

Association of Zoos and Aquariums

**Eastern Indigo Snake
Drymarchon couperi
Population Management Plan
2010-2012**



**Studbook data current as of 1 September 2010, compiled by
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Published by The Orianne Society © 2010

Introduction

The eastern indigo snake (*Drymarchon couperi*) is the longest U.S. snake, has beautiful black skin, and usually tames easily. In the past it has been a principal component of many education animal collections in U.S. zoos. Today this species is under a great deal of pressure from habitat destruction. In the future, captive propagation may become a significant part of the recovery for this species.

The indigo population under management contains 52 animals. There is a large segment of the population with unknown pedigrees and for this analysis we are considering there may be as many as 14 possibly founders (10 of which are hypothetical wild-caught animals). Over the last few years additional potential founders have been collected and their numbers have increased to 16. The majestic appearance of the indigo has made it a desirable species which has been bred both in zoos and in the private sector. They are afforded legal protection both on the state level where they naturally occur and as a federally listed threatened species under the Endangered Species Act. Indigo snakes are occasionally confiscated by law enforcement agencies and placed in zoos. Most of these have questionable origins so their genetic background is unknown.

To maintain a self sustaining population of indigo snakes for zoo programs, two things will be necessary. First there is a need to acquire unrelated animals to increase the founder base of the population. Secondly, there is a need to get more pairs into appropriate breeding situations. Unfortunately few zoos have had the opportunity to maintain breeding pairs due difficulties acquiring individuals from specific locals. A successful program will need institutional commitment and capacity building (space) to reach the goal of a self-sustaining captive indigo population. Cooperation and support from the United States Fish and Wildlife Service (USFWS) and the Florida Fish and Wildlife Conservation Commission (FWC) will be crucial in our success.

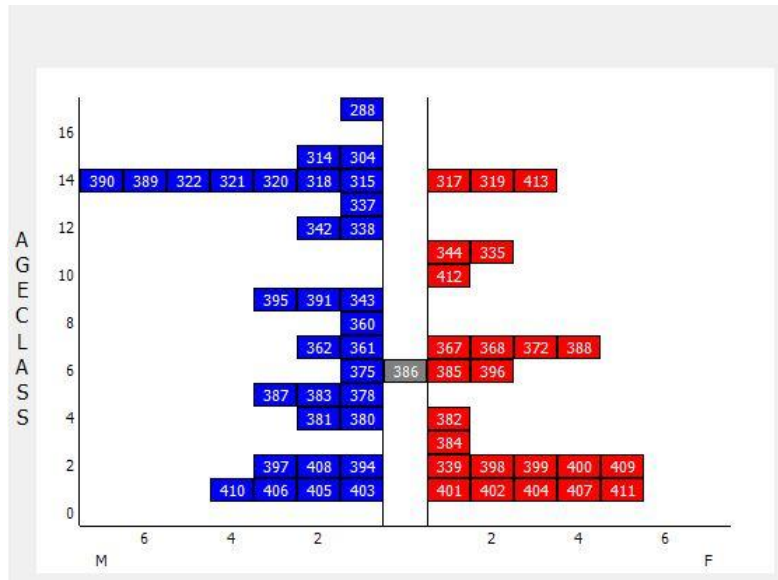
Genetic Summary statistics for the population

Below are the current genetic statistics for this population. A great deal of the animals in this population has individuals of unknown pedigree. Also many of the unknown pedigree animals in captivity may be related.

Population Statistics 2010	
Founders = 14	Potential Founders = 16 additional
Living Descendants = 18.50	Percent Known = 42.0
GD = 0.9341	Potential GD = 0.9807
fge = 7.58	Potential fge = 25.86
Founder Genomes Surviving = 9.86	Potential Founder Genomes Surviving = 25.86
Mean F = 0.0000	

Demography

The entire population contains 59 animals. Below is an age pyramid chart showing the distribution of males and females by age class.



Below are the population growth rates, generation time, and 20 year projections for this population. Using the currently available data, the population should increase to ~189 animals over the next 20 years.

Demographic Statistics		
	Males	Females
R (instantaneous rate of change)	0.0343	0.0681
Lambda	1.0349	1.0704
Generation Time	8.05	7.79
Current N	34	26
20 Year projected N	67.51	101.42

General Summary of Population Management Plan

Below is a general summary of the population and the current breeding and transfer plan for 2008-2009. When possible, animals with unknown pedigrees were not included in the pairing recommendations.

Current Plan Statistics	
Current N	60
Current % Known Ancestry	42
MK	0.0659
GD	0.9341
GV	0.9251
fge	7.58
Breeding Pairs Scheduled	10 Scheduled

Breedings Scheduled

Number	Pairing	Resulting F	Breeding Site
1	337 x 319	F = 0.250	Cincinnati
2	361 x 368	F = 0.000	Gainesville
3	321 x 372	F = 0.000	Homosassa
4	375 x 382	F=0.000	Indianapolis
5	338 x 367	F = 0.000	Jacksonville
6	387 x 385	F = 0.000	Lafay
7	304 x 317	F = 0.000	Little Rock
8	318 x 335	F=0.000	Miami Metro Zoo
9	384 x 383	F = 0.000	Orianne
10	395 x 396	F = 0.250	WLDC

Recommendations

Studbook ID	Hatch Date	Hatch Date Est.	Sire	Dam	Sex	Reproductive	Event	Location	Local ID	Date	Date Est.
AUBURN											
398	8/14/2008	None	WILD	WILD	Female		Transfer	AUBURN	A-4	5/4/2010	None
Totals: 0.1.0 (1)											
BUFFALO - Buffalo Zoological Gardens, Buffalo, NY, USA											
315	5/25/1996	None	UNK	UNK	Male		Transfer	BUFFALO	R0019	10/6/2000	None
375	6/28/2004	None	284	290	Male		Hatch	BUFFALO	R04009	6/28/2004	None
378	5/29/2005	None	315	290	Male		Hatch	BUFFALO	R05010	5/29/2005	None
Totals: 3.0.0 (3) Send 375 to Indianapolis											
CHINSEGUT											
372	8/3/2003	None	200	289	Female		Transfer	CHINSEGUT		1/12/2005	None
Totals: 0.1.0 (1) Send 272 to Homosassa											
CINCINNAT - Cincinnati Zoo & Botanical Garden, Cincinnati, OH, USA											
319	7/1/1996	Year	UNK3	UNK4	Female		Transfer	CINCINNAT	398066	11/19/1998	None
337	9/1/1997	Month	UNK2	UNK4	Male		Transfer	CINCINNAT	398068	11/19/1998	None
Totals: 1.1.0 (2) Breed 337 x 319											
FORTWORTH - Fort Worth Zoological Park, Ft Worth, TX, USA											
343	6/1/2001	Month	UNK	UNK	Male		Transfer	FORTWORTH	205715	1/22/2009	None
Totals: 1.0.0 (1)											
FT WAYNE - Fort Wayne Children's Zoological Garden, Fort Wayne, IN, USA											
385	7/15/2004	Day	UNK7	UNK8	Female		Transfer	FT WAYNE	98093	7/23/2008	None
Totals: 0.1.0 (1) Send 385 to LAYFA.											
GAINSVLL - Santa Fe Teaching Zoo, Gainesville, FL, USA											
361	1/1/2003	Year	WILD	WILD	Male		Transfer	GAINSVLL	40712	4/30/2006	None
368	8/3/2003	None	200	289	Female		Transfer	GAINSVLL	40713	11/18/2008	None
Totals: 1.1.0 (2) Breed 361 x 368											
HERSHEY - ZooAmerica (No. American Wildlife Pk.), Hershey, PA, USA											
386	8/1/2004	Year	UNK	UNK	Unknown		Transfer	HERSHEY	A9.01	2/21/2009	None
Totals: 0.0.1 (1)											
HOGLE - Utah's Hogle Zoo, Salt Lake City, UT, USA											
288	8/25/1993	None	197	208	Male		Transfer	HOGLE	950010	2/3/1995	None
Totals: 1.0.0 (1)											
HOMOSASSA, Homosassa Springs											
Receive 321 from Lowry and 272 from Chinsegut. Breed 321 x 372											
INDIANAPL - Indianapolis Zoo, Indianapolis, IN, USA											
381	7/23/2006	None	UNK	UNK	Male		Transfer	INDIANAPL	207046	5/24/2007	None
382	7/23/2006	None	UNK7	UNK8	Female		Transfer	INDIANAPL	207047	5/24/2007	None
Totals: 1.1.0 (2) Receive 375 from Buffalo. Breed 375 x 382											

JACKSONVL - Jacksonville Zoo and Gardens, Jacksonville, FL, USA											
338	1/1/1998	Year	WILD	WILD	Male		Transfer	JACKSONVL	408334	11/6/2008	None
Totals: 1.0.0 (1) Receive 367 from Sanford. Breed 338 x 367											
LAFAY IND - Columbian Park Zoo, Lafayette, IN, USA											
387	1/1/2005	Year	UNK3	UNK4	Male		Transfer	LAFAY IND	880495	5/10/2008	None
Totals: 1.0.0 (1) Receive 385 from Fort Wayne. Breed 387 x 385											
LITTLEROC - Little Rock Zoological Gardens, Little Rock, AR, USA											
304	6/1/1995	None	280	168	Male		Hatch	LITTLEROC	4779	6/1/1995	None
317	5/25/1996	None	UNK1	UNK2	Female		Transfer	LITTLEROC	5106	10/30/1996	None
Totals: 1.1.0 (2) Breed 304 x 317											
LOUISVILL - Louisville Zoological Garden, Louisville, KY, USA											
388	7/4/2003	None	UNK	UNK	Female		Transfer	LOUISVILL	301959	5/25/2005	None
Totals: 0.1.0 (1)											
LOWRY - Tampa's Lowry Park Zoo, Tampa, FL, USA											
321	8/1/1996	Month	UNK1	UNK2	Male		Transfer	HOMOSASSA	303371	12/22/2008	None
344	7/1/1999	Year	UNK5	UNK6	Female		Transfer	LOWRY	302307	8/4/2000	None
Totals: 1.1.0 (2) Send 321 to Homosassa											
MEMPHIS - Memphis Zoological Garden & Aquarium, Memphis, TN, USA											
389	5/1/1996	Month	UNK	UNK	Male		Transfer	MEMPHIS	22631	10/3/2008	None
390	5/1/1996	Month	UNK	UNK	Male		Transfer	MEMPHIS	22632	10/3/2008	None
Totals: 2.0.0 (2)											
METROZOO - Miami Metrozoo, Miami, FL, USA											
318	7/1/1996	Year	WILD	WILD	Male		Transfer	METROZOO	R00037	11/28/2000	None
335	8/1/1999	Month	WILD	WILD	Female		Transfer	METROZOO	10R022	4/15/2010	None
Totals: 1.1.0 (2) Breed 318 x 335											
NASHV ZOO - Nashville Zoo at Grassmere, Nashville, TN, USA											
322	9/1/1996	Month	UNK	UNK	Male		Transfer	NASHV ZOO	708	9/19/1998	None
Totals: 1.0.0 (1)											
NC SM RAL - NC State Museum of Natural Sciences, Raleigh, NC, USA											
342	7/3/1998	None	UNK	UNK	Male		Transfer	NC SM RAL	A37102	8/9/2003	None
Totals: 1.0.0 (1)											
NEWPORTKY - Newport Aquarium, Newport, KY, USA											
320	7/5/1996	None	UNK	UNK	Male		Transfer	NEWPORTKY	DC0301	4/11/2003	None
Totals: 1.0.0 (1)											
NORFOLK - Virginia Zoological Park, Norfolk, VA, USA											
275	7/1/1992	Year	UNK	UNK	Male		Transfer	NORFOLK	930071	12/1/1993	None
Totals: 1.0.0 (1)											

OAKLAND - Oakland Zoo, Oakland, CA, USA										
391	8/10/2001	None	UNK	UNK	Male	Transfer	OAKLAND	2541	10/22/2009	None
Totals: 1.0.0 (1)										
OMAHA - Omaha's Henry Doorly Zoo, Omaha, NE, USA										
360	7/13/2002	None	UNK	UNK	Male	Transfer	OMAHA	13902	8/8/2003	None
Totals: 1.0.0 (1)										
ORIANNE										
384	5/1/2007	None	UNK1	UNK2	Female	Transfer	ORIANNE	17	3/31/2010	None
383	5/21/2005	None	UNK1	UNK2	Male	Transfer	ORIANNE	16	3/31/2010	None
399	8/21/2008	None	WILD	WILD	Female	Transfer	ORIANNE	PO-03	1/22/2010	None
400	8/20/2008	None	WILD	WILD	Female	Transfer	ORIANNE	PO-04	1/22/2010	None
401	7/17/2009	None	WILD	WILD	Female	Transfer	ORIANNE	PO-05	1/22/2010	None
402	7/27/2009	None	WILD	WILD	Female	Transfer	ORIANNE	PO-06	1/22/2010	None
403	7/16/2009	None	WILD	WILD	Male	Transfer	ORIANNE	PO-07	1/22/2010	None
404	7/23/2009	None	WILD	WILD	Female	Transfer	ORIANNE	PO-08	1/22/2010	None
405	8/3/2009	None	WILD	WILD	Male	Transfer	ORIANNE	PO-09	1/22/2010	None
406	8/2/2009	None	WILD	WILD	Male	Transfer	ORIANNE	PO-10	1/22/2010	None
407	8/4/2009	None	WILD	WILD	Female	Transfer	ORIANNE	PO-11	1/22/2010	None
408	8/11/2008	None	UNK	UNK	Male	Transfer	ORIANNE	PO-12	2/5/2010	None
409	6/1/2008	Day	UNK	UNK	Female	Transfer	ORIANNE	PO-13	2/26/2010	None
410	7/6/2009	None	UNK	UNK	Male	Transfer	ORIANNE	PO-14	3/10/2010	None
411	7/2/2009	None	UNK	UNK	Female	Transfer	ORIANNE	PO-15	3/10/2010	None
397	8/13/2008	None	WILD	WILD	Male	Transfer	ORIANNE	18	5/4/2010	None
412	1/1/2000	Year	WILD	WILD	Female	Transfer	ORIANNE	PO#19	5/10/2010	None
Totals: 7.10.0 (17) Breed 383 x 384										
Breed 383 x 384										
ORLANDOSC										
314	7/9/1995	None	UNK	UNK	Male	Transfer	ORLANDOSC	R08004	11/18/2008	None
Totals: 1.0.0 (1)										
SANFORD - Central Florida Zoological Park, Lake Monroe, FL, USA										
367	7/1/2003	Day	UNK5	UNK6	Female	Transfer	SANFORD	7024	9/9/2005	None
339	8/10/2008	None	UNK	UNK	Female	Transfer	SANFORD	ED044	12/12/2008	None
Totals: 0.2.0 (2) Send 367 to Jacksonville to breed with 338										
ST LOUIS - Saint Louis Zoological Park, St. Louis, MO, USA										
380	1/1/2006	Year	UNK	UNK	Male	Transfer	ST LOUIS	105724	4/30/2007	None
Totals: 1.0.0 (1)										
TALLAHASEE - Tallahassee Museum of History and, Tallahassee, FL, USA										
255	7/1/1990	Year	UNK	UNK	Female	Transfer	TALLAHASEE	11R008	11/1/1991	None
Totals: 0.1.0 (1)										

TAMPA AQ - Florida Aquarium, Tampa, FL, USA										
394	8/10/2008	None	UNK	UNK	Male	Transfer	TAMPA AQ	300242	9/20/2008	None
Totals: 1.0.0 (1)										
TOLEDO - Toledo Zoological Gardens, Toledo, OH, USA										
362	6/21/2003	None	284	290	Male	Transfer	TOLEDO	4098	11/15/2005	None
Totals: 1.0.0 (1)										
TULSA - Tulsa Zoo & Living Museum, Tulsa, OK, USA										
413	1/1/1996	Year	UNK9	UNK10	Female	Transfer	TULSA	16025	4/24/2010	None
Totals: 0.1.0 (1)										
WL DISC C										
395	9/5/2001	None	UNK1	UNK2	Male	Transfer	WL DISC C	2001RC	1/1/2009	Month
396	8/30/2004	None	UNK1	UNK2	Female	Transfer	WL DISC C	2004RC	1/1/2009	Month
Totals: 1.1.0 (2) Breed 395 x 396										

ANALYTICAL DATA FOR TRUE SPECIMENS

Studbook ID	Table	Field	True	Overlay
317	Master	Dam	UNK2	WILD2
		Sire	UNK1	WILD1
319		Dam	UNK4	WILD4
		Sire	UNK3	WILD3
321		Dam	UNK2	WILD2
		Sire	UNK1	WILD1
337		Dam	UNK4	WILD4
		Sire	UNK2	WILD3
344		Dam	UNK6	WILD6
		Sire	UNK5	WILD5
367		Dam	UNK6	WILD6
		Sire	UNK5	WILD5
382		Dam	UNK8	WILD8
		Sire	UNK7	WILD7
383		Dam	UNK2	WILD2
		Sire	UNK1	WILD1
384		Dam	UNK2	WILD2
		Sire	UNK1	WILD1
385		Dam	UNK8	WILD8
		Sire	UNK7	WILD7
387		Dam	UNK4	WILD4
		Sire	UNK3	WILD3
395		Dam	UNK2	WILD2
		Sire	UNK1	WILD1
396		Dam	UNK2	WILD2
		Sire	UNK1	WILD1
413		Dam	UNK10	WILD10
		Sire	UNK9	WILD9

Recommendations by Institution

Mean Kinship of all living animals in studbook

Males

Females

St #	MK	% Known	AGE	LOCATION	St #	MK	% Known	AGE	LOCATION
318	0.000	100.0	14	METROZOO	335	0.000	100.0	11	METROZOO
338	0.000	100.0	13	JACKSONVL	398	0.000	100.0	2	AUBURN
361	0.000	100.0	8	GAINSVLL	399	0.000	100.0	2	ORIANNE
397	0.000	100.0	2	ORIANNE	400	0.000	100.0	2	ORIANNE
403	0.000	100.0	1	ORIANNE	401	0.000	100.0	1	ORIANNE
405	0.000	100.0	1	ORIANNE	402	0.000	100.0	1	ORIANNE
406	0.000	100.0	1	ORIANNE	404	0.000	100.0	1	ORIANNE
337	0.054	100.0	13	CINCINNAT	407	0.000	100.0	1	ORIANNE
387	0.054	100.0	6	LAFAY IND	412	0.000	100.0	11	ORIANNE
288	0.063	75.0	17	HOGLE	413	0.027	100.0	15	TULSA
370	0.064	87.5	U7	TREAS CST	344	0.041	100.0	11	LOWRY
362	0.077	37.5	7	TOLEDO	367	0.041	100.0	7	SANFORD
375	0.077	37.5	6	BUFFALO	382	0.041	100.0	4	INDIANAPL
378	0.077	37.5	5	BUFFALO	385	0.041	100.0	6	FT WAYNE
321	0.095	100.0	14	LOWRY	319	0.054	100.0	14	CINCINNAT
383	0.095	100.0	5	ORIANNE	368	0.064	87.5	7	GAINSVLL
395	0.095	100.0	9	WL DISC C	370	0.064	87.5	U7	TREAS CST
275	0.500	0.0	18	NORFOLK	372	0.064	87.5	7	CHINSEGUT
304	0.500	0.0	15	LITTLEROC	317	0.095	100.0	14	LITTLEROC
314	0.500	0.0	15	ORLANDOSC	384	0.095	100.0	3	ORIANNE
315	0.500	0.0	14	BUFFALO	396	0.095	100.0	6	WL DISC C
320	0.500	0.0	14	NEWPORTKY	255	0.500	0.0	20	TALLAHASE
322	0.500	0.0	14	NASHV ZOO	339	0.500	0.0	2	SANFORD
342	0.500	0.0	12	NC SM RAL	386	0.500	0.0	U6	HERSHEY
343	0.500	0.0	9	FORTWORTH	388	0.500	0.0	7	LOUISVILL
360	0.500	0.0	8	OMAHA	409	0.500	0.0	2	ORIANNE
380	0.500	0.0	5	ST LOUIS	411	0.500	0.0	1	ORIANNE
381	0.500	0.0	4	INDIANAPL					
386	0.500	0.0	U6	HERSHEY					
389	0.500	0.0	14	MEMPHIS					
390	0.500	0.0	14	MEMPHIS					
391	0.500	0.0	9	OAKLAND					
394	0.500	0.0	2	TAMPA AQ					
408	0.500	0.0	2	ORIANNE					
410	0.500	0.0	1	ORIANNE					

Male Life Table

Age (x)	Qx	Px	lx	Mx	Vx	Ex	Risk (Qx)"	Risk (Mx)"
0	0.070	0.930	1.000	0.000	1.036	11.396	156.800	146.100
1	0.020	0.980	0.930	0.000	1.124	10.896	140.500	138.900
2	0.060	0.940	0.911	0.040	1.211	10.306	136.400	131.900
3	0.060	0.940	0.857	0.110	1.290	9.900	124.100	121.200
4	0.030	0.970	0.805	0.410	1.279	9.324	114.100	112.800
5	0.070	0.930	0.781	0.040	0.946	8.759	107.700	104.400
6	0.060	0.940	0.726	0.180	1.003	8.300	97.200	94.000
7	0.050	0.950	0.683	0.000	0.902	7.726	91.400	89.100
8	0.050	0.950	0.649	0.170	0.982	7.081	85.300	83.800
9	0.060	0.940	0.616	0.310	0.890	6.434	77.600	75.100
10	0.100	0.900	0.579	0.020	0.652	5.902	70.100	66.400
11	0.110	0.890	0.521	0.190	0.730	5.476	64.200	60.600
12	0.130	0.870	0.464	0.060	0.635	5.082	55.500	50.900
13	0.160	0.840	0.404	0.000	0.695	4.769	46.500	43.200
14	0.090	0.910	0.339	0.360	0.825	4.322	33.300	31.900
15	0.220	0.780	0.309	0.120	0.567	3.918	26.900	23.000
16	0.150	0.850	0.241	0.000	0.571	3.599	20.500	19.300
17	0.300	0.700	0.205	0.000	0.756	3.328	16.600	14.700
18	0.100	0.900	0.143	1.000	1.000	2.975	10.300	10.000
19	0.350	0.650	0.129	0.000	0.000	2.527	8.500	6.800
20	0.550	0.450	0.084	0.000	0.000	2.673	5.500	4.000
21	0.400	0.600	0.038	0.000	0.000	3.370	2.500	2.200
22	0.000	1.000	0.023	0.000	0.000	3.160	1.500	1.500
23	0.000	1.000	0.023	0.000	0.000	2.160	1.500	1.500
24	0.670	0.330	0.023	0.000	0.000	1.744	1.500	1.400
25	0.000	1.000	0.007	0.000	0.000	1.500	0.500	0.500
26	1.000	0.000	0.007	0.000	0.000	1.000	0.500	0.400
27	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

$r = 0.0343$

$\lambda = 1.0349$

$T = 8.05$

$N = 34.00$

$N(\text{at } 20 \text{ yrs}) = 67.51$

Female Life Table

'''' '' '' '' '' '' '' ''

Age (x)	Qx	Px	lx	Mx	Vx	Ex	Risk (Qx)	Risk (Mx)
0	0.090	0.910	1.000	0.000	1.047	10.059	136.500	124.800
1	0.030	0.970	0.910	0.000	1.194	9.652	111.200	108.700
2	0.050	0.950	0.883	0.070	1.331	9.011	101.700	98.700
3	0.060	0.940	0.839	0.060	1.429	8.476	94.200	90.400
4	0.060	0.940	0.788	0.150	1.558	7.954	86.700	84.500
5	0.060	0.940	0.741	0.000	1.604	7.397	80.700	78.500
6	0.080	0.920	0.696	0.370	1.846	6.877	72.500	69.800
7	0.100	0.900	0.641	0.250	1.735	6.455	60.800	57.800
8	0.110	0.890	0.577	0.710	1.775	6.093	54.200	51.300
9	0.080	0.920	0.513	0.380	1.261	5.633	48.000	45.500
10	0.070	0.930	0.472	0.240	1.020	5.010	44.400	43.000
11	0.150	0.850	0.439	0.440	0.937	4.498	39.200	36.200
12	0.370	0.630	0.373	0.710	0.710	4.671	32.000	24.600
13	0.270	0.730	0.235	0.000	0.000	5.490	20.300	18.000
14	0.150	0.850	0.172	0.000	0.000	5.752	13.500	12.200
15	0.100	0.900	0.146	0.000	0.000	5.444	10.400	9.600
16	0.000	1.000	0.131	0.000	0.000	4.690	9.500	9.500
17	0.310	0.690	0.131	0.000	0.000	4.367	9.700	8.600
18	0.000	1.000	0.091	0.000	0.000	4.124	6.500	6.500
19	0.150	0.850	0.091	0.000	0.000	3.377	6.500	5.500
20	0.420	0.580	0.077	0.000	0.000	3.274	4.700	3.500
21	0.400	0.600	0.045	0.000	0.000	3.873	2.500	1.800
22	0.000	1.000	0.027	0.000	0.000	3.830	1.500	1.500
23	0.000	1.000	0.027	0.000	0.000	2.830	1.500	1.500
24	0.000	1.000	0.027	0.000	0.000	1.830	1.500	1.500
25	0.670	0.330	0.027	0.000	0.000	1.248	1.500	0.900
26	1.000	0.000	0.009	0.000	0.000	1.000	0.500	0.400
27	1.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

r = 0.0681

lambda = 1.0704

T = 7.79

N = 26.00

N(at 20 yrs) = 101.42

Founder Statistics

Studbook	Sex	Age	Representation	Contribution	Allele Retent	Potential Ret.	Descendants
200	M	D	0.0811	1.5000	0.8738	0.8738	3.00
318	M	14	0.0000	0.0000	0.0000	1.0000	0.00
335	F	11	0.0000	0.0000	0.0000	1.0000	0.00
338	M	13	0.0000	0.0000	0.0000	1.0000	0.00
361	M	8	0.0000	0.0000	0.0000	1.0000	0.00
397	M	2	0.0000	0.0000	0.0000	1.0000	0.00
398	F	2	0.0000	0.0000	0.0000	1.0000	0.00
399	F	2	0.0000	0.0000	0.0000	1.0000	0.00
400	F	2	0.0000	0.0000	0.0000	1.0000	0.00
401	F	1	0.0000	0.0000	0.0000	1.0000	0.00
402	F	1	0.0000	0.0000	0.0000	1.0000	0.00
403	M	1	0.0000	0.0000	0.0000	1.0000	0.00
404	F	1	0.0000	0.0000	0.0000	1.0000	0.00
405	M	1	0.0000	0.0000	0.0000	1.0000	0.00
406	M	1	0.0000	0.0000	0.0000	1.0000	0.00
407	F	1	0.0000	0.0000	0.0000	1.0000	0.00
412	F	11	0.0000	0.0000	0.0000	1.0000	0.00
60	F	D	0.0541	1.0000	0.4177	0.4177	7.00
63	F	D	0.0541	1.0000	0.4209	0.4209	7.00
64	M	D	0.0541	1.0000	0.4201	0.4201	7.00
WILD1	F	D	0.1622	3.0000	0.9848	0.9848	6.00
WILD10	M	D	0.0270	0.5000	0.5000	0.5000	1.00
WILD2	M	D	0.1622	3.0000	0.9852	0.9852	6.00
WILD3	F	D	0.0811	1.5000	0.8759	0.8759	3.00
WILD4	M	D	0.0811	1.5000	0.8726	0.8726	3.00
WILD5	F	D	0.0541	1.0000	0.7527	0.7527	2.00
WILD6	M	D	0.0541	1.0000	0.7512	0.7512	2.00
WILD7	F	D	0.0541	1.0000	0.7541	0.7541	2.00
WILD8	M	D	0.0541	1.0000	0.7487	0.7487	2.00
WILD9	F	D	0.0270	0.5000	0.5000	0.5000	1.00

Demographic Terms

Age Distribution – A two-way classification showing the numbers or percentages of individuals in various age and sex classes.

Ex, Life Expectancy – 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. Lambda can be based on life-table calculations (the expected lambda) or from observed changes in population size from year to year. A lambda of 1.11 means a 11% per year increase; lambda of .97 means a 3% decline in size per year.

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.

Mx, Fecundity – The average number of same-sexed young born to animals in that age class. Because SPARKS is typically using relatively small sample sizes, SPARKS calculates Mx as 1/2 the average number of young 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 one time period; is conditional on an individual being alive at the beginning of the time period. Alternatively, the proportion of individuals which survive from the beginning of one age class to the next.

Qx, Mortality – Probability that an individual of age x dies during time period. $Qx = 1 - Px$

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 hatches and deaths that occurred during an age class by the number of animals at risk of dying and reproducing during that age class.

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").

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

Genetic Terms

Allele Retention – The probability that a gene present in a founder individual exists in the living, descendant population.

Current Gene Diversity (GD) -- The proportional gene diversity (as a proportion of the source population) is the probability that two alleles from the same locus sampled at random from the population will not be identical by descent. Gene diversity is calculated from allele frequencies, and is the heterozygosity expected in progeny produced by random mating, and if the population were in Hardy-Weinberg equilibrium.

Effective Population Size (Inbreeding Ne) -- 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 gene 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 gene frequency drift is measured in the current generation).

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 Contribution -- Number of copies of a founder's genome that are present in the living descendants. Each offspring contributes 0.5, each grand-offspring contributes 0.25, etc.

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

Founder Genome Surviving – The sum of allelic retentions of the individual founders (i.e., the product of the mean allelic retention and the number of founders).

Founder Representation -- Proportion of the genes in the living, descendant population that are derived from that founder. I.e., proportional Founder Contribution.

Inbreeding Coefficient (F) -- Probability that the two alleles at a genetic locus are identical by descent from an ancestor common to both parents. The mean inbreeding coefficient of a population will be the proportional decrease in observed heterozygosity relative to the expected heterozygosity of the founder population.

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.

Mean Kinship (MK) – The mean kinship coefficient between an animal and all animals (including itself) in the living, captive-born population. The mean kinship of a population is equal to the proportional loss of gene diversity of the descendant (captive-born) population relative to the founders and is also the mean inbreeding coefficient of progeny produced by random mating. Mean kinship is also the reciprocal of two times the founder genome equivalents: $MK = 1 / (2 * FGE)$. $MK = 1 - GD$.

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