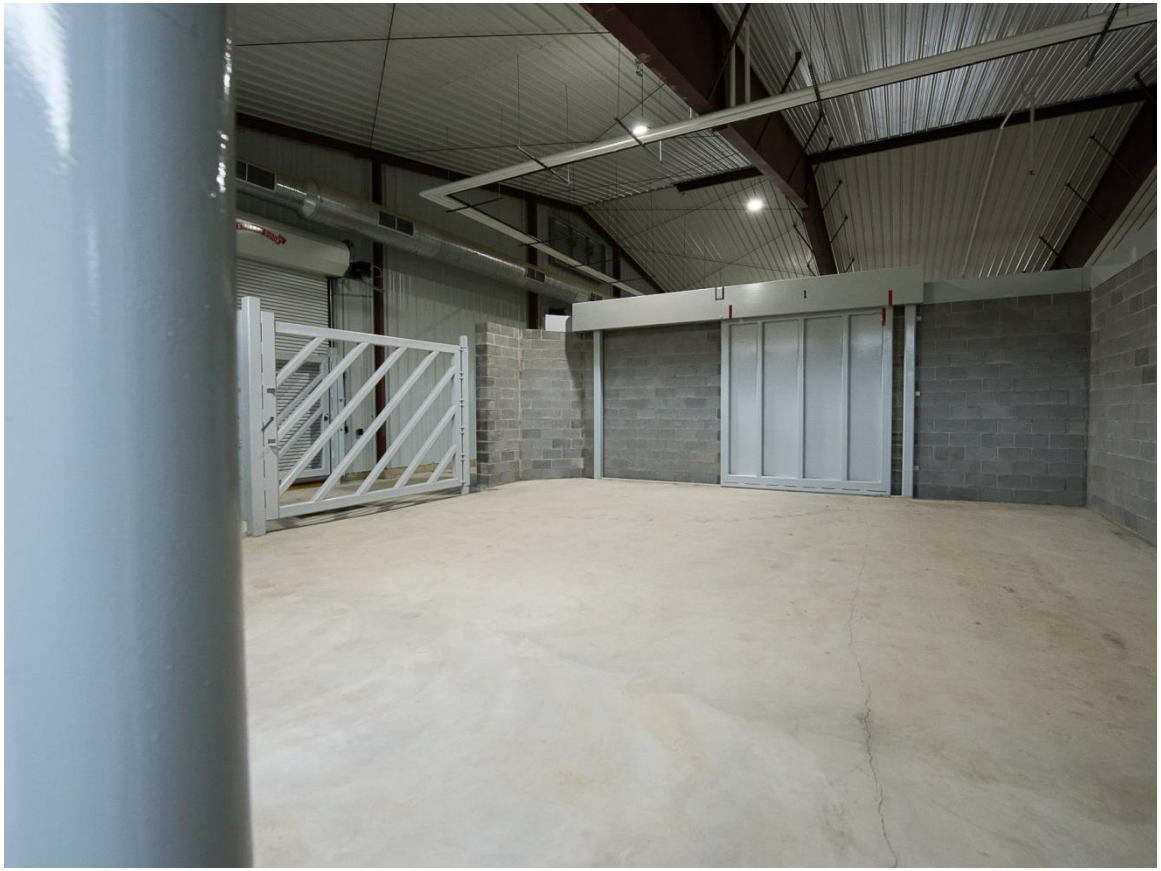
There are 7 stalls on this side of the building, with the 7th stall having the capability to be divided to create an 8th stall. Note the keeper area on the right.

Cow/Calf Barn ERD

This is the elephant restraining device (ERD). The ERD is used for elephant medical procedures.

Cow/Calf Barn stalls

This is stalls 7 and 8. This photo is taken from stall 6.



Cow/Calf Barn stall

This is stall 1. The door on the right of the photo leads to the sand room.

Cow/Calf Barn sand room

This is the large sand room. It has a sand floor and is roughly 2/3 the size of the building.

Cow/Calf Barn sand room

Cows enjoying the sand room. Note the doors on the right that lead to the stalls.

3-200-41

E. Captive-bred Wildlife Registration

African lion (*Panther leo*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium provides data and updates to the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for African lion. We currently have 2 male lions that are brothers. As these two animals are considered surplus animals we will hold them at our facility.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The genes of the African lion population at the Pittsburgh Zoo & PPG Aquarium are being managed by the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for African lions. As of the January 2013 Population Viability Analysis Report the lion population was 324 animals. There were 356 potential spaces available at that time. The AZA felid TAG does not recommend importing or breeding unpedigreed lions (generics). If all zoos follow those recommendations there will be no more generic lions in the population in approximately 17 years. Model results indicate that if the AZA lion population continues on its current trajectory it will experience a small demographic decline in the next 15-20 years as the generic population declines from natural attrition. The population however is able to increase to its potential spaces in 32 years and maintain this level for 100 years while maintaining high levels of gene diversity (93%).

Three management actions should be applied in combination to be most effective. Firstly the program should focus on breeding reproductively viable females to maintain or increase the number of offspring produced each year. At the current breeding rate it will take 32 years to reach 356 animals. If the reproduction rate is increased to 29-33 births per year then the population has the capability of slowing or preventing the slight demographic decline that will occur as the generic population ages out of the population. Secondly institutions should carefully weigh whether contraceptives should be used. The long term effects of contraception on female lions are not known. If the females currently on contraceptives cannot breed again, the population will experience a severe decline. It is therefore important to carefully weigh whether contraception is justified. Thirdly the generic population should be managed via attrition. In 2013 there were 115 generic lions. The AZA Felid TAG does not recommend that generic lions be imported or bred. In the future, the space occupied by generic lions will be converted to space for pedigreed lions.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

At this time our two animals are considered surplus animals to the AZA. In August 2015 the Pittsburgh Zoo & PPG Aquarium decided to terminate its membership with the AZA. As a result the SSP has declared our lions to be surplus animals. The genetics of our animals are part of this managed population. By holding these animals and not breeding them we are freeing up space for other facilities to breed. We only have two sibling males so no breeding control is needed.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has maintained large felid species at our facility since it's opening in 1898. African lions were one of those first large felid species.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has had 6 litters of large felids born in the last five years.

Amur Leopard – One male cub born 2 Feb 2014 – was still born
Amur Leopard – One female cub born 4 Feb 2016 – still alive today
Clouded Leopard – Two cubs, unknown sex born 28 Feb 2017 – consumed by dam
Amur Tiger – One female cub born 23 May 2017 – survived 3 days
Amur Tiger – One male and one female cub born 25 Sept 2017 – still alive today
Canada Lynx – Litter of 1.4.1 kittens born 9 May 2018 – 1.4 still alive, 0.0.1 did not survive 30 days

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The Pittsburgh Zoo & PPG Aquarium has had 12 deaths of large felids in the last five years.

African Lion – Female was euthanized for declining health 26 Dec 2013 at the age of 24
Amur Leopard – male cub was still born on 2 Feb 2014
African Lion – Female was euthanized for declining health 25 June 2015 at the age of 14

Cheetah – Female was euthanized for declining health 1 July 2015 at the age of 14
Snow Leopard – Female was euthanized, she had a tongue squamous cell carcinoma, 20 Dec 2016 at the age of 17
Clouded Leopard – 2 cubs were consumed by their dam moments after birth 28 Feb 2017
Amur Tiger – Female cub died 26 May 2017 at 3 days old, necropsy revealed life ending abnormalities
Amur Tiger – Male died post immobilization on 31 Aug 2017 at the age of 18
Amur Tiger – Female was euthanized for declining health on 3 Dec 2017 at the age of 19
African Lion – Female was euthanized on 6 Feb 2018 at the age of 17, necropsy revealed a tumor of the spleen that had metastasized to multiple locations.
Canada Lynx – cub went missing from nest box around day 18

No measures have been taken to prevent future mortalities as 7 of these animals lived long happy lives and the 5 cubs were either stillborn, consumed by the dam or had abnormalities that couldn't have been prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

The Pittsburgh Zoo's lion exhibit is 1,440 SF. The outdoor exhibit has grass, trees, a heated rock and a dry moat. The exhibit is enclosed with 16' tall chain link fencing, a sheer rock face, the building and by the moat. The indoor holding building is constructed of cement blocks and has poured cement floors. There are three holding areas dedicated to lions in the building. Each room measures 12' x 15' 4". The rest of the building is inhabited by Amur leopards. The holding areas are divided by chain link fencing and cement block walls and contain a skylight in each room. There is a runway that spans the width of the building and is located in front of the holding rooms. The runway measures 38' x 2' 8" and is used for training, voluntary medical procedures and as a means for the animals to enter the exhibit. The holding building has forced air heat. See appendix for the lion exhibit and holding pictures and diagrams.

Pittsburgh Zoo & PPG Aquarium

African lion

African lion exhibit

African lion exhibit

The rock in the center of the photo is heated to provide warmth in winter months.

African lion exhibit

- There is a dry moat on one side of the exhibit to provide containment and an unobstructed view of the exhibit.
- The heated rock is in the center of the photo.

African lion exhibit

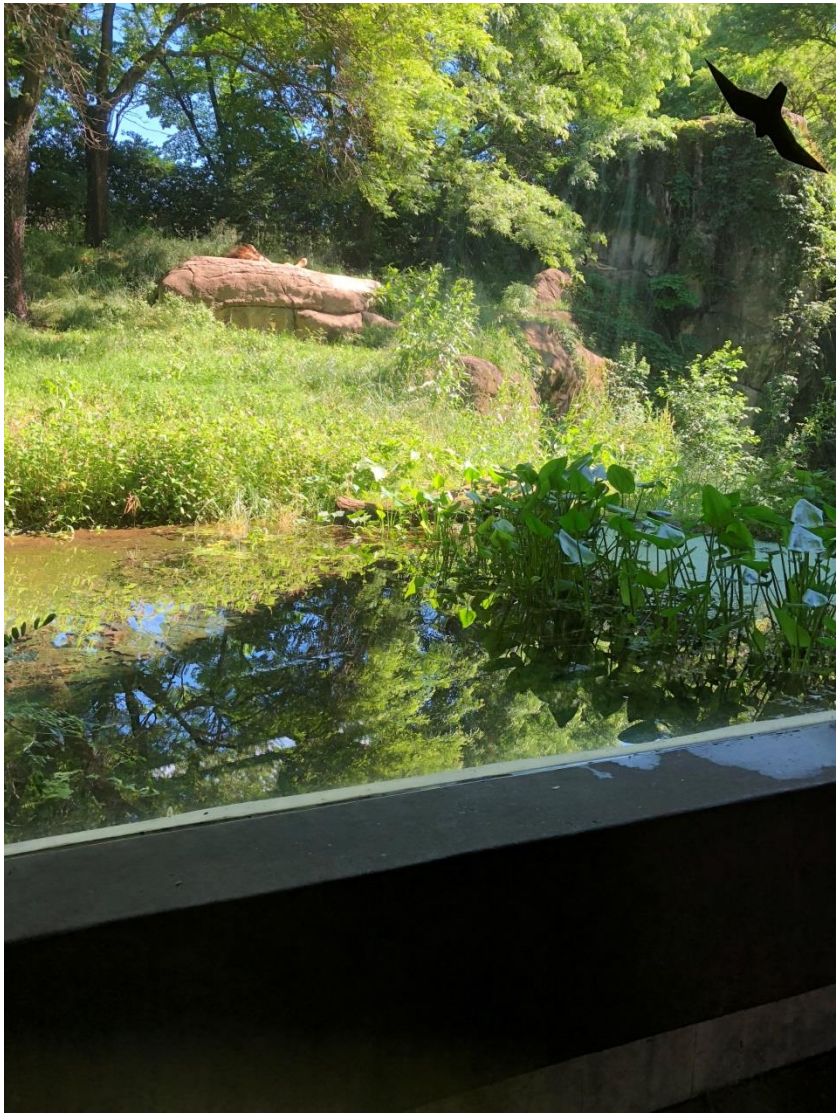
This is another view of the exhibit taken from the public viewing area.

The higher rockwork on the right hand side of the photo provides a sunny spot for basking.

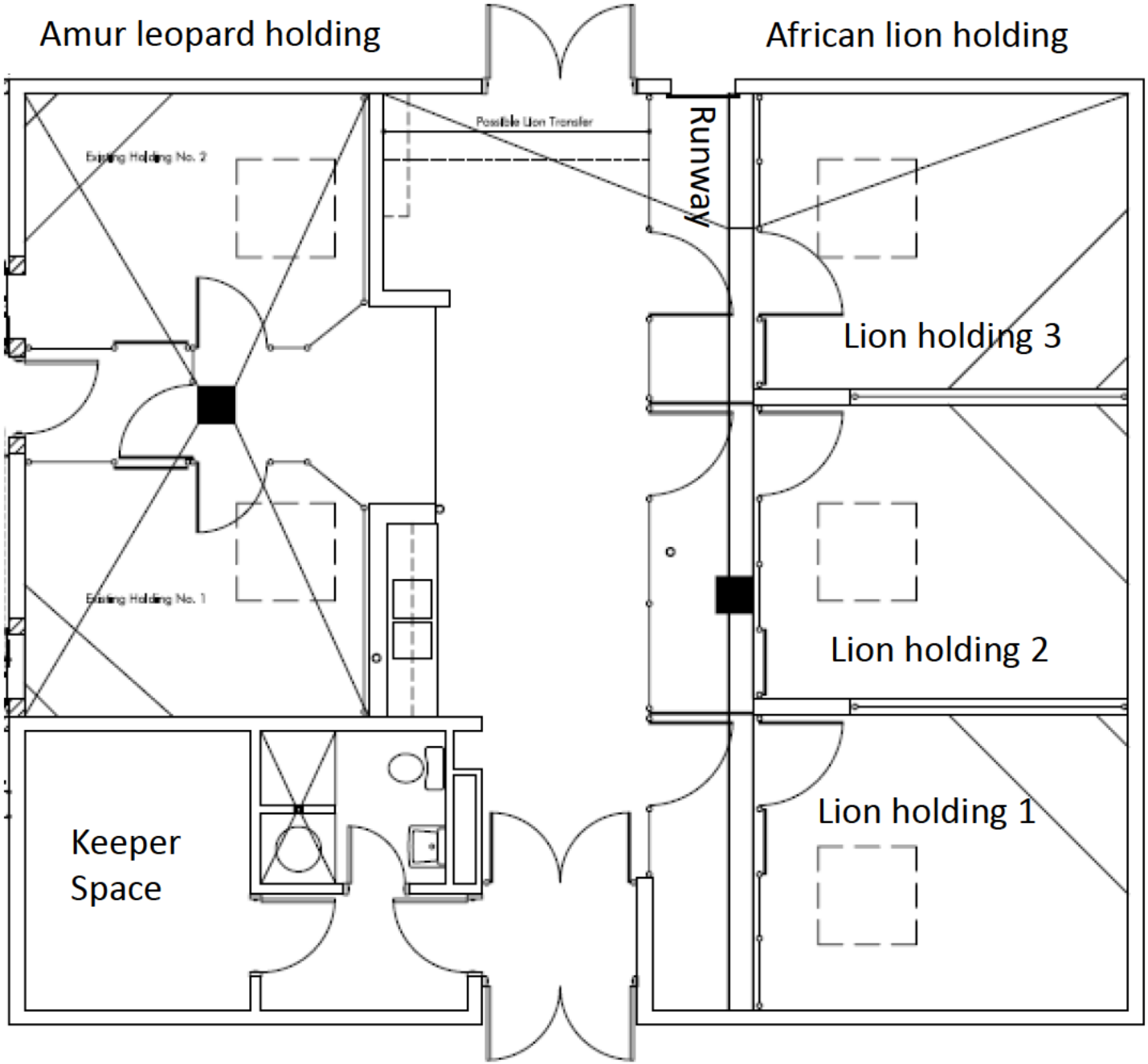
African lion exhibit

This is the public viewing window at the African lion exhibit.

African lion exhibit



- View from the public viewing window.
- The pond in the foreground provides a water source for drinking, cooling off and playing.
- The moat is located on the right, heated rock in the middle and the high basking rock in the background.


Amur leopard holding
African lion holding
Possible Lion Transfer
Runway
Lion holding 3
Lion holding 2
Lion holding 1
Keeper
Space

African lion holding

- There are three lion holding rooms, each measuring 12’ x 15’4”.
- Skylights provide ambient lighting
- Shelves provide elevated resting areas.
- Logs provide enrichment and structure.
- Temperature is maintained by forced air heat.

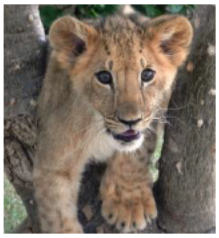
African lion holding

- Runway in lion holding provides a chute onto the exhibit.
- It also provides an area for training and voluntary medical procedures.

Lion *(Panthera leo)*

Population Biologist: Katelyn Marti, kmarti@lpzoo.org
AZA SSP Coordinator: Hollie Calahan, hcolahan@denverzoo.org
AZA Studbook Keeper: Sue Pfaff, suepfaff@riverbankszoo.org
AZA Felid TAG Chair: Don Goff, dgoff@beardsleyzoo.org

Population Viability Analyses (PVAs) for AZA Animal Programs



Projected zoo & aquarium population status in 100 years WITHOUT potential changes:

Low Risk	Vulnerable	Endangered	Critical

Projected zoo & aquarium population status in 100 years WITH potential changes:

Low Risk	Vulnerable	Endangered	Critical

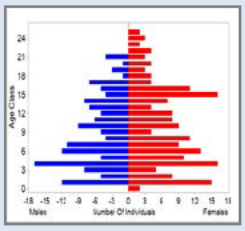
Status as of 2012

- 324 (139.185) total lions at 99 AZA institutions
- 177 (83.94) in potentially breeding population
- Population trend over last 10 years: Increasing (λ = 1.006)
- Gene diversity (GD) = 97.5%
- Target Population Size (TPS) from RCP = 320
- Potential Space in model = 356
- IUCN status = Vulnerable

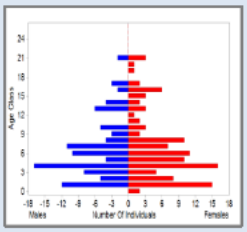
AZA Animal Program Challenges:

- Limited space
- Questions about effects of contraception

Total Population



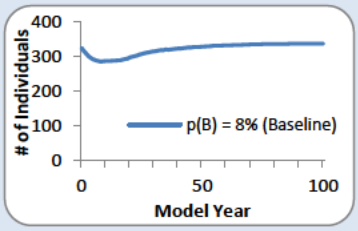
Potentially Breeding Population



Projected Status WITHOUT Potential Changes

LOW RISK in AZA institutions

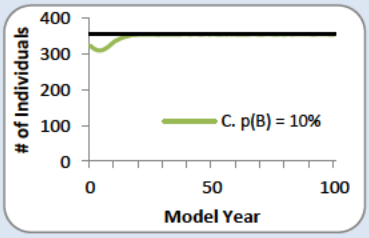
- Baseline Scenario = 23 births/year
- 97% chance of increasing to potential space in 100 yrs
- Will reach potential space (356) in approximately 32 yrs
- 356 ± 34 (SD) average lions in 100 yrs
- 93% ± 1% (SD) projected GD in 100 yrs



Projected Status WITH Potential Changes

LOW RISK in AZA institutions

- Scenario C: Increased female breeding at p(B)= 10% (~29 births/year) and potential space at 356
- 100% chance of increasing to potential space in 100 yrs
- Will reach potential space (356) in approximately 12 yrs
- 354 ± 9 (SD) average lions in 100 yrs
- 95% ± 0.2% (SD) projected GD in 100 yrs



Essential Actions

- Sustain current reproduction levels or increase reproduction as space becomes available
- Continue only breeding pedigreed lions and manage unpedigreed (generic lions to attrition)

How to Help

- Pursue breeding recommendations given to your institution and discuss husbandry challenges and successes with SSP Coordinator
- Discuss future institutional plans to house this species with SSP Coordinator to ensure lions are available
- Dedicate current generic lion spaces to pedigreed lion spaces in the future
- Discuss the use of contraceptives on females with the SSP Coordinator

Please see the 2012 AZA Lion Animal Program full PVA report on the AZA website for further details.

EXECUTIVE SUMMARY
Lion AZA Animal Program Population Viability Analysis

Population Viability Analysis (PVA) model scenarios were developed with members of the Lion Animal Program during a meeting at the 2012 Felid TAG meeting in Salt Lake City, UT. In 2011, Lincoln Park Zoo researchers received a two-year grant from the Institute of Museum and Library Services (IMLS) to analyze AZA population's long-term viability. The project team is using ZooRisk 3.80 (Earnhardt et al., 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remained the same (the baseline scenario), and then assess the impact of changes of increasing reproduction, managing the generic population to attrition, removing contracepted females, and not utilizing genetic management (alternative scenarios). The current AZA lion population size is **324 animals (139 males, 185 females) at 99 AZA institutions**

MODEL RESULTS

Model results indicate that if the AZA lion population continues on its current trajectory it will experience a small demographic decline in the next 15 to 20 years as the generic population is managed to attrition. Even with this decline, the population is able to increase to its potential spaces (356) in 32 years and maintain this level for 100 years. Increasing the population's reproduction rates allows the population to decrease or prevent the initial decline in the population and maintain slightly higher levels of gene diversity in 100 years.

Currently, the AZA Felid TAG does not recommend unpedigreed lions (generics) breed or be imported to the population. If there were no additional breeding or importations in the generic population, the Animal Program could expect generic lions to be managed to attrition in approximately 17 years. Currently, there are many female lions on contraceptives due to space limitations. If the females that are currently or have previously been on contraceptive do not breed in the future (removed from the breeding population), the population would face a much steeper demographic decline. With the removal of these females, the population will only have a 71% chance of reaching its potential spaces and will retain less gene diversity over 100 years.

MANAGEMENT ACTIONS

The AZA Lion Animal Program is currently on a positive trajectory in AZA institutions. There are several management strategies which could be applied to the population that may help it maintain or increase its current demographic and genetic health. **These management actions will be most effective when applied in combination with one another.**

- **Sustain current reproductive rates/Increase reproduction:** The program should focus on breeding reproductively viable females to **maintain or begin increasing** the number of offspring produced per year. Under current breeding rates, the population could reach its potential spaces in 32 years, and will sustain a slight decline in population size in the short-term. If reproduction is increased (29 – 33 births/year) the population has the capability of slowing or preventing the slight demographic decline that will occur as the generic population ages out of the population.
    - All breeding recommendations received are important to the long-term future of this population; institutions should work hard to get recommended pairs into appropriate breeding situations quickly and work on husbandry to improve breeding success.

- **Carefully weigh whether contraceptives are needed or warranted:** Currently, there is not enough information to determine the long-term effects of contraception on female lions. However, model results indicate that if the females currently on contraceptive do not breed again, the population will experience a much more severe decline than the baseline scenario. As the effects of contraceptives could be costly, it is important to carefully weigh whether contraception is justified for wide use across the lion population. Institutions should contact the SSP Coordinator prior to placing female lions on contraceptives.

- **Manage the generic population via attrition:** There are currently 115 (43.72) generic lions in the AZA population. The AZA Felid TAG does not recommend that lions with unknown pedigree (generics) breed or be imported to the AZA population. In the future, space occupied by generic lions will be converted to space for pedigreed lions. Institutions holding generic lions should discuss their plans for lions with the AZA Lion SSP Coordinator.

Please see the 2012 AZA Lion Animal Program full PVA report on the AZA website for further details.

3-200-41

E. Captive-bred Wildlife Registration

Amur Tiger (*Panthera tigris altaica*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium provides data and updates to the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for Amur tigers. We currently have a breeding pair and two offspring. As these four animals are considered surplus animals we will hold them at our facility.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The AZA SSP is a member of the WAZA Amur Tiger Global Species Management Plan (GSMP), which also includes managed populations in Europe (EAZA), Russia (EARAZA) and Japan (JAZA), totaling about 500 Amur tigers. The population has been maintained between 140 and 160 animal for about 20 years, however low recruitment and a reduction in spaces has led to a decline over the past four years. Reproductive success has also been lower than expected in recent years.

The goal for this SSP is to retain at least 90% gene diversity for a 100-year program. Modeling projections suggest that with intensive genetic management this can be achieved without importation of new founders. However, additional founders will likely become available from the EEP because of orphaned wild-born cubs.

Eighteen formal breedings were recommended for 2017-2018 and an additional 12 artificial inseminations were recommended. Given the probability of success, 9.4 births are expected from natural breeding and one birth from artificial insemination which would maintain the population around 127 tigers.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

At this time our four animals are considered surplus animals to the AZA. In August 2015 the Pittsburgh Zoo & PPG Aquarium decided to terminate its membership with the AZA. As a result the SSP has declared our animals to be surplus animals. The genetics of our animals are part of this managed population. Their genes have been represented in the population with the addition of the two cubs last year (this breeding being a 2015 breeding recommendation by the Amur tiger SSP). By holding these animals and not breeding them we are freeing up space for other facilities to breed tigers that are not as represented genetically in the population. Breeding management in tigers is obtained through separation of the animals by sex.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has maintained large felid species at our facility since it's opening in 1898. The first animal recorded in the Association of Zoos & Aquariums (AZA) Amur Tiger Studbook was acquired by the Pittsburgh Zoo in August 1969.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has had 6 litters of large felids born in the last five years.

Amur Leopard – One male cub born 2 Feb 2014 – was still born
Amur Leopard – One female cub born 4 Feb 2016 – still alive today
Clouded Leopard – Two cubs, unknown sex born 28 Feb 2017 – consumed by dam
Amur Tiger – One female cub born 23 May 2017 – survived 3 days
Amur Tiger – One male and one female cub born 25 Sept 2017 – still alive today
Canada Lynx – Litter of 1.4.1 kittens born 9 May 2018 – 1.4 still alive, 0.0.1 did not survive 30 days

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The Pittsburgh Zoo & PPG Aquarium has had 12 deaths of large felids in the last five years.

African Lion – Female was euthanized for declining health 26 Dec 2013 at the age of 24
Amur Leopard – male cub was stillborn on 2 Feb 2014
African Lion – Female was euthanized for declining health 25 June 2015 at the age of 14
Cheetah – Female was euthanized for declining health 1 July 2015 at the age of 14
Snow Leopard – Female was euthanized, she had a tongue squamous cell carcinoma, 20 Dec 2016 at the age of 17

Clouded Leopard – 2 cubs were consumed by their dam moments after birth 28 Feb 2017
Amur Tiger – Female cub died 26 May 2017 at 3 days old, necropsy revealed life ending abnormalities
Amur Tiger – Male died post immobilization on 31 Aug 2017 at the age of 18
Amur Tiger – Female was euthanized for declining health on 3 Dec 2017 at the age of 19
African Lion – Female was euthanized on 6 Feb 2018 at the age of 17, necropsy revealed a tumor of the spleen that had metastasized to multiple locations.
Canada Lynx – cub went missing from nest box around day 18, presumed to have been consumed by the dam

No measures have been taken to prevent future mortalities as 7 of these animals lived long happy lives and the 5 cubs were either stillborn, consumed by the dam or had abnormalities that couldn't have been prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

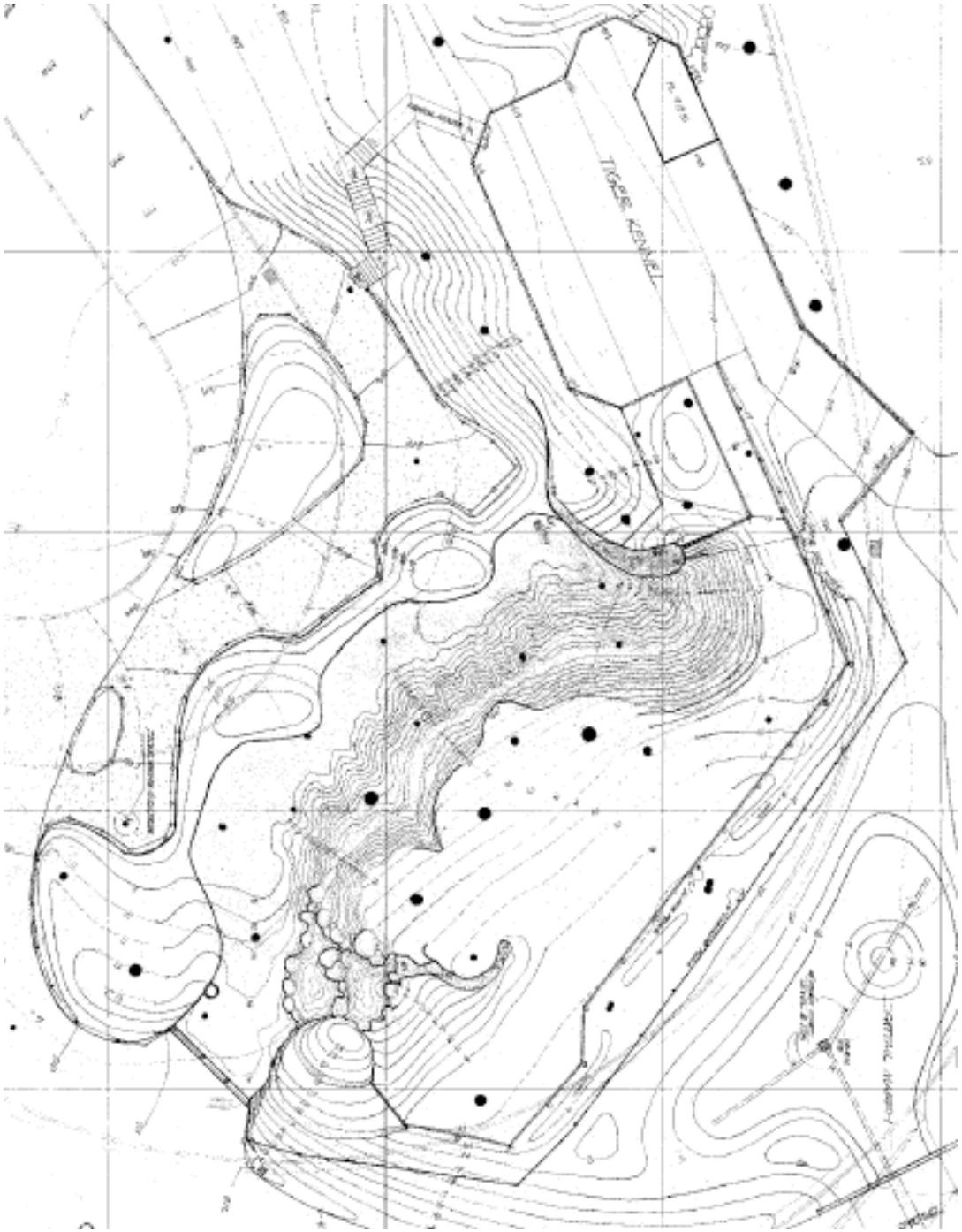
14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

The Pittsburgh Zoo's tiger habitat consists of an approximately ¼ acre outdoor exhibit. The outdoor exhibit has grass, trees, heated rock, a den and a moat for swimming. The exhibit is enclosed with 16' tall chain link fencing on three sides and by the moat on the fourth side. The indoor holding building is constructed of cement blocks and has poured cement floors. There are five holding areas total in the building that are divided by chain link fencing. Four of the holding areas are open to the elements in half of the area and are covered under a fiberglass roof on the other half. Each holding area has a den that is enclosed on three sides and has den heat only. They are 22' 4" x 15' in dimension. The fifth holding area has an outdoor off exhibit holding that is 11' 4" x 20' and an indoor enclosed nursery holding room that is 10' x 12'. The nursery area has forced air heat. See appendix for the tiger exhibit pictures and diagrams.

Pittsburgh Zoo & PPG Aquarium

Amur tiger

Tiger exhibit and holding



Amur tiger exhibit

- This is a view of the Tiger exhibit taken from the public side.
- The cave provides shelter and shade.

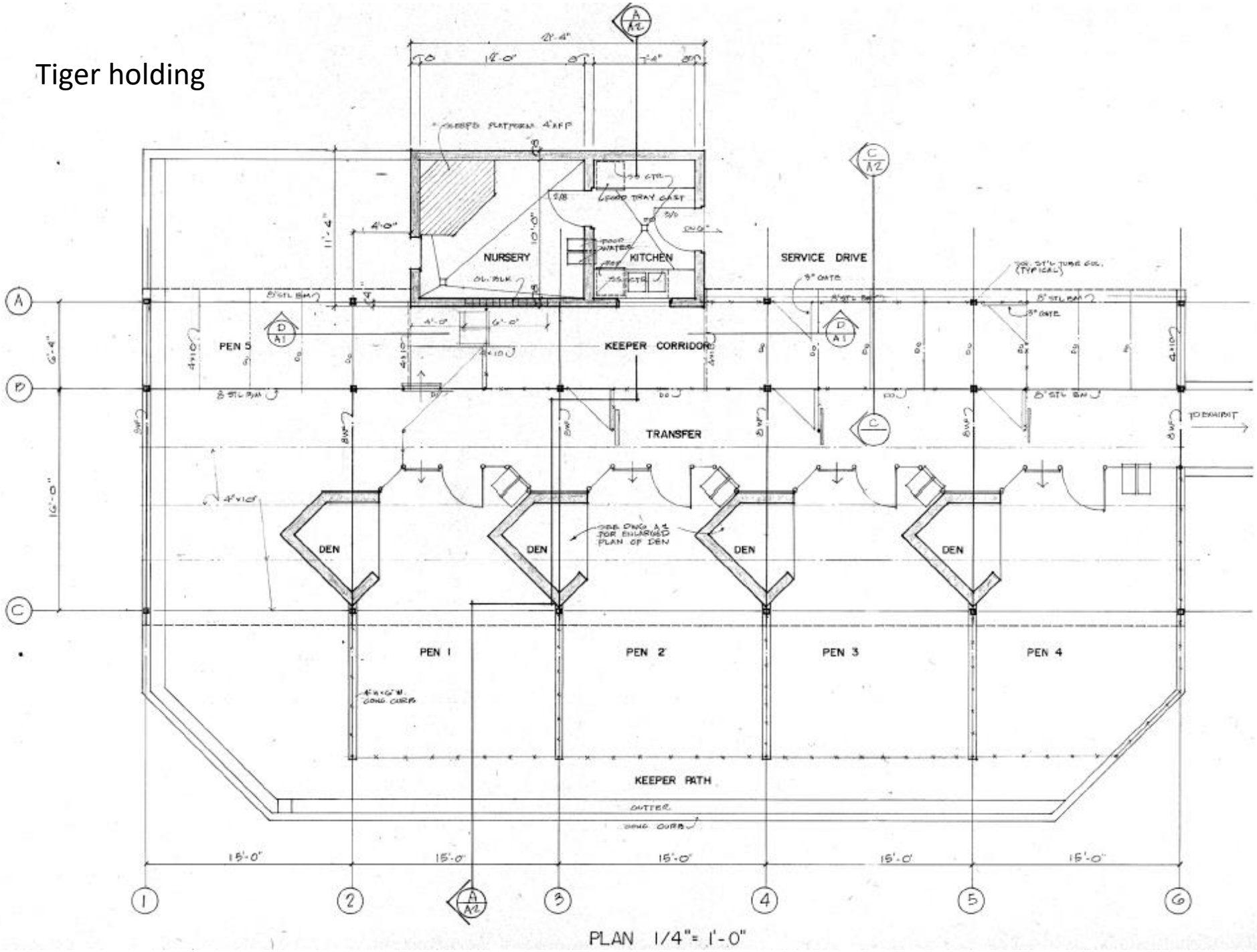
Amur tiger exhibit

- This is a view of the Tiger exhibit moat.
- The moat is used for containment but also as enrichment for the tigers. They love playing in the water.

Amur tiger exhibit

- This is the public viewing window at the amur tiger exhibit.

Tiger holding



PLAN 1/4"= 1'-0"

Amur tiger holding

- The top picture is a view of the shifting mechanism in Tiger holding.
- The bottom is a view of the door to the exhibit.

Amur tiger holding

- The top is a view of one of the holding rooms.
- The logs in this room provide structure and enrichment.
- The bottom view is of the tiger sleeping pad in one of these rooms.

Amur tiger holding

- This is a view of the birthing den. When young are anticipated a piece of plywood (with a door cut out) is attached to the front of the shelf and this area is bedded with straw.

Population Analysis & Breeding and Transfer Plan for the

Amur Tiger (*Panthera tigris altaica*)
AZA Species Survival Plan®
Green Program

Photo courtesy of Minnesota Zoo

AZA SPECIES COORDINATOR
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AZA STUDBOOK KEEPER / SPMAG ADVISOR
Kathy Traylor-Holzer, Minnesota Zoo/IUCN SSC CPSG (kathy@cpsg.org)

Data Current through: 19 July 2017

OCTOBER 2017

Table of Contents

AMUR TIGER (*Panthera tigris altaica*) Species Survival Plan®
Executive Summary

There are N = 128 animals (52 males; 76 females) at 47 institutions as of 19 July 2017. The target population size designated by the AZA Felid Taxon Advisory Group is 150. The AZA SSP is a member of the WAZA Amur Tiger Global Species Management Plan (GSMP), which also includes managed populations in Europe (EAZA), Russia (EARAZA), and Japan (JAZA), totaling about 500 Amur tigers.

This population has been maintained at 140-160 individuals for ~20 years; however, low recruitment and a reduction in spaces has led to decline over the past four years. Overall, reproductive success of recommended pairs has been lower than expected in recent years, but increased during the past year. The SSP now considers the age and reproductive history of females when estimating breeding pair success based on statistical analysis of past trends. The current population is female-biased. Historically, survival and reproduction are good into the mid-teen years. Gene diversity increased from 1982 through 2001 due in part to periodic opportunistic importations from the EEP and Russia, and is now at 96.38%.

Demographic summary

Current size of SSP population – total (males. females)	128 (52.76)
Number of individuals excluded from analyses	7 (1.6)
Population size following exclusions	121 (51.70)
Target population size from Felid TAG	150
Mean generation time	8.6 years
Population growth rate (λ)*: Historical / 5–year / Projected	0.99/0.99/0.97

*Historical from life tables; 5-year from studbook census; Projected from PMx stochastic 20 yr projections; population constrained by space

Genetic summary

	Current	**Potential**
Number of founders	70 (actual)	0 additional
Founder genome equivalents (FGE)	13.81	21.50
Gene diversity retained (GD%)	96.38	97.67
Population mean kinship (MK)	0.0362	
Mean inbreeding (F)	0.0120	
Effective population size/census size ratio (Ne / N)	0.26	
% of pedigree known	100	
Projections	**Deterministic (PMx)**	**Stochastic (Vortex)**
Years to 90% gene diversity	44	>100
Years to 10% loss of gene diversity	69	>100
Gene diversity at 100 years from present (%)*	83	91
	Assuming λ = 1.02, target size = 150	Assuming λ = 1.02, target size = 150

The SSP has set a goal of retaining at least 90% gene diversity for a 100-year program. Stochastic model projections suggest this goal is achievable with intensive genetic management without the importation of new founders; however, the periodic incorporation of additional founders would be genetically beneficial to this population. Additional founders likely will be available periodically via the EEP population due to the opportunistic influx of new genetic lines from Russia (primarily due to orphaned wild-born cubs that are transferred to EARAZA zoos in Russia), coordinated through the GSMP. Three importations of genetically valuable individuals occurred in 2015, and another two occurred in 2017.

Summary Actions: Eighteen formal breedings were recommended for 2017-2018; 12 of these are carryover recommendations, one is a rebreed recommendation, and 5 are new recommendations (two of which are future breedings). Additionally, twelve artificial inseminations were recommended, some involving the same pairs that received natural breeding recommendations. Given the probability of success of all pairs based on age, reproductive history and current location, 9.4 births are expected from natural breeding, and an additional estimated one birth from artificial insemination, which would maintain the population around 127 tigers. At this time, 7 (1.6) tigers are designated as non-breeders due to age, health and/or uncertain lineage. Eight transfers are recommended to accommodate recommended breeding or future breeding, one transfer (already completed) is recommended for surrogate rearing, and six transfers are recommended to meet exhibition and/or management needs.

Report Citations:

Ballou, J.D., R.C. Lacy, K. Traylor-Holzer, K. Bauman, J.A. Ivy, P. Siminski and C. Asa. Strategies for establishing and using genome resource banks in endangered species conservation breeding. In review.

Harris, T. and K. Traylor-Holzer. 2015. *WAZA Amur Tiger Global Species Management Plan 2012*. Minnesota Zoo/ IUCN SSC Conservation Breeding Specialist Group. 30pp.

Hendrickson, S.L., Mayer, G.C., Wallen, E.P. & Quigley, K. 2000.Genetic variability and geographic structure of three subspecies of tigers (*Panthera tigris*) based on MHC class I variation. *Animal Conservation* **3**, 135-143.

IUCN SSC. 2014. *Guidelines on the Use of Ex Situ Management for Species Conservation*. Version 2.0. Gland, Switzerland: IUCN Species Survival Commission.

Kitchener, A. C., Breitenmoser-Würsten, Ch., Eizirik, E., Gentry, A., Werdelin, L., Wilting, A., Yamaguchi, N., Abramov, A. V., Christiansen, P., Driscoll, C., Duckworth, J. W., Johnson, W., Luo, S.-J., Meijaard, E., O'Donoghue, P., Sanderson, J., Seymour, K., Bruford, M., Groves, C., Hoffmann, M., Nowell, K., Timmons, Z. & Tobe, S. 2017. A revised taxonomy of the Felidae. The final report of the Cat Classification Task Force of the IUCN/SSC Cat Specialist Group. Cat News Special Issue 11, 80 pp.

Luo, S. 2006. *Comparative phylogeography of sympatric wild cats: Implications for biogeography and conservation in Asian biodiversity hotspots.* Ph.D. Dissertation. (University of Minnesota, St. Paul, MN.

Russello, M.A., Gladyshev, E., Miquelle, D., & Caccone, A. 2004. Potential genetic consequences of a recent bottleneck in the Amur tiger of the Russian Far east. *Conservation Genetics* **5**, 707-713.

Saunders, S.P., T. Harris, K. Traylor-Holzer, and K. Goodrowe Beck. 2014. Factors influencing breeding success, ovarian cyclicity, and cub survival in zoo-managed tigers (*Panthera tigris*). *Animal Reprod. Science* 144: 38-47

Wilting, A. et al. 2015. Planning tiger recovery: Understanding intraspecific variation for effective conservation. *Sci. Adv*. 26 June 2015.

3-200-41

E. Captive-bred Wildlife Registration

Black and white ruffed lemur (*Varecia variegata variegata*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for black and white ruffed lemur. We currently have a pair of black and white ruffed lemurs. This is a non-breeding pair as the male has been sterilized. We plan to follow the SSP breeding and transfer plan and provide a home for these animals. If asked in the future to obtain a breeding pair we will comply and disposition progeny as the SSP breeding and transfer plan suggests.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The genetic diversity of the black and white ruffed lemurs is currently at 95.93% according to the 2017 SSP Population Analysis. Gene diversity in 100 years is projected to be 87.0%. When the gene diversity falls below 90% of that in the founding population lower birth weights and greater infant mortality among other factors can increasingly compromise reproduction. The current population is at 172 animals. The target population size is 225 per the Prosimian Taxon Advisory Group 2014 Regional Collection Plan. The gene diversity retention could therefore be equalized if there was breeding of underrepresented lineages and by reaching the target population size. Approximately 22-34 births per year are needed to grow this population size to 225 in the next 5 years as indicated by demographic analyses.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

Since we do participate in the SSP, we follow the recommendations set forth by the Breeding and Transport Plan. We are currently to hold the pair of ruffed lemurs that we have because the male is sterile. If the plan were to ask us to hold more animals to alleviate stress at other facilities with breeding

recommendations we would comply. If contraception at that point would be necessary it would be utilized.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has had Black and White ruffed lemurs since 1993. We have had Ring-tailed lemurs since 1990 and red ruffed lemurs in their collection from 1990 to 2009 and then received a breeding pair in 2014 to present

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has not had any lemur births in the last 5 years.

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

Our male red ruffed lemur was euthanized on 5 Dec 2017. He was 28 ½ years old and was being treated for heart failure for several years. The median life expectancy for red ruffed lemurs is 19.9 years. No measures have been taken as he lived a long happy life.

The only other death of a lemur was the euthanasia of a male ring-tailed lemur on 29 September 2015. He was a four year old male that had idiopathic chylothorax. This is a random disease where the animal has a fluid filled chest cavity and it prevents proper breathing. There was no apparent cause for the disease. We performed a thoracic duct ligation surgery in an attempt to correct but he developed post-surgical lung lobe torsion. This is a rare disease that can't be predicted or prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The black and white ruffed lemurs have

access to a public viewing enclosure that is 445 SF with a varying height of 18’ to 30’. The indoor exhibit has a cement floor with gunite textured concrete simulating rocks, boulders, riverbanks and a waterfall. This exhibit also has an artificial tree structure in the middle that is made from painted, textured epoxy on steel pipe and is surrounded by 2” x 2” woven wire mesh on three sides and a viewing window in the front. The viewing windows are 2 ply 3/16” glass laminated with 60 mil polyvinyl butyral interlayer, both plies tempered.

The black and white ruffed lemurs are housed downstairs in two 279 SF holding rooms with cement block sides and poured cement floors. There are shelves on the walls and enrichment items hanging from the ceiling. One side of the holding area is 1” x 1” Galvanized aluminum chain link. Any progeny that would be born would be housed in these three areas. See attached for photos and a diagram.

Pittsburgh Zoo & PPG Aquarium

Black and white ruffed lemur

Tropical Forest Complex (TFC)

TFC interior

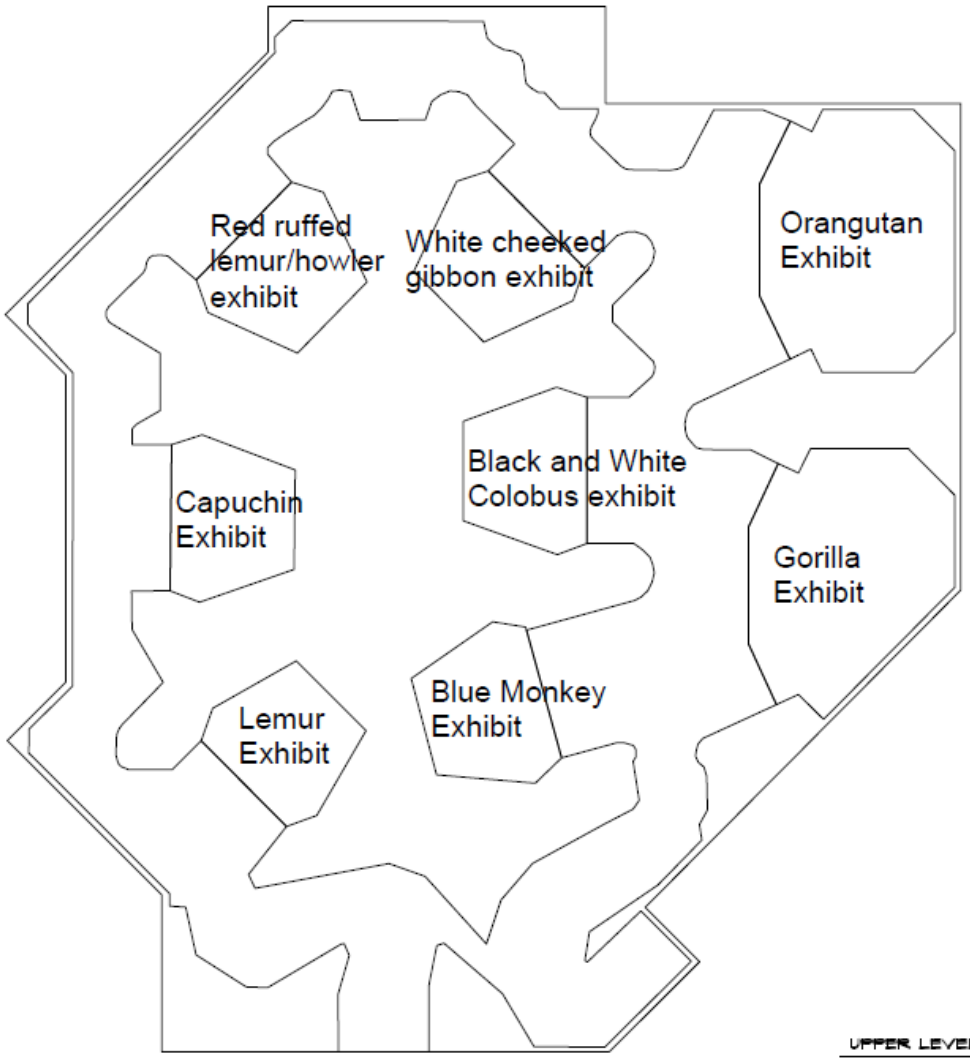
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

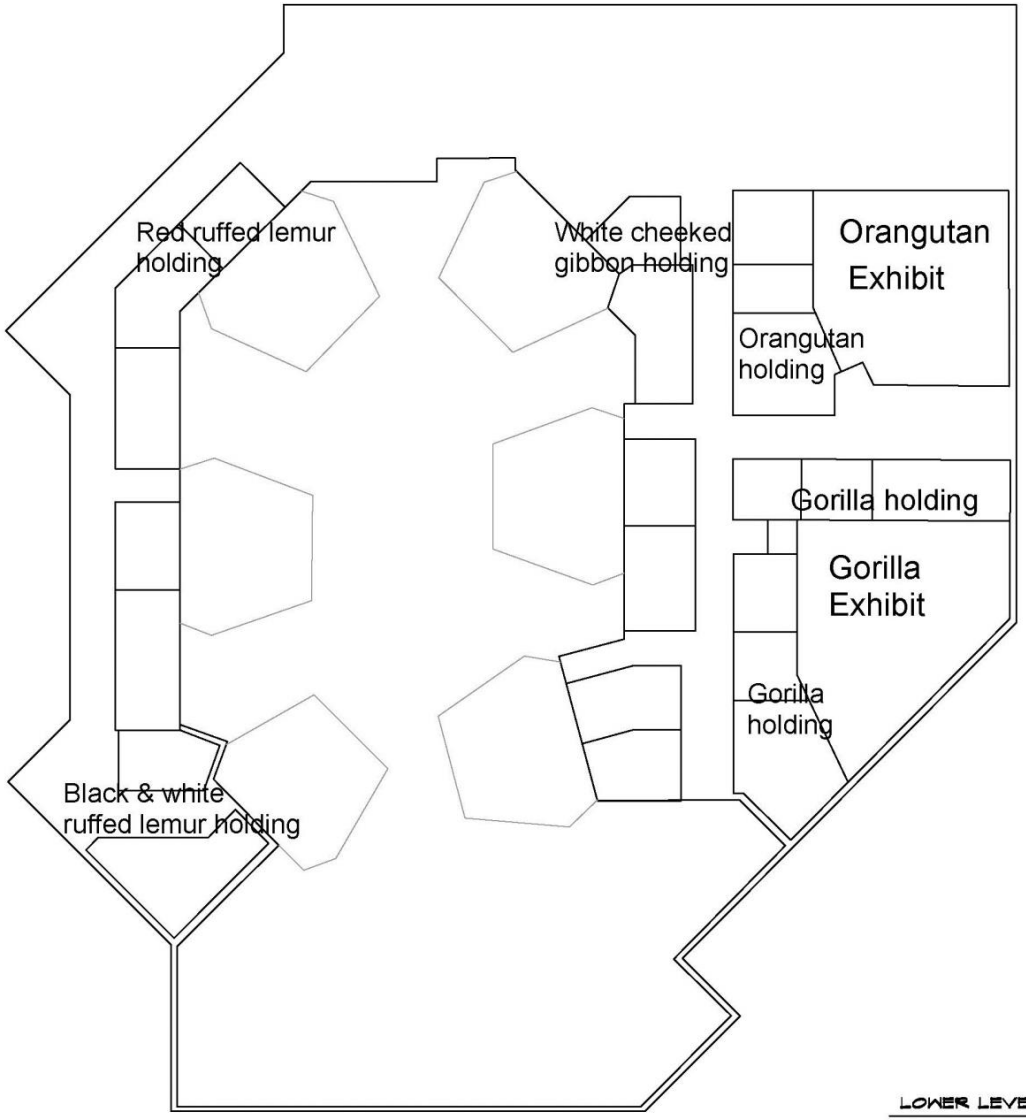
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level

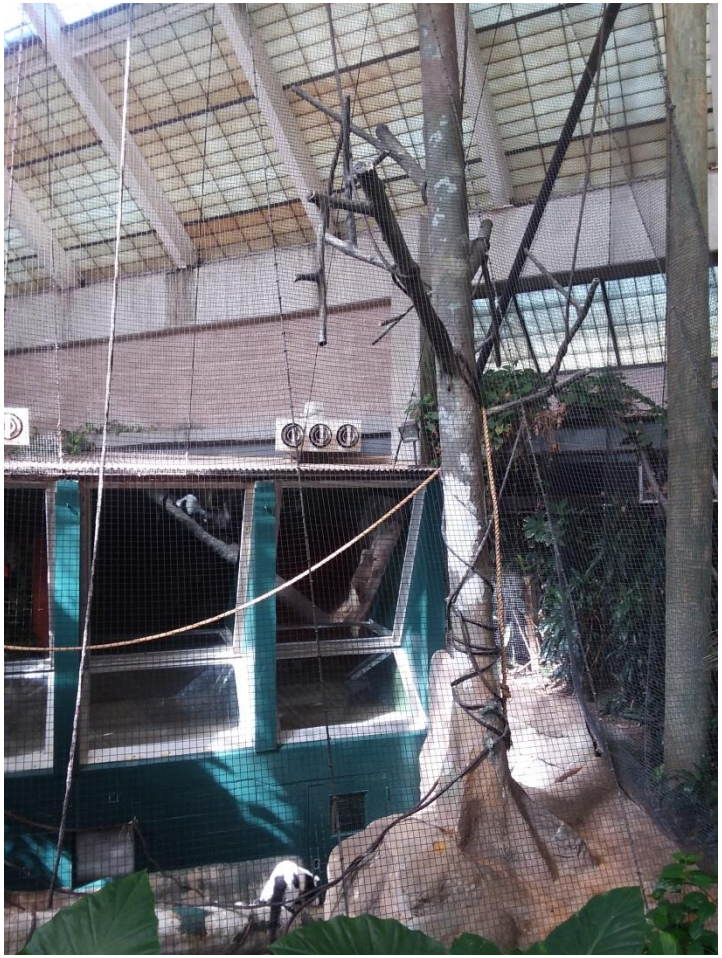


LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

Black and white ruffed lemur exhibit



- Artificial trees and fabricated vines provide enrichment and structure.
- The height of the exhibit provides climbing opportunities

Black and white ruffed lemur exhibit

- Water source creates a stream that trickles through the exhibit providing a water source and enrichment.
- This photo also shows how the exhibit sits in the surrounding jungle.

Black and white ruffed lemur exhibit

This photo is taken from the interior jungle toward the visitor viewing windows. HVAC fans located above the viewing windows provide air flow for the exhibits.

Black and white ruffed lemur exhibit

Gunite rock work providing naturalistic rocks, boulders and a stream bank.

Black and white ruffed lemur holding room 1

- This is one of two holding rooms available to these lemurs.
- Fire hose and hammocks provide climbing structure

Black and white ruffed lemur holding

- The door on the right of the picture opens into the exhibit
- A heater is secured on the exterior to provide a hot spot.

Black and white ruffed lemur holding room 2

- This room also opens onto the lemur exhibit
- Fire hose and hammocks provide climbing structure
- This exhibit and holding space is shared with ring-tailed lemurs

Population Analysis & Breeding and Transfer Plan

Black and White Ruffed Lemur (*Varecia variegata*)

AZA Species Survival Plan®
Yellow Program

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28 April 2017

PMC Population Management Center

LINCOLN PARK ZOO. ASSOCIATION OF ZOOS & AQUARIUMS

Disney's ANIMALS, SCIENCE and ENVIRONMENT

Executive Summary
Species Survival Plan® for Black and White Ruffed Lemur (*Varecia variegata*)

The current SSP population of black and white ruffed lemurs is N = 172 animals (99 males; 68 females; 5 unknown sex) at 49 AZA institutions and 6 non-member participating institutions. This Population Analysis and Breeding and Transfer Plan was prepared in January 2017 at Disney's Animal Kingdom®. The last Breeding and Transfer Plan for this species was finalized 8 January 2016. Analyses were based on the North American data of the International *Varecia variegata* Studbook (current to 30 June 2016) and were performed using PopLink 2.4 and PMx 1.2.20160831.

The target population size designated by the Prosimian Taxon Advisory Group 2014 Regional Collection Plan is 225. This population currently qualifies as a Yellow SSP.

Genetic diversity in this population is currently 95.93%. When gene diversity falls below 90% of that in the founding population, it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights and greater infant mortality. Gene diversity in 100 years is projected to be 87.0% (based on current statistics, assuming a target population for projections of 225 and lambda = 1.052). Gene diversity in 10 generations (79 years) is projected to be 88.8%. Equalizing the founder representation by breeding individuals from underrepresented lineages and increasing the effective size, and target population size could extend gene diversity retention.

Demography	
Current size of population (N) – Total (Males.Females.Unknown Sex)	172(99.68.5)
Number of individuals excluded from the potentially breeding population	16 (12.4)
Population size following exclusions	156(87.64.5)
Target population size (Kt) from the Prosimian TAG's 2014 RCP	225
Mean generation time (T; years)	7.9
Historical population growth rate (λ; life table lambda 1969-present) / 5 – year from Poplink census / Projected growth rate from PMx stochastic 20 yr projections	1.052 / 0.978 / 1.028 <> 1.047 <> 1.061

Genetics		
	Current	***Potential***
Founders	27	0
Founder genome equivalents (FGE)	12.28	20.34
Gene diversity (GD %)	95.93%	97.54%
Population mean kinship (MK)	0.0407	-----
Mean inbreeding (F)	0.0232	-----
N_e/N (Effective population size/census size ratio)	0.2896*	-----
% Pedigree Known prior to assumptions and exclusions	91.7%	-----
% Pedigree Known after assumptions and exclusions	99.7%	-----
% Pedigree Certain after assumptions and exclusions	96.5%	-----
Projections		
	[a]Historical/Projected λ = 1.052	
Years to 90% GD	64	
Years to 10% loss of GD	107	
Gene Diversity at 100 Years (%)	87.0%	
Gene Diversity in 10 Generations (%)	88.8%	
Generation time (*T*) and Target population size used in projections	*T*=7.9 x 10 = 79 Target = 225	

*Value includes founders in calculations.
[a]Historical λ is population growth rate from demographic window (1969-2016) from life table calculated in PMx, also Projected λ is within the range of the PMx stochastic 20 yr projections.

Demographic analyses indicated that to increase the population size to 225 in 5 years, approximately 22-34 births are required (λ = 1.052). To remain at the current size (λ = 1.00), approximately 13 births are needed in the next year. As with most SSP populations, pairings are prioritized to maintain or increase gene diversity through considerations of mean kinship, avoidance of inbreeding, differences in sire and dam mean kinships, and the degree of uncertainty within a pedigree.

Summary Actions: The SSP recommends 30 breeding males and 29 breeding females, as well as 8 transfers for this period. Approximately 22-34 births per year are required to grow this population to a size of 225 in the next 5 years.

This Animal Program is currently a Yellow SSP Program and recommendations proposed are non-binding – Participation is voluntary. Dispositions to non-AZA institutions should comply with each institution's acquisition/disposition policy.

3-200-41

E. Captive-bred Wildlife Registration

Bornean Orangutan (*Pongo pygmaeus pygmaeus*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium provides data and updates to the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for Bornean orangutans. We currently have a 39 year old female and her 12 year old son. As these two animals are considered surplus animals we will hold them at our facility.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The genes of the Bornean orangutan population at the Pittsburgh Zoo & PPG Aquarium are being managed by the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for orangutans. As of the August 2014 Population Viability Analyses the orangutan population was at 84 individuals. In the previous 10 years the population averaged 2.7 births/year and the gene diversity was 97.2% with an inbreeding coefficient of F=0.0004.

The orangutan population currently has 45 hybrid individuals. The SSP does not recommend that these animals be bred and that they should be managed via attrition. Therefore the hybrid population can be expected to age out of zoos in approximately 32 years, which will increase spaces for the two orangutan managed populations. If the AZA Bornean orangutan population continues with the current birth rate it is expected to have 16 individuals remaining in 100 years. To maintain the population at its current size, it would need to produce an average of 4 births per year over the next 10 years. If the population produces ~5 birth/year, it could fill 115 potential spaces (the current spaces and half of the spaces currently held by hybrids) in approximately 32 years.

The AZA Orangutan Animal Programs should therefore re-allocate spaces currently occupied by hybrids as they come available between the two orangutan managed populations. They should also increase the breeding rates from the current ~3 births/year to ~5 births/year to fill spaces currently occupied by hybrid orangutans.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation

that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

At this time our two animals are considered surplus animals to the AZA. In August 2015 the Pittsburgh Zoo & PPG Aquarium decided to terminate its membership with the AZA. As a result the SSP has declared our orangutans to be surplus animals. The genetics of our animals are part of this managed population. By holding these animals and not breeding them we are freeing up space for other facilities to breed. Oral contraceptives are used on the dam to prevent inbreeding.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The earliest written record of orangutans occurring at the Pittsburgh Zoo & PPG Aquarium was in 1943. Our first family group was established with the opening of our Tropical Forest Complex (TFC) building in 1991 and some of those original troop members are still here today. We also maintain a troop of gorillas at our facility that was also established in 1991 but the earliest records of gorillas at the Pittsburgh Zoo was in 1953.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

Western lowland gorilla – one male infant born 11 April 2013 – Still alive today

Western lowland gorilla – one male infant born 25 May 2018 – Still alive today

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

There have been no mortalities in our large primates in the last 5 years.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The indoor orangutan exhibit is 1135 SF. It varies in height from 22' to 30'. There are 3 holding rooms for orangutans that total 408 SF. The building is constructed out of masonry walls and poured concrete floors in the basement and precast concrete plank on the first floor. There is 2" x 2" galvanized mesh used in the interior holding rooms of the basement. The orangutan viewing windows are 3 ply – ½" glass laminated with 2-90 mil polyvinyl butyral interlayers with tempered glass on the visitor's side. The indoor exhibit contains skylights throughout the high roof area and artificial trees made of textured epoxy on steel pipe. There are gunite painted and textured concrete simulating rocks, boulders, riverbanks, pools and waterfalls in the indoor exhibit. The indoor temperature is maintained by 2 roof mounted air conditioning units with in-line hot water duct heaters designed to maintain a temperature of 70-85 degrees with a relative humidity of 50%. The building also contains smoke detectors throughout and a sprinkler system in the basement. See attached for photos and diagrams.

Orangutan (*Pongo pygmaeus + Pongo abelii*)

August 2014

Population Biologist: Brent Johnson, bjohnson@lpzoo.org
Studbook Keeper: Megan Elder, megan.elder@ci.stpaul.mn.us
Animal Program Leader: Lori Perkins, lperkins@zooatlanta.org
AZA Ape TAG Chair: Tara Stoinski, tstoinski@zooatlanta.org
AZA Ape TAG Vice-Chair: Tracy Fenn, fennt@jacksonvillezoo.org

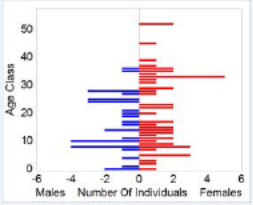
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years

	Sumatran	Bornean		
WITHOUT potential changes:	**Low Risk**	**Vulnerable**	Endangered	Critical
	Both			
WITH potential changes:	**Low Risk**	Vulnerable	Endangered	Critical

Bornean Population Status

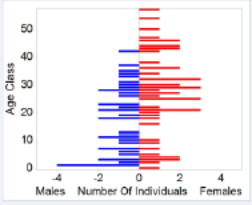
- 84 orangutans (33 males, 51 females) are housed at 25 AZA institutions
- The population has increased at 0.6% annual growth over the last decade, with an average of ~3 births/year
- 97% of the founding gene diversity (GD) has been retained
- Average inbreeding (F) is 0.0004
- IUCN status: Endangered



Age pyramid of the Bornean orangutan population

Sumatran Population Status

- 85 orangutans (36 males, 48 females, 1 unknown) are housed at 28 institutions
- The population has decreased at -0.4% annual growth over the last decade, with an average of ~3 births/year
- 98% of the founding gene diversity (GD) has been retained
- Average inbreeding value (F) is 0.0056
- IUCN status: Critically Endangered



Age pyramid of the Sumatran orangutan population

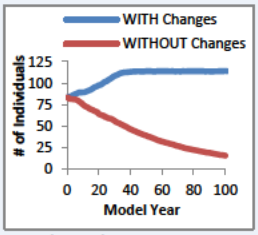
Program Challenges

- Managers intend to move toward a standard of parent rearing with a minimum of 8-year interbirth intervals among females, which allows for proper social development of offspring but lowers the breeding potential of each population

Model Results

Projected Status WITHOUT Potential Changes

- If the Bornean population continues its current breeding rate, it would have a 4% chance of extinction or ~16 individuals in 100 years
- 84.4% (± 8.8%) gene diversity and low inbreeding (F: 0.055 ± 0.003) would be maintained
- Status: **Vulnerable** in zoos in 100 years
- For additional details, see page 10 in the main report



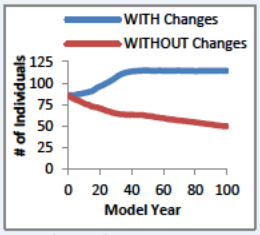
Projected size of the Bornean orangutan population

Projected Status WITH Potential Changes

- The Bornean population could fill available spaces if the breeding rate is increased to ~5 births/year
- High gene diversity (GD: 95.1% ± 0.2%) and low inbreeding (F: 0.039 ± 0.007) would be maintained
- Status: **Low Risk** in institutions in 100 years
- For additional details, see pages 11-12 (scenario D) in main report

Projected Status WITHOUT Potential Changes

- If the Sumatran population continues its current breeding rate, it would have decline to ~50 individuals in the next 100 years
- High gene diversity (GD: 92.2% ± 2.1%) and low inbreeding (F: 0.049 ± 0.015) would be maintained
- Status: **Low Risk** in zoos in 100 years
- For additional details, see page 17 in the main report



Projected size of the Sumatran orangutan population

Projected Status WITH Potential Changes

- The Sumatran population could fill available spaces if the breeding rate is increased to ~5 births/year
- High gene diversity (GD: 95.3% ± 0.2%) and low inbreeding (F: 0.040 ± 0.008) would be maintained
- Status: **Low Risk** in institutions in 100 years
- For additional details, see page 18-19 (scenario G) in main report

Essential Management Actions

- Re-allocate spaces currently occupied by hybrids as they become available over the next 32 years
- Increasing breeding rates to produce ~5 births/year in each population to fill spaces as they become available

How Institutions Can Help

- Pursue breeding recommendations given to your institution
- Report breeding challenges and successes to the Program Leader

Please see the 2014 Orangutan AZA Animal Programs full PVA report on the AZA website for further details.

Contact Brent Johnson at bjohnson@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) are being conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team uses ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Ape Taxon Advisory Group (TAG) during summer of 2014.

POPULATION HISTORY/CURRENT STATUS

Bornean orangutans (*Pongo pygmaeus*) have been consistently held in AZA institutions since 1940. Through a combination of importations of animals from outside of AZA and zoo births, the population grew to a size near 75 individuals by 1969. The population currently includes 84 individuals. In the past 10 years, the population has had an average of 2.7 births/year. Current gene diversity is high (97.2%) and inbreeding is low (average inbreeding coefficient of 0.0004).

Sumatran orangutans (*Pongo abelii*) have been consistently housed in North American institutions since 1928, although the population size remained low (<30 individuals) until 1960. After that year, the population grew through a combination of importations of animals from outside of the formally managed population and zoo births to a peak size of 105 individuals in 1997. The population averaged 2.8 births/year in the past 10 years and currently includes 85 individuals. At present, the Sumatran orangutan population has high gene diversity (97.6%) and low inbreeding (average inbreeding coefficient of 0.0056).

For each orangutan population, managers have been moving toward a standard of parent rearing and more prolonged time that offspring spend with their mother. They intend to maintain a minimum of 8-year interbirth intervals among females (except when infant mortalities occur) to allow them to fully raise their young.

PVA RESULTS

Model results indicate that hybrid orangutans will age out of AZA institutions in approximately 32 years, which could increase spaces for the other orangutan populations. If the AZA Bornean orangutan population continues its current breeding rate (2.7 births/year in the past 10 years), it is expected to have a 4% chance of extinction or approximately 16 individuals remaining in 100 years. However, **increasing breeding is predicted to allow the AZA Bornean orangutan population to remain stable over the next 100 years**. For the population to maintain its current size, it would need to produce an average of ~4 births per year over the next 10 years. If the population produces ~5 births/year, it could fill 115 potential spaces (including half of those currently occupied by hybrids) in approximately 32 years.

Under its current breeding rate (2.8 births/year in the past 10 years), the formally managed Sumatran orangutan population is predicted to decline to an average of 50 individuals over the next 100 years. **Increasing breeding is predicted to also allow the Sumatran orangutan population to remain stable over the next 100 years**. To maintain its current size, the population should produce an average of ~4 births per year over the next 10 years. By producing ~4 births/year over the next decade and ~5 births every following year, the population could fill 115 potential spaces in approximately 33 years. Increasing breeding rates (to either maintain the current population size or fill potential spaces) is also expected to maintain the genetic health of each orangutan population over the next century.

MANAGEMENT ACTIONS

The AZA Orangutan Animal Programs should consider the following changes to current management strategies:

- **Re-allocate spaces currently occupied by hybrids as they become available:** Because spaces are expected to become available as hybrid orangutans age out of AZA institutions, managers should ensure that these spaces are allocated to Bornean and Sumatran orangutans to maintain each of these populations at a larger, stable size with the best possible genetic health.

- **Increase breeding rates:** For each orangutan population, breeding should be increased from ~3 births per year to a minimum of ~4 births each year to maintain the current population size. To fill spaces currently occupied by hybrid orangutans as they become available, the Bornean population should produce ~5 births per year. The Sumatran population, however, should produce ~4 births each year for the next decade and ~5 births every following year in order to do so. To achieve these higher breeding rates, it may not be possible to immediately implement the recommended 8-year interbirth intervals. If higher breeding rates could be maintained, each population may become demographically stable and maintain its genetic health.

Pittsburgh Zoo & PPG Aquarium

Bornean Orangutan

Tropical Forest Complex (TFC)

TFC interior

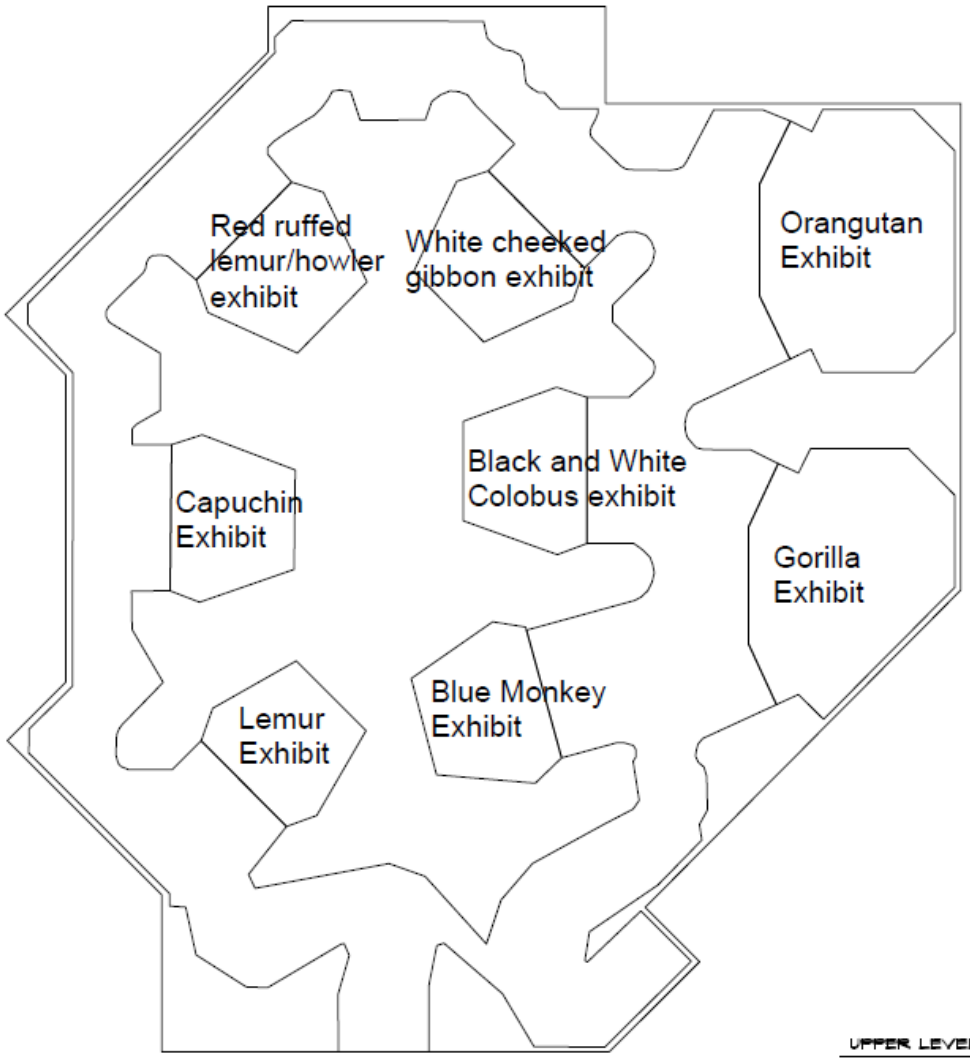
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

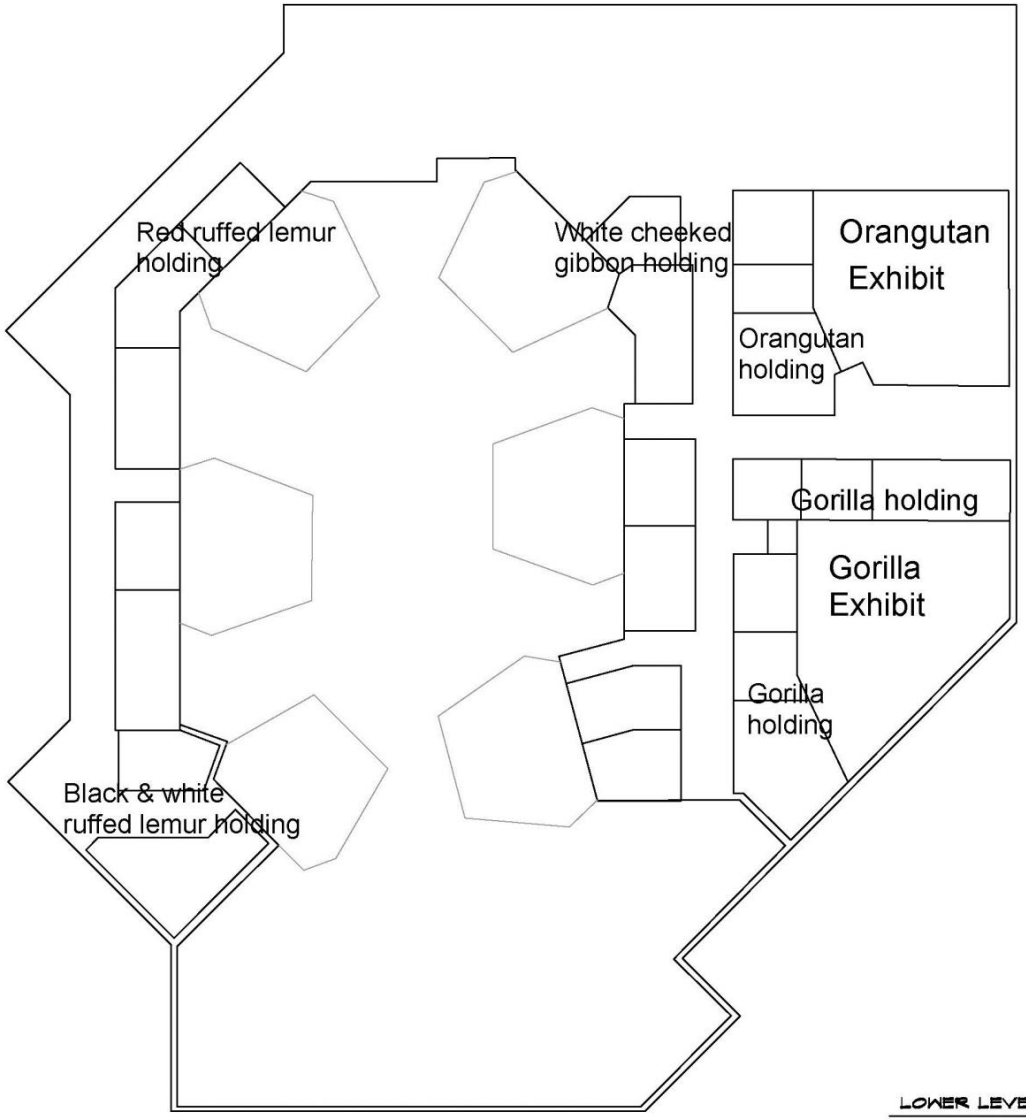
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level



LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

Orangutan exhibit

Artificial trees and fabricated vines provide enrichment and structure.

Orangutan exhibit

Artificial trees and fabricated vines provide enrichment and structure.

Orangutan holding room

Fire hose hammocks provide nesting sites. Exhibit door located on the far wall.

Orangutan holding room

Fire hose hammock and shelves provide nesting sites. The door on the far wall leads to the exhibit.

Orangutan holding room

Handles in the walls provide climbing structure.

3-200-41

E. Captive-bred Wildlife Registration

Cheetah (*Acinonyx jubatus*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for cheetah. We currently have a 6 year old female and her 1.5 year old daughter. We plan to follow the SSP breeding and transfer plan and will acquire and disposition as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the cheetah SSP. As of the January 2017 AZA Population Viability Analyses for cheetah (Appendix), the cheetah SSP population consisted of 309 individuals. These individuals retain 97.5% of the founding gene diversity and have an average inbreeding value of F=0.0032. Of those 309 individuals, 50 are currently ambassador or education animals and 69 individuals are excluded for being older than reproductive age, medical reasons or unknown pedigrees, leaving a potential breeding population of 190 individuals. An average of 31.8 births was born per year over the past decade and 4 animals on average were placed in education programs. To improve breeding and reduce the need to import individuals a Breeding Center Coalition (BCC) was formed by facilities with cheetah husbandry expertise and ample holding space. There are 9 BCC members that hold 70% of the potentially breeding population and produced 93% of the births within the past decade.

For modeling purposes, 259 “reproductively managed” individuals (190 potential breeders and 69 non-breeding) were considered. If the average birth rate of 31.8 births/year is used and with the transfer of 2 males and 2 females to the education population, the population is predicted to decline to approximately 221 individuals in 100 years. This decline will become more severe if the number of cheetahs allocated to the education program increases or if the sex ratio deviates from being even. If breeding is increased to 35-36 births/year, the reproductively managed population could support the allocation of 3 males and 3 females annually to education and remain near its current size.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be

obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

At this time the 2 female cheetahs that we have at our facility are considered part of the non-breeding population and are surplus. The dam has produced several litters and the cub is one of many of her offspring so their genes have been represented in the population. Since 93% of cheetah breeding occurs at the BCC facilities it is important for the remaining facilities to house the offspring so that they can continue to concentrate on breeding to reach the goal of 36 births/year. We will continue to support this program by following the SSP recommendations and hold these animals. Since both of these animals are female there is no need for contractives.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has maintained large felid species at our facility since it's opening in 1898.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has had 6 litters of large felids born in the last five years.

Amur Leopard – One male cub born 2 Feb 2014 – was still born
Amur Leopard – One female cub born 4 Feb 2016 – still alive today
Clouded Leopard – Two cubs, unknown sex born 28 Feb 2017 – consumed by dam
Amur Tiger – One female cub born 23 May 2017 – survived 3 days
Amur Tiger – One male and one female cub born 25 Sept 2017 – still alive today
Canada Lynx – Litter of 1.4.1 kittens born 9 May 2018 – 1.4 still alive, 0.0.1 did not survive 30 days

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The Pittsburgh Zoo & PPG Aquarium has had 12 deaths of large felids in the last five years.

African Lion – Female was euthanized for declining health 26 Dec 2013 at the age of 24
Amur Leopard – male cub was stillborn on 2 Feb 2014
African Lion – Female was euthanized for declining health 25 June 2015 at the age of 14
Cheetah – Female was euthanized for declining health 1 July 2015 at the age of 14
Snow Leopard – Female was euthanized, she had a tongue squamous cell carcinoma, 20 Dec

2016 at the age of 17

Clouded Leopard – 2 cubs were consumed by their dam moments after birth 28 Feb 2017

Amur Tiger – Female cub died 26 May 2017 at 3 days old, necropsy revealed life ending abnormalities

Amur Tiger – Male died post immobilization on 31 Aug 2017 at the age of 18

Amur Tiger – Female was euthanized for declining health on 3 Dec 2017 at the age of 19

African Lion – Female was euthanized on 6 Feb 2018 at the age of 17, necropsy revealed a tumor of the spleen that had metastasized to multiple locations.

Canada Lynx – cub went missing from nest box around day 18, presumed to have been consumed by the dam

No measures have been taken to prevent future mortalities as 7 of these animals lived long happy lives and the 5 cubs were either stillborn, consumed by the dam or had abnormalities that couldn't have been prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

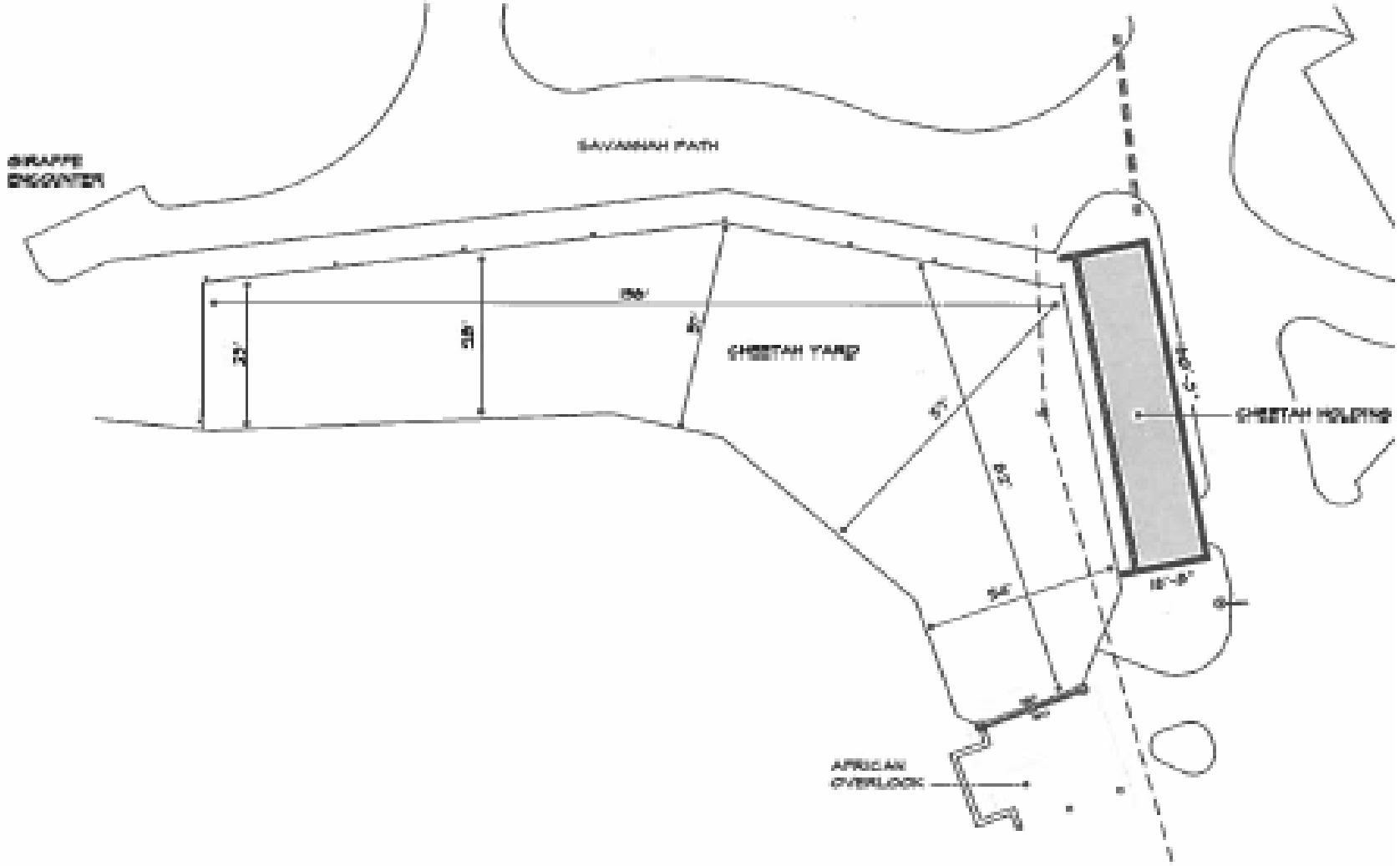
See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

The cheetah exhibit at the Pittsburgh Zoo & PPG Aquarium exists of an outdoor yard that is approximately 7500 SF and an indoor building that is 60'8" x 14'8". The outdoor yard is a long narrow exhibit perfect for allowing cheetahs to run. It is enclosed by woven wire mesh on three sides and the holding building across the fourth side. There is a cave structure, trees and a grass in the exhibit. The holding building was recently constructed and contains a family den that is 18' x 14'8" and will contain three holding stalls each measuring 8'9" x 8'8" when the chain link fencing arrives. The building was constructed out of cement block walls and poured floors. There is a visitor window into the family den that allows cold weather viewing and glass block windows down one side of the building as well as skylights above each animal holding area that provide natural light into each area. The building is heated with hydronic floor heat which is supplied by a gas fired boiler.

Pittsburgh Zoo & PPG Aquarium

Cheetah exhibit


SAVANNAH PATH
CHEETAH YARD
CHEETAH HOLDING
AFRICAN OVERLOOK

SITE PLAN

Cheetah holding building

This is the back view of the cheetah holding building. This building has several windows on this side to let in natural light.

Cheetah viewing window

This window allows viewing into a holding room in the cheetah building. This provides light for the cheetah while indoors and provides viewing from the public during the colder months.

Cheetah exhibit viewing window

This window allows the public to view the cheetah outdoor exhibit.

Cheetah outdoor exhibit

This is the view of the cheetah outdoor exhibit from the viewing window.

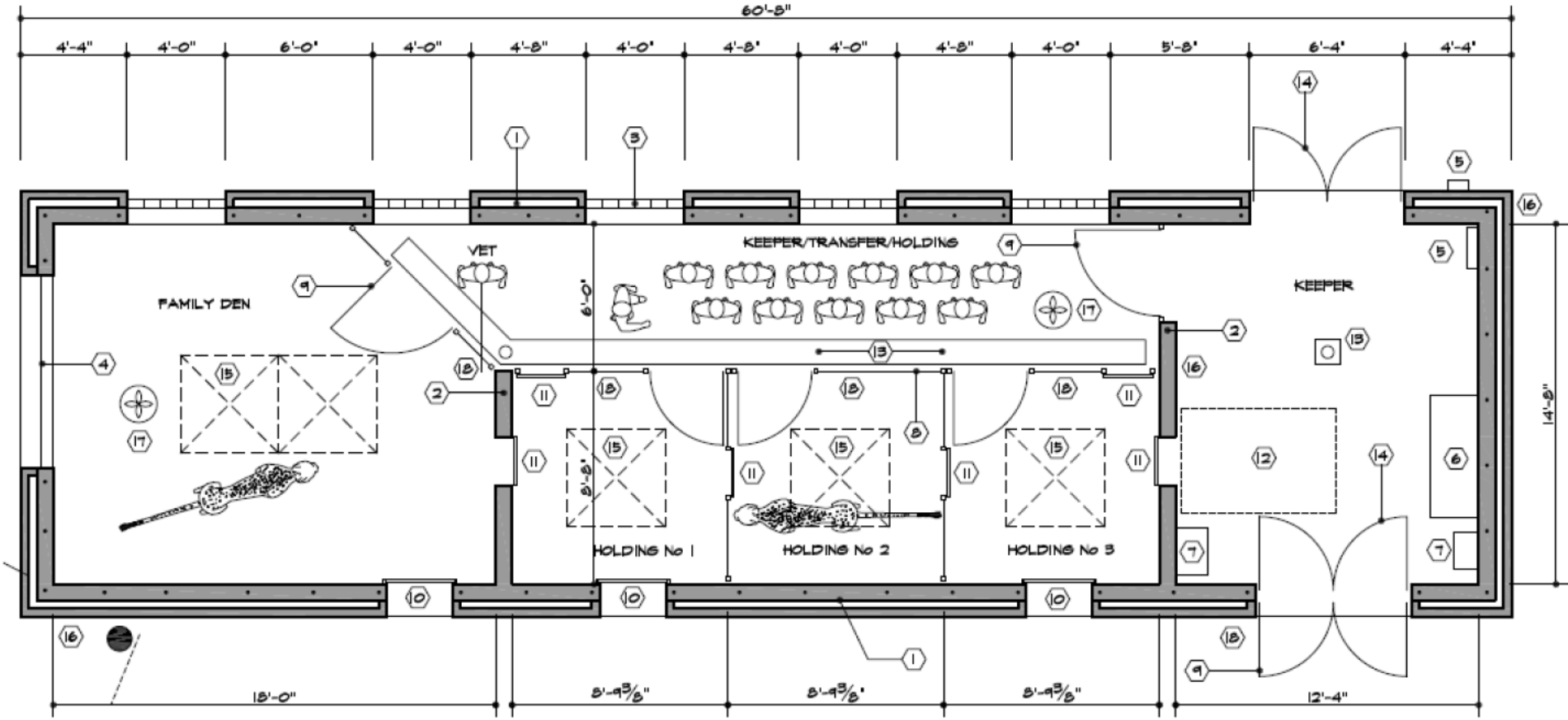
Cheetah exhibit

This exhibit was built as a long narrow exhibit to allow the cheetah to build up speed while running.

Cheetah on exhibit

The exhibit is enclosed with woven wire mesh.

Cheetah Holding



Cheetah indoor family den

Raised firehose beds and straw provide sleeping space. Visitors can view the cheetah all year round when they are in this family room.

Cheetah (*Acinonyx jubatus*)

January 2017

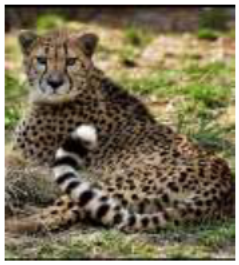


Photo courtesy of Meghan Murphy, National Zoological Park

Population Biologists: Lauren Terwilliger, lterwilliger@lpzoo.org
Sarah Long, slong@lpzoo.org
Brent Johnson, bjohnson@lpzoo.org
Animal Program Leader: Adrienne Crosier, CrosierA@si.edu
Studbook Keeper: Erin Moloney, Erin.Moloney@BuschGardens.com
AZA Felid TAG Chair: Don Goff, dgoff@beardsleyzoo.org

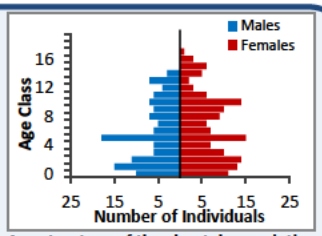
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected breeding population status in 100 years

WITHOUT potential changes:	Low Risk	**Vulnerable**	Endangered	Critical
WITH potential changes:	**Low Risk**	Vulnerable	Endangered	Critical

Current Population Status

- 309 cheetahs (145 males, 164 females) are housed at 57 institutions
- 50 cheetahs (28 males, 22 females) are in education/animal ambassador programs and are non-breeding
- The population increased over the last decade at an average rate of 2.4%, and averaged ~32 births, 4.1 imports and 1.9 exports per year
- 97.5% of the founding gene diversity (GD) has been retained
- The population's average inbreeding value (F) is 0.003
- IUCN status: Vulnerable in the wild



Age structure of the cheetah population

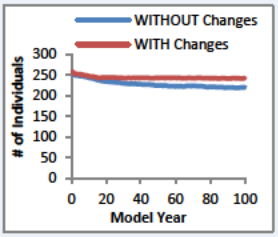
Program Challenges

- The potentially breeding population is presently limited to 190 individuals (91 males, 99 females) which is ~61% of the total population
- 69% of the potentially breeding population is concentrated at 9 Breeding Center Coalition institutions with husbandry expertise and breeding success; these institutions have produced 93% of births over the last decade, but limited space or resources could limit future reproduction at these facilities
- Interest in cheetahs for education/animal ambassador programs is increasing and these animals typically do not contribute to breeding
- Space may limit reproduction, as holding spaces for program animals may be interchangeable with that for exhibit animals, but is rarely interchangeable with that for breeding animals

Reproductively Managed Population Results

Projected Status WITHOUT Potential Changes

- If the population continues to produce ~32 births/year and allocate 4 cheetahs/year to education, it would have a 7% chance of extinction or ~221 individuals in 100 years
- 89.1% (± 3.8%) gene diversity and moderate inbreeding (F: 0.119 ± 0.022) would be maintained
- Status: **Vulnerable** in zoos in 100 years
- For additional details, see page 8-9 (Scenario A) in the main report



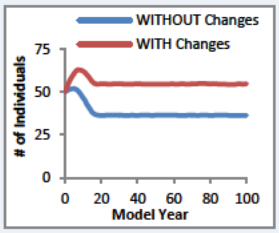
Projected Status WITH Potential Changes

- The population could maintain its size and support 6 animals/year to education only if breeding is increased to 35-36 births/year
- 90.8% ± 1.7% gene diversity and moderate inbreeding (F: 0.102 ± 0.013) would be maintained
- Status: **Low Risk** in institutions in 100 years
- For additional details, see page 10 (Scenario E) in main report

Education Population Model Results

Projected Status WITHOUT Potential Changes

- If the non-breeding education population continues to draw 4 animals/year from the reproductively managed population, it would decrease and stabilize at ~36 individuals in 100 years
- For additional details, see pages 12-13 in the main report



Projected Status WITH Potential Changes

- The education population needs 6 cheetahs/year to maintain its current size
- For additional details, see pages 11-12 (scenario D) in main report

Management Actions

- Increase breeding to 35-36 births/year and allocate 6 cheetahs/year to education to maintain the cheetah population near 300 individuals

How Institutions Can Help

- Pursue breeding recommendations given to your institution by the Program Leader
- Help the SSP meet the needs of education programs and the breeding population by balancing the number of new program animals with annual births

Please see the 2017 Cheetah AZA Animal Program PVA report update on the AZA website for further details.

Contact Lauren Terwilliger at lterwilliger@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) have been conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team used ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Felid Taxon Advisory Group (TAG) in 2012 and with the SSP and Population Advisor in 2015-2016.

POPULATION HISTORY/CURRENT STATUS

As of 1 January 2016, the cheetah (*Acinonxy jubatus*) Species Survival Plan© (SSP) population (at 57 AZA and partner institutions) included 309 individuals, that retain 97.5% of founding gene diversity and have an average inbreeding value of F = 0.0032 (F = 0.0625 is equivalent to mating between first cousins). Over the past decade, the total population has increased by approximately 2.4%, with annual rates varying from -3.5% to 8.7%. At the same time, there has been increasing interest in the use of cheetahs in education/animal ambassador programs. Due to differences in rearing, handling, and housing, and reluctance to remove animals from education/ambassador programs, it is generally assumed that program cheetahs are not part of the breeding population. Currently, 50 individuals are considered education animals/animal ambassadors. An additional 69 animals are excluded from breeding (due to age, health, unknown pedigree, etc.), limiting the potentially breeding population to 190 individuals. The population averaged 31.8 births/year over the past decade. Also during the past decade, individuals were placed in education programs at an average rate of 4 animals (2 males and 2 females) annually, and managers anticipate that the allocation of cheetahs to these programs will continue at a rate at least that of the past decade.

PROGRAM CHALLENGES

Following a series of workshops (2010-2012) aimed to focus programmatic research and management goals and increase offspring production led by the Conservation Centers for Species Survival, the Cheetah SSP re-focused its efforts on improving breeding to meet population goals and institutional demand for this popular species. To improve breeding, and reduce the need to import individuals, a Breeding Center Coalition (BCC) was formed by facilities with cheetah husbandry expertise and ample holding space. Currently, the potentially breeding population is distributed among 32 institutions, although only nine of these institutions are members of the BCC, which collectively holds ~70% of the potentially breeding population and produced 93% of births within the past decade. In addition to ongoing demand for exhibit animals, there is increasing interest in using cheetahs as non-breeding education animals/animal ambassadors. Space availability may also challenge the population, as holding space for program animals may be interchangeable with that for exhibit animals, but is rarely interchangeable with that for potentially breeding animals. Furthermore, space at breeding centers is often occupied by post-reproductive animals that are difficult to place at other institutions.

PVA RESULTS

For the purposes of the PVA model, all 190 potentially breeding animals and 69 non-breeding, excluded animals were considered part of a single "reproductively managed" population of 259 individuals, occupying and moving between breeding and exhibit spaces. The 50 animals presently in education/animal ambassador programs were considered to be members of a separate "education" population that serves as a "sink" to which the reproductively managed population exports and permanently loses potential breeders. If we consider only the reproductively managed population (starting N = 259), under the average breeding rate of the past 10 years (31.8 births/year) and the transfer of 2 males and 2 females per year to the education population, the population is predicted to decline to approximately 221 individuals and have a ~7% likelihood of extinction over the next century. This population decline is predicted to be more extreme if the number of cheetahs allocated to education increases or deviates from an even sex ratio. However, if allocation to education programs is reduced, the reproductively managed population could remain near 250 individuals with fewer births annually. Alternatively, if breeding is increased from ~32 births/year to 33-34 births/year, the reproductively managed population could maintain its present size and support the transfer of 2 males and 2 females annually to the education population. If breeding is increased further to 35-36 births/year, the reproductively managed population could support the allocation of 3 males and 3 females annually to education and remain near its current size. With increased breeding, the reproductively managed population is estimated to have ~91% gene diversity and inbreeding above that of a first-cousin mating (F = 0.0625) in 100 years. Projections of the education population (starting N= 50) indicate that it could stabilize at a smaller size of ~36 individuals over the next century with the addition of 2 males and 2 females annually from the reproductively managed population; the addition of 3 males and 3 females annually could allow the education population to stabilize near 55 individuals over the next 100 years. In summary, the cheetah population could maintain a demographically stable reproductive population and support a consistent number of program animals into the future if the breeding rate is increased to ~35-36 births/year.

MANAGEMENT ACTIONS

Given current challenges for the cheetah SSP population, PVA results indicate that the following changes in management, pertaining to the use of animals for education/ambassador programs, should be considered in an effort to improve this population's sustainability. Note that the PVA allows us to compare between hypothetical changes, but cannot evaluate whether achieving these changes is feasible, practical, or desirable given the program's constraints.

- **To maintain the demographic stability of the reproductively managed population:**
  - **Increase breeding:** If breeding is increased from an average of ~32 births/year to ~33 births/ year in the next decade and 34-35 births/year thereafter, the reproductively managed portion of the population could remain near its current size and support the current rate of allocation to education/animal ambassador programs (2 males and 2 females per year). Any breeding rate below this would cause the population to decline. Furthermore, allocating uneven numbers of males and females to education/animal ambassador programs may make it challenging to achieve the recommended breeding rate by limiting the number of potential breeding pairs that can be formed.
  - **Reduce allocation to (non-breeding) education programs:** The reproductively managed population could maintain its current size with fewer births annually if allocation to education/animal ambassador programs is reduced in the future.
- **To maintain both the reproductively managed population and the education population near their current sizes, increase breeding to support an increase in the rate at which individuals are allocated to education programs:** If breeding in the reproductively managed portion of the population is increased to an average of ~35-36 births/year and 6 animals (3 males and 3 females) are transferred into the education population annually, both the reproductively managed and education populations could remain near their current sizes for the next century.

Please see the 2017 Cheetah AZA Animal Program PVA report update on the AZA website for further details.

Contact Lauren Terwilliger at lterwilliger@lpzoo.org with questions

3-200-41

E. Captive-bred Wildlife Registration

Clouded Leopard (*Neofelis nebulosa*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for clouded leopards. We currently have a breeding pair. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the clouded leopard SSP. As of the April 2013 AZA Animal Program Population Viability Analysis Report (appendix) there were 72 clouded leopards in the population. The current holding availability is 82 individuals. The modeling results indicate that if the conditions stay the same the AZA population faces an annual decline of 2% over the next 25 years. The model is predicting an average of 6 births per year and an average of 8 deaths per year in the first 10 years. If the population could raise its average number of births to 8 births per year then the population could sustain its current size in the next 100 years. If the population could increase its average number of births to 11 births per year, the population could reach the number of available spaces in approximately 6 years.

When looking at the genetic viability of this population the inbreeding levels are very high at the end of 100 years under the baseline scenarios. Improved reproduction and importations improve the populations genetic outlook the most at the end of 100 years but the genetics remain a concern as many of the animals in the current population are related to one another resulting in low gene diversity and high inbreeding levels. Therefore the AZA Clouded Leopard Animal Program will need to apply several management strategies to counteract the projected demographic decline, low gene diversity and high inbreeding levels. They will need to increase reproduction; import young, unrelated, reproductively viable individuals; recruit new institutions to increase holding space and research pairing options such as creating trios at early ages.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

As per the final breeding recommendations for 2017-2018 (appendix) we are to breed the pair of clouded leopards at our facility so we have not been asked by the SSP to hold surplus animals at this time.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has maintained large felid species at our facility since it's opening in 1898. We received our first pair of clouded leopards into our collection in December 2014.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has had 6 litters of large felids born in the last five years.

Amur Leopard – One male cub born 2 Feb 2014 – was still born
Amur Leopard – One female cub born 4 Feb 2016 – still alive today
Clouded Leopard – Two cubs, unknown sex born 28 Feb 2017 – consumed by dam
Amur Tiger – One female cub born 23 May 2017 – survived 3 days
Amur Tiger – One male and one female cub born 25 Sept 2017 – still alive today
Canada Lynx – Litter of 1.4.1 kittens born 9 May 2018 – 1.4 still alive, 0.0.1 did not survive 30 days

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The Pittsburgh Zoo & PPG Aquarium has had 12 deaths of large felids in the last five years.

African Lion – Female was euthanized for declining health 26 Dec 2013 at the age of 24
Amur Leopard – male cub was still born on 2 Feb 2014
African Lion – Female was euthanized for declining health 25 June 2015 at the age of 14
Cheetah – Female was euthanized for declining health 1 July 2015 at the age of 14

Snow Leopard – Female was euthanized, she had a tongue squamous cell carcinoma, 20 Dec 2016 at the age of 17
Clouded Leopard – 2 cubs were consumed by their dam moments after birth 28 Feb 2017
Amur Tiger – Female cub died 26 May 2017 at 3 days old, necropsy revealed life ending abnormalities
Amur Tiger – Male died post immobilization on 31 Aug 2017 at the age of 18
Amur Tiger – Female was euthanized for declining health on 3 Dec 2017 at the age of 19
African Lion – Female was euthanized on 6 Feb 2018 at the age of 17, necropsy revealed a tumor of the spleen that had metastasized to multiple locations.
Canada Lynx – cub went missing from nest box around day 18

No measures have been taken to prevent future mortalities as 7 of these animals lived long happy lives and the 5 cubs were either stillborn, consumed by the dam or had abnormalities that couldn't have been prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

The Clouded leopards share a building with Visayan Warty Pigs. The Clouded leopards have two holding rooms each measuring 8' x 8'1" and an indoor day room that is 11' x 10'. The building is constructed with concrete slab-on-grade, masonry walls and metal roof decks. Holding rooms have masonry walls on three sides and galvanized steel 2"x 2" mesh on the 4th side. Holding room 1 has two wooden nest boxes each measuring 30" x 30" x 24". Heating is in-floor hydronic heating sourced by natural gas boilers with mechanical ventilation. Plumbing includes gas fires instantaneous water heaters, sinks, hose connections, and catch basin style floor drains. Electrical involves general power distribution and LED lighting.

The outdoor enclosure is netted with woven wire mesh and covers 750 SF in area and 10,000 CF in volume. The netted enclosure is 10' high at the perimeter and 16' high at the center. The outdoor exhibit has 2 handcrafted trees that support the leopards climbing and perching and a water feature for drinking water and enrichment. See attached for photos and diagrams.

Clouded Leopard *(Neofelis nebulosa)*

Population Biologist: Katelyn Marti, kmarti@lpzoo.org
AZA SSP Coordinator & AZA Studbook Keeper:
Bonnie Breitbiell, bonnieb@centralfloridazoo.org
AZA Felid Chair: Don Goff, dgoff@beardsleyzoo.org

Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years WITHOUT potential changes:

Low Risk | Vulnerable | Endangered | **Critical**

Projected zoo & aquarium population status in 100 years WITH potential changes:

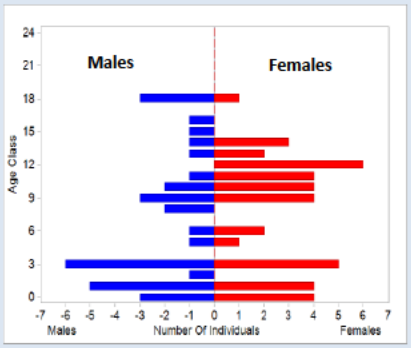
Low Risk | Vulnerable | **Endangered** | Critical

Status as of 2012

- 72 (32.40) total clouded leopards at 22 AZA institutions
  Population trend over last 10 years: slightly decreasing (λ = 0.962)
- Gene diversity (GD) = 87.77%
- Potential Space in model = 82
- IUCN status = Vulnerable

AZA Animal Program Challenges:

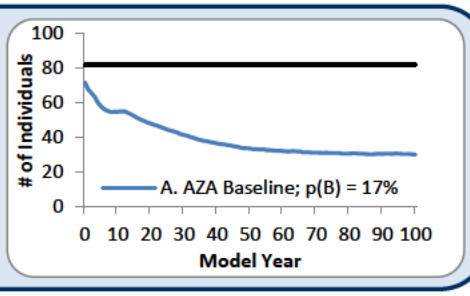
- Unique breeding system (pair young animals)
- Older, non-reproductive population
- High inbreeding levels



Projected Status WITHOUT Potential Changes

CRITICAL AZA institutions

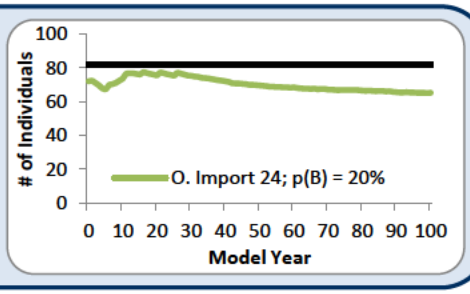
- Baseline Scenario = 6 births/year
- 57% chance of reaching extinction in 100 yrs
- Median time to extinction = 70 yrs
- 44 ± 20 (SD) average leopards in 25 yrs
- 30 ± 33 (SD) average leopards in 100 yrs
- 55% ± 14% (SD) projected GD in 100 yrs
- 0.38 ± 0.11 (SD) projected F in 100 yrs



Projected Status WITH Potential Changes

ENDANGERED in AZA institutions

- Increased female breeding at p(B)= 20% (~8 births/year) and potential space at 82
- 3% chance of reaching extinction in 100 yrs
- Median time to extinction = 83 yrs
- 65 ± 20 (SD) average leopards in 100 yrs
- 78% ± 7% (SD) projected GD in 100 yrs
- 0.20 ± 0.05 (SD) projected F in 100 yrs



Essential Actions

- Increase reproduction
- If possible, import young, unrelated animals in accordance with federal and international regulations

How to Help

- Pursue breeding recommendations given to your institution
- Research alternative paring options for current or future individuals
- Discuss husbandry challenges and successes with the SSP Coordinator
- Work with the SSP Coordinator and TAG to import young, unrelated animals

Please see the 2013 AZA Clouded Leopard Animal Program full PVA report on the AZA website for further details.

EXECUTIVE SUMMARY

Clouded Leopard AZA Animal Program Population Viability Analysis

Population Viability Analysis (PVA) model scenarios were developed with members of the Association of Zoos and Aquariums (AZA) Felid Taxon Advisory Group (TAG) and Clouded Leopard Animal Program in July 2012. The PVA is being conducted under the support of a two-year grant to Lincoln Park Zoo researchers from the Institute of Museum and Library Services (IMLS) to analyze AZA population's long-term viability. The project team is using ZooRisk 3.80 (Earnhardt et al., 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remained the same (the baseline scenario), and then assess the impact of changes such as increasing reproduction, importation strategies, and not utilizing genetic management (alternative scenarios). The current AZA clouded leopard total population size is 72 (32 males, 40 females) individuals at 22 institutions.

MODEL RESULTS

Model results indicate that if conditions remain the same, the AZA clouded leopard population faces an **annual 2% decline over the next 25 years.** The projected population decline occurs because the number of deaths exceeds the number of births in the population. The baseline AZA model produces, on average, 6 births per year in comparison to an average of 8 projected deaths per year in the first 10 years of the model. The declining population has an only 27% probability of reaching its number of potential space of 82 individuals under current conditions.

The clouded leopard population is able to improve its trajectory with reasonable improvements in reproduction. For instance, an increase from the current average of 6 births per year to 8 births per year (p(B) = 20% scenario), would allow the population to roughly sustain its current size in the next 100 years. If the population can reach an average of 11 births per year, the population will reach the number of potential spaces in approximately 6 years with 100% of model iterations meeting the space goal.

If appropriate, young, reproductively-viable clouded leopards may be available from outside the AZA population and imported in accordance with federal and international regulations. These individuals would benefit the population demographically, but more importantly genetically as inbreeding levels are very high at the end of 100 years under the baseline scenarios (higher than sibling relationship). Model scenarios with both improved reproduction and importations improve the population's demographic and genetic outlook the most at the end of 100 years; however, genetics remain a concern as many of the animals in the current population are related to one another resulting in low gene diversity retention and higher inbreeding levels than desired.

MANAGEMENT ACTIONS

The AZA Clouded Leopard Animal Program should apply several management strategies in combination with one another to counteract the projected demographic decline, low gene diversity, and high inbreeding levels in the future, and to accommodate institutional interest.

- **Increase reproduction:** The Animal Program should focus on breeding more reproductively viable females to increase the number of offspring produced per year. Any number of births in excess of the current level (6 births per year) will assist the population in growing towards its potential space of 82 animals. All breeding recommendations received are important to the long-term future of this population; institutions should work to get males and females into appropriate breeding situations quickly and work on husbandry to improve breeding success.
- **Importation of young, reproductively viable individuals:** In some cases importation could offset the decline the population is facing in the next several years and increase the long-term gene diversity. However, importations will have less of a positive impact on genetics if the imported individuals are related to the current population or each other, which may be challenging for this population as the source of many of the imports is a population with some animals already related to the AZA population. In addition, it would increase the capacity of the population to produce offspring, which is limited currently by an aging population with many animals unable to breed for medical, behavioral, or age. Imports must be coupled with increased reproduction to successfully grow the population in the long-term and increase gene diversity. Even though modeled levels of imports assisted the population demographically, ultimately this population under most model scenarios had lower-than-desired levels of gene diversity in 100 years.
- **Recruit new institutions and allocate additional spaces:** Space and institutional interest are a main concern for this population if reproduction is increased. If additional spaces are not available it will complicate the placement of offspring or imported individuals. If reproduction and or/importation is successful in improving the population's trajectory, it will quickly be hampered by its small number of potential spaces. As a long-term goal, an increased number of potential spaces for the population will allow for a healthier age structure, a more stable population size, and better long-term genetic health.
- **Research pairing options**: Institutions should work to form alternate pairing situations to provide more flexibility in breeding opportunities, thus increasing the number of females breeding. Forming trios (1.2.0) at early ages could allow for the rotation of males between familiar females and may provide additional breeding opportunities for the AZA population. This management strategy could also provide more genetic variation and reduce the issue of long-term bonded pairs that are unable to be managed with other individuals.

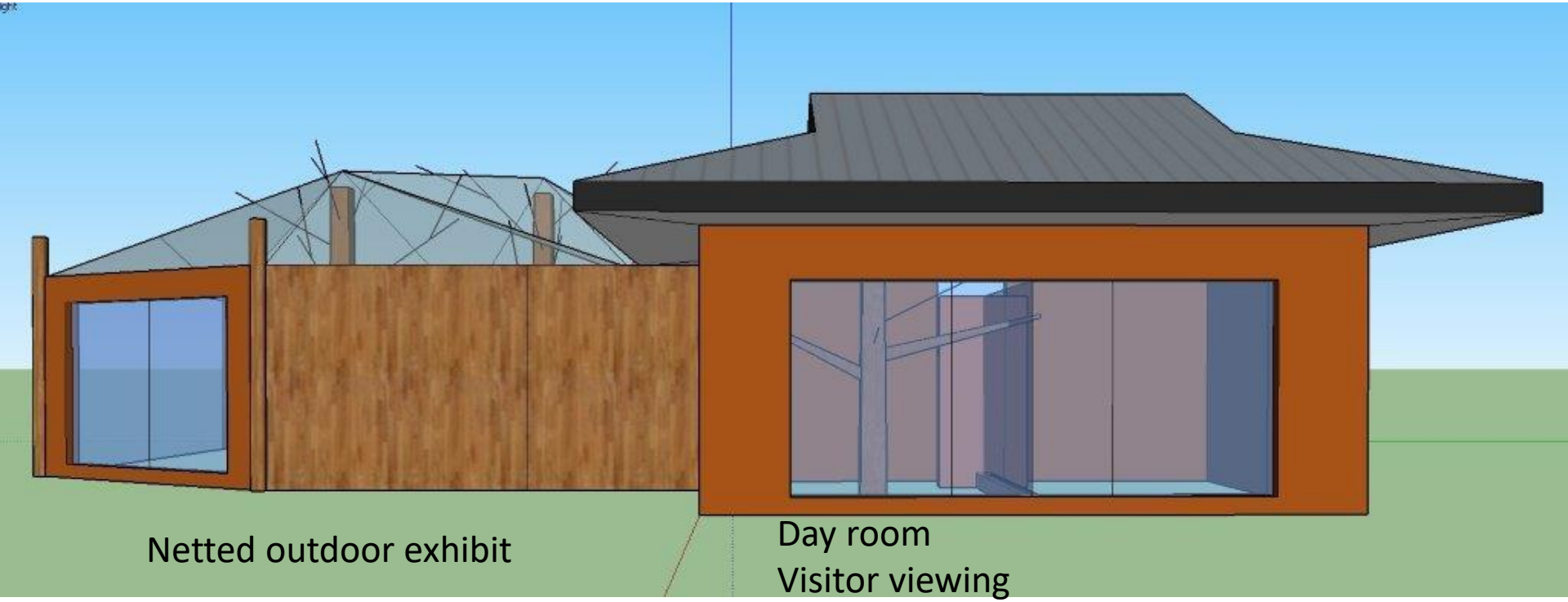
Please see the 2013 AZA Clouded Leopard Animal Program full PVA report on the AZA website for further details.

Pittsburgh Zoo & PPG Aquarium

Clouded leopard

Clouded Leopard

Visayan Warty Pig



Clouded leopard building

The window in this photo is visitor viewing into the day room. The Clouded leopard viewing is on the left and the Visayan warty pig is on the right.

Clouded leopard building

Outdoor netted enclosure is located on the left. Visitor viewing window is also visible.

Clouded leopard outdoor exhibit

Woven wire mesh encloses the outdoor exhibit. One of two visitor viewing windows into the outdoor exhibit.

Clouded leopard exhibit

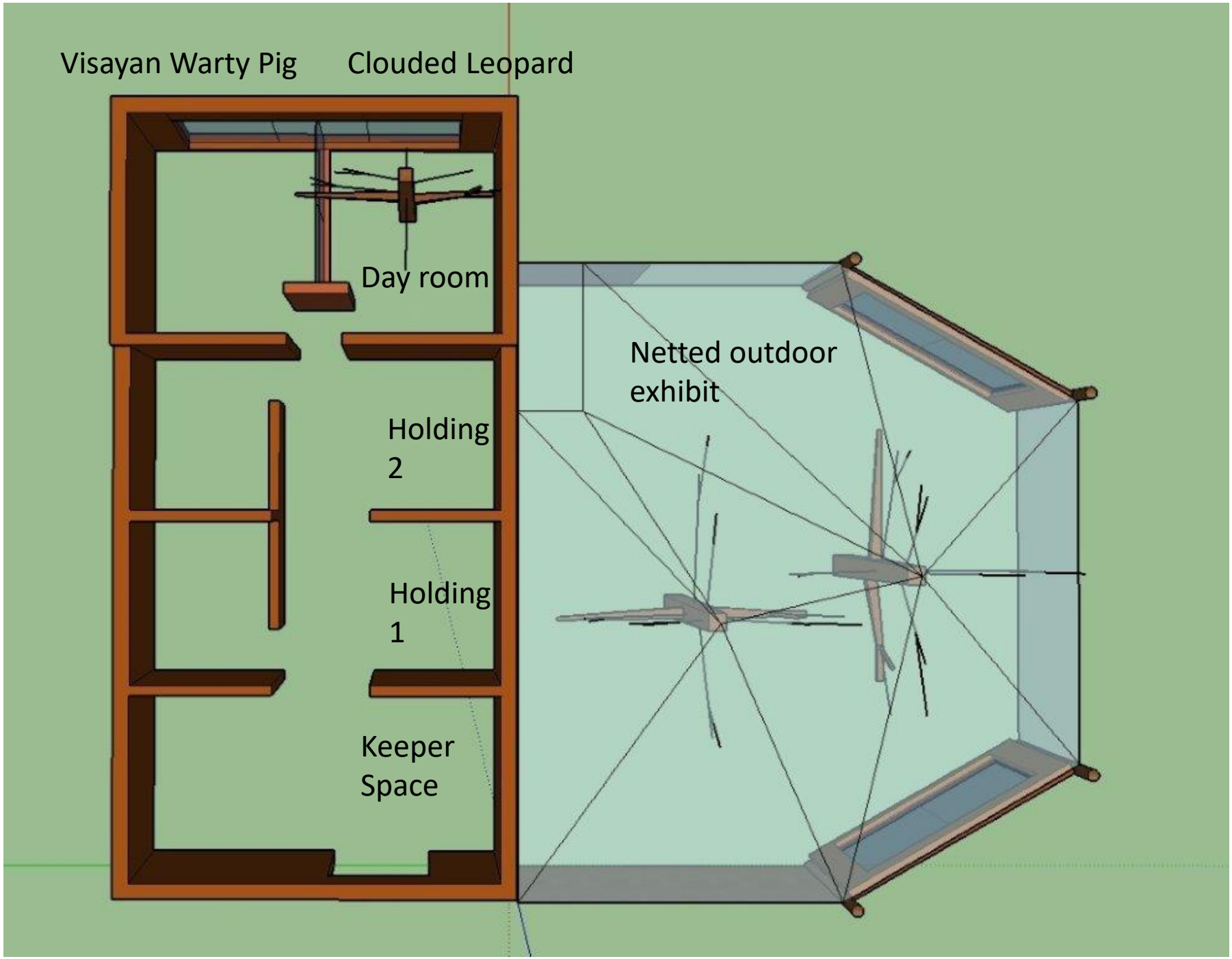
Artificial tree provides climbing structure. Shade cloth over exhibit provides shade.

Clouded leopard exhibit

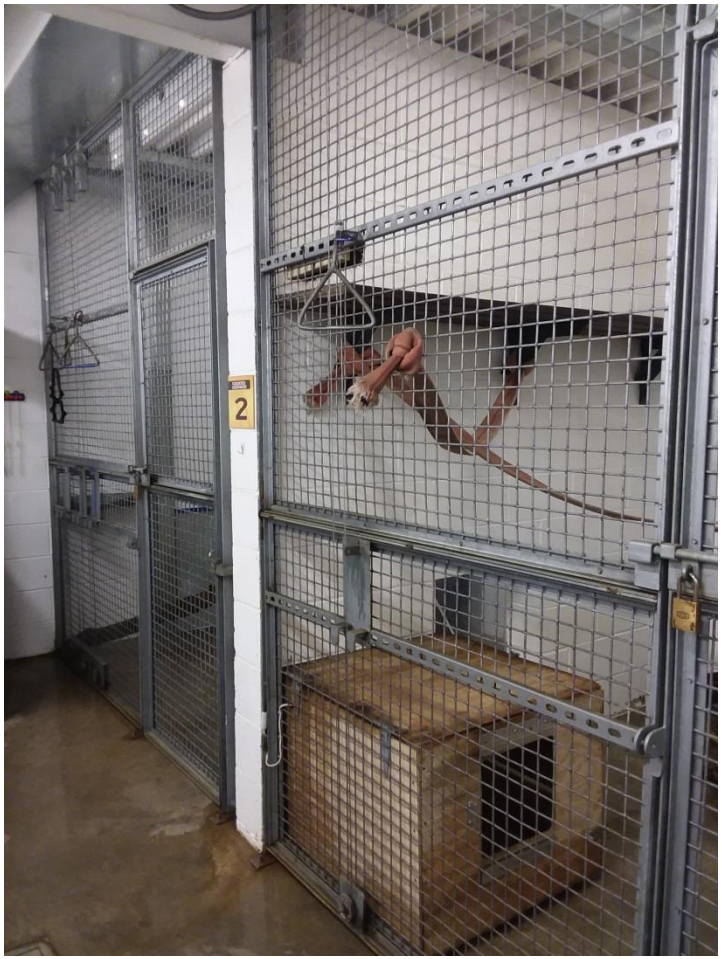
This water feature provides fresh water and enrichment.

Clouded leopard

Limbs on artificial tree structure are wide enough for lounging in the sun.


Visayan Warty Pig
Clouded Leopard
Day room
Holding 2
Holding 1
Keeper Space
Netted outdoor exhibit

Clouded leopard holding



- There are two holding rooms for clouded leopards
- The first stall contains nesting boxes.

Clouded leopard holding 1

- The door on the back wall leads to the outdoor exhibit.
- The door on the left leads to the 2nd holding room.
- Shelves and rope provide climbing structure.

Clouded leopard holding 2

- The door on the back wall leads to the outdoor exhibit.
- The door on the left leads to the indoor day room.
- Shelves and logs provide climbing structure.

Population Analysis & Breeding and Transfer Plan

Red Ruffed Lemur (*Varecia rubra*)

AZA Species Survival Plan®
Yellow Program

AZA Species Survival Plan® Coordinator
Christie Eddie, Omaha's Henry Doorly Zoo & Aquarium
(christiee@omahazoo.com)

AZA Studbook Keeper
Mylisa Whipple, Saint Louis Zoo
(whipple@stlzoo.org)

AZA Adjunct Population Advisor
Gina M. Ferrie, Disney's Animal Kingdom®
(Gina.M.Ferrie@disney.com)

9 February 2017

PMC
Population Management Center
Lincoln Park Zoo
Association of Zoos & Aquariums

Disney's Animals, Science and Environment

Executive Summary
Species Survival Plan® for Red Ruffed Lemur (*Varecia rubra*)

The current SSP population of red ruffed lemurs is N = 187 animals (104 males; 83 females; 0 unknown sex) at 48 AZA institutions and 4 non-member participating institutions. This Population Analysis and Breeding and Transfer Plan was prepared November 2016 at Disney's Animal Kingdom®. The last Breeding and Transfer Plan for this species was finalized 8 December 2015. Analyses were based on the North American data of the International *Varecia rubra* Studbook (current to 30 June 2016) and were performed using PopLink 2.4 and PMx 1.4.20160831.

The target population size designated by the Prosimian Taxon Advisory Group 2014 Regional Collection Plan is 225. This population currently qualifies as a Yellow SSP.

Genetic diversity in this population is currently 91.61%. When gene diversity falls below 90% of that in the founding population, it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights and greater infant mortality. Gene diversity in 100 years is projected to be 84.2% (based on current statistics, assuming a target population for projections of 225 and lambda = 1.05). Gene diversity in 10 generations (83 years) is projected to be 85.4%. Equalizing the founder representation by breeding individuals from underrepresented lineages and increasing the effective size, and target population size could extend gene diversity retention.

Demography	
Current size of population (N) – Total (Males.Females.Unknown Sex)	187(104.83.0)
Number of individuals excluded from the potentially breeding population	27 (14.13)
Population size following exclusions	160(90.70.0)
Target population size (Kt) from the Prosimian TAG's 2014 RCP	225
Mean generation time (T; years)	8.3
Historical population growth rate (λ; life table lambda 1973-present) / 5 – year from Poplink census / Projected growth rate from PMx stochastic 20 yr projections	1.050 / 0.979 / 1.028 <> 1.042 <> 1.055

Genetics		
	Current	***Potential***
Founders	12	0
Founder genome equivalents (FGE)	5.96	9.24
Gene diversity (GD %)	91.61%	94.59%
Population mean kinship (MK)	0.0839	-----
Mean inbreeding (F)	0.0430	-----
N_e/N (Effective population size/census size ratio)	0.3200*	-----
% Pedigree Known prior to assumptions and exclusions	92.0%	-----
% Pedigree Known after assumptions and exclusions	100%	-----
% Pedigree Certain after assumptions and exclusions	98.0%	-----
Projections		
	[a]Historical/Projected λ = 1.05	
Years to 90% GD	20	-----
Years to 10% loss of GD	124	-----
Gene Diversity at 100 Years (%)	84.2%	-----
Gene Diversity in 10 Generations (%)	85.4%	-----
Generation time (*T*) and Target population size used in projections	*T*=8.3 x 10 = 83 Target = 225	

*Value includes founders in calculations.
[a]Projected/Historical λ is growth rate from PMx stochastic 20 yr projections and historical λ from demographic window (1973-2015) from life table calculated in PMx.

Demographic analyses indicated that to increase the population size to 225 in 4 years, approximately 22-24 births are required (λ = 1.048). To remain at the current size (λ = 1.00), approximately 14 births are needed in the next year. As with most SSP populations, pairings are prioritized to maintain or increase gene diversity through considerations of mean kinship, avoidance of inbreeding, differences in sire and dam mean kinships, and the degree of uncertainty within a pedigree.

Summary Actions: The SSP recommends 18 breeding males and 16 breeding females, as well as 11 transfers for this period. Approximately 22-24 births per year are required to grow this population to a size of 225 in the next 4 years.

This Animal Program is currently a Yellow SSP Program and recommendations proposed are non-binding – Participation is voluntary. Dispositions to non-AZA institutions should comply with each institution's acquisition/disposition policy.

3-200-41

E. Captive-bred Wildlife Registration

Red ruffed lemur (*Varecia rubra*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for red ruffed lemurs. We currently have a 14 year old female that recently lost her companion. She is an over-represented female in the population but had a breeding recommendation with a valuable male. The male died at the age of 28 years old. Currently we are holding for the SSP to make a decision. We would like to bring in a male for breeding. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the red ruffed lemur SSP. As of the February 2017 Population Analysis & Breeding and Transfer Plan (see Appendix), there are 187 red ruffed lemurs in the population. The target population size is 225 according to the 2014 Regional Collection Plan. The genetic diversity of the population is currently 91.61%. The gene diversity in 100 years is projected to be 84.2%. To extend the gene diversity retention, individuals from underrepresented lineages need to be breed and the population size needs to be increased to the target population. To increase the population size to 225 individuals in 4 years, approximately 22-24 births are required each year.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

Since we do participate in the SSP, we follow the recommendations set forth by the Breeding and Transport Plan. We are currently to hold our female as they hopefully look for a male of breeding age or at least a companion animal.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The Pittsburgh Zoo & PPG Aquarium has had red ruffed lemurs in their collection from 1990 to 2009 and then received a breeding pair in 2014 to present. We have had Ring-tailed lemurs since 1990 and Black and White ruffed lemurs since 1993.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

The Pittsburgh Zoo & PPG Aquarium has not had any lemur births in the last 5 years.

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

Our male red ruffed lemur was euthanized on 5 Dec 2017. He was 28 ½ years old and was being treated for heart failure for several years. The median life expectancy for red ruffed lemurs is 19.9 years. No measures have been taken as she lived a long happy life.

The only other death of a lemur was the euthanasia of a male ring-tailed lemur on 29 September 2015. He was a four year old male that had idiopathic chylothorax. This is a random disease where the animal has a fluid filled chest cavity and it prevents proper breathing. There was no apparent cause for the disease. We performed a thoracic duct ligation surgery in an attempt to correct but he developed post-surgical lung lobe torsion. This is a rare disease that can't be predicted or prevented.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The red ruffed lemur has access to a public viewing enclosure that is 445 SF with a varying height of 18' to 30'. The indoor exhibit has a cement floor with gunite textured concrete simulating rocks, boulders, riverbanks and a waterfall. This

exhibit also has an artificial tree structure in the middle that is made from painted, textured epoxy on steel pipe and is surrounded by 2” x 2” woven wire mesh on three sides and a viewing window in the front. The viewing windows are 2 ply 3/16” glass laminated with 60 mil polyvinyl butyral interlayer, both plies tempered.

The red ruffed lemur is housed downstairs in two 279 SF holding rooms with cement block sides and poured cement floors. There are shelves on the walls and enrichment items hanging from the ceiling. One side of the holding area is 1” x 1” Galvanized aluminum chain link. Any progeny that would be born would be housed in these three areas. See attached for photos and a diagram. The red ruffed lemur alternates into the public exhibit space with the black howler monkeys. The exhibit is marked “howlers” on the attached diagram.

Pittsburgh Zoo & PPG Aquarium

Red ruffed lemur

Tropical Forest Complex (TFC)

TFC interior

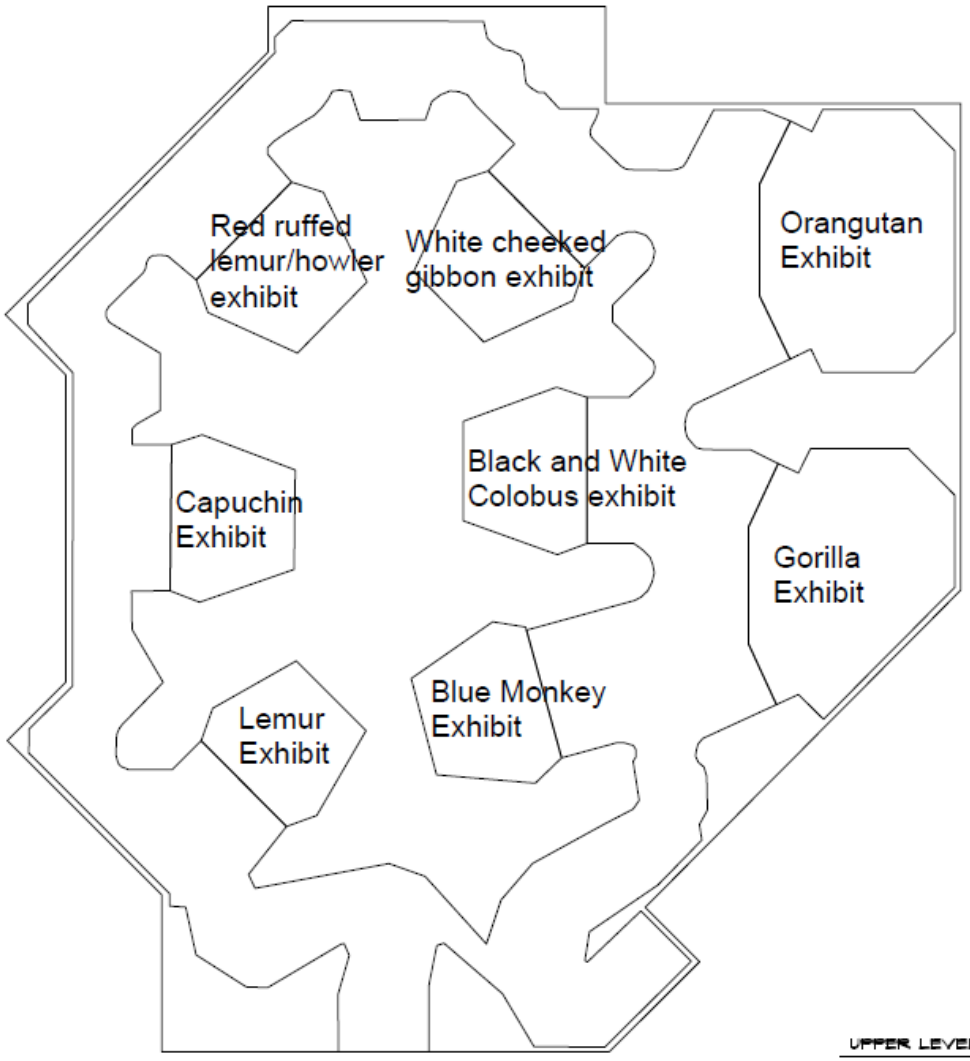
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

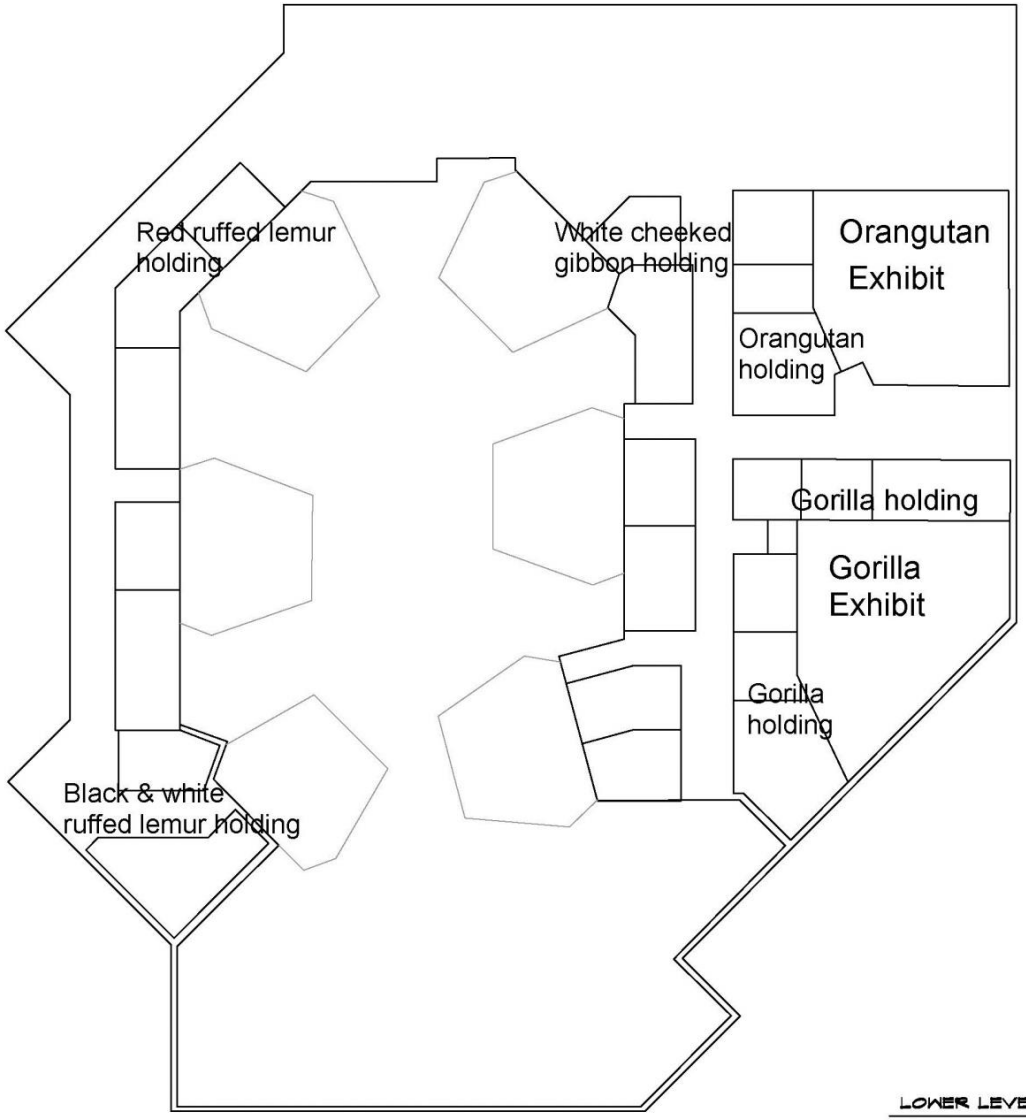
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level



LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

Red ruffed lemur exhibit

- Photo taken from the viewing window
- Waterfall feature for fresh running water
- Artificial trees and vines provide climbing structures
- Gunite rockwork

Red ruffed lemur holding

- Door on back wall leads to the exhibit.
- Branches and hanging platforms provide structure and enrichment

Red ruffed lemur holding

- Door on the right connects this holding room to another holding room

Red ruffed lemur holding

- Handles along the back wall provide climbing structure.

Red ruffed lemur holding

- She alternates time on exhibit and in holding with the howler monkeys.
- Door along the back wall leads onto the exhibit.

3-200-41

E. Captive-bred Wildlife Registration

Siamang (*Symphalangus syndactylus*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for siamang. In 2015 we opened an Islands exhibit at the zoo and included siamangs. This was a new species for us. We had maintained several species of gibbons in the past but wished to increase our conservation efforts with primates by including a new species. We obtained a breeding pair. In 2017 they gave birth to a female offspring. We are currently looking into bringing in a young male companion animal and future mate to this young female. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium currently has 1.2 siamang in their collection. This is a breeding pair with their offspring. Since we do not house enough animals to maintain genetic vitality we participate in the AZA SSP for siamang. As of the 2017 SSP Population Analysis the current gene diversity of the captive population of siamang is just over 97%. Based on current population parameters, the SSP population is projected to retain 90% gene diversity for over 100 years. Approximately 7 births are needed in the upcoming year and 8-9 births are needed each year for the next 3 years to reach the recommended target of 130 individuals. There are two program challenges. The first is that the population is near space capacity thus making placement of offspring difficult. The second is that breeding rates have declined recently because new breeding pairs are being established. See appendix for PVA summary.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

Since we participate in the SSP, we follow the recommendations set forth by the Breeding and Transport Plan. We are currently to hold the pair of siamangs that we have and not breed them since they bred last year. The female is currently being contracepted until we are asked to breed again.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

We have maintained two hylobatid species at our facility, White-cheeked gibbons (*Nomascus leucogenys*) and White-handed gibbons (*Hylobates lar*). The first White-handed gibbon arrived in 1969 and we maintained them in our collection until 1994. In 1990 we received White-cheeked gibbons which we currently house in our collection and Siamangs were added in 2015.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

In the past five years we had one successful birth of a siamang. She is currently 8 months old. The pair of white-cheeked gibbons that we have was not slated to breed as the female was 44 years old and had an amputated left arm.

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The only mortality of hylobatid that we have had in the last five years was of our elderly female white-cheeked gibbon. According to the studbook keeper, she was the 4th oldest living white-cheeked gibbon in the population. She died of liver disease. No measures have been taken as she lived a long happy life.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See attached staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

The siamangs are housed in a 3,800 SF building with 2 holding rooms (246 SF and 140 SF), a public viewing day room that is 320 SF with a vertical height of 14' which gives a room volume of 877 CF and an outdoor 1730 SF island. Siamang Island is surrounded by a filtered fresh water lagoon containing 60,000 gallons. There are five hand crafted artificial trees that support siamang brachiating activity. These animals are currently housed in holding rooms with 3 cement block sides with windows

for ambient light, one side with chain link for interaction with the keepers and poured cement floors. There are ropes, tire swings and hammocks hanging from the ceiling for enrichment. The public viewing day room has a cement floor, a cement tree structure in the middle and is surrounded by cement block sides and a viewing window in the front. From the day room they also have rope access to an outdoor island that has several cement trees and ropes for swinging. See appendix for photos

Siamang *(Symphalangus syndactylus)*

August 2016

Photo Credit:
Meghan Murphy,
Smithsonian's National Zoo

Population Biologist: Lauren Mechak, lmechak@lpzoo.org
AZA Studbook Keeper: Becky Malinsky, malinskyb@si.edu
Former Animal Program Leader: Jay Petersen
Vice-Program Leader: Janet Steele, jsteele@palmbeachzoo.org
AZA TAG Name TAG Chair: Tara Stoinski, tstoinski@gorillafund.org
AZA Ape TAG Vice Chair: Tracy Fenn, fennt@jacksonvillezoo.org

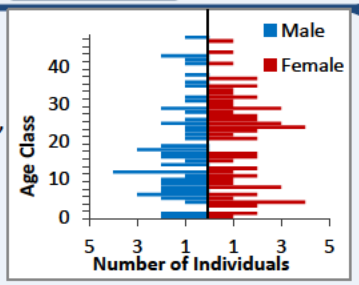
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years

WITHOUT potential changes:	Low Risk	**Vulnerable**	Endangered	Critical
WITH potential changes:	**Low Risk**	Vulnerable	Endangered	Critical

Current Population Status

- 115 siamangs (55 males, 60 females) are housed at 48 AZA institutions and 1 non-AZA holder
- The population size has remained stable over the last decade, with an average ~4 births per year
- 97.6% of the founding gene diversity (GD) has been retained
- The population's average inbreeding value (F) is 0.0034
- IUCN status: Endangered in the wild



Age structure of the siamang SSP population

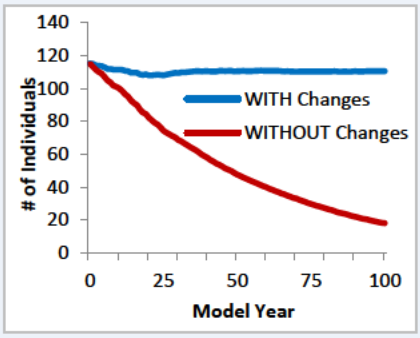
Program Challenges

- The population is currently near space capacity, which may make it difficult to place offspring
- Recent breeding rates have declined slightly because the population is in the process of establishing new breeding pairs

Model Results

Projected Status Without Potential Changes

- If the population continues to produce ~4 births/year, it would decline to ~18 individuals in 100 years without future imports. With future imports, more individuals may remain
- The remaining individuals would retain 84% ± 8% GD, with inbreeding levels of F = 0.077 ± 0.038 in 100 years
- Status: **Vulnerable** in zoos and aquariums due to its declining gene diversity
- For additional details, see page 8 in the main report



Projected size of the siamang SSP population

Projected Status With Potential Changes

- If breeding is increased to produce 5-6 births per year, the population could maintain approximately its current size over the next century
- Gene diversity is expected to be high (94% ± 0.4% GD), with low inbreeding levels (F = 0.055 ± 0.010) in 100 years
- Status: **Low Risk** in zoos and aquariums
- For more information, see page 11 (Scenarios D) in the main report

Management Actions

- Increase breeding from ~4 births per year to ~5-6 births per year to remain near the current population size for the next century and avoid a population decline

How Institutions Can Help

- Pursue breeding recommendations given to your institution by the Program Leader
- Report breeding challenges and successes to the Program Leader

Please see the 2016 Siamang AZA Animal Program full PVA report on the AZA website for further details.
Contact Lauren Mechak at lmechak@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) are being conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team uses ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Ape Taxon Advisory Group (TAG) in 2016.

POPULATION HISTORY/CURRENT STATUS

Siamangs (*Symphalangus syndactylus*) have been consistently held in AZA zoos since 1950. The population grew primarily through imports until regular breeding began in the 1960s. It reached a peak size of 135 individuals in 1987, but subsequently declined due to reduced breeding. In recent years, the population has maintained approximately its current size of 115 individuals. Over the past 10 years, the population averaged 3.9 births, 0.4 imports, and 0.2 exports per year. A small number (~2 per decade) of imports are expected to continue, but exports are not expected to occur. The population currently retains 97.6% of founding gene diversity and has low inbreeding (average inbreeding coefficient [F] of 0.0034).

PROGRAM CHALLENGES

The population is currently near space capacity, which may limit the ability to place young offspring. In recent years, breeding rates have declined as managers are in the process of establishing many new breeding pairs.

PVA RESULTS

Model results indicate that under its average breeding rate from the past 10 years (~4 births/year), the siamang population would decline to a minimum of 18 individuals, with no risk of extinction in zoos and aquariums during the next century. The remaining individuals would retain ~91% of the founding gene diversity with unrelated imports, or ~84% without. However, **increasing breeding is predicted to allow the siamang population to stabilize over the next 100 years**. With or without regular imports, the population could have a low risk of extinction and maintain approximately its current size (~115 individuals) in 100 years by producing an average of 5-6 births/year. A stable population would retain approximately 94% of the founding gene diversity, with inbreeding levels (F = 0.055) below those expected from mating between first cousins (F = 0.063). With the addition of ~2 genetically unique potential founders each year, gene diversity may be slightly higher (~96% GD), and inbreeding levels may be slightly lower (F = 0.038) in 100 years. If managers are able to add more potential spaces to hold a total of 125 siamangs, the population could gradually grow to fill these spaces over the next three decades by producing an average of ~6 births/year over the next decade and 6-7 births/year thereafter. However, the larger population size would not substantially alter genetic metrics in 100 years.

MANAGEMENT ACTIONS

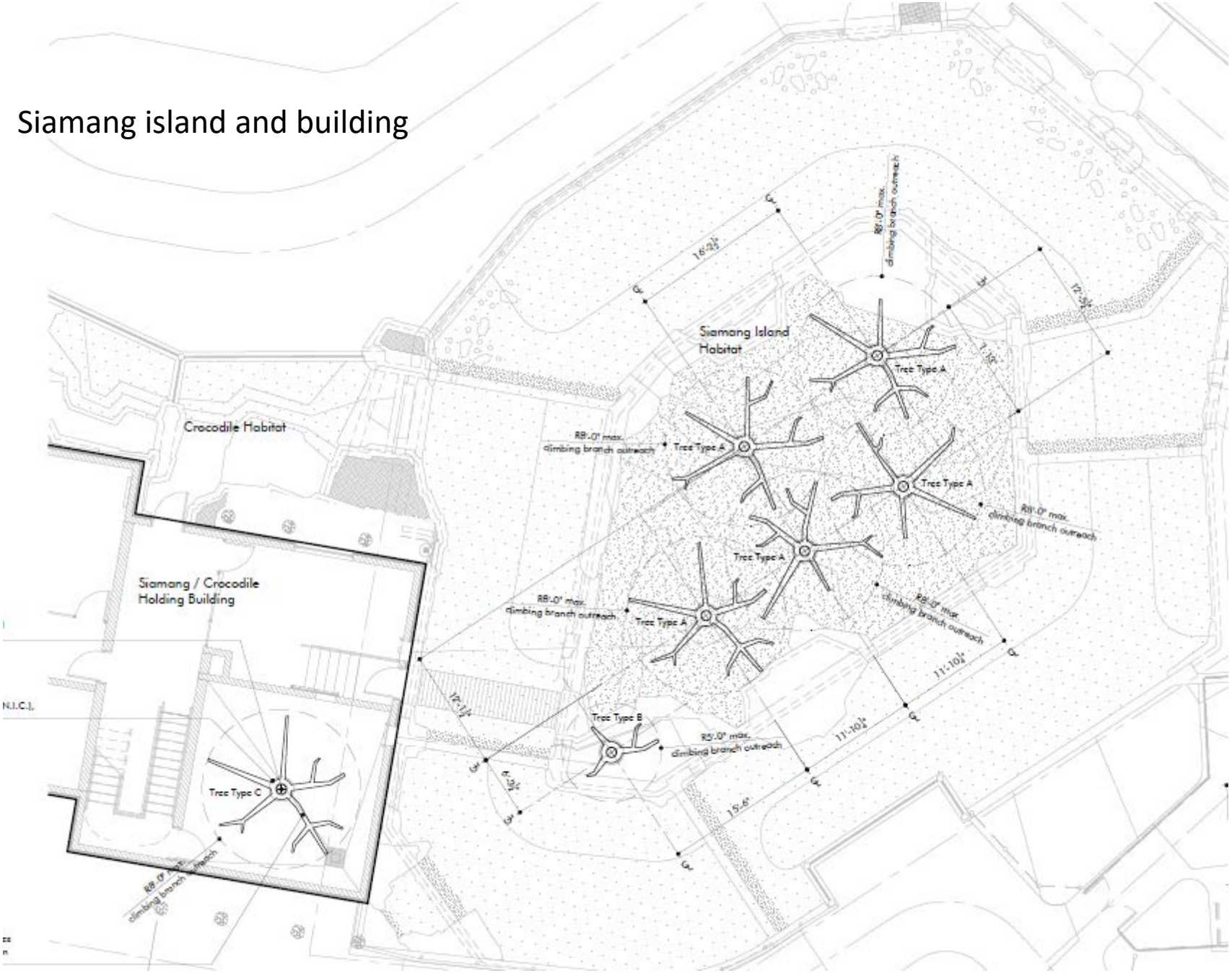
Given the current challenges for the AZA siamang population, PVA results indicate that the following changes in management should be considered in an effort to improve this population's sustainability. Note that the PVA allows us to compare between these hypothetical changes, but cannot evaluate whether achieving these changes is feasible, practical, or desirable given the program's constraints.

- **To maintain the population near its current size, increase breeding:** If breeding is increased from ~4 births per year to an average of ~5-6 births each year, the siamang population could maintain a low risk of extinction, maintain its current size, and retain 94% of the founding gene diversity in 100 years. Any lower rate of breeding would cause the population to decline over the next century. Additional holding space may be necessary to place offspring, as this population is close to its holding capacity.

Pittsburgh Zoo & PPG Aquarium

Siamang

Siamang island and building



Siamang outdoor exhibit

Upper siamang holding room

Currently being used as the nursery holding for our young siamang. This room contains straw padding on the floor, ropes and climbing structures and a nighttime sleeping space.

Downstairs holding room

Contains ropes and shelves for climbing. Note the animal and keeper doors that lead to the outdoor island exhibit. The opening on the right opens into the day room. Windows to allow ambient light are located on the left.

Siamang day room

This photo is taken through the visitor viewing window. The upper opening on the back wall opens into the upper holding room and the lower opening into the lower holding room. There is also a door on the right that opens to the outdoor island exhibit. The door to the left opens into the keeper space.

3-200-41

E. Captive-bred Wildlife Registration

Western lowland Gorilla (*Gorilla gorilla gorilla*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium provides data and updates to the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for Western lowland gorillas. We currently have a troop of 7 gorillas. As these 7 animals are considered surplus animals we will hold them at our facility.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The genes of the Western lowland gorilla population at the Pittsburgh Zoo & PPG Aquarium are being managed by the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for Western lowland gorillas. As of the July 2016 AZA Animal Program Population Viability Analysis Report there are 351 animals in the population that retain 98.9% gene diversity and have a low inbreeding coefficient of F = 0.003. The target population size is 350 individuals. With an average breeding rate of 12 to 13 births/year, the western lowland gorilla population can remain stable at approximately 350 individuals over the next 100 years. In 100 years, the gorilla population is predicted to retain approximately 98.3% gene diversity and to have an inbreeding coefficient of F=0.014.

12. If your activities include the holding of surplus animals (ie, no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

At this time our seven animals are considered surplus animals to the AZA. In August 2015 the Pittsburgh Zoo & PPG Aquarium decided to terminate its membership with the AZA. As a result the SSP has declared our animals to be surplus animals. The genetics of our animals are part of this managed population. By holding these animals and not breeding them we are freeing up space for other facilities to breed gorillas that are not as represented genetically in the population. Breeding management in gorillas is obtained through oral contraception of the female.

13. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

The earliest written record of gorillas occurring at the Pittsburgh Zoo & PPG Aquarium was in 1953. Our first troop was established with the opening of our Tropical Forest Complex (TFC) building in 1991 and some of those original troop members are still here today. We also maintain a group of Orangutans at our facility that was also established in 1991 but the earliest records of Orangutans at the Pittsburgh Zoo was in 1943.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

Western lowland gorilla – one male infant born 11 April 2013 – Still alive today

Western lowland gorilla – one male infant born 25 May 2018 – Still alive today

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

There have been no mortalities in our large primates in the last 5 years.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The indoor gorilla exhibit is 1036 SF. It varies in height from 22' to 30'. The outdoor gorilla exhibit is 15,339 SF and has a 14' W and 14' H dry moat that surrounds the raised exhibit. The building is constructed out of masonry walls and poured concrete floors in the basement and precast concrete plank on the first floor. There are 6 holding rooms for the gorillas that total 768 SF. There is 2" x 2" galvanized mesh used in the interior holding rooms of the basement. The gorilla viewing windows are 3 ply – ½" glass laminated with 2-90 mil polyvinyl butyral interlayers with tempered glass on the visitor's side. The indoor exhibit contains skylights throughout the high roof area and artificial trees made of textured epoxy on steel pipe. There are gunite painted

and textured concrete simulating rocks, boulders, riverbanks, pools and waterfalls in both the indoor and outdoor exhibits. The indoor temperature is maintained by 2 roof mounted air conditioning units with in-line hot water duct heaters designed to maintain a temperature of 70-85 degrees with a relative humidity of 50%. The building also contains smoke detectors throughout and a sprinkler system in the basement. See attached for photos and diagrams.

Western Lowland Gorilla (*Gorilla gorilla gorilla*)

July 2016

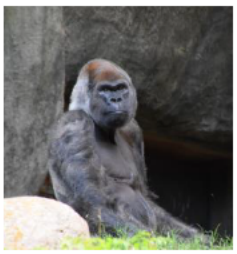


Photo courtesy of Kristen Lukas, Cleveland Metroparks Zoo

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Studbook Keeper: Roby Elsner, robyelsner@msn.com
Animal Program Leader: Kristen Lukas, kel@clevelandmetroparks.com
Vice Animal Program Leader: Rachel Daneault, rachel.b.daneault@disney.com
AZA Ape TAG Chair: Tara Stoinski, tstoinski@gorillafund.org
AZA Ape TAG Vice-Chair: Tracy Fenn, fennt@jacksonvillezoo.org

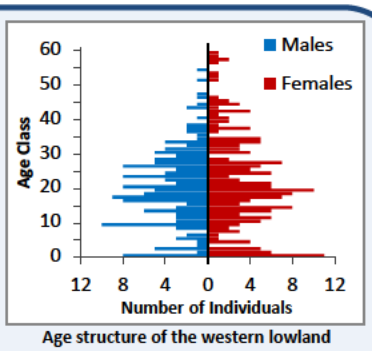
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years

WITHOUT potential changes: **Low Risk** | Vulnerable | Endangered | Critical

Current Population Status

- 351 gorillas (164 males, 187 females) are housed at 49 AZA institutions and 2 non-AZA partners
- The population decreased at -0.4% annually over the last decade, with several years of reduced breeding, and produced an average of ~12.5 births per year among other years
- 99% of the founding gene diversity (GD) has been retained
- The population's average inbreeding value (F) is 0.003
- IUCN status: Critically Endangered in the wild

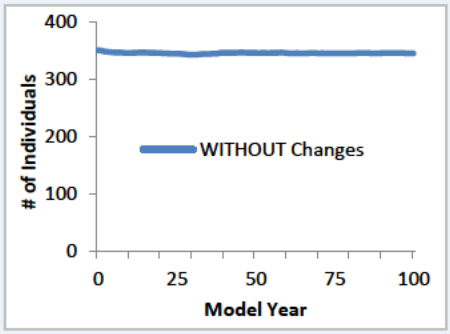


Age structure of the western lowland gorilla population

Model Results

Projected Status WITHOUT Potential Changes

- The population could remain near its current size by continuing to produce 12 to 13 births/year
- 98% ± 0% gene diversity and low inbreeding (F: 0.014 ± 0.002) could be maintained for 100 years
- Status: **Low Risk** within zoos
- For additional details, see pages 8-9 (Scenario A) in the main report
- As the population maintains its current size and high gene diversity, no alternate "With Changes" scenario was selected



Projected size of the western lowland gorilla population

Management Actions

- Continue to produce 12 to 13 births/year to maintain the population near its current size

How Institutions Can Help

- Pursue breeding recommendations given to your institution by the Program Leader
- Report breeding challenges and successes to the Program Leader
- Transfer males and females as recommended by the Program Leader to promote socialization

Please see the 2016 Western Lowland Gorilla AZA Animal Program full PVA report on the AZA website for further details.
Contact Brent Johnson at bjohnson@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) are being conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team uses ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Ape Taxon Advisory Group (TAG) in 2015 and 2016.

POPULATION HISTORY/CURRENT STATUS

Western lowland gorillas (*Gorilla gorilla gorilla*) have been consistently held in North American institutions since 1927. Through a combination of zoo births and importation from other populations, the Species Survival Plan® (SSP) population (at AZA and two non-AZA partner institutions) grew to a peak size of approximately 368 individuals in 2002. Following four decades of very high growth, in 2005 program managers and advisors recognized a need to accommodate the growing number of non-breeding males and therefore reduced breeding recommendations to maintain the population at its current size. Over the past decade, years of reduced breeding (2007-2011) averaged 5.0 births/year. In the years before and after (2005-2006, 2012-2014), the population averaged 12.4 births/year. Currently, the population includes 351 individuals (164 males, 187 females), which retain 98.9% gene diversity and have low inbreeding (average inbreeding coefficient [F] = 0.003).

PROGRAM CHALLENGES

Program managers intend to maintain the gorilla population near a target size of 350 individuals. In 2005, program managers initiated a significant restructuring of the gorilla population in which they recommended the formation of many new bachelor groups and mixed-sex groups comprised of one male and three females in order to place more solitary males in social situations. The program purposefully reduced breeding recommendations in order to stem the increase in additional non-breeding males projected through 2020. Since 2011, however, managers have increased breeding recommendations and subsequently increased births to adjust for low breeding success rates and to stabilize the population size.

PVA RESULTS

Model results indicate that under an average breeding rate of 12 to 13 births/year, the western lowland gorilla population could stabilize at approximately 350 individuals. Therefore, **the western lowland gorilla population is predicted to remain stable under current management over the next 100 years**. Within the next 25 years, the sex ratio of the population could become slightly more female-biased, with 1.2 females per male as opposed to 1.1 females per male currently. This change in sex ratio is projected to occur because of slightly higher mortality and short life expectancy for males. In 100 years, the gorilla population is predicted to retain approximately 98.3% gene diversity and to have inbreeding (F = 0.014) below that of offspring produced by mating between first cousins (F = 0.063).

MANAGEMENT ACTIONS

Given the current challenges for the western lowland gorilla population, PVA results indicate that the following management action should be considered in an effort to maintain this population's sustainability. Note that the PVA allows us to compare between hypothetical changes, but cannot evaluate whether achieving these changes is feasible, practical, or desirable given the program's constraints.

- **To remain demographically stable, maintain a consistent breeding rate:** If 12 to 13 births continue to be produced each year, on average, the western lowland gorilla population could stabilize near 350 individuals and retain ~98% gene diversity over the next 100 years. Any lower breeding rate would cause the population to decline during the next century.

Pittsburgh Zoo & PPG Aquarium

Western lowland gorilla

Tropical Forest Complex (TFC)

TFC interior

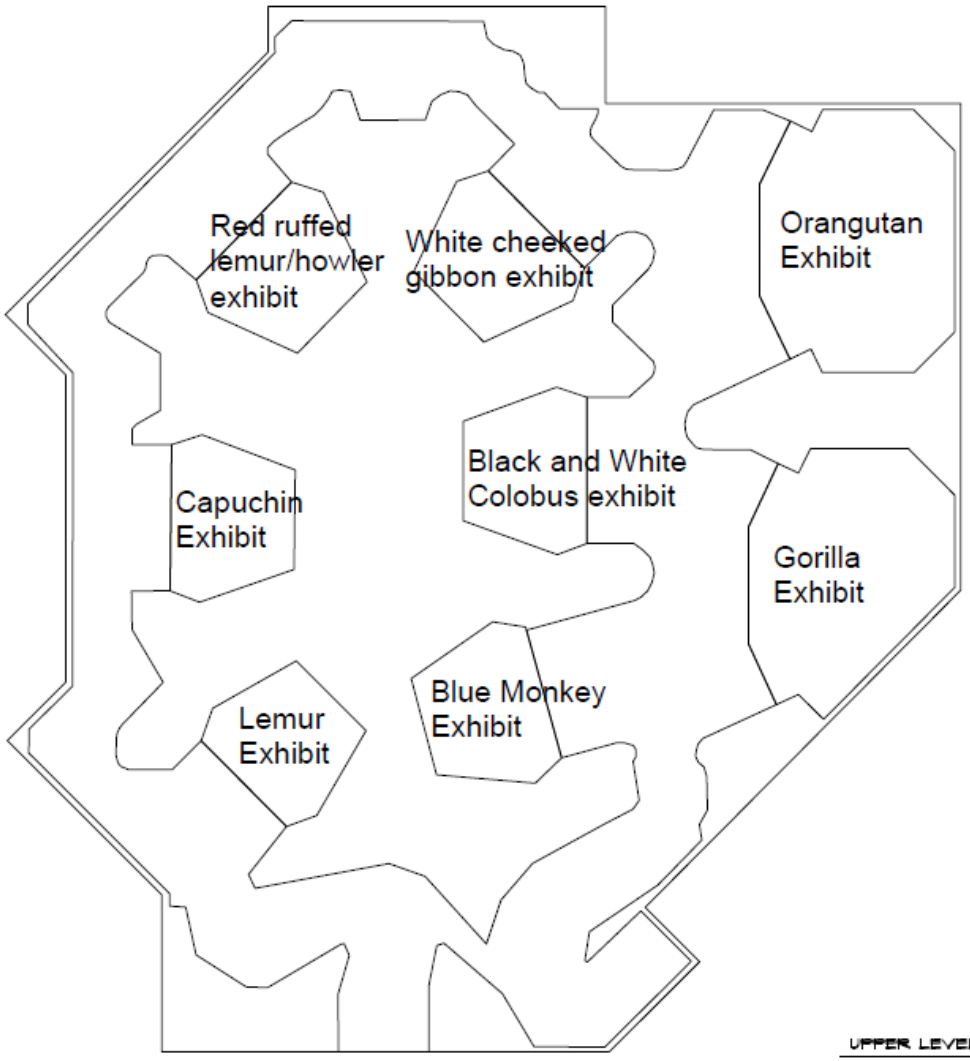
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

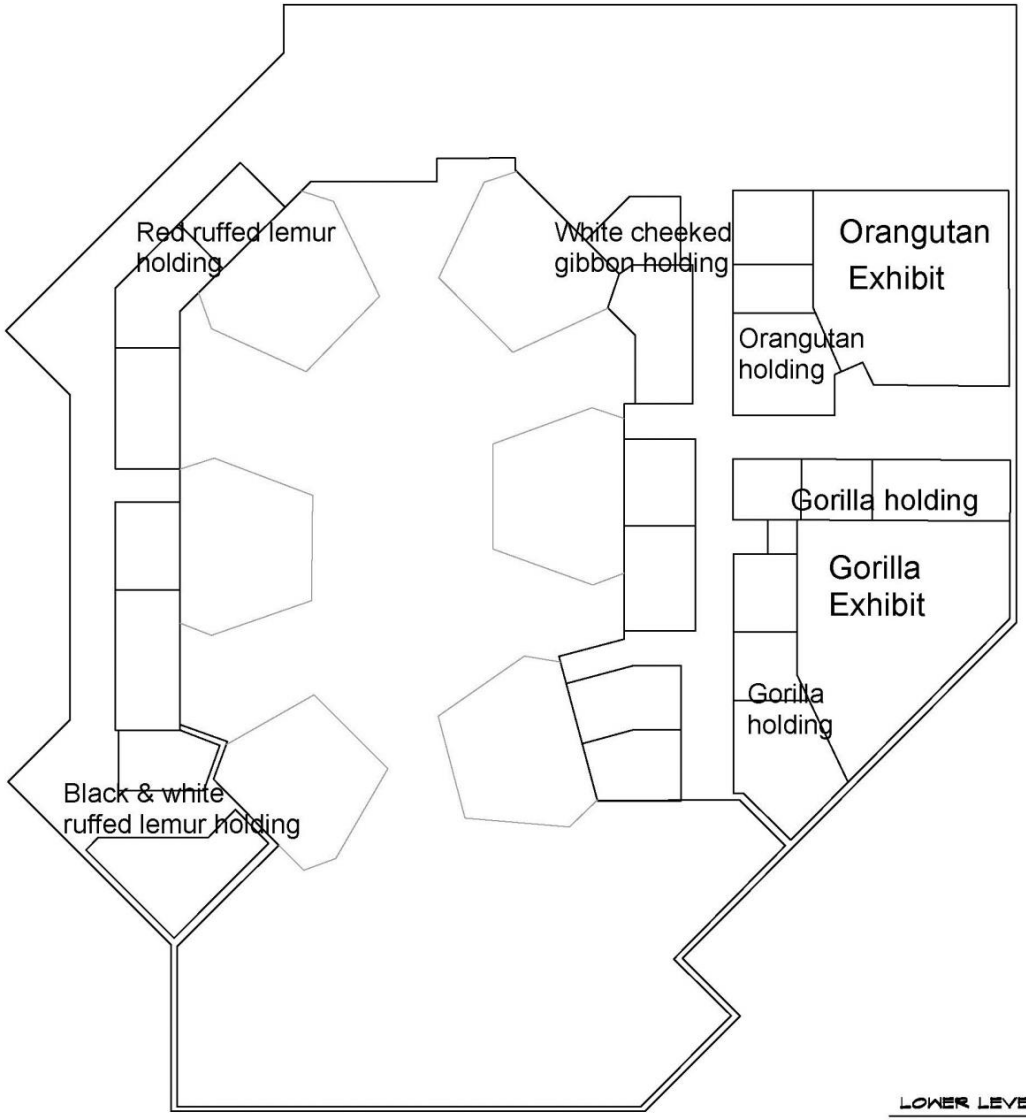
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level

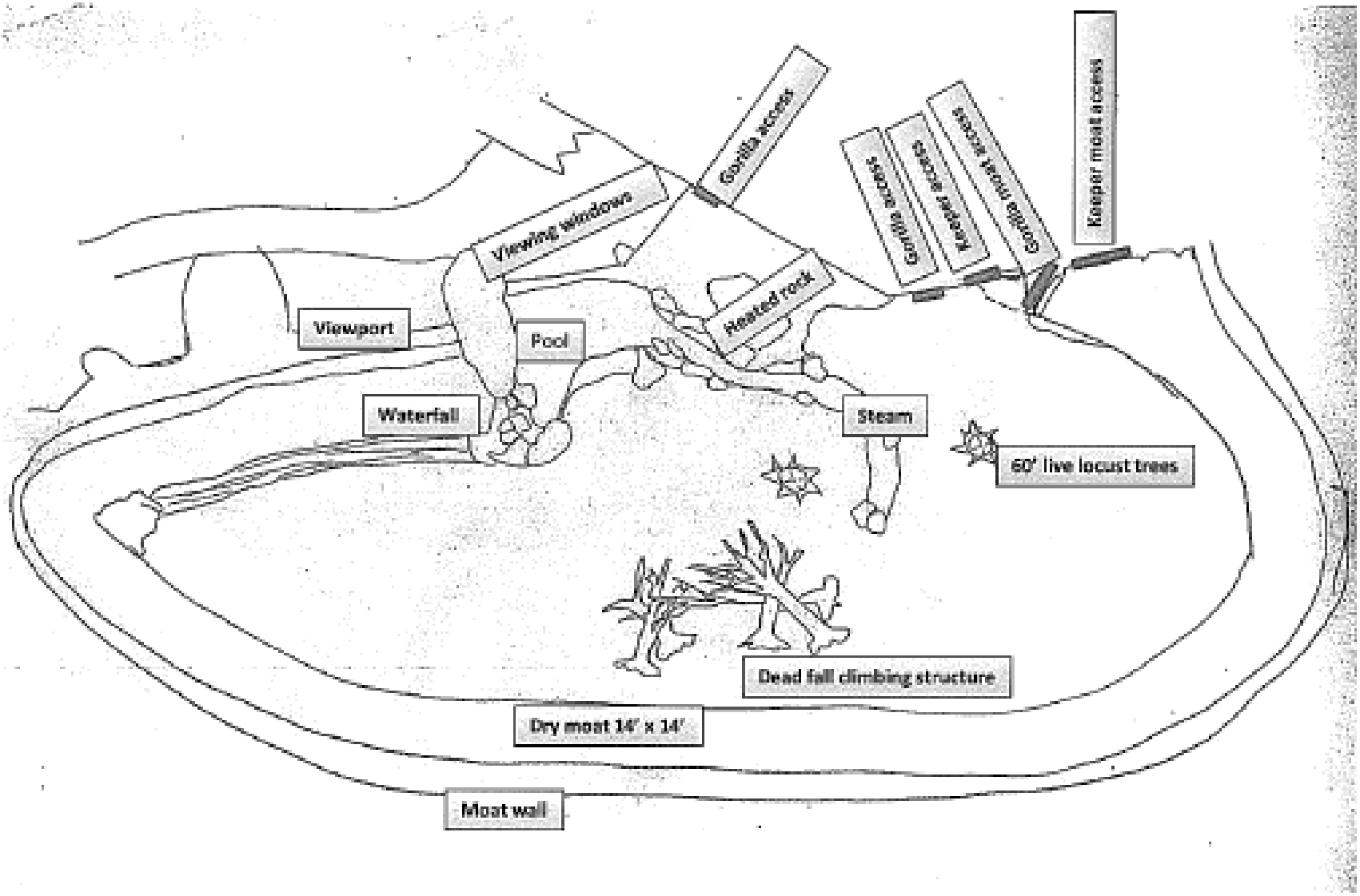


LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

Pittsburgh Zoo & PPG Aquarium
Outdoor Gorilla Habitat 1/3 Acre



Outdoor gorilla exhibit

This photo is taken from the visitor overlook across the exhibit. The large tree in the yard provides shade.

Gorilla outdoor exhibit

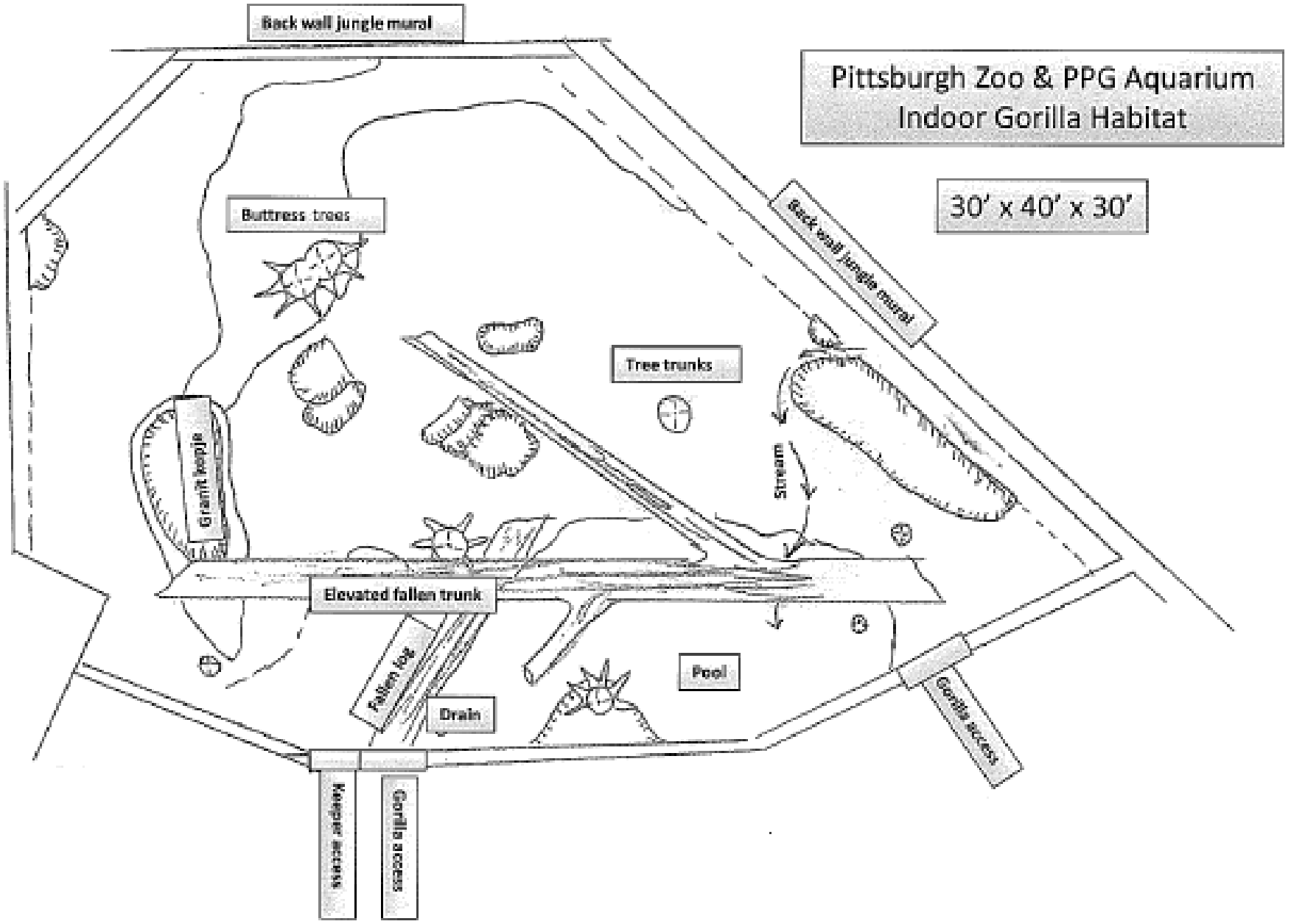
This photo is taken from the visitor viewing window. The pool in the foreground provide fresh water for drinking and playing. The stacked logs in the background provide climbing structure.

Gorilla outdoor exhibit

This is a photo of the dry moat that surrounds the exhibit. It is 14’ high and 14’ wide. The gorillas have access to the moat and use it for shade and physical separation.

Gorilla outdoor exhibit

This is another view of the gorilla exhibit .

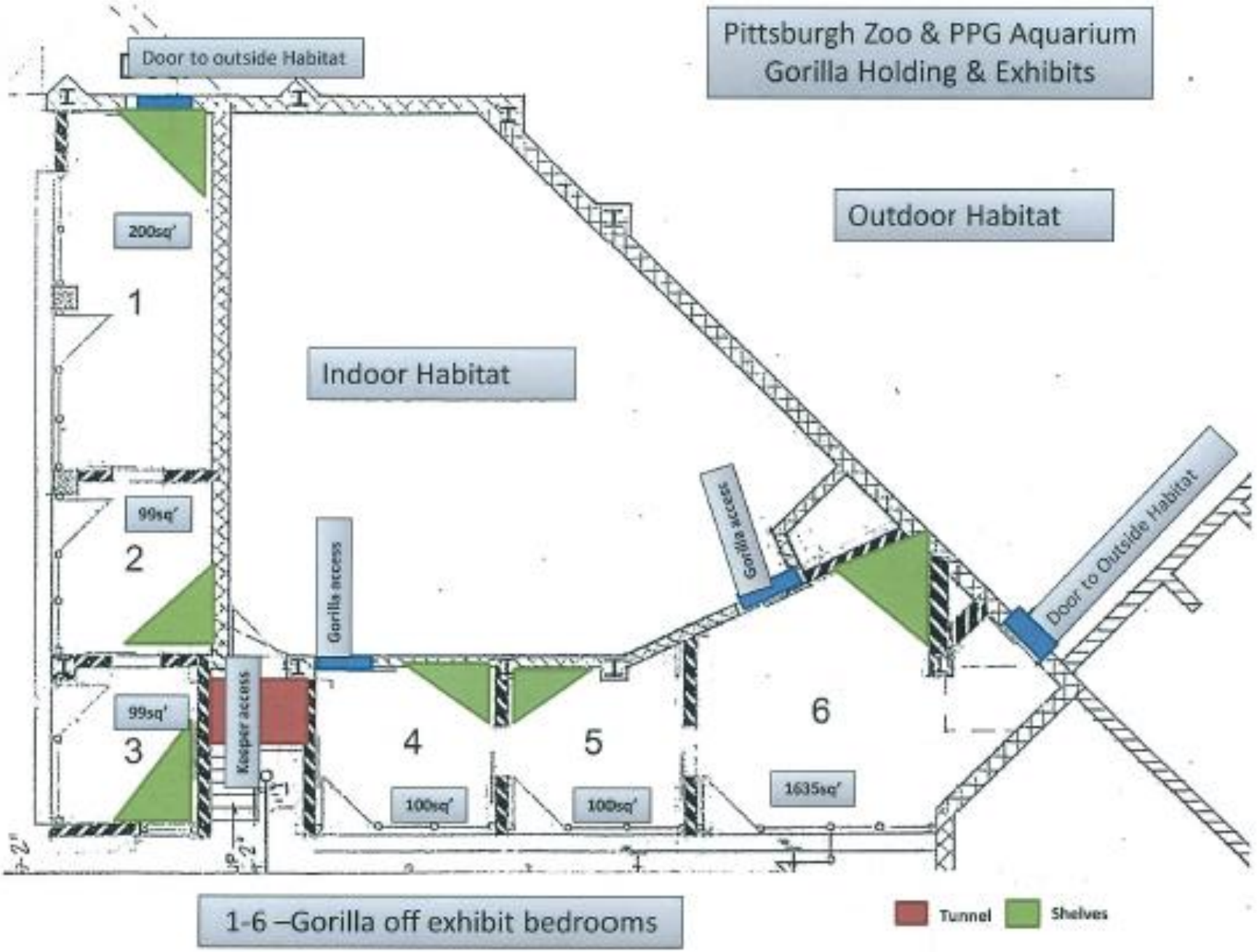

Back wall jungle mural
Pittsburgh Zoo & PPG Aquarium
Indoor Gorilla Habitat
30' x 40' x 30'
Buttress trees
Back wall jungle mural
Tree trunks
Granit loopje
Stream
Elevated fallen trunk
Fallen log
Drain
Pool
Gorilla access
Keeper access
Gorilla access

Gorilla indoor exhibit

This photo shows the graphics above the viewing windows.

Gorilla indoor exhibit

This photo is taken from the viewing window and shows the artificial trees in the exhibit.


Pittsburgh Zoo & PPG Aquarium
Gorilla Holding & Exhibits
Door to outside Habitat
Outdoor Habitat
200sq'
1
Indoor Habitat
99sq'
2
Gorilla access
Gorilla access
Door to Outside Habitat
99sq'
3
Keeper access
4
5
6
100sq'
100sq'
1635sq'
1-6 –Gorilla off exhibit bedrooms
Tunnel
Shelves

Gorilla holding room 1

Hammocks and shelves provide nesting places and climbing structure. Door on left leads to the outdoor exhibit moat.

Gorilla holding room 2

Fire hose and shelves provide climbing structure

Door on the left leads to Gorilla holding room 1

Gorilla holding room 3

Door in the center of the photo leads to room 2. Photo shows how all three holding rooms in this row are connected. Door on the right leads to room 4. Ladder on far left and fire hose on the right provide climbing structure.

Gorilla holding room 4

- The door on the wall leads to the indoor exhibit
- The door to the left leads into room 3
- Shelves and hay provide nesting space

Gorilla holding room 5

Shelves and hay provide nesting places. Door to the right leads into holding room 6.

Gorilla holding room 6

- The door on the left leads to the gorilla indoor exhibit.
- Shelf and hay provide nesting space
- Fire hose in foreground and wall ladders provide climbing structure

Gorilla holding room 6

- Wall ladder on the right leads to the outdoor exhibit
- The blue ladder was added for ease of exit for our geriatric gorilla

Gorilla holding

- The layout of gorilla holding prevents animals from being cornered.
- Animals can pass from room 1 all the way thru to room 6.
- Animals can get to the outdoor exhibit from rooms 1 and 6.
- Animals can get to the indoor exhibit from
- rooms 4 and 6.

3-200-41

E. Captive-bred Wildlife Registration

White-cheeked gibbons (*Hylobates leucogenys*)

10. Provide a specific description of how your proposed activities are going to facilitate captive breeding for conservation purposes of the species, including your long-term goals for your breeding program and intended disposition of any progeny.

The Pittsburgh Zoo & PPG Aquarium participates in the Association of Zoos & Aquariums (AZA) species survival plan (SSP) for gibbons. We currently have a 20 year old male that recently lost his companion. We would like to bring in a female for breeding. We plan to follow the SSP breeding and transfer plan and will breed when asked. We will disposition progeny as recommended by the SSP.

11. Provide documentation or a complete description showing how your captive population is being managed to maintain its genetic vitality. If you do not currently maintain sufficient specimens in each species request to maintain the genetic vitality of the species, you must participate in an organized breeding program. Please indicate this program and provide documentation describing the objectives and goals of the program.

The Pittsburgh Zoo & PPG Aquarium does not house enough specimens to maintain sufficient genetic vitality of the species so we participate in the White-cheeked gibbon SSP. As of the October 2016 AZA Population Viability Analyses for White-cheeked Gibbon (Appendix), there are 88 gibbons in the population and the population size has increased at a rate of 1.2% annually over the last decade with an average of ~3.3 births, 0.2 imports and 0.1 exports per year. The founding gene diversity has been retained at 95.1%. The goal of this SSP is to increase breeding to ~ 4 births/year to remain near its current size over the next 100 years. This will give a gene diversity of 91.6% over 100 years. If the population continues to produce ~3.3 births/year the population would decline to ~41 individuals in 100 years without any future imports or exports and have a gene diversity of 87.6% +/- 4.4%. There are three challenges to this goal. There is a slight male bias in this population. There is limited space available making it difficult to re-pair individuals and to place offspring. Importing and exporting to other managed populations is difficult because those populations are managed at the subspecies level.

12. If your activities include the holding of surplus animals (i.e., no longer needed in the organized breeding program and will no longer be bred) for an organized management program, document how your acquisition of such wildlife will relieve crowding at the location from which the wildlife will be obtained, and thereby assist the breeding program for the species involved. Provide documentation that you are a participant in an organized breeding program where the holding of surplus wildlife has been identified as a necessary objective of the breeding program. Provide a description of how you will restrict/control breeding at your facility.

Since we do participate in the SSP, we follow the recommendations set forth by the Breeding and Transport Plan. We are currently to hold our male as they hopefully look for a female of breeding age or

at least a companion animal. If they request that we hold this animal and others as surplus animals then we will comply as that opens up room at other facilities to set up breeding pairs and family groups.

9. For each requested species, provide a description of your experience in maintaining and propagating the requested species or similar species including:

a. The number of years you or the facility has/have maintained the requested species or similar species.

We have maintained White-cheeked gibbons in our collection since 1990. We have also maintained two other hylobatid species at our facility, White-handed gibbons (*Hylobates lar)* and Siamang (*Symphalangus syndactylus)*. The first White-handed gibbon arrived in 1969 and we maintained them in our collection until 1994. Siamang arrived in 2015 and are currently still in our collection.

b. During the past five years, how many (by species, by year) successful births/hatches of each requested species or similar species have occurred at your facility? How many survived beyond 30 days?

In the past five years we had one successful birth of a siamang. She is currently 8 months old. The pair of white-cheeked gibbons that we have was not slated to breed as the female was 44 years old and had an amputated left arm. So we have not had any white-cheeked gibbon births in the last five years.

c. How many mortalities of requested species or similar species, have occurred at your facility during the past five years? What were the causes? What measures have you taken to prevent future mortalities?

The only mortality of a hylobatid that we have had in the last five years was of our elderly female white-cheeked gibbon. According to the studbook keeper, she was the 4th oldest living white-cheeked gibbon in the population. She died of liver disease. No measures have been taken as she lived a long happy life.

d. A brief resume for all senior animal care staff or personnel that will be working with or maintaining of each species requested.

See staff qualifications attachment.

14. Provide a detailed description, including size, construction materials and protection from the elements, as well as photographs and detailed diagrams (no blueprints, please) clearly depicting your <u>existing</u> facilities, including space for future progeny, where the wildlife will be maintained.

These animals are currently exhibited in our Tropical Forest Complex building. It is a 31,085 SF building that houses tropical primates. The roof is a 10,000 SF translucent, insulated roof system that contains skylights and windows that allow lush tropical foliage to thrive. The white-cheeked gibbons have access

to a public viewing enclosure that is 445 SF with a varying height of 18’ to 30’. The indoor exhibit has a cement floor with gunite textured concrete simulating rocks, boulders, riverbanks and a waterfall. This exhibit also has an artificial tree structure in the middle that is made from painted, textured epoxy on steel pipe and is surrounded by 2” x 2” woven wire mesh on three sides and a viewing window in the front. The viewing windows are 2 ply 3/16” glass laminated with 60 mil polyvinyl butyral interlayer, both plies tempered.

The white-cheeked gibbons are housed downstairs in two 279 SF holding rooms with cement block sides and poured cement floors. There are shelves on the walls and enrichment items hanging from the ceiling. One side of the holding area is 1” x 1” galvanized chain link. Any progeny that would be born would be housed in these three areas. See attached for photos and a diagram.

White-cheeked Gibbon (*Nomascus leucogenys*)

October 2016

Photo courtesy of Sue Margulis

Population Biologist: Lauren Terwilliger, lterwilliger@lpzoo.org
Former Studbook Keeper: Sue Margulis, Margulis@canisius.edu
Former Animal Program Leader: Jay Petersen
Vice Animal Program Leader: Janet Steele, jsteele@palmbeachzoo.org
AZA Ape TAG Chair: Tara Stoinski, tstoinski@gorillafund.org
AZA Ape TAG Vice-Chair: Tracy Fenn, fennt@jacksonvillezoo.org

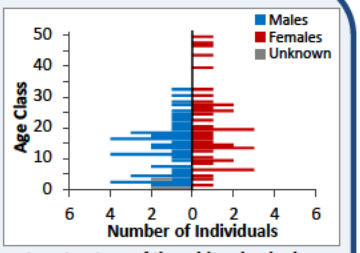
Population Viability Analyses (PVAs) for AZA Animal Programs

Projected zoo & aquarium population status in 100 years

WITHOUT potential changes:	Low Risk	**Vulnerable**	Endangered	Vulnerable
WITH potential changes:	**Low Risk**	Vulnerable	Endangered	Critical

Current Population Status

- 88 white-cheeked gibbons (46 males, 39 females, 3 unknown) are housed at 26 AZA institutions and 2 non-AZA partners
- The population size increased at 1.2% annually over the last decade, with an average of ~3.3 births, 0.2 imports and 0.1 exports per year
- 95.1% of the founding gene diversity (GD) has been retained
- The population's average inbreeding value (F) is 0.0043
- IUCN status: Critically Endangered in the wild



Age structure of the white-cheeked gibbon population

Program Challenges

- Slight male bias in the standing sex ratio and male-biased birth sex ratio may require same sex and contracepted sibling pairs to manage bachelor males and solitary animals.
- Limited space availability makes it difficult to re-pair individuals or place offspring.
- Genetic testing is needed to determine the extent of hybridization in the population between *N. leucogenys leucogenys* and *N. leucogenys siki*, which may limit exchanges with other zoo regions that manage the subspecies separately.

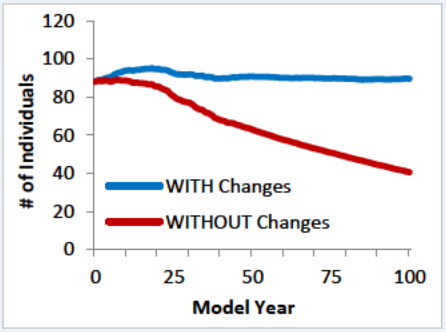
Model Results

Projected Status WITHOUT Potential Changes

- If the population continues to produce ~3.3 births/year, it would decline to ~41 individuals in 100 years without future imports and exports. With future exchanges more individuals may remain in 100 years
- 87.6% ± 4.4% gene diversity and low inbreeding (F = 0.086 ± 0.023) would be maintained in 100 years
- Status: **Vulnerable** within zoos and aquariums due to declining gene diversity
- For additional details, see pages 9-10 in the main report

Projected Status WITH Potential Changes

- If breeding is increased to produce ~4 birth/year, the population could remain near its current size over the next century
- 91.6% gene diversity and low inbreeding (F = 0.075) would be retained in 100 years without future exchanges
- Status: **Low Risk** within zoos and aquariums
- For more information, see page 11 (Scenario D) in the main report



Projected size of the white-cheeked gibbon population

Management Actions

- Pursue breeding recommendations given to your institution by the Program Leader
- Report breeding challenges and successes to the Program Leader

How Institutions Can Help

- Increase breeding to an average of ~4 births/year to maintain the population near its current size and avoid a population decline

Please see the 2016 White-cheeked Gibbon AZA Animal Program full PVA report on the AZA website for further details.

Contact Lauren Terwilliger at lterwilliger@lpzoo.org with questions

EXECUTIVE SUMMARY

Population Viability Analyses (PVA) are being conducted by Lincoln Park Zoo and Population Management Center researchers through funding from the Institute of Museum and Library Services (IMLS). The project team uses ZooRisk 3.80 (Earnhardt et al. 2008), a PVA modeling software, to examine what would happen to AZA populations if current conditions remain the same (the baseline scenario), and then assess the impact of changes in reproductive rates, space availability, imports/exports, and other potential management actions (alternate scenarios). Model scenarios for this population were developed with members of the Association of Zoos and Aquarium (AZA) Ape Taxon Advisory Group (TAG) in 2016.

POPULATION HISTORY/CURRENT STATUS

White-cheeked gibbons (*Nomascus leucogenys*) have been consistently held in North American zoos since 1966, but the population grew via imports from other populations until regular breeding began in the late 1970s. Predominantly through births, the Species Survival Plan© (SSP) population (at AZA and partner institutions) has continued to grow, and is currently at its peak size of 88 individuals. Over the past decade (2006-2015) the population has averaged 3.3 births/year. Managers expect to continue importing 1 male and 1 female per decade, and plan to export 2 genetically over-represented males per decade. Currently, the population retains 95.1% of founding gene diversity and has low average inbreeding (average inbreeding coefficient [F] of 0.0043).

PROGRAM CHALLENGES

The population is slightly male-biased, particularly the potentially breeding population, and has a significantly male-biased birth sex ratio. Since white-cheeked gibbons are held in pairs, to maximize the number of females in breeding situations, eliminate individually housed individuals, and manage bachelor males, managers anticipate the need to establish brother-brother and father-son pairs. However, a lack of available holding space often limits the program's ability to move animals into optimal social or reproductive groupings. While the program expects future import rates to match that of the past decade (2006-2015), the export of an individual female occurred based on institutional needs, and the program plans to export only males in the future. However, due to concerns about hybridization between Northern white-cheeked gibbons (*N. leucogenys leucogenys*) and Southern white-cheeked gibbons (*N. leucogenys siki*) in the SSP population, European managers may be unwilling to exchange with the SSP population, as these subspecies are managed separately in Europe. Presently, the program is pursuing phylogenetic testing to examine the extent of hybridization in the current population.

PVA RESULTS

Model results indicate that under the average breeding rate from the past 10 years (3.3 births/year) the white-cheeked gibbon population would decline during the next century either with or without future imports and exports. However, **increasing breeding would allow the population size to stabilize over the next 100 years**. If breeding is increased from ~ 3 births/year to ~4 births/year, the population could maintain its current size (~88 individuals) over the next 100 years with or without regular exchanges. With future imports and exports, including the export of two over-represented males and the import of two genetically unique individuals per decade, a stable population could retain 94.7% gene diversity and develop inbreeding levels (F = 0.044) below that expected from mating between first cousins. In the absence of exchanges, the population would retain slightly less gene diversity (91.6%) and develop inbreeding levels (F = 0.075) in 100 years above that of a first-cousin mating. If additional potential space to hold 125 white-cheeked gibbons is acquired by the program, the population could grow to fill those spaces, either with or without future exchanges, in approximately 30 years if breeding is further increased to 4-5 births/year over the next decade and 5-6 births/year thereafter. However, managing the population at a larger size would provide only minor improvements in the population's genetic metrics in 100 years.

MANAGEMENT ACTIONS

Given the current challenges for the white-cheeked gibbon population, PVA results indicate that the following changes in management should be considered in an effort to improve this population's sustainability. Note that the PVA allows us to compare between hypothetical changes, but cannot evaluate whether achieving these changes is feasible, practical, or desirable given the program's constraints.

- **To remain demographically stable, increase breeding:** If breeding is increased from ~3 births per year to ~4 births per year, the white-cheeked gibbon population could maintain a low risk of extinction, remain near its current size of 88 individuals, and retain approximately 95% or 92% gene diversity over the next 100 years, with or without exchanges, respectively. Any lower breeding rate would cause the population to decline over the next century.

Pittsburgh Zoo & PPG Aquarium

White-cheeked gibbon

Tropical Forest Complex (TFC)

TFC interior

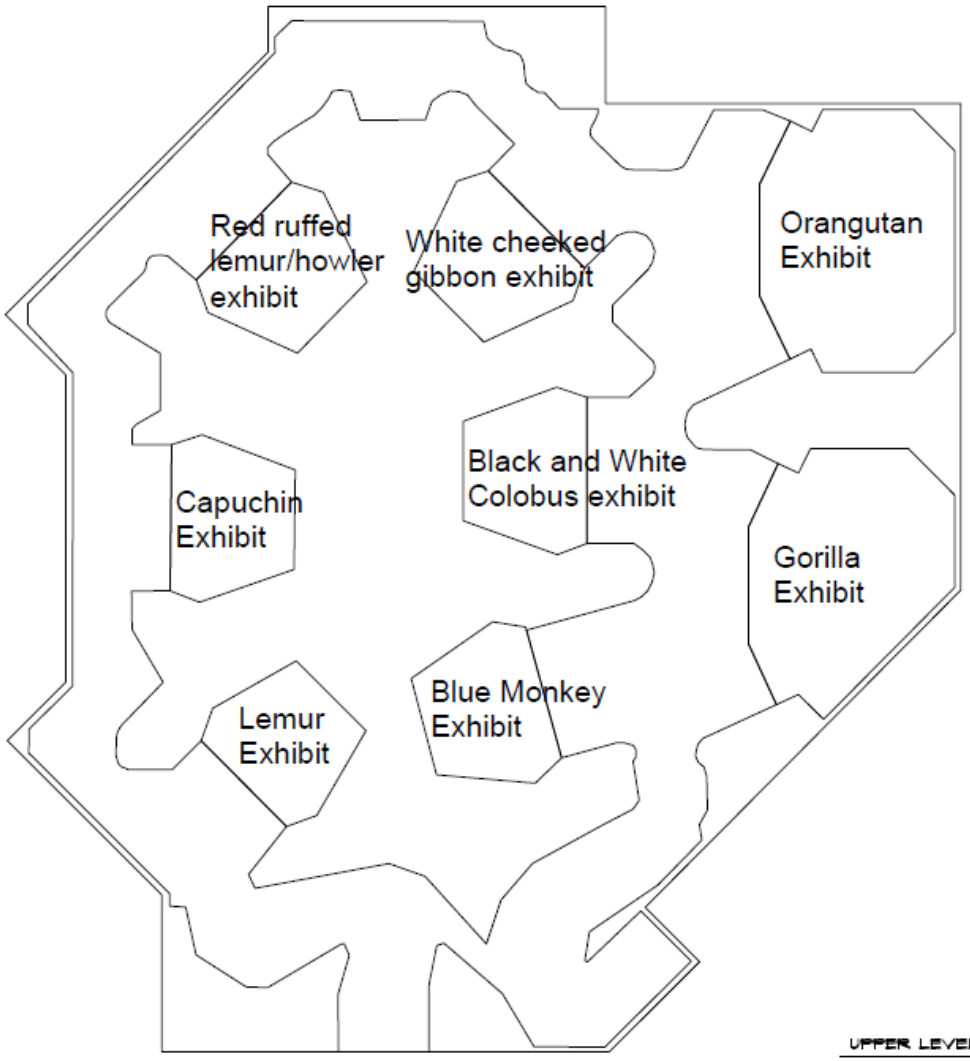
This picture shows the lush tropical foliage and the variable height exhibit mesh on the left

TFC Interior

This photo shows the translucent roof system.

Tropical Forest Complex

Floor plan
Exhibit level



UPPER LEVEL EXHIBIT PLAN

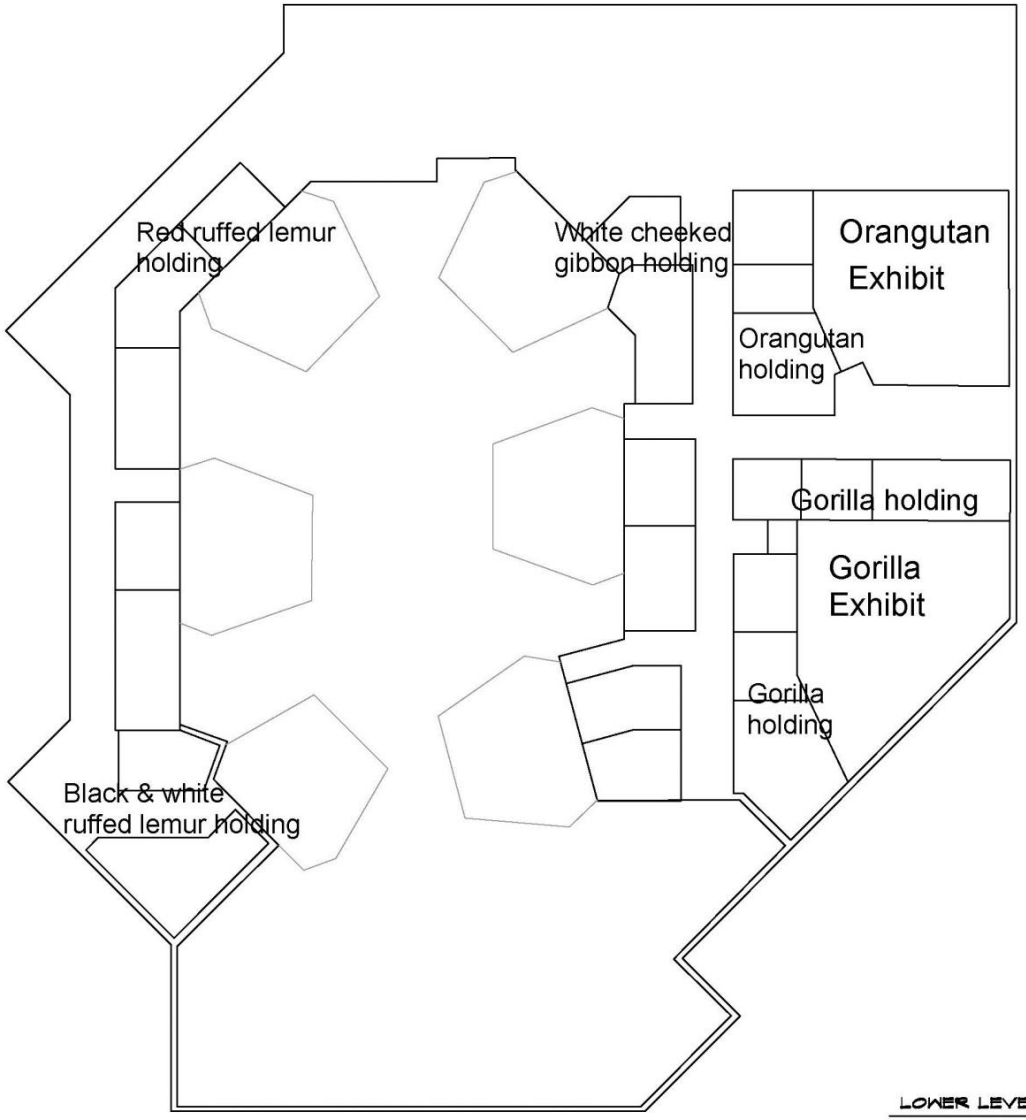
TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

A2

Tropical Forest Complex

Floor plan
Holding level



LOWER LEVEL HOLDING PLAN

TROPICAL FOREST COMPLEX

PITTSBURGH ZOO & PPG AQUARIUM

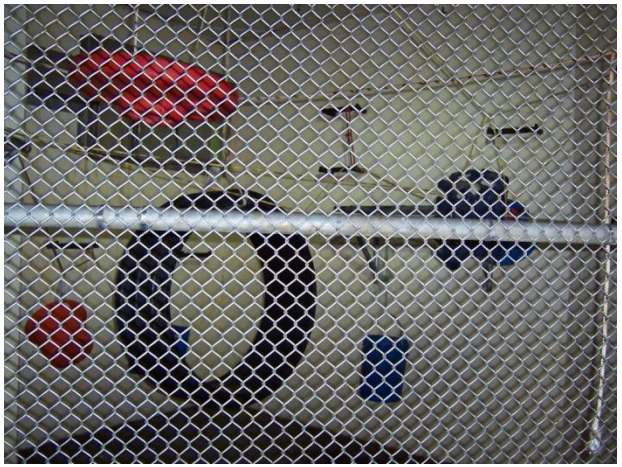
White-cheeked gibbon

- Artificial trees and fabricated vines provide enrichment and structure.
- Note the translucent roof in the background that allows ambient light

White-cheeked gibbon

- There are two Gibbon holding rooms. These pictures show one of those rooms.
- Walls are made of cement block and the floor is poured cement. One side is made of chain link.

White-cheeked gibbon



- The top is a view of the second White-cheeked Gibbon holding room.
- The bottom picture is of some of the enrichment provided for the Gibbons.

hterrell@pittsburghzoo.org

http://www.pittsburghzoo.org

From: Nelson, Emma [mailto:emma_nelson@fws.gov]
Sent: Monday, November 26, 2018 1:51 PM
To: Heather Terrell

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Heather Terrell, MS

Registrar, IACUC Deputy Chair

One Wild Place
Pittsburgh, PA 15206
Phone: 412-365-2581

Fax: 412-365-2583

hterrell@pittsburghzoo.org

http://www.pittsburghzoo.org

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Leopard, Clouded - 2018 FINAL - PITTSBURG.pdf
90K

Nelson, Emma <emma_nelson@fws.gov> Thu, Dec 6, 2018 at 6:11 PM
To: hterrell@pittsburghzoo.org

Hi Heather,

Thank you for reaching out. If the SSP explicitly lists your facility and you can provide me with a copy of that, then yes, that would be sufficient. Also, just to let you know, if I know an applicant is actively obtaining the information requested I won't abandon their file. To confirm though, if you can provide a copy of the SSP pages where your facility is listed as well as the executive summary, that is sufficient. If not, I will still need a letter from the SSP coordinator confirming participation.

Regards,
Emma

Emma Nelson
Senior Biologist
U.S. Fish and Wildlife Service
Division of Management Authority
5275 Leesburg Pike,
Falls Church, VA 22041
(703) 358-2296

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4 attachments

image001.jpg
5K

image002.jpg
2K

image001.jpg
5K

image002.jpg
2K

Heather Terrell <hterrell@pittsburghzoo.org> Thu, Jan 10, 2019 at 4:04 PM
To: "Nelson, Emma" <emma_nelson@fws.gov>

Emma,

Please find a ached the Studbook pages that show our par cipa on with the SSP for all the red and yellow SSPs except for elephants. I've also a ached le ers from the Orangutan and Lion SSP coordinators for the surplus species. I am s ll trying to obtain a le er from the Tiger and Gorilla SSP coordinators and get the Studbook pages from the elephant studbook. I will send the rest as soon as they become available.

Thank you.

Heather

Heather Terrell, MS

Registrar, IACUC Deputy Chair

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Fax: 412-365-2583

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http://www.pittsburghzoo.org

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Sent: Monday, November 26, 2018 1:51 PM
To: Heather Terrell

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8 attachments

lemur, Black and White Ruffed - Yellow SSP 2017 FINAL - PITTSBURG participation.pdf
149K

CheetahYellowSSP2018Final-PITTSBURG participation.pdf
189K

Leopard, Clouded - Yellow SSP 2018 FINAL- PITTSBURG participation.pdf
145K

Lemur, Red Ruffed - Yellow SSP 2017 FINAL- PITTSBURG participation.pdf
132K

Siamang Yellow SSP 2017 FINAL - PITTSBURG participation.pdf
119K

Gibbon, White-cheeked - Yellow SSP 2018 FINAL-PITTSBURG participation.pdf
132K

Pittsburg SSP letter - Lion.pdf
398K

Pittsburgh_CBW_Dec2018 - Orangutan.pdf

267K

Population Analysis & Breeding and Transfer Plan

Clouded Leopard (*Neofelis nebulosa*)
AZA Species Survival Plan®
Yellow Program

AZA Species Survival Plan® Coordinator & Studbook Keeper
WAZA International Studbook Keeper
Jilian Fazio, PhD., Smithsonian National Zoological Park
(fazioj@si.edu)

AZA Population Advisor
John Andrews, AZA Population Management Center at Lincoln Park Zoo
(jandrews@lpzoo.org)

20 November 2018

PMC Population Management Center

LINCOLN PARK ZOO.

ASSOCIATION OF ZOOS & AQUARIUMS

OKLAHOMA

Oklahoma City Zoological Park

Oklahoma City, OK

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	RecNotes
1144	Gemma	769118	F	17	HOLD	OKLAHOMA	DO NOT BREED		Excluded - Age
1227	Luke	772019	M	14	HOLD	OKLAHOMA	DO NOT BREED		Excluded - Age/behavior

PITTSBURG (non-AZA)

Pittsburgh Zoo & PPG Aquarium

Pittsburgh, PA

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	RecNotes
1710	Pi	102933	M	4	HOLD	PITTSBURG	BREED WITH	1719	Co Rear
1719	Saya	102934	F	4	HOLD	PITTSBURG	BREED WITH	1710	Co Rear

PRESCOTT (non-AZA)

Heritage Park Zoological Sanctuary

Prescott, AZ

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	RecNotes
1777		A015-4	F	3	HOLD	PRESCOTT	DO NOT BREED		
1778		A015-4	F	3	HOLD	PRESCOTT	DO NOT BREED		

ROSAMOND (non-AZA)

Exotic Feline Breeding Compound Inc.

Rosamond, CA

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	RecNotes
1574	Kyoke		F	7	SEND TO	NZP-CRC	DO NOT BREED		

Population Analysis & Breeding and Transfer Plan

Black and White Ruffed Lemur (*Varecia variegata*)

AZA Species Survival Plan®
Yellow Program

AZA Species Survival Plan® Coordinator
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28 April 2017

PMC Population Management Center

LINCOLN PARK ZOO. ASSOCIATION OF ZOOS & AQUARIUMS

Disney's ANIMALS, SCIENCE and ENVIRONMENT

Executive Summary
Species Survival Plan® for Black and White Ruffed Lemur (*Varecia variegata*)

The current SSP population of black and white ruffed lemurs is N = 172 animals (99 males; 68 females; 5 unknown sex) at 49 AZA institutions and 6 non-member participating institutions. This Population Analysis and Breeding and Transfer Plan was prepared in January 2017 at Disney's Animal Kingdom®. The last Breeding and Transfer Plan for this species was finalized 8 January 2016. Analyses were based on the North American data of the International *Varecia variegata* Studbook (current to 30 June 2016) and were performed using PopLink 2.4 and PMx 1.2.20160831.

The target population size designated by the Prosimian Taxon Advisory Group 2014 Regional Collection Plan is 225. This population currently qualifies as a Yellow SSP.

Genetic diversity in this population is currently 95.93%. When gene diversity falls below 90% of that in the founding population, it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights and greater infant mortality. Gene diversity in 100 years is projected to be 87.0% (based on current statistics, assuming a target population for projections of 225 and lambda = 1.052). Gene diversity in 10 generations (79 years) is projected to be 88.8%. Equalizing the founder representation by breeding individuals from underrepresented lineages and increasing the effective size, and target population size could extend gene diversity retention.

Demography	
Current size of population (N) – Total (Males.Females.Unknown Sex)	172(99.68.5)
Number of individuals excluded from the potentially breeding population	16 (12.4)
Population size following exclusions	156(87.64.5)
Target population size (Kt) from the Prosimian TAG's 2014 RCP	225
Mean generation time (T; years)	7.9
Historical population growth rate (λ; life table lambda 1969-present) / 5 – year from Poplink census / Projected growth rate from PMx stochastic 20 yr projections	1.052 / 0.978 / 1.028 <> 1.047 <> 1.061

Genetics		
	Current	***Potential***
Founders	27	0
Founder genome equivalents (FGE)	12.28	20.34
Gene diversity (GD %)	95.93%	97.54%
Population mean kinship (MK)	0.0407	-----
Mean inbreeding (F)	0.0232	-----
N_e/N (Effective population size/census size ratio)	0.2896*	-----
% Pedigree Known prior to assumptions and exclusions	91.7%	-----
% Pedigree Known after assumptions and exclusions	99.7%	-----
% Pedigree Certain after assumptions and exclusions	96.5%	-----
Projections		
	[a]Historical/Projected λ = 1.052	
Years to 90% GD	64	
Years to 10% loss of GD	107	
Gene Diversity at 100 Years (%)	87.0%	
Gene Diversity in 10 Generations (%)	88.8%	
Generation time (*T*) and Target population size used in projections	*T*=7.9 x 10 = 79 Target = 225	

*Value includes founders in calculations.
[a]Historical λ is population growth rate from demographic window (1969-2016) from life table calculated in PMx, also Projected λ is within the range of the PMx stochastic 20 yr projections.

Demographic analyses indicated that to increase the population size to 225 in 5 years, approximately 22-34 births are required (λ = 1.052). To remain at the current size (λ = 1.00), approximately 13 births are needed in the next year. As with most SSP populations, pairings are prioritized to maintain or increase gene diversity through considerations of mean kinship, avoidance of inbreeding, differences in sire and dam mean kinships, and the degree of uncertainty within a pedigree.

Summary Actions: The SSP recommends 30 breeding males and 29 breeding females, as well as 8 transfers for this period. Approximately 22-34 births per year are required to grow this population to a size of 225 in the next 5 years.

This Animal Program is currently a Yellow SSP Program and recommendations proposed are non-binding – Participation is voluntary. Dispositions to non-AZA institutions should comply with each institution's acquisition/disposition policy.

PHILADELP

Philadelphia Zoo
Philadelphia, PA

ID	Local ID	Sex	Age	House Name	Disposition	Location	Breeding	With	Notes
2406	104405	M	10	Huey	HOLD	PHILADELP	BREED WITH	2439	Genetically valuable pair
2439	104855	F	9	Kiaka	HOLD	PHILADELP	BREED WITH	2406	
4294	105205	F	0		HOLD	PHILADELP	DO NOT BREED		Genetically valuable
4295	105206	M	0		HOLD	PHILADELP	DO NOT BREED		Genetically valuable
4296	105207	M	0		HOLD	PHILADELP	DO NOT BREED		Genetically valuable
4297	105208	M	0		HOLD	PHILADELP	DO NOT BREED		Genetically valuable

PHOENIX

Phoenix Zoo
Phoenix, AZ

ID	Local ID	Sex	Age	House Name	Disposition	Location	Breeding	With	Notes
2446	13132	M	8	Jasper	HOLD	PHOENIX	DO NOT BREED		
3963	13133	F	3	Tatum	HOLD	PHOENIX	DO NOT BREED		Contracept

PITTSBURG – *non-AZA SSP participant*

Pittsburgh Zoo & PPG Aquarium
Pittsburgh, PA

ID	Local ID	Sex	Age	House Name	Disposition	Location	Breeding	With	Notes
325	100763	s	33	Lance	HOLD	PITTSBURG	DO NOT BREED		Excluded, sterile
2408	102309	F	10	Firenze	HOLD	PITTSBURG	DO NOT BREED		

PUEBLA

Africam Safari (Africam, S. A.)
Puebla, Mexico
Note: The pair that has produced offspring (M #1997 and F #1761) are related greater than siblings and producing highly inbred offspring. Please consider repairing female with suggested male to avoid inbreeding.

ID	Local ID	Sex	Age	House Name	Disposition	Location	Breeding	With	Notes
1761	3433	F	20	Pem	HOLD	PUEBLA	BREED WITH	2874	Genetically valuable pairing
1997	3432	M	18	Simon	HOLD	PUEBLA	DO NOT BREED		Genetically valuable
2874	7206	M	12	Eiko	HOLD	PUEBLA	BREED WITH	1761	Genetically valuable pairing
3461	7139	M	7		HOLD	PUEBLA	DO NOT BREED		Genetically valuable
4068	8077	M	4		HOLD	PUEBLA	DO NOT BREED		Genetically valuable
4301	9371	U	0		HOLD	PUEBLA	DO NOT BREED		Genetically valuable

This Animal Program is currently a Yellow SSP Program and recommendations proposed are non-binding – Participation is voluntary. Dispositions to non-AZA institutions should comply with each institution's acquisition/disposition policy.

Population Analysis & Breeding and Transfer Plan

Cheetah (*Acinonyx jubatus*)
AZA Species Survival Plan®
Yellow Program

AZA Species Survival Plan® Coordinator
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1 February 2018

PMC Population Management Center

LINCOLN PARK ZOO. ASSOCIATION OF ZOOS & AQUARIUMS

Executive Summary 2017

Species Survival Plan® for the Cheetah (*Acinonyx jubatus*)

The Cheetah SSP population currently consists of 373 cats (186 males, 187 females and 0 unknowns) at 58 facilities. Fifty-four (54) AZA facilities hold 349 cats (169.189) and 4 non-AZA participants hold 24 (18.6) cats as of 26 January 2018. In this plan, two new non-AZA participants (ROCKTON & HEMMINGFD) were added resulting in a slight increase in the total population. The target population size set by the Felid Taxon Advisory Groups is 300 in the 2009 Regional Collection Plan. The population currently qualifies as a Yellow SSP Program.

Current gene diversity for the managed population is 97.35% and is equivalent to the genetic diversity of a population descended from approximately 19 founders (FGE = 18.85). The standard genetic goal for AZA managed populations is to maintain 90% gene diversity for 100 years. When gene diversity falls below 90% (and average inbreeding increases), it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights, smaller litter sizes, and greater neonatal mortality. Under potential conditions, with a growth rate of 0% (lambda = 1.00), gene diversity can be maintained at or above 90% gene diversity for at least 57 years. Increasing population growth rate, representation of underrepresented founder lineages, and the proportion of breeders in the population will promote increased gene retention.

Demography

Current size of population (N) – Total (Males.Females.Unknown Sex)	373 (181.178.14)
Number of individuals excluded from genetic analyses	125 (52.73)
Population size following exclusions	248 (129.105.14)
Target population size (Kt) from Felid TAG 2009 RCP	300
Mean generation time (T, years)	6.4
Population Growth Rates (λ; lambda)*: Historical / 5 –year / Projected	0.989 / 1.036 / 0.974<>0.989<>1.004

*Historical from life tables (N.America, 1993 – present); 5-year from studbook census; Projected from PMx stochastic 20 yr projections

Genetics*

	Current	Potential
Founders	102	0
Founder genome equivalents (FGE)	18.85	33.24
Gene diversity (GD%)	97.35	98.50
Population mean kinship (MK)	0.0266	-
Mean inbreeding (F)	0.0049	-
Effective population size/potentially breeding population (Ne/N)	0.2292	-
Percentage of pedigree known before assumptions & exclusions	96.9	-
Percentage of pedigree known after assumptions & exclusions	98.7	-
Percentage of pedigree certain after assumptions & exclusions	98.7	-
Projections		
Years To 90% Gene Diversity	44	57
Years to 10% Loss of Gene Diversity	58	81
Gene Diversity at 100 Years From Present (%)	76.0	84.8
Assumed lambda and target size (Kt).	λ = 0.989 Kt = 300	λ = 1.00 Kt = 300

*Genetic statistics based on an analytical studbook "Cheetah_18Jan2017 + OverlayEMbasedofBT2016"

To maintain the current SSP population size of 373 and offset expected deaths (lambda = 1.00), the SSP needs 40 - 45 births in the coming year. Assuming an average litter size of 3 and probability of success at 20%, this would require approximately 75 females in breeding situations. All breeding facilities were given breeding options listed in a "MateRx" table but many of these may be less likely to breed in the next year (e.g., due to having a litter recently, potential pregnancies, due to marginal age, or being too young to breed). Recent population viability analyses (2015/16) indicate that the SSP can currently support providing only four cubs to education programs per year. Pulling animals from the breeding population for use in education programs will be decided on a case by case basis and after consideration of the total SSP population's annual breeding success and overall demographic needs.

Breeding recommendations are based on mean kinship, avoidance of inbreeding, avoidance of linking rare and common lineages, and behavioral and logistical constraints identified by the participating institutions. Individuals with low mean kinship values were prioritized and pairings with inbreeding levels higher than the current average mean kinship have been avoided.

Summary Actions: The SSP has provided a MateR$_x$ to every breeding institution containing a combined 76 females with SEE MATERX breeding recommendations. Animals in mateRx include 2017 and 2016 cubs that cannot yet breed. Recommend 47 transfers to create new breeding pairs or meet institutional requests. Note, several transfers recommended in the October meeting have been fulfilled already prior to the draft distribution. No imports from or exports to other regions are recommended at this time other than proposed exchanges with partner Canadian institutions. New education program animals will be discussed on a case by case basis and after consideration of the demographic needs of the total SSP population.

PHOENIX
Phoenix Zoo
Phoenix, AZ
Contact: Kara Schilling, kschilling@phoenixzoo.org, (602)914-4375

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
8875	WILKES	12761	M	4	SEND TO	FOSSILRIM	SEE MATERX		
8876	RHETT	12762	M	4	SEND TO	FOSSILRIM	SEE MATERX		
8877	BEAU	12763	M	4	SEND TO	FOSSILRIM	SEE MATERX		
9224	BOYKIN	1216	M	2	RECEIVE FROM	FOSSILRIM	DO NOT BREED		
9225	DeMARCO	1217	M	2	RECEIVE FROM	FOSSILRIM	DO NOT BREED		
9226	DIRK	1218	M	2	RECEIVE FROM	FOSSILRIM	DO NOT BREED		

PITTSBURG (non-AZA)
Pittsburgh Zoo & PPG Aquarium
Pittsburgh, PA
Contact: Kenneth Kaemmerer, kkaemmerer@pittsburghzoo.org, (412)365-2580

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
6593	ANDIAMO	103066	M	10	SEND TO	WHEELING	DO NOT BREED		
6594	FRANKIE	103067	M	10	SEND TO	WHEELING	DO NOT BREED		
8767	ZOLA	3403	F	5	RECEIVE FROM	FOSSILRIM	DO NOT BREED		Excluded - unknown pedigree
9811	REY	3419	F	0	RECEIVE FROM	FOSSILRIM	DO NOT BREED		Excluded - unknown pedigree

PORTLAND
Oregon Zoo
Portland, OR
Contact: Rebecca Van Beek, Becca.VanBeek@oregonzoo.org, (503) 226-1561 x 5229

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
9480	MARY JANE	B70095	F	1	HOLD	PORTLAND	DO NOT BREED		

Population Analysis & Breeding and Transfer Plan

Clouded Leopard (*Neofelis nebulosa*)
AZA Species Survival Plan®
Yellow Program

AZA Species Survival Plan® Coordinator & Studbook Keeper
WAZA International Studbook Keeper
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AZA Population Advisor
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20 November 2018

PMC Population Management Center

LINCOLN PARK ZOO.

ASSOCIATION OF ZOOS & AQUARIUMS

Executive Summary

Species Survival Plan® for Clouded Leopard (*Neofelis nebulosa*)

The Clouded Leopard SSP population at the time of analysis consists of 109 animals (45 males and 64 females). AZA members hold 31.42 cats across 25 facilities and 6 non AZA facilities hold 14.22 cats. The Felid Taxon Advisory Group (TAG) designated this population for SSP level management with a target population size of 100 individuals in their 2009-2012 Regional Collection Plan (RCP). The 2018 RCP is in progress and will use the same target size of 100. The Program currently qualifies as a Yellow SSP.

The current SSP population is descended from 18 founders and the current gene diversity of the descendant population is estimated to be 87.91%, equivalent to that of approximately four unrelated animals (FGE = 4.14). Long term projections based on a growth rate of approximately 1% (λ = 1.01) indicate that population gene diversity will decline to 71.4% over the next 100 years or 80.1% in ten generations under current population parameters. As gene diversity falls below 90% of that in the founding population, it is expected that reproduction and survival may be increasingly compromised.

Demography

Current size of SSP population (N) – Total (Males.Females.Unknown Sex)	109 (45.64)
Number of individuals excluded from genetic analyses	22 (6.16)
Population size following exclusions	87 (39.48)
Target population size (Kt) from *Felid* TAG *2009* RCP	100
Mean generation time (T, years)	4.4
Population Growth Rates (λ; lambda)*: Historical / 5 –year / Projected	1.052 / 1.034 / 1.032

*Historical from life tables (N.America; 1970 - present); 5-year from studbook census; Projected from PMx stochastic 20 yr projections

Genetics*

	Total SSP	AZA Only	Potential
Founders	18	18	0
Founder genome equivalents (FGE)	4.14	3.92	6.93
Gene diversity (GD %)	87.91	87.24	92.79
Population mean kinship (MK)	0.1209	0.1276	--
Mean inbreeding (F)	0.0773	0.0708	--
Effective population size/potentially breeding population (Ne / N)	0.5016	0.4135	--
Percentage of pedigree known before assumptions & exclusions	72	72	--
Percentage of pedigree known after assumptions & exclusions	100	100	--
Percentage of pedigree certain after assumptions & exclusions	100	100	--
Projections**			
Years To 90% Gene Diversity	<90%	<90%	<90%
Years to 10% Loss of Gene Diversity	56	26	59
Gene Diversity at 100 Years From Present (%)	71.4	58.8	71.7
Gene Diversity at 10 generations (44 years)	80.1	72.1	80.4
**Ktp (target pop) for projections was 116 to account for space to grow to 100 held in AZA while still including the non-AZA space. For AZA Ktp = 100 – 22 excluded = 78.	λ = 1.01 **Ktp = 116	λ = 1.01 **Ktp = 78	λ = 1.03 **Ktp = 116

**Genetic estimates based on an analytical studbook "NEOF2018_July + 2011"*

The population is in demographic crisis due in part to long-standing husbandry difficulties with successfully introducing potential breeding animals. Demographic goals of this population should focus on improving husbandry in order to increase the growth rate. Demographic projections indicate that approximately 9 - 10 births are required in the coming year to maintain the current population size (λ =1.00), and approximately 10 - 12 are needed per year to grow to the recommended target size of 100 AZA spaces in 10 years (λ=1.011). Where possible, existing breeding pairs were left together and new breeding pairs were formed to increase gene diversity through consideration of mean kinship. However, due to the husbandry challenges of this species, demographic and husbandry considerations outweighed genetic considerations (e.g., inbreeding avoidance) for many breeding pairs.

Summary Actions: The SSP recommends 9 females for breeding. The SSP recommends that facilities holding multiple breeding pairs breed only one pair per year. Additionally, five (5) transfers are recommended at this time but more may be recommended in the interim as needed.

OKLAHOMA

Oklahoma City Zoological Park

Oklahoma City, OK

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	RecNotes
1144	Gemma	769118	F	17	HOLD	OKLAHOMA	DO NOT BREED		Excluded - Age
1227	Luke	772019	M	14	HOLD	OKLAHOMA	DO NOT BREED		Excluded - Age/behavior

PITTSBURG (non-AZA)

Pittsburgh Zoo & PPG Aquarium

Pittsburgh, PA

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	RecNotes
1710	Pi	102933	M	4	HOLD	PITTSBURG	BREED WITH	1719	Co Rear
1719	Saya	102934	F	4	HOLD	PITTSBURG	BREED WITH	1710	Co Rear

PRESCOTT (non-AZA)

Heritage Park Zoological Sanctuary

Prescott, AZ

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	RecNotes
1777		A015-4	F	3	HOLD	PRESCOTT	DO NOT BREED		
1778		A015-4	F	3	HOLD	PRESCOTT	DO NOT BREED		

ROSAMOND (non-AZA)

Exotic Feline Breeding Compound Inc.

Rosamond, CA

SB ID	House Name	Local ID	Sex	Age	Disposition	Location	Breeding	With	RecNotes
1574	Kyoke	_____	F	7	SEND TO	NZP-CRC	DO NOT BREED		

Population Analysis & Breeding and Transfer Plan

Red Ruffed Lemur (*Varecia rubra*)

AZA Species Survival Plan®
Yellow Program

AZA Species Survival Plan® Coordinator
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9 February 2017

PMC
Population Management Center
Lincoln Park Zoo
Association of Zoos & Aquariums

Disney's Animals, Science and Environment

Executive Summary
Species Survival Plan® for Red Ruffed Lemur (*Varecia rubra*)

The current SSP population of red ruffed lemurs is N = 187 animals (104 males; 83 females; 0 unknown sex) at 48 AZA institutions and 4 non-member participating institutions. This Population Analysis and Breeding and Transfer Plan was prepared November 2016 at Disney's Animal Kingdom®. The last Breeding and Transfer Plan for this species was finalized 8 December 2015. Analyses were based on the North American data of the International *Varecia rubra* Studbook (current to 30 June 2016) and were performed using PopLink 2.4 and PMx 1.4.20160831.

The target population size designated by the Prosimian Taxon Advisory Group 2014 Regional Collection Plan is 225. This population currently qualifies as a Yellow SSP.

Genetic diversity in this population is currently 91.61%. When gene diversity falls below 90% of that in the founding population, it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights and greater infant mortality. Gene diversity in 100 years is projected to be 84.2% (based on current statistics, assuming a target population for projections of 225 and lambda = 1.05). Gene diversity in 10 generations (83 years) is projected to be 85.4%. Equalizing the founder representation by breeding individuals from underrepresented lineages and increasing the effective size, and target population size could extend gene diversity retention.

Demography	
Current size of population (N) – Total (Males.Females.Unknown Sex)	187(104.83.0)
Number of individuals excluded from the potentially breeding population	27 (14.13)
Population size following exclusions	160(90.70.0)
Target population size (Kt) from the Prosimian TAG's 2014 RCP	225
Mean generation time (T; years)	8.3
Historical population growth rate (λ; life table lambda 1973-present) / 5 – year from Poplink census / Projected growth rate from PMx stochastic 20 yr projections	1.050 / 0.979 / 1.028 <> 1.042 <> 1.055

Genetics		
	Current	*Potential*
Founders	12	0
Founder genome equivalents (FGE)	5.96	9.24
Gene diversity (GD %)	91.61%	94.59%
Population mean kinship (MK)	0.0839	-----
Mean inbreeding (F)	0.0430	-----
N_e/N (Effective population size/census size ratio)	0.3200*	-----
% Pedigree Known prior to assumptions and exclusions	92.0%	-----
% Pedigree Known after assumptions and exclusions	100%	-----
% Pedigree Certain after assumptions and exclusions	98.0%	-----
Projections		
	[a]Historical/Projected λ = 1.05	
Years to 90% GD	20	-----
Years to 10% loss of GD	124	-----
Gene Diversity at 100 Years (%)	84.2%	-----
Gene Diversity in 10 Generations (%)	85.4%	-----
Generation time (*T*) and Target population size used in projections	*T*=8.3 x 10 = 83 Target = 225	

*Value includes founders in calculations.
[a]Projected/Historical λ is growth rate from PMx stochastic 20 yr projections and historical λ from demographic window (1973-2015) from life table calculated in PMx.

Demographic analyses indicated that to increase the population size to 225 in 4 years, approximately 22-24 births are required (λ = 1.048). To remain at the current size (λ = 1.00), approximately 14 births are needed in the next year. As with most SSP populations, pairings are prioritized to maintain or increase gene diversity through considerations of mean kinship, avoidance of inbreeding, differences in sire and dam mean kinships, and the degree of uncertainty within a pedigree.

Summary Actions: The SSP recommends 18 breeding males and 16 breeding females, as well as 11 transfers for this period. Approximately 22-24 births per year are required to grow this population to a size of 225 in the next 4 years.

This Animal Program is currently a Yellow SSP Program and recommendations proposed are non-binding – Participation is voluntary. Dispositions to non-AZA institutions should comply with each institution's acquisition/disposition policy.

PITTSBURG - *non-AZA SSP participant*

Pittsburgh Zoo & PPG Aquarium

Pittsburgh, PA

ID	Local ID	Sex	Age	House Name	Disposition	Location	Breeding	With	Notes
317	106811	M	27	Copper	HOLD	PITTSBURG	BREED WITH	970	Mis-matched pairing, male valuable, female over-represented breed for demographics
970	6838	F	12	Carina	HOLD	PITTSBURG	BREED WITH	317	

SAN ANTON

San Antonio Zoological Gardens & Aquar

San Antonio, TX

ID	Local ID	Sex	Age	House Name	Disposition	Location	Breeding	With	Notes
433	Y01107	F	25	Aludra	HOLD	SAN ANTON	DO NOT BREED		Excluded due to age
1503	N13030	M	9	Aries	HOLD	SAN ANTON	DO NOT BREED		
1504	N13029	M	9	Scorpius	HOLD	SAN ANTON	DO NOT BREED		
1578	N13032	M	7	Orion Jr	HOLD	SAN ANTON	DO NOT BREED		
1579	N13031	F	7	Phoebe	HOLD	SAN ANTON	DO NOT BREED		Contracept

SAN FRAN

San Francisco Zoological Gardens

San Francisco, CA

ID	Local ID	Sex	Age	House Name	Disposition	Location	Breeding	With	Notes
541	101052	M	22	Nozee Bay	HOLD	SAN FRAN	DO NOT BREED		Genetically valuable
1010	M80124	M	9	Tomady	RECEIVE FROM	METROZOO	DO NOT BREED		
1587	111038	M	7	Antonio	HOLD	SAN FRAN	DO NOT BREED		
1716	202065	M	5	Fitily	HOLD	SAN FRAN	DO NOT BREED		

SANDIEGOZ

San Diego Zoo

San Diego, CA

Note: SSP will likely send a new breeding male to breed with SB#1575 in summer/fall 2017 for the 2017-2018 breeding season based on the request of this institution.

ID	Local ID	Sex	Age	House Name	Disposition	Location	Breeding	With	Notes
397	590155	F	26	Ana	HOLD	SANDIEGOZ	DO NOT BREED		Genetically valuable
409	591231	F	25	Hendrix	HOLD	SANDIEGOZ	DO NOT BREED		Genetically valuable
574	594168	M	22	Lucifer	HOLD	SANDIEGOZ	BREED WITH	1575	Genetically valuable pairing
1575	515081	F	7	Morticia	HOLD	SANDIEGOZ	BREED WITH	574	
2011	515046	M	0	Ony	HOLD	SANDIEGOZ	DO NOT BREED		Genetically valuable

Population Analysis & Breeding and Transfer Plan

White-Cheeked Gibbon (*Nomascus leucogenys*) AZA Species Survival Plan® Yellow Program

AZA Species Survival Plan® Coordinator
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AZA Species Survival Plan® Vice Coordinator
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AZA Studbook Keeper
Amanda Ott, Disney's Animal Kingdom®
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AZA Adjunct Population Advisor
Gina M. Ferrie, Disney's Animal Kingdom®
(Gina.M.Ferrie@disney.com)

11 October 2018

PMC
Population Management Center

LINCOLN PARK ZOO.

ASSOCIATION OF ZOOS & AQUARIUMS

Disney's ANIMALS, SCIENCE and ENVIRONMENT

Draft for Review by Institutional Representatives – Please comment by November 9th

Executive Summary

Species Survival Plan® for White-cheeked gibbon (*Nomascus leucogenys*)

At the time of analyses, the current White-cheeked Gibbon SSP population consists of 84 individuals (45 males, 38 females, 1 unknown sex) at 27 AZA and 2 non-AZA institutions. The Ape Taxon Advisory Group designated this population for SSP level management with a target size of 125 individuals in their 2014 Regional Collection Plan. The population currently qualifies as a Yellow SSP Program.

The current gene diversity of this population is descended from 26 founders with no potential founders remaining, and current gene diversity is estimated to be approximately 95.15%, equivalent to that of about ten founders (FGE = 10.31). Under current population parameters and a growth rate of 1.4% (λ=1.014), the population is projected to maintain 90% gene diversity for approximately 89 years and 89.4% gene diversity for 100 years. When gene diversity falls below 90%, it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights, and greater neonatal mortality. However, a high level of gene diversity may be retained for longer by maintenance of the already high effective population size, future importation of unrelated individuals, and equalization of founder representation (by breeding animals with low and well-matched mean kinship values).

Demography	
Current size of population (N) – Total (Males.Females.Unknown Sex)	84 (45.38.1)
Number of individuals excluded from the potentially breeding population	8 (0.8.0)
Population size following exclusions	76 (45.30.1)
Target population size (Kt) from the Ape TAG's 2014 RCP	125
Mean generation time (T; years)	17.5
Historical population growth rate (λ; life table lambda 1980-present) / 5 – year from Poplink census / Projected growth rate from PMx stochastic 20 yr projections	1.014/ 0.998/ 0.989 <> 1.003 <> 1.016

Genetic Summary[1]		
	2018	Potential
Founders	26	0
Founder genome equivalents (FGE)	10.31	17.34
Gene diversity (GD %)	95.15	97.12
Population mean kinship (MK)	0.0485	--
Mean inbreeding (F)	0.0029	--
% Pedigree Known prior to assumptions and exclusions	95.4	--
% Pedigree Known after assumptions and exclusions	99.7	--
N_e/N (Effective population size/census size ratio)	0.3943	--
Projections[3]		
	Historical / Projected λ = 1.014	--
Years to 90% GD	89	--
Years to 10% loss of GD	174	--
Gene Diversity at 100 Years (%)	89.4%	--
Gene Diversity in 10 Generations (%)	85.6%	--
Generation time (*T*) and Target population size used in projections	*T* = 17.5 x 10 = 175 Kt = 125	--

To grow the population gradually to the target size of 125 animals at a rate of 1.4% over the next 28 years (λ=1.014), approximately 4-7 births are required each year. To simply maintain the population at its current size of 84, approximately three births are required in the next year. As with most SSPs, recommended pairings have been determined with consideration of demographic goals, mean kinship, population change in gene diversity, maximum avoidance of inbreeding, and the needs of individual institutions in an attempt to increase and maintain gene diversity for as long as possible.

Summary Actions: The SSP recommends 7 breeding pairs to breed over the next two years and 5 transfers are recommended to create new breeding pairs and meet institutional needs. Approximately 4-7 births are required each year to grow the population towards its target size.

This Animal Program is currently a Red SSP and recommendations proposed are non-binding – Participation is voluntary. Dispositions to non-AZA institutions must comply with each institution's acquisition/disposition policy, in accordance with the AZA policy on Responsible Population Management.

OMAHA

Omaha's Henry Doorly Zoo
Omaha, NE
Note: This female is being foster reared by a lar gibbon.

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
384	24644	Mu	F	1	SEND TO	W ORANGE	DO NOT BREED		#328 to serve as foster

PITTSBURG – non-AZA participating organization

Pittsburgh Zoo & PPG Aquarium
Pittsburgh, PA
Note: Maintain females in fission-fusion style management and SSP will continue to look at future options for these animals.

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
0190	0196	Cai Lay	F	22	RECEIVE FROM	ERIE	DO NOT BREED		
0203	101685	Picard	M	21	HOLD	PITTSBURG	DO NOT BREED		
366	2014	Chua	F	6	RECEIVE FROM	ERIE	DO NOT BREED		

PORTLAND

Oregon Zoo
Portland, OR
Note: Institution has requested placement of this pair. SSP will continue to look for new location.

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
0042	1318	Phyllis	F	48	HOLD	PORTLAND	DO NOT BREED		Excluded due to age, health
303	A00018	Duffy	M	22	HOLD	PORTLAND	DO NOT BREED		

PROVIDENCE

Roger Williams Park Zoo
Providence, RI

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
349	100452	Quon	M	9	HOLD	PROVIDENCE	DO NOT BREED		
353	100395	Ari	F	8	HOLD	PROVIDENCE	DO NOT BREED		

SAN ANTON

San Antonio Zoological Gardens & Aquarium
San Antonio, TX

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
0184	B05029	Maya	F	25	HOLD	SAN ANTON	DO NOT BREED		
311	B05034	Melouprey	M	19	HOLD	SAN ANTON	DO NOT BREED		
374	Y14098	Harrison	M	4	HOLD	SAN ANTON	DO NOT BREED		
383	F17005		U	1	HOLD	SAN ANTON	DO NOT BREED		

Population Analysis & Breeding and Transfer Plan

Siamang (*Symphalangus syndactylus*)
AZA Species Survival Plan®
Yellow Program

AZA Species Survival Plan® Siamang Species Coordinator
Beth Richards, Disney's Animal Kingdom
(beth.a.richards@disney.com)

AZA Studbook Keeper
Becky Malinsky, Smithsonian National Zoological Park
(malinskyb@si.edu)

AZA Population Advisor
Gina Ferrie, Disney's Animal Kingdom®
(gina.m.ferrie@disney.com)
Sara Sullivan, Population Management Center, Lincoln Park Zoo
(ssullivan@lpzoo.org)

9 June 2017

PMC Population Management Center

LINCOLN PARK ZOO.

ASSOCIATION OF ZOOS & AQUARIUMS

Executive Summary
Siamang (*Symphalangus syndactylus*)

At the time of analyses, the Siamang population consists of 124 individuals (60 males, 61 females, and 3 unknown sex offspring) at 51 institutions, 106 (51.52.3) at 46 AZA and 18 (9.9.0) at 5 non-AZA. The Ape Taxon Advisory Group (TAG) in their 2014 Regional Collection Plan (RCP) set a target population size in AZA of 115 individuals. **Under AZA's current sustainability designations, this population does not meet the criteria to remain a Green SSP and is now designated as a Yellow SSP Program.** To account for extra spaces provided by five recently added non-AZA participants, an adjusted target size of 130 individuals is used for analyses.

Genetic analyses based on an analytical studbook with pedigree assumptions indicate that the current SSP population is descended from 59 founders with no potential founders remaining. The current gene diversity of this population is just over 97%, equivalent to about 22 unrelated animals (FGE=22.50). Based on current population parameters, including a target size of 130 individuals (to account for AZA + non-AZA space), the SSP population is projected to retain 90% gene diversity for over 100 years, even assuming no growth ($\lambda = 1.00$). However, the standard benchmark goal of 90% for 100 years cannot be met by the AZA population alone, and, consequently, the SSP no longer meets the criteria to remain a Green SSP. When gene diversity falls below 90% of that in the founding population, it is expected that reproduction will be increasingly compromised by, among other factors, lower birth weights and greater neonatal mortality. However, potential gene diversity in the SSP is very high and could be exploited by managed breeding targeted at equalizing founder representation, maintenance of the high effective size ratio (proportion of population breeding), and increased growth.

Demography

Current size of population (N) – Total (Males.Females.Unknown Sex)	124 (60.61.3)
Number of individuals excluded from genetic analyses	27 (11.16.0)
Population size following exclusions	97 (49.45.3)
Target population size (Kt; adjusted from 2014 Ape TAG RCP)	130 (115 AZA + 15 non-AZA spaces)
Mean generation time (years)	16.1
Population growth rates (λ)[1]: Historical / 5-Year/ Projected	1.01/ 0.995/ 0.993

[1]Historical from life tables (NA 1980-2016)/ 5-Year from PopLink Census/ Projected from PMx 20 year stochastic projections

Genetics

(based on an analytical studbook)	Current	Potential
Founders	59	0
Founder genome equivalents (FGE)	22.50	34.06
Gene diversity retained (GD %)	97.78	98.53
Population mean kinship (MK)	0.0222	-
Mean inbreeding (F)	0.0055	-
Percentage of pedigree known before/after exclusions & assumptions	91.2/ 100	-
Effective population size/census size ratio (Ne / N)[1]	0.4583	-
PROJECTIONS[2]	λ=1.00, K(t) = 130	λ=1.00, K(t) = 115 (AZA only)
Years To 90% Gene Diversity	116	95
Years to 10% Loss of Gene Diversity	152	132
Gene Diversity at 100 Years From Present (%)	91.1	89

[2]This population does not currently qualify as a Green SSP as 90% GD cannot be retained for >100 years for AZA alone.

In order to maintain current population size, approximately seven births are needed in the upcoming year. Approximately eight to nine births are needed per year to reach recommended target size of 130 individuals within three years ($\lambda = 1.01$). As with most SSPs, recommended pairings have been determined with consideration of demographic goals, mean kinship, population change in gene diversity, maximum avoidance of inbreeding, the needs of individual institutions, and behavioral considerations in an attempt to increase and maintain gene diversity for as long as possible.

Summary Actions: Recommend 22 breeding pairs and 13 transfers over the next two to three years. Adult females not recommended to breed should be contracepted. If a recommended pair successfully produces a live birth, contact the SSP Coordinator as soon as possible to determine if postpartum contraception is needed. Institutions with young females age 4 or older being housed with mature males should contact the SSP to determine the most appropriate time to begin contraception.

OMAHA
Omaha's Henry Doorly Zoo
3701 South 10th St., Omaha, NE 68107-2200, USA

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
474	18540	Joey	M	15	HOLD	OMAHA	BREED WITH	493	
493	17910	Stewey	F	12	HOLD	OMAHA	BREED WITH	474	Demographic pair - both over-represented

PHOENIX
Phoenix Zoo
455 N Galvin Pky, Phoenix, AZ 85008-3431, USA

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
389	9297	Boyd	M	24	HOLD	PHOENIX	DO NOT BREED		
464	12797	Hadiah	F	16	HOLD	PHOENIX	DO NOT BREED		

PITTSBURG, *non-AZA*
Pittsburgh Zoo & PPG Aquarium
One Wild Place, Pittsburgh, PA 15206-1178, USA

Institution Notes: Male 502 x female 595 is a potential future breeding pair.

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
502	102762	Zoli	M	9	RECEIVE FROM	LOUISVILL	DO NOT BREED		Potential future breeding pair with 595
518	102942	Merlin	M	6	SEND TO	~~SYRACUSE~~ BROWNSVIL	DO NOT BREED		
590	102951	Leela	F	6	SEND TO	~~SYRACUSE~~ BROWNSVIL	DO NOT BREED		
595	212099	Haumea	F	4	RECEIVE FROM	HONOLULU	DO NOT BREED		Genetically valuable; Contracept until sexually mature – potential future breeding pair with 502

RIO GRAND
Albuquerque Biological Park
903 Tenth St. SW, Albuquerque, NM 87102-4098, USA

ID	Local ID	House Name	Sex	Age	Disposition	Location	Breeding	With	Notes
288	M03014	Brian	M	27	HOLD	RIO GRAND	BREED WITH	383	
383	M09015	Johore	F	25	HOLD	RIO GRAND	BREED WITH	288	Genetically valuable pair
597	M14001	Tika	F	2	HOLD	RIO GRAND	DO NOT BREED		
617	M17004	Eerie	U	0	HOLD	RIO GRAND	DO NOT BREED		Offspring reported during comment period

ORANGUTAN
SPECIES SURVIVAL PLAN

www.orangutanssp.org

21 December 2018

Dr. Barbara Baker
President, CEO
Pittsburgh Zoo & PPG Aquarium
One Wild Place
Pittsburgh, PA 15206

Dear Dr. Baker,

The Association of Zoos and Aquariums (AZA) Species Survival Plan® (SSP) for Bornean Orangutans is a "Green" program, indicating that the population is sustainable within AZA. As the Pittsburgh Zoo & PPG Aquarium is not a member of AZA, the orangutans housed at your institution are currently considered surplus to the SSP population. If Pittsburgh Zoo & PPG Aquarium submits an application to participate in the Orangutan SSP as a Sustainability Partner and such application is approved by AZA's Wildlife Conservation and Management Committee (WCMC), your orangutans would then be considered part of the SSP-managed (non-surplus) population.

Please let me know if you have any questions or other feedback.

Sincerely,

Lori Perkins
Chair, Orangutan SSP
Deputy Director, Birmingham Zoo, Inc.
lperkins@birminghamzoo.com

ASSOCIATION OF ZOOS & AQUARIUMS

The Orangutan Species Survival Plan® is a cooperative population management and conservation program for orangutans living in zoos accredited by the Association of Zoos and Aquariums (AZA). The steering committee and advisory board are made up of experts in the field of orangutan care and behavior who are well positioned as advocates for the well-being of orangutans both within and outside of accredited zoos.

Nelson, Emma <emma_nelson@fws.gov> Tue, May 21, 2019 at 10:13 AM
To: Heather Terrell <hterrell@pittsburghzoo.org>

Good morning Heather,

I hope you're doing well. I wanted to check in with you about the remaining documentation. From your last email I believe you are still working on obtaining letters from the Amur tiger and gorilla SSP coordinators. Additionally, in reviewing the last batch of documents, the letters from the orangutan and lion SSP coordinators appear to indicate that unless you apply to the SSP as a sustainability partner, your specimens are not included in the SSP. As such, for those species, since you do not participate in an established breeding program, we will need documentation to show how you are maintaining genetic vitality within your population, including maintaining sufficient numbers. If, instead, you would like to remove these specimens from consideration, you can email me requesting withdrawal of these species. Lastly, it appears that we still need a copy of the participant list with your institution for the elephant SSP Breeding and Transfer Plan.

Please provide the information and documentation indicated. **Any response must be in written form (email is considered written form).**

If we do not receive the information requested above within **45 days** from the date of this e-mail, your application will be abandoned and administratively closed. Once the file is closed, you would need to submit a new application and all required fees. If you have questions, you may contact me at Emma_Nelson@fws.gov or at 703-358-2296. Please reference your file number, **PRT-98224C.**

Best,
Emma
[Quoted text hidden]
--
Emma Nelson
Pronouns: she/her
[Quoted text hidden]

Heather Terrell <hterrell@pittsburghzoo.org> Thu, Jun 6, 2019 at 4:27 PM
To: "Nelson, Emma" <emma_nelson@fws.gov>

Emma,

It is taking longer than expected to become sustainability partners for these species. Therefore we would like to just remove Amur ger, gorilla, orangutan, lion and elephant from our applica on. Once we have obtained sustainability partner status then we will apply to amend our CBW to include them.

Thank you for your work on this applica on.

Heather

[Quoted text hidden]

Nelson, Emma <emma_nelson@fws.gov> Mon, Jun 10, 2019 at 7:43 AM
To: Heather Terrell <hterrell@pittsburghzoo.org>

Good morning Heather,

Thank you for getting back to me. Okay, I will withdraw the tiger, gorilla, orangutan, lion, and elephant from consideration. I will move forward with the rest of your application today. And as you mentioned in your email, you can always apply to include these species under your CBW at a later date.

Kindest regards,
Emma
[Quoted text hidden]