Population Analysis & Breeding and Transfer Plan

Linne's Two-toed Sloth (*Choloepus didactylus*)
AZA Species Survival Plan®
Signature Program

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5 June 2023

PMC Population Management Center

LINCOLN PARK ZOO. ASSOCIATION OF ZOOS & AQUARIUMS ZOO ATLANTA

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Acknowledgments

The Linne's Two-toed Sloth SSP planning meeting was held at Zoo Atlanta and via online conferencing on 21 November 2022, attended by the following:

Lynn Yakubinis, Zoo Atlanta
Deb Dial, National Aquarium
Liz Wilson, Audubon Zoo
Jennifer Mickelberg, Zoo Atlanta
Several IRs were also in attendance

Cover photo courtesy of Minnesota Zoo

This plan was prepared and distributed with the assistance of the Planning Coordinator and Program Assistant at the AZA Population Management Center (pmc@lpzoo.org).

Description of Population Status

Species Survival Plan® for the Linne's Two-toed Sloth *(Choloepus didactylus)*

Introduction: This current SSP population consists of 158 animals (81 males, 74 females, and 3 unknown sex) distributed among 79 facilities. The Pangolin, Aardvark & Xenarthra Taxon Advisory Group has set the target population size for this population to be 175 animals (2022 Regional Collection Plan). Under AZA's new sustainability designations, as of 6 February 2023, this Animal Program is designated as a Signature SSP.

Analytical Assumptions and Exclusions: The pedigree of this population is 75% known before assumptions and exclusions. Following assumptions and exclusions, the pedigree is 92.8% known and 90.6% certain (Appendix A). Thirty animals have been excluded from the potentially breeding population (Appendix C).

Demography: This SSP species has been held continuously in AZA facilities since the 1920s. Initial growth of the population was the result of importations, with zoo breeding starting in the mid-1970s. The first recorded captive birth was in 1956. Over the past 30 years, the Linne's two-toed sloth population showed an overall trend of decline growth (historical lambda= 0.971) (Figure 1). There has been an increase in imports over the last 5 years which has helped to support the population demographically. Over the past five years, the population has been growing at a rate of just over 4% per year (lambda = 1.041). At least ten births are necessary to keep the population stable at its current size (lambda = 1.00 or 0% growth). There have been between 3 and 12 births over the last 10 years so this goal appears to be quite reasonable.

The age structures illustrates the number of males and females in each age class (Figure 2). Based on its current age structure and growth rate, if the population continues on its current trajectory, this population could increase over time if institutions follow breeding recommendations.

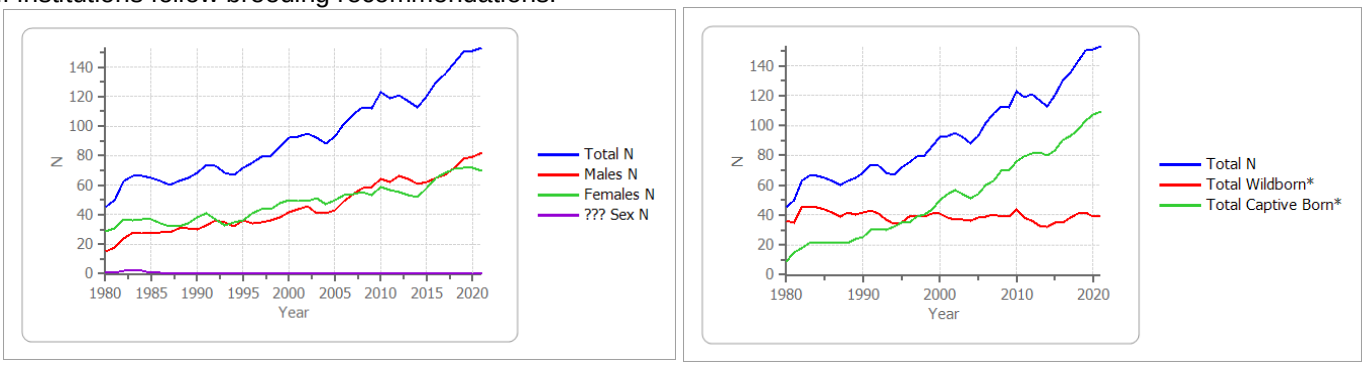

Figure 1. *Census of Linne's Two-toed Sloth SSP from 1980 to 2022 by sex (left) and birth type (right)*

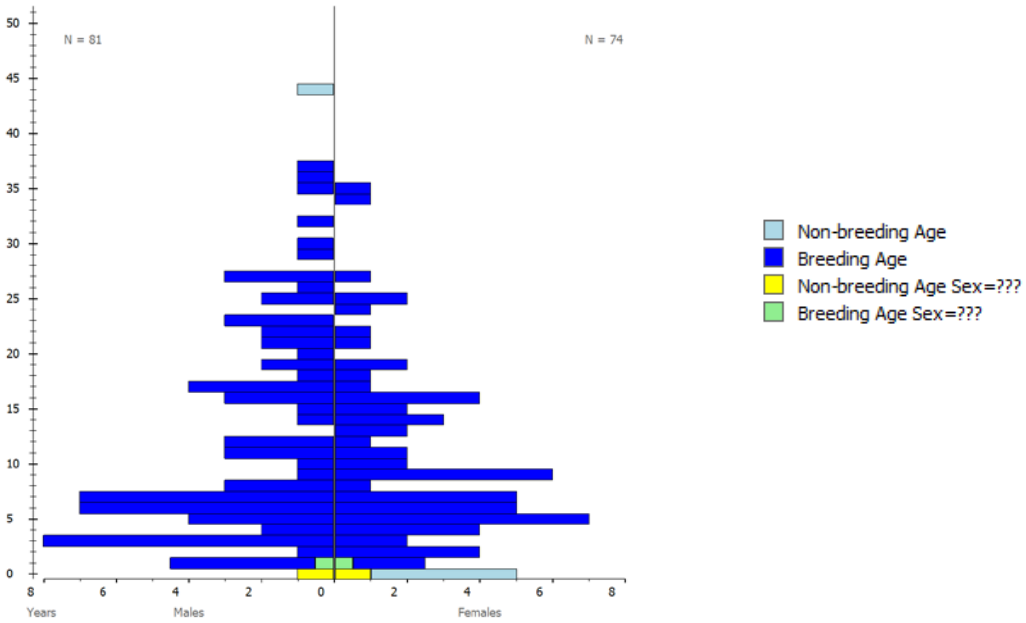

Figure 2. *Age distribution of the population, N= 158 (81.74.3) in the Linne's Two-toed Sloth SSP.*

Table 1: *Demographic status of SSP population, according to studbook.*

Demography Summary		
Current size of SSP population (N) – Total (Males.Females.Unknown Sex)	158 (81.74.3)	
Number of individuals excluded from genetic analyses	30 (19.11.0)	
Population size following exclusions	128 (62.63.3)	
Target population size (Kt) from *PAX* TAG 2022 RCP	175	
Mean generation time (T, years)	17.0	
Population growth rates (λ; lambda)*: Life Table / 5-year / Projected	0.971 / 1.04 / 0.977	
Percentage (%) of living population born in zoos and aquariums	25%	
Survival/Mortality	**Males**	**Females**
Observed first year mortality rate (Q_x)	0.33	0.30
Median life expectancy (MLE), excluding first year mortalities (years) (from PopLink Survival Statistics Report (https://www.aza.org/species-survival-statistics))	22.5	13.4
Observed maximum longevity (L_x) (Studbook ID # of individual)	44 (SB # 376)	49 (SB # 138)
Reproduction		
Observed reproductive age range	1–38	2–38
Gestation/Incubation time	11.5 months	
Median litter size born	1	

* Life table (1/1/1980—11/21/2022 AZA); 5-year from studbook census; Projected from PMx stochastic 20-year projections

Genetics: Based on pedigree assumptions and exclusions, the studbook pedigree indicates that this SSP is descended from 45 founders with 26 potential founders remaining. The gene diversity of the population is 97.3%, which is equivalent to that found in 18 founders (FGE =18.68). Typical AZA program goals include thresholds for tolerance of gene diversity loss over time; 90% gene diversity retention for 100 years is a common management goal. Decreases in gene diversity below 90% of that in the founding population have been associated with reproduction increasingly compromised by, among other factors, lower birth weights, smaller litter sizes, and greater neonatal mortality in some species. Based on current population parameters and recent growth rate trends, gene diversity is projected to decline to 89.3% over the next 100 years if the current population grows to the RCP target size of 175 at its projected growth rate of 4%.

Table 2: *Population size, genetic status, and projections for the Linne's Two-toed Sloth SSP population.*

Genetics Summary*			
	2019	**2023**	**Potential**
Founders	*54*	45	26
Founder genome equivalents (FGE)	*21.15*	16.68	61.09
Gene diversity (GD %)	*97.6*	97.3	99.18
Population mean kinship (MK)	*0.0236*	0.0268	--
Mean inbreeding (F)	*0.010*	0.00	--
Effective population size relative to population size (N_e/N)	*0.1750*	0.1980	--
Percentage of pedigree known before / after assumptions and exclusions	*78% / 98%*	75 % / 92.8%	--
Percentage pedigree certain after assumptions and exclusions	*98%*	73%/90.6%	--
Projections			
Years to 90% gene diversity	*94*	82	91
Years to 10% loss of gene diversity	*121*	89	130
Gene diversity at 100 Years (%)	*89.9*	88.5	90
	Assuming λ = 1.0, Target size = 175, Generation length = 15.7, Starting population size = 168	Assuming λ = 1.0, Target size = 175, Generation length = 17, Starting population size = 158	Assuming λ = 1.04, Target size = 175, Generation length = 17, Starting population size = 158

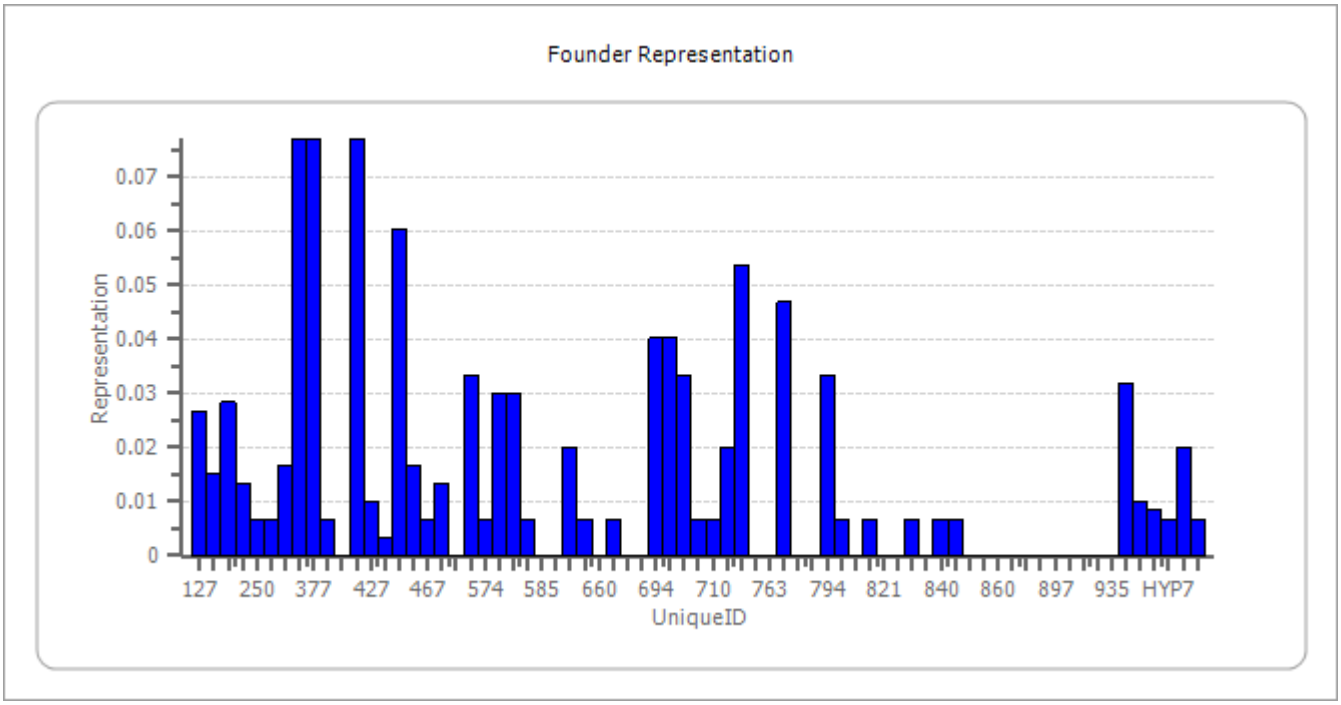

Figure 3. *Founder representation distribution of the analytical Linne's Two-toed Sloth SSP population.*

Recommendation Outcomes:
The website PMCTrack calculates the outcomes fo SSP recommendations by comparing Breeding and Transfer Plan recommendations to births and transfers recorded in the studbook (Figure 4). There are many reasons that recommendations might not be fulfilled, including interim recommendations issued by the SSP Coordinator; these reasons can be captured using PMCTrack Outcomes Surveys. SSP participants are always encouraged to attempt to fulfill recommendations and to communicate successes and failures to the SSP Coordinator.

Of the recommendations proprosed in the 2019 Breeding and Transfer Plan, 21% of the BREED WITH recommendations were fulfilled, and 53% of SEND TO recommendations were fulfilled as requested. SSP participants are always encouraged to attempt to fulfill recommendations and communicate sucesses and challenges to the SSP Coordinator.

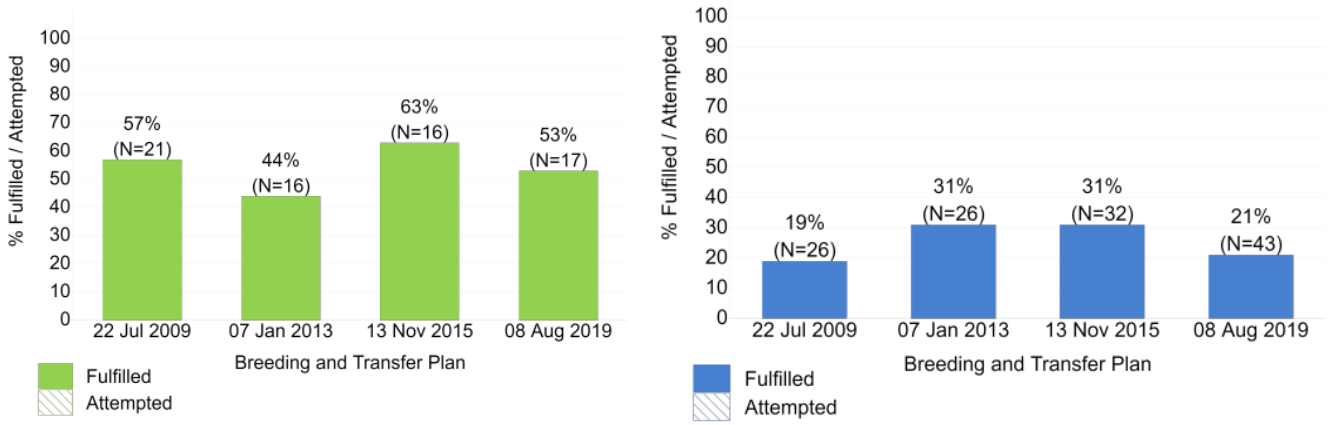

Figure 4. Recommendation outcomes by transfers (left) and breeding (right) for the past Hoffman's Two-toed Sloth SSP Breeding and Transfer Plans. The number represents the percentage recommendations fulfilled. Please visit PMCTrack.org or contact pmctrack@lpzoo.org for more information or with any questions.

Management Strategies: This is a 2-year plan (2023-2025). Interim recommendations will continue to be made as needed until another full set of recommendations are produced. Recommendations contained in this plan supersede all previous recommendations.

Table 3: *Historic reproduction and future population goals.*

Current Reproductive Goals Summary		
	Number of Births Needed per Year over the next 2 Years	**Target Population Size**
To maintain current population size (λ = 1.00)	10-12	158
To grow to the TAG's recommended target population size in 5 years (Kt = 175; λ =1.02)	14-17	175
Reproductive Goals Summary from the Last BTP (2019)		
Number of females recommended to breed	44	
Number of births since then	8	
Average Number of Events in the SSP Population per Year over the Last Five Years		
Average number of births per year	5.5	
Average number of deaths per year	8.6	
Average number of imports per year	9.4	
Average number of exports per year	0	

At this time, the SSP:

1. **Recommends 30 females/pairs/groups to breed at 27 facilities.** The number of breeding females/pairs/groups recommended is intended to maintain the current population size and fill additional spaces as they can be become available. Institutions recommendation to breed are expected to hold offspring for at least 1 year. Offspring should be kept with the dam for a minimum of 10-12 months (depending on natural weaning process)

2. **Recommends 22 transfers to establish new pairs and meet facility requests.**

3. DNA testing is recommended to resolve any remaining pedigree/species or sexing questions. Counting neck vertebrae and photo identification are **not** reliable methods for species determination. Please confirm sex of untested animals either by DNA testing or physical exam,
    - Contact the SSP Coordinator for information regarding genetic testing procedures and labs.
    - Contact the SSP Coordinator if you have any questions regarding how to sex your sloth.
    - Please inform the SSP Coordinator/Studbook Keeper of genetic testing results.

4. Institutions wishing to receive (or place animals) should contact the SSP Coordinator for guidance before making arrangements. The SSP can recommend sources for acquiring sloths. Animals should not be transferred before first discussing with the SSP Coordinator. It must be ensured that the best moves and pairings are carried out in order to achieve demographic stability and genetic health for the population into the future.

5. Any institution wishing to import unrelated, young animals should contact the SSP coordinator first—this includes sloths intended for education purposes.

6. If considering acquiring a sloth for education, please contact the SSP coordinator first. All Two-toed Sloths in AZA institutions are managed by the SSP coordinator. All sloths are valuable to the population and are needed for the demographic stability and genetic health of the population. The SSP recommends that education sloths are housed in natural exhibits with the opportunity for them to exhibit natural behaviors. They should never be held or carried for programs – they should be trained to voluntarily enter a crate or climb on a perch.

Breeding and Transfer Recommendations by Studbook

Updates since draft are highlighted in yellow.

By studbook ID

ID	Location	Sex	Age	Disposition	New Location	Breeding	With	Notes
376	TULSA	M	44	HOLD		DO NOT BREED		Excluded
378	BROWNSVIL	M	37	HOLD		DO NOT BREED		
391	NZP-WASH	M	36	HOLD		BREED WITH	852	
404	CALI	M	---	HOLD		DO NOT BREED		
406	MOODY	M	35	HOLD		DO NOT BREED		
479	DENVER	M	32	HOLD		BREED WITH	539	
485	GRANBY	M	30	SEND TO	BIODOME	BREED WITH	753	
496	SAN ANTON	M	29	HOLD		DO NOT BREED		Excluded
526	HOUSTON	M	27	HOLD		BREED WITH	530	
530	HOUSTON	F	27	HOLD		BREED WITH	526	
538	CLEVELAND	F	---	SEND TO	BALTIM AQ	BREED WITH	800	
539	DENVER	F	---	HOLD		BREED WITH	479	
544	BALTIM AQ	M	26	SEND TO	CHATTANOG	DO NOT BREED		
551	PROVIDNCE	M	25	HOLD		DO NOT BREED		
552	DULUTH	M	25	HOLD		DO NOT BREED		Excluded
569	VANCOUVAQ	F	24	HOLD		DO NOT BREED		
~~573~~	~~LINCOLN C~~	~~M~~	~~23~~	~~HOLD~~		~~DO NOT BREED~~		Excluded, Died during draft
581	SAN FRAN	M	12	HOLD		DO NOT BREED		
582	BIODOME	F	13	HOLD		DO NOT BREED		

ID	Location	Sex	Age	Disposition	New Location	Breeding	With	Notes
585	FRESNO	M	16	HOLD		DO NOT BREED		
586	BATTLE CR	F	16	HOLD		BREED WITH	685	
587	AUDUBON	F	16	HOLD		DO NOT BREED		
588	AUDUBON	F	12	SEND TO	BALTIM AQ	BREED WITH	800	
596	VANCOUVAQ	F	25	HOLD		DO NOT BREED		
660	LINCOLN C	F	35	HOLD		DO NOT BREED		
661	TORONTO	F	34	HOLD		DO NOT BREED		
673	PARAMUS	M	27	HOLD		BREED WITH	818	
674	PARAMUS	M	27	SEND TO	JNGLARY F	BREED WITH	773	
685	BATTLE CR	M	23	HOLD		BREED WITH	586	
692	NATAVPGH	M	22	HOLD		DO NOT BREED		
693	SANFORD	F	22	HOLD		DO NOT BREED		
694	LUFKIN	M	21	HOLD		BREED WITH	695	
695	LUFKIN	F	21	HOLD		BREED WITH	694	
702	GRANBY	M	20	HOLD		BREED WITH	831	
708	HONOLULU	M	19	HOLD		BREED WITH	794	
709	MEMPHIS	F	---	HOLD		BREED WITH	710	
710	MEMPHIS	M	---	HOLD		BREED WITH	709	
711	NY BRONX	F	19	HOLD		DO NOT BREED		
717	STONEHAM	F	18	HOLD		BREED WITH	724	Infant born 3/3 not in genetic analysis
723	BREVARD	F	17	HOLD		BREED WITH	735	

ID	Location	Sex	Age	Disposition	New Location	Breeding	With	Notes
724	STONEHAM	M	17	HOLD		BREED WITH	717	
726	SD-WAP	M	17	HOLD		BREED WITH	786, 812	
735	BREVARD	M	19	HOLD		BREED WITH	723	
736	MINNESOTA	M	18	HOLD		DO NOT BREED		
737	FRESNO	M	17	SEND TO	NASHV ZOO	BREED WITH	827	
738	NZP-WASH	M	14	HOLD		DO NOT BREED		
739	TULSA	M	15	HOLD		DO NOT BREED		Excluded
748	CLEVELAND	F	15	HOLD		BREED WITH	808	
749	SCOVILL F	F	13	HOLD		DO NOT BREED		
753	BIODOME	F	15	HOLD		BREED WITH	485	
754	BIODOME	F	14	HOLD		DO NOT BREED		
756	MOODY	F	16	HOLD		DO NOT BREED		
762	TACOMA	M	22	HOLD		DO NOT BREED		Excluded
763	CINCINNAT	M	23	HOLD		BREED WITH	798	
767	SOUTHBEND	F	16	HOLD		BREED WITH	820	
771	DALLAS	F	13	HOLD		DO NOT BREED		Excluded
773	JNGLARY F	F	19	HOLD		BREED WITH	674	
777	ALEXANDRI	M	12	HOLD		DO NOT BREED		
778	LOSANGELE	M	11	HOLD		DO NOT BREED		
779	BOISE	F	11	HOLD		DO NOT BREED		
780	LOWRY	F	25	HOLD		DO NOT BREED		

ID	Location	Sex	Age	Disposition	New Location	Breeding	With	Notes
781	DAYMNH	F	10	HOLD		DO NOT BREED		
~~784~~	~~W PALM BE~~	~~M~~	~~10~~	~~HOLD~~	~~-~~	~~DO NOT BREED~~		Deceased during comment period
786	SANDIEGOZ	F	9	HOLD		BREED WITH	726	
789	AUDUBON	M	9	SEND TO	ABILENE	BREED WITH	791	Demographic Pairing
790	BREVARD	F	9	SEND TO	SANFORD	DO NOT BREED		
791	ABILENE	F	9	HOLD		BREED WITH	789	Demographic Pairing
793	MINNESOTA	M	7	HOLD		DO NOT BREED		
794	HONOLULU	F	9	HOLD		BREED WITH	708	
795	HONOLULU	F	7	HOLD		DO NOT BREED		
796	BALTIM AQ	F	9	HOLD		DO NOT BREED		
797	LOWRY	F	7	HOLD		DO NOT BREED		
798	CINCINNAT	F	10	HOLD		BREED WITH	763	
799	SAN FRAN	M	8	HOLD		DO NOT BREED		
800	LOWRY	M	7	SEND TO	BALTIM AQ	BREED WITH	538, 588	
806	FRANKLINP	F	8	HOLD		DO NOT BREED		
808	CLEVELAND	M	7	HOLD		BREED WITH	748	
810	DALLAS	M	7	HOLD		BREED WITH	863, 853	
811	OCEANJRNY	M	11	HOLD		DO NOT BREED		Excluded
812	SD-WAP	F	6	HOLD		BREED WITH	726	
814	PHOENIX	M	6	HOLD		DO NOT BREED		
816	PORTLAND	F	9	HOLD		DO NOT BREED		

ID	Location	Sex	Age	Disposition	New Location	Breeding	With	Notes
818	PARAMUS	F	6	HOLD		BREED WITH	673	
820	SOUTHBEND	M	12	HOLD		BREED WITH	767	
821	TOLEDO	F	11	HOLD		BREED WITH	897	
825	BIODOME	F	6	SEND TO	TORONTO	DO NOT BREED		
826	KANSASCTY	M	6	HOLD		DO NOT BREED		
827	NASHV ZOO	F	---	HOLD		BREED WITH	737	
829	NASHV ZOO	M	6	HOLD		DO NOT BREED		
831	GRANBY	F	7	HOLD		BREED WITH	702	
832	SEA WORLD	M	6	HOLD		DO NOT BREED		
835	LANDRYSAQ	M	7	HOLD		DO NOT BREED		
840	PROVIDNCE	M	7	HOLD		BREED WITH	841	
841	PROVIDNCE	F	7	HOLD		BREED WITH	840	
842	HOGLE	M	4	HOLD		DO NOT BREED		
849	METROZOO	F	6	HOLD		DO NOT BREED		
850	SOUTHBEND	M	6	HOLD		BREED WITH	895	
852	NZP-WASH	F	4	HOLD		BREED WITH	391	
853	DALLAS	F	5	HOLD		BREED WITH	810	
855	NATAVPGH	M	7	HOLD		DO NOT BREED		Excluded
856	NATAVPGH	F	5	HOLD		DO NOT BREED		Excluded
858	NORFOLK	F	7	HOLD		DO NOT BREED		
~~860~~	~~NORFOLK~~	~~M~~	~~8~~	~~HOLD~~	-	~~BREED WITH~~		Died during draft

ID	Location	Sex	Age	Disposition	New Location	Breeding	With	Notes
863	DALLAS	F	4	HOLD		BREED WITH	810	
864	FRANKLINP	M	6	HOLD		DO NOT BREED		
865	INDIANAPL	M	5	HOLD		DO NOT BREED		
867	BREVARD	M	4	HOLD		DO NOT BREED		
870	MEMPHIS	F	5	HOLD		DO NOT BREED		
871	JENKINSON	M	6	HOLD		DO NOT BREED		Excluded
874	ODYSEA AQ	F	---	HOLD		DO NOT BREED		Excluded
875	LVZOO	M	11	HOLD		DO NOT BREED		Excluded
881	WACO	F	3	HOLD		BREED WITH	891	
885	DRAPER	M	8	HOLD		DO NOT BREED		
889	ORLANDO	M	15	HOLD		DO NOT BREED		Excluded
891	DENVER	M	3	SEND TO	WACO	BREED WITH	881	
892	STONEHAM	M	3	SEND TO	LINCOLN C	DO NOT BREED		
893	SANDIEGOZ	M	3	HOLD		DO NOT BREED		
894	DETROIT	M	21	SEND TO	MINNESOTA	DO NOT BREED		Excluded
895	SOUTHBEND	F	4	HOLD		BREED WITH	850	
896	TOLEDO	F	5	HOLD		BREED WITH	897	
897	TOLEDO	M	5	HOLD		BREED WITH	821, 896	
898	WHEELING	F	6	HOLD		DO NOT BREED		Excluded
899	WHEELING	M	1	HOLD		DO NOT BREED		Excluded
909	BUFFALO	M	5	HOLD		DO NOT BREED		Excluded

ID	Location	Sex	Age	Disposition	New Location	Breeding	With	Notes
910	W ORANGE	F	5	SEND TO	BUFFALO	DO NOT BREED		Excluded
911	W ORANGE	M	5	SEND TO	FARGO	DO NOT BREED		Excluded
913	WATERTNSD	M	5	HOLD		DO NOT BREED		Excluded
914	W ORANGE	F	5	SEND TO	PORTLAND	DO NOT BREED		Excluded
915	LOUISVILL	F	4	HOLD		DO NOT BREED		
916	LOUISVILL	M	3	HOLD		DO NOT BREED		
917	GREENVISC	F	---	HOLD		DO NOT BREED		Excluded
918	GREENVISC	M	---	HOLD		DO NOT BREED		Excluded
920	METROZOO	M	3	SEND TO	ROLLING H	DO NOT BREED		
921	SACRAMNTO	F	3	HOLD		DO NOT BREED		
922	AUDUBON	M	3	SEND TO	EL PASO	DO NOT BREED		Excluded
923	TUCSON	M	3	HOLD		DO NOT BREED		
925	CHICAGOBR	M	2	HOLD		DO NOT BREED		Excluded
926	NORRISTOW	F	2	HOLD		DO NOT BREED		Excluded
927	MINOT	F	2	HOLD		DO NOT BREED		Excluded
928	PROVIDNCE	F	2	SEND TO	MARITIME	DO NOT BREED		
929	RIPLEYSSC	F	2	HOLD		BREED WITH	935	
932	HONOLULU	M	1	HOLD		DO NOT BREED		
933	W ORANGE	U	1	HOLD		DO NOT BREED		
934	BREVARD	F	1	SEND TO	GREEN NSC	DO NOT BREED		
935	RIPLEYSSC	M	1	HOLD		BREED WITH	929	

ID	Location	Sex	Age	Disposition	New Location	Breeding	With	Notes
936	BREVARD	M	1	HOLD		DO NOT BREED		
937	STONEHAM	F	1	SEND TO	BLOOMINGT	DO NOT BREED		
939	AUDUBON	F	0	HOLD		DO NOT BREED		
942	HONOLULU	F	0	SEND TO	PUEBLO	DO NOT BREED		
943	SOUTHBEND	U	0	HOLD		DO NOT BREED		
944	CAPE MAY	F	0	HOLD		DO NOT BREED		Excluded
945	SANDIEGOZ	F	0	HOLD		DO NOT BREED		
946	METROZOO	U	0	HOLD		DO NOT BREED		
947	KNOXVILLE	M	3	HOLD		DO NOT BREED		Excluded
950	LOUISVILL	F	5	HOLD		DO NOT BREED		Excluded

Breeding and Transfer Recommendations by Institution

Updates since draft are highlighted in yellow

ABILENE

Abilene Zoological Gardens
Abilene, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
791	M17012	F	9	HOLD	ABILENE	BREED WITH	789	DEMOG PAIR
789	20M016	M	9	RECEIVE FROM	AUDUBON	BREED WITH	791	DEMOG PAIR

ALEXANDRI

Alexandria Zoological Park
Alexandria, LA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
777	M00444	M	12	HOLD	ALEXANDRI	DO NOT BREED		

AUDUBON

Audubon Zoo
New Orleans, LA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
587	20M017	F	16	HOLD	AUDUBON	DO NOT BREED		
588	20M020	F	12	SEND TO	BALTIM AQ	BREED WITH	800	
789	20M016	M	9	SEND TO	ABILENE	BREED WITH	791	DEMOG PAIR
922	20M019	M	3	SEND TO	EL PASO	DO NOT BREED		Excluded
939	22M001	F	0	HOLD	AUDUBON	DO NOT BREED		

BALTIM AQ

National Aquarium in Baltimore
Baltimore, MD

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
544	219001	M	26	SEND TO	CHATTANOG	DO NOT BREED		
796	213002	F	9	HOLD	BALTIM AQ	DO NOT BREED		
538	960808	F	---	RECEIVE FROM	CLEVELAND	BREED WITH	800	
800	103337	M	7	RECEIVE FROM	LOWRY	BREED WITH	538, 588	
588	20M020	F	12	RECEIVE FROM	AUDUBON	BREED WITH	800	

BATTLE CR

Binder Park Zoo
Battle Creek, MI

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
685	99M63	M	23	HOLD	BATTLE CR	BREED WITH	586	
586	1782	F	16	HOLD	BATTLE CR	BREED WITH	685	

BIODOME

Biodome de Montreal
Montreal, Quebec

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
582	2709	F	13	HOLD	BIODOME	DO NOT BREED		
753	2514	F	15	HOLD	BIODOME	BREED WITH	485	
754	2572	F	14	HOLD	BIODOME	DO NOT BREED		
825	3180	F	6	SEND TO	TORONTO	DO NOT BREED		
485	M92178	M	30	RECEIVE FROM	GRANBY	BREED WITH	753	

BLOOMINGT

Miller Park Zoo
Bloomington, IL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
937	P21008	F	1	RECEIVE FROM	STONEHAM	DO NOT BREED		

BOISE

Zoo Boise
Boise, ID

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
779	13200	F	11	HOLD	BOISE	DO NOT BREED		

BREVARD

Brevard Zoo
Melbourne, FL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
723	17202	F	17	HOLD	BREVARD	BREED WITH	735	
735	26072	M	19	HOLD	BREVARD	BREED WITH	723	
790	16049	F	9	SEND TO	SANFORD	DO NOT BREED		
867	18143	M	4	HOLD	BREVARD	DO NOT BREED		
934	20098	F	1	SEND TO	GREEN NSC	DO NOT BREED		
936	20117	M	1	HOLD	BREVARD	DO NOT BREED		

BROWNSVIL

Gladys Porter Zoo
Brownsville, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
378	8184	M	37	HOLD	BROWNSVIL	DO NOT BREED		

BUFFALO

Buffalo Zoo
Buffalo, NY

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
909	M18017	M	5	HOLD	BUFFALO	DO NOT BREED		Excluded
~~825~~	~~3180~~	~~F~~	~~6~~	~~RECEIVE FROM~~	~~BIODOME~~	~~DO NOT BREED~~		
910	2385	F	5	RECEIVE FROM	W ORANGE	DO NOT BREED		Excluded

CHATTANOG

Chattanooga Zoo
Chattanooga, TN

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
544	219001	M	26	RECEIVE FROM	BALTIM AQ	DO NOT BREED		

CALI

Fundacion Zoologica de Cali
Colombia

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
404	87016	M	---	HOLD	CALI	DO NOT BREED		

CAPE MAY

Cape May County Park Zoo
Cape May, NJ

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
944	3975	F	0	HOLD	CAPE MAY	DO NOT BREED		Excluded

CHICAGOBR

Chicago Zoological Park
Brookfield, IL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
925	9282	M	2	HOLD	CHICAGOBR	DO NOT BREED		Excluded

CINCINNAT

Cincinnati Zoo & Botanical Garden
Cincinnati, OH

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
763	106053	M	23	HOLD	CINCINNAT	BREED WITH	798	
798	119041	F	10	HOLD	CINCINNAT	BREED WITH	763	

CLEVELAND

Cleveland Metroparks Zoo
Cleveland, OH

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
538	960808	F	---	SEND TO	BALTIM AQ	BREED WITH	800	
748	M70939	F	15	HOLD	CLEVELAND	BREED WITH	808	
808	180502	M	7	HOLD	CLEVELAND	BREED WITH	748	

DALLAS

Dallas Zoo
Dallas, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
771	09J880	F	13	HOLD	DALLAS	DO NOT BREED		Excluded
810	19Y431	M	7	HOLD	DALLAS	BREED WITH	863, 853	
853	19Y432	F	5	HOLD	DALLAS	BREED WITH	810	
863	19Y262	F	4	HOLD	DALLAS	BREED WITH	810	

DAYMNH

Boonshoft Museum of Discovery
Dayton, OH

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
781	42014	F	10	HOLD	DAYMNH	DO NOT BREED		

DENVER

Denver Zoological Gardens
Denver, CO

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
479	980176	M	32	HOLD	DENVER	BREED WITH	539	
539	A15134	F	---	HOLD	DENVER	BREED WITH	479	Just had new infant not included in analysis
891	A19028	M	3	SEND TO	WACO	BREED WITH	881	When ready to leave

DETROIT

Detroit Zoo
Detroit, MI

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
894	13888	M	21	SEND TO	MINNESOTA	DO NOT BREED		Excluded

DRAPER

Loveland Living Planet Aquarium
Draper, UT

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
885	10064	M	8	HOLD	DRAPER	DO NOT BREED		

DULUTH

Lake Superior Zoological Gardens
Duluth, MN

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
552	100026	M	25	HOLD	DULUTH	DO NOT BREED		Excluded

EL PASO

El Paso Zoo
El Paso, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
922	20M019	M	3	RECEIVE FROM	AUDUBON	DO NOT BREED		Excluded

FARGO

Red River Zoo
Fargo, ND

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
911	2386	M	5	RECEIVE FROM	W ORANGE	DO NOT BREED		Excluded

FRANKLINP

Zoo New England/Franklin Park Zoo
Boston, MA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
806	F13039	F	8	HOLD	FRANKLIN P	DO NOT BREED		
864	P16056	M	6	HOLD	FRANKLIN P	DO NOT BREED		

FRESNO

Fresno Chaffee Zoo
Fresno, CA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
585	202024	M	16	HOLD	FRESNO	DO NOT BREED		
737	280045	M	17	SEND TO	NASHV ZOO	BREED WITH	827	
~~588~~	~~20M017~~	~~F~~	~~16~~	~~RECEIVE FROM~~	~~AUDUBON~~	~~BREED WITH~~	~~932~~	
~~932~~	~~221004~~	~~M~~	~~1~~	~~RECEIVE FROM~~	~~HONOLULU~~	~~BREED WITH~~	~~588~~	

GRANBY

Zoo de Granby
Granby, Quebec

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
485	M92178	M	30	SEND TO	BIODOME	BREED WITH	753	
702	M02051	M	20	HOLD	GRANBY	BREED WITH	831	
831	M15044	F	7	HOLD	GRANBY	BREED WITH	702	

GREEN NSC

Greensboro Science Center
Greensboro, NC

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
934	20098	F	1	RECEIVE FROM	BREVARD	DO NOT BREED		

GREENVISC

Greenville Zoo
Greenville, SC

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
917	M22001	F	---	HOLD	GREENVISC	DO NOT BREED		Excluded
918	M22002	M	---	HOLD	GREENVISC	DO NOT BREED		Excluded

HOGLE

Utah's Hogle Zoo
Salt Lake City, UT

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
842	U19047	M	4	HOLD	HOGLE	DO NOT BREED		

HONOLULU

Honolulu Zoo
Honolulu, HI

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
708	206067	M	19	HOLD	HONOLULU	BREED WITH	794	
794	213216	F	9	HOLD	HONOLULU	BREED WITH	708	
795	215014	F	7	HOLD	HONOLULU	DO NOT BREED		
932	221004	M	1	HOLD	HONOLULU	DO NOT BREED		
942	222019	F	0	SEND TO	PUEBLO	DO NOT BREED		

HOUSTON

Houston Zoo, Inc.
Houston, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
526	1400	M	27	HOLD	HOUSTON	BREED WITH	530	
530	M01500	F	27	HOLD	HOUSTON	BREED WITH	526	

INDIANAPL

Indianapolis Zoo
Indianapolis, IN

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
865	219037	M	5	HOLD	INDIANAPL	DO NOT BREED		

JENKINSON

Jenkinson's Aquarium
Point Pleasant Beach, NJ

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
871	JA7097	M	6	HOLD	JENKINSON	DO NOT BREED		Excluded

JNGLARY F

The Naples Zoo
Naples, FL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
790	16049	F	9	RECEIVE FROM	BREVARD	DO NOT BREED		
773	A3M072	F	19	HOLD	JNGLARY F	BREED WITH	674	
674	2501	M	27	RECEIVE FROM	PARAMUS	BREED WITH	773	

KANSASCTY

Kansas City Zoo
Kansas City, KS

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
826	3183	M	6	HOLD	KANSASCTY	DO NOT BREED		

KNOXVILLE

Knoxville Zoo
Knoxville, TN

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
947	5868	M	3	HOLD	KNOXVILLE	DO NOT BREED		Excluded

LANDRYAQ

Landry's Houston Downtown Aquarium
Houston, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
835	CH0215	M	7	HOLD	LANDRYAQ	DO NOT BREED		

LINCOLN C

Lincoln Children's Zoo (Fmr. Folsom)
Lincoln, NE

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
~~573~~	~~1275~~	~~M~~	~~23~~	~~HOLD~~	~~LINCOLN C~~	~~DO NOT BREED~~		Excluded, died during draft
660	8957	F	35	HOLD	LINCOLN C	DO NOT BREED		
892	P19035	M	3	RECEIVE FROM	STONEHAM	DO NOT BREED		

LOSANGELE

Los Angeles Zoo
Los Angeles, CA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
778	16282	M	11	HOLD	LOSANGELE	DO NOT BREED		

LOUISVILL

Louisville Zoo
Louisville, KY

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
915	103716	F	4	HOLD	LOUISVILL	DO NOT BREED		
916	103715	M	3	HOLD	LOUISVILL	DO NOT BREED		
950	103863	F	5	HOLD	LOUISVILL	DO NOT BREED		Excluded

LOWRY

Tampa's Lowry Park Zoo
Tampa, FL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
780	102984	F	25	HOLD	LOWRY	DO NOT BREED		
797	103489	F	7	HOLD	LOWRY	DO NOT BREED		
800	103337	M	7	SEND TO	BALTIM AQ	BREED WITH	538, 588	

LUFKIN

Ellen Trout Zoo
Lufkin, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
694	9848	M	21	HOLD	LUFKIN	BREED WITH	695	
695	9849	F	21	HOLD	LUFKIN	BREED WITH	694	

LVZOO

Lehigh Valley Zoo
Lehigh County, PA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
875	LV0200	M	11	HOLD	LV ZOO	DO NOT BREED		Excluded

MARITIME

The Maritime Aquarium
Norwalk, CT

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
928	100520	F	2	RECEIVE FROM	PROVIDNCE	DO NOT BREED		

MEMPHIS

Memphis Zoological Garden & Aquarium
Memphis, TN

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
709	21286	F	U	HOLD	MEMPHIS	BREED WITH	710	
710	21287	M	U	HOLD	MEMPHIS	BREED WITH	709	
870	17M006	F	5	HOLD	MEMPHIS	DO NOT BREED		

METROZOO

Miami Metrozoo
Miami, FL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
849	17M073	F	6	HOLD	METROZOO	DO NOT BREED		
920	19M089	M	3	SEND TO	ROLLING H	DO NOT BREED		
946	22M034	U	0	HOLD	METROZOO	DO NOT BREED		

MINNESOTA

Minnesota Zoological Garden
Apple Valley, MN

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
736	12064	M	18	HOLD	MINNESOTA	DO NOT BREED		
793	14069	M	7	HOLD	MINNESOTA	DO NOT BREED		
894	13888	M	21	RECEIVE FROM	DETROIT	DO NOT BREED		Excluded

MINOT

Roosevelt Park Zoo
Minot, ND

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
927	2010M010	F	2	HOLD	MINOT	DO NOT BREED		Excluded

MOODY

Aquarium and Rainforest at Moody Gardens
Galveston, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
406	3082	M	35	HOLD	MOODY	DO NOT BREED		
756	5230	F	16	HOLD	MOODY	DO NOT BREED		

NASHV ZOO

Nashville Zoo at Grassmere
Nashville, TN

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
827	5144	F	---	HOLD	NASHV ZOO	BREED WITH	737	
829	5146	M	6	HOLD	NASHV ZOO	DO NOT BREED		
737	280045	M	17	RECEIVE FROM	FRESNO	BREED WITH	827	

NATAVPGH

National Aviary in Pittsburgh
Pittsburgh, PA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
692	7562	M	22	HOLD	NATAVPGH	DO NOT BREED		
855	8643	M	7	HOLD	NATAVPGH	DO NOT BREED		Excluded
856	8963	F	5	HOLD	NATAVPGH	DO NOT BREED		Excluded

NORFOLK

Virginia Zoological Park
Norfolk, VA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
858	218163	F	7	HOLD	NORFOLK	DO NOT BREED		
~~860~~	~~218165~~	~~M~~	~~8~~	~~HOLD~~	~~NORFOLK~~	~~BREED WITH~~	~~858~~	Died during draft

NORRISTOW

Elmwood Park Zoo
Norristown, PA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
926	20110	F	2	HOLD	NORRISTOW	DO NOT BREED		Excluded

NY BRONX

Bronx Zoo
Bronx, NY

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
711	E08071	F	19	HOLD	NY BRONX	DO NOT BREED		

NZP-WASH

Smithsonian National Zoological Park
Washington, DC

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
391	110846	M	36	HOLD	NZP-WASH	BREED WITH	852	
738	115111	M	14	HOLD	NZP-WASH	DO NOT BREED		
852	115921	F	4	HOLD	NZP-WASH	BREED WITH	391	

OCEANJRNY

Landry's Downtown Aquarium
Denver, CO

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
811	415201	M	11	HOLD	OCEANJRNY	DO NOT BREED		Excluded

ODYSEA AQ

OdySea Aquarium
Scottsdale, AZ

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
874	160801	F	U	HOLD	ODYSEA	DO NOT BREED		Excluded

ORLANDO

Sea World Orlando
Orlando, FL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
889	66138	M	15	HOLD	ORLANDO	DO NOT BREED		Excluded

PARAMUS

Bergen County Zoological Park
Paramus, NJ

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
673	2500	M	27	HOLD	PARAMUS	BREED WITH	818	
674	2501	M	27	SEND TO	JNGLARY F	BREED WITH	773	
818	3252	F	6	HOLD	PARAMUS	BREED WITH	673	

PHOENIX

Phoenix Zoo
Phoenix, AZ

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
814	13762	M	6	HOLD	PHOENIX	DO NOT BREED		

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PORTLAND

Oregon Zoo
Portland, OR

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
816	B60150	F	9	HOLD	PORTLAND	DO NOT BREED		
~~585~~	~~202024~~	~~M~~	~~16~~	~~RECEIVE FROM~~	~~FRESNO~~	~~BREED WITH~~	~~816~~	
914	2384	F	5	RECEIVE FROM	W ORANGE	DO NOT BREED		Excluded

PROVIDNCE

Roger Williams Park Zoo
Providence, RI

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
551	100287	M	25	HOLD	PROVIDNCE	DO NOT BREED		
840	100449	M	7	HOLD	PROVIDNCE	BREED WITH	841	
841	100450	F	7	HOLD	PROVIDNCE	BREED WITH	840	
928	100520	F	2	SEND TO	MARITIME	DO NOT BREED		

PUEBLO

Pueblo Zoo
Pueblo, CO

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
942	222019	F	0	RECEIVE FROM	HONOLULU	DO NOT BREED		

RIPLEYSSC

Ripley's Aquarium of Myrtle Beach
Myrtle Beach, SC

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
929	UNDETERMINED	F	2	HOLD	RIPLEYSSC	BREED WITH	935	
935	UNDETERMINED	M	1	HOLD	RIPLEYSSC	BREED WITH	929	

ROLLING H

Rolling Hills Zoo
Salina, KS

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
920	19M089	M	3	RECEIVE FROM	METROZOO	DO NOT BREED		

SACRAMNTO

Sacramento Zoo
Sacramento, CA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
921	101315	F	3	HOLD	SACRAMNTO	DO NOT BREED		

SAN ANTON

San Antonio Zoological Gardens and Aquarium
San Antonio, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
496	L09101	M	29	HOLD	SAN ANTON	DO NOT BREED		Excluded
~~922~~	~~20M019~~	~~M~~	~~3~~	~~RECEIVE FROM~~	~~AUDUBON~~	~~DO NOT BREED~~		~~Excluded~~

SAN FRAN

San Francisco Zoo
San Francisco, CA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
799	115004	M	8	HOLD	SAN FRAN	DO NOT BREED		
581	114019	M	12	HOLD	SAN FRAN	DO NOT BREED		

SANDIEGOZ

San Diego Zoo Safari Park
San Diego, CA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
786	513072	F	9	HOLD	SANDIEGOZ	BREED WITH	726	Visit from SD-WAP
893	100289	M	3	HOLD	SANDIEGOZ	DO NOT BREED		
945	1004128	F	0	HOLD	SANDIEGOZ	DO NOT BREED		

SANFORD

Central Florida Zoological Park
Lake Monroe, FL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
693	1519	F	22	HOLD	SANFORD	DO NOT BREED		
790	16049	F	9	RECEIVE FROM	BREVARD	DO NOT BREED		

~~773~~	~~A3M072~~	~~F~~	~~19~~	~~RECEIVE FROM~~	~~From JNGLARY F~~	~~BREED WITH~~	~~674~~
~~674~~	~~2501~~	~~M~~	~~27~~	~~RECEIVE FROM~~	~~From PARAMUS~~	~~BREED WITH~~	~~773~~

SCOVILL F

Scovill Zoo
Decatur, IL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
749	200772	F	13	HOLD	SCOVILL F	DO NOT BREED		

SD-WAP

San Diego Zoo Safari Park
Escondido, CA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
726	516089	M	17	HOLD	SD-WAP	BREED WITH	786, 812	
812	516147	F	6	HOLD	SD-WAP	BREED WITH	726	

SEA WORLD

Sea World San Diego
San Diego, CA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
832	92107	M	6	HOLD	SEA WORLD	DO NOT BREED		

SOUTHBEND

Potawatomi Zoo
South Bend, IN

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
767	34519	F	16	HOLD	SOUTHBEND	BREED WITH	820	
820	34231	M	12	HOLD	SOUTHBEND	BREED WITH	767	
850	34321	M	6	HOLD	SOUTHBEND	BREED WITH	895	
895	34520	F	4	HOLD	SOUTHBEND	BREED WITH	850	
943	34608	U	0	HOLD	SOUTHBEND	DO NOT BREED		

STONEHAM

Stone Zoo
Stoneham, MA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
717	A07020	F	18	HOLD	STONEHAM	BREED WITH	724	Infant born 3/3 not in genetic analysis
724	A07010	M	17	HOLD	STONEHAM	BREED WITH	717	
892	P19035	M	3	SEND TO	LINCOLN C	DO NOT BREED		
937	P21008	F	1	SEND TO	BLOOMINGT	DO NOT BREED		

TACOMA

Point Defiance Zoo & Aquarium
Tacoma, WA

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
762	Q00M11	M	22	HOLD	TACOMA	DO NOT BREED		Excluded

TOLEDO

Toledo Zoo
Toledo, OH

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
821	11252	F	11	HOLD	TOLEDO	BREED WITH	897	
896	15438	F	5	HOLD	TOLEDO	BREED WITH	897	
897	15439	M	5	HOLD	TOLEDO	BREED WITH	821, 896	

TORONTO

Toronto Zoo
Scarborough, Ontario

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
661	24652	F	34	HOLD	TORONTO	DO NOT BREED		
825	3180	F	6	RECEIVE FROM	BIODOME	DO NOT BREED		

TUCSON

Reid Park Zoo
Tucson, AZ

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
923	M22160	M	3	HOLD	TUCSON	DO NOT BREED		

TULSA

Tulsa Zoo & Living Museum
Tulsa, OK

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
376	8057	M	44	HOLD	TULSA	DO NOT BREED		Excluded
739	15304	M	15	HOLD	TULSA	DO NOT BREED		Excluded

VANCOUVAQ

Vancouver Aquarium Marine Science Ctr
Vancouver, BC

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
569	990430	F	24	HOLD	VANCOUVAQ	DO NOT BREED		
596	19189	F	25	HOLD	VANCOUVAQ	DO NOT BREED		

W ORANGE

Turtle Back Zoo
West Orange, NJ

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
910	2385	F	5	SEND TO	BUFFALO	DO NOT BREED		Excluded
911	2386	M	5	SEND TO	FARGO	DO NOT BREED		Excluded
914	2384	F	5	SEND TO	PORTLAND	DO NOT BREED		Excluded
933	2611	U	1	HOLD	W ORANGE	DO NOT BREED		

W PALM BE

Lion Country Safari, Inc.
Loxahatchee, FL

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
~~784~~	~~M12209~~	~~M~~	~~10~~	~~HOLD~~	~~W PALM BE~~	~~DO NOT BREED~~		~~Deceased during comment period~~

WACO

Cameron Park Zoo
Waco, TX

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
881	M00921	F	3	HOLD	WACO	BREED WITH	891	
891	A19028	M	3	RECEIVE FROM	DENVER	BREED WITH	881	When ready to leave

WATERTNSD

Bramble Park Zoo
Watertown, SD

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
913	4067	M	5	HOLD	WATERTNSD	DO NOT BREED		Excluded

WHEELING

Oglebay's Good Children's Zoo
Wheeling, WV

ID	Local ID	Sex	Age	Disposition	Location	Breeding	With	Notes
898	4469	F	6	HOLD	WHEELING	DO NOT BREED		Excluded
899	4719	M	1	HOLD	WHEELING	DO NOT BREED		Excluded

Appendices

A. Analytical Assumptions

ANALYTICAL DATA FOR TRUE INDIVIDUALS

STUDBOOK ID	FIELD	TRUE	OVERLAY	NOTES
Hypothetical 1	Sire		196 (100%)	Combination of two possible dams 196 and 197
	Dam		197 (100%)	
Hypothetical 2	Sire		WILD (100%)	
	Dam		WILD (100%)	
Hypothetical 3	Sire		WILD (100%)	
	Dam		WILD (100%)	
Hypothetical 4	Sire		WILD (100%)	
	Dam		WILD (100%)	
Hypothetical 5	Sire		WILD (100%)	
	Dam		WILD (100%)	
Hypothetical 6	Sire		WILD (100%)	
	Dam		WILD (100%)	
Hypothetical 7	Sire		WILD (100%)	
	Dam		WILD (100%)	
461	Sire	UND (100%)	331 (100%)	Unknown parentage connected to breeding animals at Salisbury.
	Dam	UND (100%)	Hypothetical 1 (100%)	
726	Sire	UND (100%)	691 (100%)	Reported as captive born at R. Miller, possibly related to other offspring born at this facility. 691 was primary breeder at that time
	Dam	UND (100%)	Hypothetical 2 (100%)	
727	Sire	UND (100%)	691 (100%)	Reported as captive born at R. Miller, possibly related to other offspring born at this facility. 691 was primary breeder at that time
	Dam	UND (100%)	Hypothetical 3 (100%)	
728	Sire	UND (100%)	691 (100%)	Reported as captive born at R. Miller, possibly related to other offspring born at this facility. 691 was primary breeder at that time
	Dam	UND (100%)	Hypothetical 4 (100%)	
746	Sire	UND (100%)	Hypothetical 5 (100%)	
	Dam	UND (100%)	Hypothetical 6 (100%)	
756	Sire	UND (100%)	691 (100%)	Reported as captive born at R. Miller, possibly related to other offspring born at this facility. 691 was primary breeder at that time
	Dam	UND (100%)	Hypothetical 7 (100%)	

B. Summary of Data Exports

Studbook Name	Sloth, Linne's Two-Toed (Choloeopus didactylus)
Studbook Currentness Date	Nov 01, 2022
Studbook Software and version #	ZIMS for Studbooks
Overlay Name (if applicable)	Linnes_overlay
PMx version #	1.6.2.20200804
.fed file	AZA.fed
Descriptive Survival Statistics Report	Report is archived with PMC/AZA and Median Life Expectancy can be viewed here: https://www.aza.org/species-survival-statistics

PMx Project: Linnes wOverlayBTP2022v2
Created: 2022-11-21 by PMx version 1.6.5.20220325
File: C:\PMxProjects\Linnes wOverlayBTP2022v2.pmxproj

Primary data file
Data File Name: zims.zims
Common Name: Linne's two-toed sloth
Scientific Name: Choloepus didactylus
Data Source: ZIMS for Studbooks
Studbook Name: Sloth, Linne's Two-Toed (Choloepus didactylus)
Exported On: 2022-11-21
Software version: ZIMS for Studbooks 3.0
Current Through: 2022-11-01
Compiled By: Deb Dial
Scope: AZA
Dates: 1980-01-01 to 2022-11-21
Location:
Association: AZA / Association of Zoos & Aquariums (AZA)
Other Filters: Status = Living
User: Jennifer Mickelberg

Demographic input files
Census1 file: Exchcens.txt

58 births to parents with unknown ages have been added in proportion to known aged parents.
This is 30% of TOTAL births (N=195)

Selected population was changed from the originally imported data.

C. Animals Excluded from Genetic Analyses

Studbook ID	Location	Sex	Age	Reason for Exclusion
496	SAN ANTON	M	29	Education animal
552	DULUTH	M	25	Medical concerns
573	LINCOLN C	M	23	Medical issues
762	TACOMA	M	15	Education animal
771	DALLAS	F	7	Unknown pedigree
784	W PALM BE	M	10	Medical concerns
811	OCEANJRNY	M	11	Education animal
855	NATAVPGH	M	7	Education animal
856	NATAVPGH	F	5	Education animal
871	JENKINSON	M	6	Education animal
874	ODYSEA AQ	F	UNK	Unknown origin
875	LVZOO	M	11	Unknown origin
889	ORLANDO	M	15	Education animal
894	DETROIT	M	21	Unknown origin
898	WHEELING	F	6	Unknown origin
899	WHEELING	M	1	Unknown origin
909	BUFFALO	M	5	Unknown origin
910	W ORANGE	F	5	Unknown origin
911	W ORANGE	M	5	Unknown origin
913	WATERTNSD	M	UNK	Unknown origin
914	W ORANGE	F	5	Unknown origin
917	GREENVISC	F	3	Unknown origin
918	GREENVISC	M	3	Unknown origin
922	AUDUBON	M	3	Medical issues
925	CHICAGOBR	M	2	Education animal
926	NORRISTOW	F	2	Unknown origin
927	MINOT	F	2	Education animal
944	CAPE MAY	F	0	Unknown origin
947	KNOXVILLE	M	3	Unknown origin
950	LOUISVILL	F	5	Unknown origin
H669	AUDUBON	M	22	Confirmed hybrid, excluded from demographic and genetic analysis

D. Life Tables

Males

Age	Px	Qx	Risk Qx	Lx	Mx	Risk Mx	Vx
0	0.668	0.332	67.04	1	0	67.04	1.199
1	0.962	0.038	90.64	0.668	0.006	90.645	1.502
2	0.96	0.04	98.738	0.643	0.034	98.757	1.533
3	0.968	0.032	95.018	0.617	0.013	95.022	1.531
4	0.979	0.021	96.689	0.598	0.05	96.705	1.535
5	0.926	0.074	92.021	0.585	0.056	92.033	1.535
6	0.961	0.039	86.726	0.542	0.049	86.746	1.545
7	0.963	0.037	80.49	0.521	0.045	80.502	1.531
8	0.987	0.013	78.433	0.501	0.055	78.452	1.501
9	0.959	0.041	71.751	0.495	0.076	71.772	1.464
10	0.971	0.029	67.381	0.475	0.045	67.409	1.417
11	0.97	0.03	64.918	0.461	0.075	64.95	1.393
12	0.983	0.017	60.244	0.447	0.05	60.271	1.33
13	0.983	0.017	58.647	0.439	0.072	58.705	1.282
14	0.966	0.034	56.403	0.432	0.065	56.436	1.222
15	1	0	56.068	0.417	0.097	56.106	1.16
16	0.945	0.055	52.416	0.417	0.057	52.449	1.076
17	0.959	0.041	47.885	0.394	0.087	47.911	1.055
18	1	0	46.77	0.378	0.129	46.806	0.973
19	0.978	0.022	44.91	0.378	0.08	44.948	0.841
20	0.952	0.048	41.863	0.37	0.058	41.897	0.775
21	0.975	0.025	39.268	0.352	0.047	39.297	0.733
22	0.885	0.115	33.115	0.344	0.086	33.133	0.726
23	0.93	0.07	27.115	0.304	0.065	27.166	0.696
24	0.96	0.04	23.778	0.283	0.051	23.827	0.659
25	0.957	0.043	21.814	0.271	0.085	21.832	0.624
26	0.947	0.053	18.488	0.259	0	18.509	0.558
27	1	0	17.211	0.246	0.069	17.301	0.565
28	0.938	0.063	15.104	0.246	0.08	15.17	0.504
29	0.929	0.071	14.485	0.23	0.04	14.503	0.447
30	0.923	0.077	11.871	0.214	0.05	11.889	0.433
31	0.909	0.091	10.436	0.198	0.115	10.477	0.411
32	1	0	9.184	0.18	0.067	9.199	0.306
33	1	0	9	0.18	0	9.065	0.236
34	0.889	0.111	8.923	0.18	0.067	8.986	0.246
35	1	0	7.236	0.16	0.075	7.245	0.188
36	0.833	0.167	6.416	0.16	0	6.416	0.121
37	1	0	4.962	0.133	0	4.962	0.131
38	0.75	0.25	3.389	0.133	0.148	3.411	0.148
39	1	0	3	0.1	0	3	0
40	0.667	0.333	2.003	0.1	0	2.003	0
41	0.5	0.5	1.592	0.067	0	1.592	0
42	1	0	1	0.033	0	1	0
43	1	0	1	0.033	0	1	0
44	1	0	0.247	0.033	0	0.247	0
45	1	0	0	0.033	0	0	0
46	1	0	0	0.033	0	0	0
47	1	0	0	0.033	0	0	0
48	1	0	0	0.033	0	0	0
49	1	0	0	0.033	0	0	0
50	1	0	0	0.033	0	0	0
51	1	0	0	0.033	0	0	0

Px = survival; Qx = mortality; Lx = cumulative survivorship; Mx = fecundity; Ex = life expectancy; Vx = expected future reproduction,
At Risk (Qx and Mx) = number of animals corresponding values are estimated from.

Female

Age	Px	Qx	Risk Qx	Lx	Mx	Risk Mx	Vx
0	0.703	0.297	90.445	1	0	90.445	1.174
1	0.93	0.07	102.793	0.703	0.012	102.794	1.412
2	0.925	0.075	104.588	0.654	0.03	104.619	1.445
3	1	0	103.122	0.605	0.031	103.127	1.41
4	0.928	0.072	107.538	0.605	0.069	107.57	1.37
5	0.935	0.065	102.36	0.562	0.08	102.374	1.338
6	0.944	0.056	96.819	0.525	0.083	96.848	1.282
7	0.933	0.067	88.184	0.496	0.079	88.201	1.223
8	0.918	0.082	81.507	0.463	0.061	81.547	1.184
9	0.908	0.092	72.203	0.424	0.093	72.229	1.179
10	0.97	0.03	66.337	0.385	0.056	66.365	1.11
11	0.94	0.06	65.068	0.374	0.038	65.1	1.056
12	0.954	0.046	63.427	0.352	0.029	63.459	1.029
13	0.934	0.066	59.189	0.335	0.084	59.213	1.014
14	0.964	0.036	54.616	0.313	0.045	54.64	0.939
15	0.981	0.019	52.515	0.302	0.131	52.56	0.881
16	0.943	0.057	49.759	0.296	0.051	49.799	0.747
17	0.892	0.108	43.575	0.279	0.07	43.605	0.726
18	0.976	0.024	40.192	0.249	0.047	40.226	0.675
19	0.899	0.101	36.523	0.243	0.069	36.552	0.641
20	0.941	0.059	33.233	0.218	0.038	33.242	0.597
21	0.905	0.095	31.356	0.206	0.021	31.358	0.58
22	0.962	0.038	25.696	0.186	0	25.696	0.574
23	1	0	25	0.179	0.025	25.006	0.56
24	0.92	0.08	24.285	0.179	0.051	24.307	0.534
25	1	0	22.326	0.165	0.028	22.327	0.483
26	0.952	0.048	20.392	0.165	0	20.392	0.447
27	0.947	0.053	18.973	0.157	0.033	19.009	0.45
28	0.889	0.111	17.737	0.149	0.034	17.778	0.435
29	0.875	0.125	15.121	0.132	0.041	15.141	0.435
30	0.867	0.133	13.915	0.116	0.044	13.936	0.433
31	0.857	0.143	13.54	0.1	0.047	13.568	0.432
32	0.917	0.083	11.326	0.086	0.056	11.343	0.417
33	0.818	0.182	10.408	0.079	0	10.483	0.397
34	1	0	8.644	0.064	0.068	8.716	0.423
35	0.762	0.238	7.342	0.064	0.077	7.354	0.385
36	1	0	6	0.049	0.102	6.023	0.342
37	0.833	0.167	5.573	0.049	0.122	5.573	0.251
38	0.8	0.2	4.016	0.041	0.151	4.043	0.151
39	0.75	0.25	3.805	0.033	0	3.805	0
40	1	0	3	0.025	0	3	0
41	1	0	3	0.025	0	3	0
42	1	0	3	0.025	0	3	0
43	1	0	3	0.025	0	3	0
44	1	0	3	0.025	0	3	0
45	0.667	0.333	2.855	0.025	0	2.855	0
46	0.5	0.5	1.882	0.016	0	1.882	0
47	1	0	1	0.008	0	1	0
48	1	0	1	0.008	0	1	0
49	0	1	0	0.008	0	0	0
50	0	1	0	0	0	0	0
51	0	1	0	0	0	0	0

Px = survival; Qx = mortality; Lx = cumulative survivorship; Mx = fecundity; Ex = life expectancy; Vx = expected future reproduction, At Risk (Qx and Mx) = number of animals corresponding values are estimated from.

E. Ordered Mean Kinship List

These lists are current to November 2022 and values are subject to change with any birth, death, import, export, inclusion, exclusion, or changes in pedigree or pedigree assumptions. Unknown sexed animals appear on both the male and female side of the mean kinship list and are designated by a "U" in front of their ages

Population MK = 0.0268

Male

Stbk#	MK	Location	% Known	Age
404	0	CALI	100	---
585	0	FRESNO	100	16
673	0	PARAMUS	100	27
674	0	PARAMUS	100	27
737	0	FRESNO	100	17
763	0	CINCINNAT	100	23
835	0	LANDRYSAQ	100	7
850	0	SOUTHBEND	100	6
860	0	NORFOLK	100	8
880	0	FARGO	100	16
885	0	DRAPER	100	8
897	0	TOLEDO	100	5
916	0	LOUISVILL	100	3
935	0	RIPLEYSSC	100	1
574	0.0033	BUSCH TAM	100	17
710	0.0033	MEMPHIS	100	---
820	0.0033	SOUTHBEND	100	12
840	0.0033	PROVIDNCE	100	7
479	0.0065	DENVER	100	32
685	0.0065	BATTLE CR	100	23
829	0.0065	NASHV ZOO	100	6
832	0.0065	SEA WORLD	100	6
526	0.009	HOUSTON	100	27
544	0.009	BALTIM AQ	100	26
735	0.0098	BREVARD	100	19
810	0.0138	DALLAS	100	7
891	0.0147	DENVER	100	3
814	0.0155	PHOENIX	50	6
378	0.0163	BROWNSVIL	100	37
391	0.0163	NZP-WASH	100	36
406	0.0163	MOODY	100	35
708	0.0163	HONOLULU	100	19
943 U	0.0163	SOUTHBEND	100	U 0
485	0.0175	GRANBY	100	30
694	0.0195	LUFKIN	100	21
738	0.0195	NZP-WASH	50	14
932	0.0195	HONOLULU	100	1

Female

Stbk#	MK	Location	% Known	Age
538	0	CLEVELAND	100	---
586	0	BATTLE CR	100	16
660	0	LINCOLN C	100	35
773	0	JNGLARY F	100	19
780	0	LOWRY	100	25
816	0	PORTLAND	100	9
821	0	TOLEDO	100	11
827	0	NASHV ZOO	100	---
858	0	NORFOLK	100	7
896	0	TOLEDO	100	5
915	0	LOUISVILL	100	4
929	0	RIPLEYSSC	100	2
709	0.0033	MEMPHIS	100	---
801	0.0033	BUSCH TAM	100	14
841	0.0033	PROVIDNCE	100	7
530	0.0065	HOUSTON	100	27
756	0.0065	MOODY	50	16
870	0.0065	MEMPHIS	100	5
928	0.0065	PROVIDNCE	100	2
587	0.0098	AUDUBON	100	16
569	0.0112	VANCOUVAQ	100	24
693	0.013	SANFORD	100	22
863	0.0147	DALLAS	100	4
796	0.0155	BALTIM AQ	50	9
797	0.0155	LOWRY	50	7
596	0.0159	VANCOUVAQ	100	25
539	0.0163	DENVER	100	---
661	0.0163	TORONTO	100	34
794	0.0163	HONOLULU	100	9
943 U	0.0163	SOUTHBEND	100	U 0
588	0.0195	AUDUBON	100	12
695	0.0195	LUFKIN	100	21
795	0.0195	HONOLULU	100	7
812	0.0195	SD-WAP	100	6
853	0.0195	DALLAS	100	5
881	0.0195	WACO	100	3
942	0.0195	HONOLULU	100	0

Stbk#	MK	Location	% Known	Age
799	0.0228	SAN FRAN	100	8
800	0.0228	LOWRY	100	7
736	0.0261	MINNESOTA	100	18
867	0.0261	BREVARD	100	4
936	0.0261	BREVARD	100	1
793	0.0277	MINNESOTA	100	7
893	0.0277	SANDIEGOZ	75	3
842	0.0301	HOGLE	100	4
865	0.0301	INDIANAPL	100	5
923	0.0301	TUCSON	100	3
726	0.0309	SD-WAP	50	17
789	0.0342	AUDUBON	100	9
376	0.0375	TULSA	100	44
826	0.0402	KANSASCTY	75	6
581	0.0407	SAN FRAN	100	12
692	0.0407	NATAVPGH	100	22
739	0.0407	TULSA	100	15
778	0.0407	LOSANGELE	100	11
808	0.0413	CLEVELAND	75	7
702	0.0415	GRANBY	100	20
551	0.044	PROVIDNCE	100	25
724	0.0489	STONEHAM	100	17
777	0.0517	ALEXANDRI	100	12
864	0.0517	FRANKLINP	100	6
892	0.0517	STONEHAM	100	3
920	-1	METROZOO	0	3
933	-1	W ORANGE	0	U 1
946	-1	METROZOO	0	U 0

Stbk#	MK	Location	% Known	Age
831	0.0212	GRANBY	100	7
767	0.0228	SOUTHBEND	100	16
786	0.0228	SANDIEGOZ	100	9
798	0.0228	CINCINNAT	100	10
818	0.0228	PARAMUS	100	6
852	0.0228	NZP-WASH	100	4
921	0.0228	SACRAMNTO	100	3
934	0.0244	BREVARD	100	1
779	0.0277	BOISE	100	11
895	0.0277	SOUTHBEND	100	4
945	0.0277	SANDIEGOZ	75	0
939	0.0301	AUDUBON	100	0
723	0.0326	BREVARD	100	17
748	0.0334	CLEVELAND	100	15
749	0.0334	SCOVILL F	100	13
790	0.0358	BREVARD	100	9
825	0.0402	BIODOME	75	6
781	0.0407	DAYMNH	100	10
791	0.0407	ABILENE	100	9
582	0.0415	BIODOME	100	13
754	0.0415	BIODOME	100	14
753	0.0432	BIODOME	100	15
717	0.048	STONEHAM	100	18
806	0.0517	FRANKLINP	100	8
937	0.0517	STONEHAM	100	1
711	-1	NY BRONX	0	19
849	-1	METROZOO	0	6
933	-1	W ORANGE	0	U 1
946	-1	METROZOO	0	U 0

F. Definitions

Management Terms (as of December 2021)

Green Species Survival Plan® (Green SSP) Program – A Green SSP Program has a population size of 50 or more animals and is projected to retain 90% gene diversity for a minimum of 100 years or 10 generations. Green SSP Programs are subject to AZA's Full Participation and Sustainability Partner Policies.

Yellow Species Survival Plan® (Yellow SSP) Program – A Yellow SSP Program has a population size of 50 or more animals but cannot retain 90% gene diversity for 100 years or 10 generations. Yellow SSP participation by AZA facilities is voluntary. Yellow SSP Programs are subject to AZA's Sustainability Partner Policy.

Red Species Survival Plan® (Red SSP) Program – A Red SSP Program has a population size of twenty or more animals managed among three or more participating AZA facilities. If a population does not meet these minimum criteria, but has an IUCN designation of Critically Endangered, Endangered, or Extinct in the Wild, and the TAG has developed three goals to sustain this population, then the population will be considered a Red SSP Program. Red SSPs cannot retain 90% gene diversity for 100 years or 10 generations and participation by AZA facilities is voluntary. Red SSP Programs are subject to AZA's Sustainability Partner Policy.

Candidate Program – A Candidate Program either has a population size of fewer than twenty individuals and/or found at fewer than three AZA facilities or it does not yet have a completed studbook so the population size is unclear. A Candidate Program is overseen by the TAG, with no additional AZA accountability requirements.

Sustainability Partners – AZA Animal Population Management (APM) Committee approved wildlife facilities that regularly exchange animals with AZA-accredited facilities and certified related facilities, typically as part of the Species Survival Plan® (SSP) Program Breeding and Transfer Plan or other SSP Program management process.

Full Participation – AZA policy stating that all AZA accredited facilities and certified related facilities having a Green SSP animal in their collection are required to participate in the collaborative SSP planning process (e.g., provide relevant animal data to the AZA Studbook Keeper, assign an Institutional Representative who will communicate facility wants and needs to the SSP Coordinator and comment on the draft plan during the 30-day review period, and abide by the recommendations agreed upon in the final plan).

All AZA member facilities and Animal Programs, regardless of management designation, must adhere to the AZA Policy on Responsible Population Management and the AZA Code of Professional Ethics. For more information on AZA policies, see https://www.aza.org/board-approved-policies-and-position-statements.

Currentness Date – The date when the entire studbook is updated. This equates to the first date you received an update after requesting updates from all the facilities included in your studbook.

Demographic Terms

Age Distribution – A visual representation of the numbers or percentages of individuals in various age and sex classes.

Ex, Life Expectancy – The average years of further life for an animal in age class x.

Lambda (λ) or Population Growth Rate – The proportional change in population size from one year to the next. A lambda of 1.11 means an 11% per year increase; a lambda of 0.97 means a 3% decline in size per year. The three lambdas highlighted in this BTP are: 1) Life Table, from the PMx life tables, the change in the population based on the demographic regional and date window exported from the studbook, the life table lambda is the rate at which the population would be expected to grow (in the future) given the birth and death rates reported in the life tables and assuming a stable age distribution (does NOT factor in imports or exports); 2) 5-year, from the studbook census, the 5-year lambda is calculated from observed changes in population size over the last 5 years and includes births, deaths, imports and exports; and 3) Projected, from the PMx stochastic 20-year projections (includes confidence intervals), models how the population is predicted to grow or decline over the next 20 years given the birth and death rates from the life tables and the age structure of the current population.

lx, Age-Specific Survivorship – The probability that a new individual (e.g., age 0) is alive at the *beginning* of age *x*. Alternatively, the proportion of individuals which survive from birth to the beginning of a specific age class.

Mean Generation Time (T) – The average time elapsing from reproduction in one generation to the time the next generation reproduces. Also, the average age at which a female (or male) produces offspring. It is not the age of first reproduction. Males and females often have different generation times.

Median Life Expectancy (MLE) – The 'typical' age at which an average animal is expected to live; 50% will die before the median life expectancy and 50% die after. The MLE reported in Breeding and Transfer Plans (BTPs) and Survival Stats Reports, does excludes individuals that did not survive to their first birthday. The MLE obtained from population management software (PM2000, PMx, ZooRisk) or from life tables in BTPs (e.g., where Lx = 0.5) will be lower because they include those individuals that did not

survive to their first birthday in order to project the correct number of births needed. A Survival Statistics Library is maintained for most AZA Animal Programs on the AZA website: https://www.aza.org/species-survival-statistics.

Maximum Longevity – The maximum age at which we have observed a species to live. If the oldest observed animal is currently living, we do not yet know the maximum longevity.

Mx, Fecundity – The average number of same-sexed offspring born to animals in that age class. Because studbooks typically have relatively small sample sizes, studbook software calculates Mx as 1/2 the average number of offspring born to animals in that age class. This provides a somewhat less "noisy" estimate of Mx, though it does not allow for unusual sex ratios. The fecundity rates provide information on the age of first, last, and maximum reproduction.

Px, Age-Specific Survival – The probability that an individual of age *x* survives an age class; is conditional on an individual being alive at the beginning of the age class. Alternatively, the proportion of individuals that survive from the beginning of one age class to the next.

Qx, Mortality – The probability that an individual of age *x* dies during an age class (Qx = 1-Px). Alternatively, the proportion of individuals that die during an age class. It is calculated from the number of animals that die during an age class divided by the number of animals that were alive at the beginning of the age class (i.e., "at risk").

Risk (Qx or Mx) – The number of individuals that have lived during an age class. The number “at risk” is used to calculate Mx and Qx by dividing the number of births and deaths that occurred during an age class by the number of animals at risk of dying and reproducing during that age class.

Target Population Size (TPS) – The desired number of SSP animals to be held across AZA and approved partner facilities over a specific, stated timeframe. This number is determined with consideration for program roles and goals (genetic, demographic, and others), logistical constraints, spatial competition with other TAG-managed species, and other population-specific concerns. Target Population Size is determined by the Taxon Advisory Group (TAG) and published in their Regional Collection Plan (RCP).

Vx, **Reproductive Value –** The expected number of offspring produced this year and in future years by an animal of age *x*.

Genetic Terms

Allele – Alternate forms of DNA at a particular position in a genome (genetic locus). Alleles represent the most basic form of genetic diversity.

Gene Diversity (GD) – The probability that two alleles randomly sampled from the same genetic locus across a population are not identical by descent. Gene diversity is calculated relative to a population’s founders, which are assumed to be unrelated and not inbred, and is the proportional diversity retained by the current, descendant population.

Effective Population Size (N_e) – The size of a randomly mating population of constant size with equal sex ratio and a Poisson distribution of family sizes that would (a) result in the same mean rate of inbreeding as that observed in the population, or (b) would result in the same rate of random change in allele frequencies (genetic drift) as observed in the population. These two definitions are identical only if the population is demographically stable (because the rate of inbreeding depends on the distribution of alleles in the parental generation, whereas the rate of allele frequency drift is measured in the current generation). More specifically, PMx software uses the definition as the size of the current population that have produced offspring, assuming that there are current breeders, that these current breeders have a Poisson distribution of family sizes, that none of the current breeders are now post-reproductive, and none of the not-yet-breeding adults will breed.

Founder – An individual obtained from a source population (often the wild) that has no known relationship to any individuals in the derived population (except for its own descendants).

Founder Genome Equivalents (FGE) – The number of wild-caught individuals (founders) that represent the same amount of gene diversity as does the population under study. The gene diversity of a population is 1 - 1 / (2 * FGE).

Founder Representation – The proportion of the alleles in the living, descendant population that are derived from that founder.

Inbreeding Coefficient (F) – The probability that the two alleles present at an individual’s genetic locus are identical by descent (i.e., both alleles originated from an ancestor common to both the individual’s parents).

Mean Kinship (MK) – The mean (or average) kinship coefficient between an animal and all animals (including itself) in the living, captive-born population. An individual’s mean kinship is a measure of how well its alleles are represented within a population. Animals with low mean kinships have few relatives, are from under-represented founder lineages, and have transmitted few of their alleles to the next generation; these individuals should be prioritized for breeding to slow a population’s gene diversity loss.

Percent Known – The percentage of an animal's genome that is traceable to known founders. Thus, if an animal has an UNK sire, its % Known = 50. If it has an UNK grandparent, its % Known = 75.

Percent Certain – The percentage of the living individuals' pedigree that can be completely identified as *certain:* (exact identity of both parents is known) and traceable back to known founders. Individuals that are 100% *certain* do not have any MULTs or UNKs in their pedigree. *Certainty* represents a higher degree of knowledge than *Known* and therefore is always less than or equal to *Known*.

G. AZA Animal Population Management (APM) Committee Disclaimers

as of June 2019

This Animal Program is currently a Signature SSP and recommendations proposed are non-binding – participation is voluntary. Transfers to non-AZA facilities must comply with each facility's acquisition/transfer policy, in accordance with the AZA Policy on Responsible Population Management. APM Committee-approved Sustainability Partners are expected to agree and abide by AZA's Code of Professional Ethics, SSP Full Participation Policy, Policy on Responsible Population Management, and Accreditation Standards related to animal care and welfare.

H. Directory of Institutional Representatives

Exported from PMCTrack as of 2/4/23

Facility Mnemonic	Facility	Institutional Representative	IR Email
ABERDE HK	Ocean Park Corporation	Charlie Young	charlie.young@oceanpark.com.hk
ABILENE	Abilene Zoological Gardens	Alex Gonzalez	alex.gonzalez@abilenetx.gov
ADVENTURE	Adventure Aquarium	Mark Hacker	mhacker@adventureaquarium.com
AKRON	Akron Zoological Park	Eric Albers	e.albers@akronzoo.org
ALEXANDRI	Alexandria Zoological Park	Lisa Laskoski	lisa.laskoski@cityofalex.com
AQUARAMER	Audubon Aquarium of the Americas	Kristine Grzenda	kgrzenda@audubоninstitute.org
AUDUBON	Audubon Zoo	Liz Wilson	lwilson@audubоninstitute.org
BALTIM AQ	National Aquarium	Debra Dial	ddial@aqua.org
BATTLE CR	Binder Park Zoo	Justin Thompson	Jthompson@binderparkzoo.org
BIODOME	Biodôme de Montreal	Emiko Wong	ewong@ville.montreal.qc.ca
BLOOMINGT	Miller Park Zoo	Pearl Yusuf	pyusuf@cityblm.org
BOISE	Zoo Boise	Melissa Wade	mwilliams@cityofboise.org
BOSTON MS	Museum of Science	Jacqueline Peeler	jpeeler@mos.org
BREVARD	Brevard Zoo	Kim Castrucci	kcastrucci@brevardzoo.org
BROWNSVIL	Gladys Porter Zoo	Walter DuPree	wdupree@gpz.org
BUFFALO	Buffalo Zoo	Lisa Smith	lsmith@buffalozoo.org
BUSCH TAM	Busch Gardens Tampa Bay	Chanel Crow	chanel.crow@buschgardens.com
CAPE MAY	Cape May County Park Zoo	Bert Paluch	zvetpaluch@co.cape-may.nj.us
CHATTANOG	Chattanooga Zoo at Warner Park	Lacey Hickle	lhickle@chattzoo.org
CHICAGOBR	Chicago Zoological Society - Brookfield Zoo	Tim Sullivan	Tim.Sullivan@CZS.org
CHICAGOLP	Lincoln Park Zoo	Maureen Leahy	mleahy@lpzoo.org
CINCINNAT	Cincinnati Zoo & Botanical Garden	Sarah Swanson	sarah.swanson@cincinnatizoo.org
CLEVELAND	Cleveland Metroparks Zoo	Tad Schoffner	tad@clevelandmetroparks.com
DALLAS	Dallas Zoo	Sprina Liu	sprina.liu@dallaszoo.com
DAYMNH	Boonshoft Museum of Discovery	Elizabeth Toth	ltoth@boonshoftmuseum.org
DENVER	Denver Zoo	Andy Schertz	aschertz@denverzoo.org
DETROIT	Detroit Zoo	Elizabeth Arbaugh	elizabeth@dzs.org
DISNEY AK	Disney's Animal Kingdom	Thomas Probst	Tom.probst@disney.com
DRAPER	Loveland Living Planet Aquarium	Lesley Scoville	lesley.s@thelivingplanet.com
DULUTH	Lake Superior Zoo	Maggie Waters	mwaters@lszoo.org
EL PASO	El Paso Zoo	Sylvia Ware	WareSM1@elpasotexas.gov
EVANSVLLE	Mesker Park Zoo & Botanic Garden	Leigh Ramon	lramon@meskerparkzoo.com
FARGO	Red River Zoo	Nicole Lee	nlee@redriverzoo.org

Facility Mnemonic	Facility	Institutional Representative	IR Email
FRANKLINP	Franklin Park Zoo	Lisa Zidek-Sullivan	lzideksullivan@zoonewengland.org
FRESNO	Fresno Chaffee Zoo	Mark Halvorsen	mhalvorsen@fresnochaffeezoo.org
FT WAYNE	Fort Wayne Children's Zoo	Shelley Scherer	shelley.scherer@kidszoo.org
GRANBY	Zoo de Granby	Chantal Routhier	crouthier@zoodegranby.com
GREEN NSC	Greensboro Science Center	Jessica Hoffman	jhoffman@greensboroscience.org
GREENVISC	Greenville Zoo	James Traverse	jtraverse@greenvillesc.gov
HOGLE	Utah's Hogle Zoo	Janice Thompson	jthompson@hoglezoo.org
HONOLULU	Honolulu Zoo	Kevin Murata	kmurata@honolulu.gov
HOUSTON	Houston Zoo, Inc.	Kamryn Suttinger	ksuttinger@houstonzoo.org
INDIANAPL	Indianapolis Zoological Society, Inc.	Meagan Keen	mkeen@indyzoo.com
JENKINSON	Jenkinson's Aquarium	Carlo DiMicco	jenksaqmammals@gmail.com
JNGLARY F	Naples Zoo	Julie Bragovich	jbragovich@napleszoo.org
KANSASCTY	Kansas City Zoo	Brian Dorn	briandorn@fotzkc.org
KNOXVILLE	Zoo Knoxville	Brad Parsons	bparsons@zooknoxville.org
LANDRYSAQ	Houston Aquarium, Inc.	Suzanne Smith	suzanne.smith@ldry.com
LINCOLN C	Lincoln Children's Zoo	Lissa McCaffree	lmccaffree@lincolnzoo.org
LITTLEROC	Little Rock Zoo	Karen Caster	kcaster@littlerock.gov
LOSANGELE	Los Angeles Zoo and Botanical Gardens	Dorothy Belanger	dorothy.belanger@lacity.org
LOUISVILL	Louisville Zoological Garden	Steven Taylor	steven.taylor@louisvilleky.gov
LOWRY	ZooTampa at Lowry Park	Lauryn Foster	Lauryn.foster@zootampa.org
LUFKIN	Ellen Trout Zoo	Gordon Henley	ghenley@ellentroutzoo.com
LVZOO	Lehigh Valley Zoo	Cherlyn Vatalaro	cvatalaro@lvzoo.org
MADISON	Henry Vilas Zoo	Johanna Soto	soto.johanna@henryvilaszoo.gov
MARITIME	Maritime Aquarium at Norwalk	Sandi Schaefer	sschaefer@maritimeaquarium.org
MEMPHIS	Memphis Zoo	Lauren Caskey	lcaskey@memphiszoo.org
METROZOO	Zoo Miami	Michael Malden	Michael.Malden@miamidade.gov
MILWAUKEE	Milwaukee County Zoological Gardens	Patricia Khan	patricia.khan@milwaukeecountywi.gov
MINNESOTA	Minnesota Zoological Garden	John Rex Mitchell	John.Rex.Mitchell@state.mn.us
MINOT	Roosevelt Park Zoo	Brandi Clark	brandi@minotparks.com
MOODY	Rainforest & Aquarium at Moody Gardens, Inc.	Paula Kolvig	pkolvig@moodygardens.org
NASHV ZOO	Nashville Zoo, Inc.	Stephanie White	swhite@nashvillezoo.org
NATAVPGH	National Aviary	Teri Grendzinski	Teri.Grendzinski@aviary.org
NORFOLK	Virginia Zoological Park	Crystal Matthews	crystal.matthews@norfolk.gov
NORRISTOW	Elmwood Park Zoo	Michele Goodman	mgoodman@elmwoodparkzoo.org

Facility Mnemonic	Facility	Institutional Representative	IR Email
NY BRONX	Bronx Zoo	Colleen McCann	cmccann@wcs.org
NZP-WASH	Smithsonian National Zoological Park	Sarah Rezac	rezacs@si.edu
OCEANJRNY	Landry's Downtown Aquarium - Denver	Ryan Herman	ryan.herman@ldry.com
ODYSEA AQ	OdySea Aquarium	Chelsea Grubb	cgrubb@odyseaaquarium.com
OMAHA	Omaha's Henry Doorly Zoo & Aquarium	Christie Eddie	christiee@omahazoo.com
ORLANDO	SeaWorld Orlando	Robert Yordi	robert.yordi@seaworld.com
PARAMUS	Bergen County Zoological Park	Cindy Norton	CNorton@co.bergen.nj.us
PHOENIX	Phoenix Zoo	Mary Yoder	myoder@phoenixzoo.org
PORTLAND	Oregon Zoo	Kate Gilmore	kate.gilmore@oregonzoo.org
PROVIDNCE	Roger Williams Park Zoo	Jennifer Theuman	jtheuman@rwpzoo.org
PUEBLO	Pueblo Zoo	Gina Gley	ggley@pueblozoo.org
RACINE	Racine Zoo	Dan Powell	dpowell@racinezoo.org
RIPLEYSSC	Ripley's Aquarium in Myrtle Beach	Laura Beaudoin	beaudoin@ripleys.com
ROLLING H	Rolling Hills Zoo	Brenda Gunder	Brenda@rollinghillszoo.org
S BARBARA	Santa Barbara Zoological Gardens	Rachel Ritchason	rritchason@sbzoo.org
SACRAMNTO	Sacramento Zoo	Janine Steele	jsteele@saczoo.org
SAN ANTON	San Antonio Zoological Society	Rachel Malstaff	rachel.malstaff@sazoo.org
SAN FRAN	San Francisco Zoological Gardens	Dominick Dorsa	dominickd@sfzoo.org
SANDIEGOZ	San Diego Zoo	Nicki Boyd	nboyd@sdzwa.org
SANFORD	Central Florida Zoo & Botanical Gardens	Erin Bussom	erinb@centralfloridazoo.org
SCOVILL F	Scovill Zoo	Katelyn Huggins	khuggins@decparks.com
SD-WAP	San Diego Zoo Safari Park	Jim Haigwood	jhaigwood@sdzwa.org
SEA WORLD	SeaWorld San Diego	Stephanie Costelow	stephanie.costelow@SeaWorld.com
SEOUL	Seoul Zoo	Woojin Song	woojin8011@seoul.go.kr
SHARKREEF	Shark Reef Aquarium at Mandalay Bay	Jack Jewell	jjewell@mandalaybay.com
SOUTHBEND	Potawatomi Zoo	Anna Pelc	apelc@potawatomizoo.org
ST LOUIS	Saint Louis Zoo	John Clark	clark@stlzoo.org
ST PAUL	Como Park Zoo and Conservatory	Allison Jungheim	allison.jungheim@ci.stpaul.mn.us
STONEHAM	Walter D. Stone Memorial Zoo	Peter Costello	pcostello@zoonewengland.org
TACOMA	Point Defiance Zoo & Aquarium	Maureen O'Keefe	Maureen.OKeefe@pdza.org
TOLEDO	Toledo Zoo & Aquarium	Michael Frushour	Michael.Frushour@Toledozoo.org
TORONTO	Toronto Zoo	Brent Huffman	bhuffman@torontozoo.ca
TUCSON	Reid Park Zoo	Adam Ramsey	adam.ramsey@reidparkzoo.org
TULSA	Tulsa Zoo	Jordan Piha	jpiha@tulsazoo.org
VANCOUVAQ	Vancouver Aquarium Ltd	Alaiza Barron	alaiza.barron@vanaqua.org
W ORANGE	Turtle Back Zoo	Jilian Fazio	jfazio@parks.essexcountynj.org

Facility Mnemonic	Facility	Institutional Representative	IR Email
W PALM BE	Lion Country Safari	Denise Urban	wtkeepers@lioncountrysafari.com
WACO	Cameron Park Zoo	Chris Geerts	cgeerts@wacotx.gov
WATERTNSD	Bramble Park Zoo	Stacy Plocher	splocher@brambleparkzoo.com
WHEELING	Oglebay's Good Zoo	Joe Greathouse	WGreathouse@oglebay.com
WINNIPEG	Assiniboine Park Zoo	Michelle Pasnak-Mazur	mpasnak@assiniboinepark.ca
WINSTON	Wildlife Safari	Daniel Brands	dbrands@wildlifesafari.net
WW ANFWM	Wonders of Wildlife Museum & Aquarium	Olivia Rose	OAHunter@wondersofwildlife.org