

Population Analysis & MateRx

Verreaux's Eagle Owl (*Bubo lacteus*) AZA Red Program



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17 June 2013

PMC

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Explanation of MateRx

Recommendations Provided from MateRx:

MateRx is analytical software developed jointly by the National Zoological Park and Lincoln Park Zoo. The primary output is a matrix of genetic ratings (Mate Suitability Indices = MSI) for every possible breeding pair in a population. MSIs allow managers to quickly discover how the genetic status of animals in their collections compare to the rest of a managed population.

Each MSI represents the genetic consequences for the population if a given pair was to produce offspring. There are seven values for MSIs: offspring of pairs rated 1, 2, or 3 would benefit the population's genetic situation; pairs rated 4, 5, or 6 would be detrimental to the population's genetic situation. Pairs without an MSI value (i.e., a dash [--]) should not be considered under any circumstances without consulting an advisor.

These MSI values are defined as:

- 1 – very beneficial
- 2 – moderately beneficial
- 3 – slightly beneficial
- 4 – slightly detrimental
- 5 – moderately detrimental
- 6 – very detrimental

MateRx integrates four genetic factors to produce the Mate Suitability Index (MSI). These four components are currently used to develop pairing recommendations for SSPs and PMPs. In decreasing order of "importance," they are:

1. the expected change in genetic diversity (increase, decrease) that would result if an offspring of a pair is added to the population;
2. the relative rareness or commonness of the parents genetic information (i.e., the relative dissimilarity of parental mean kinships);
3. the inbreeding coefficient of offspring that would be produced by a pair; and
4. the proportion, if any, of the dam and/or sire's pedigree that is of unknown origin.

Analysis Note: The "breakpoint" and "no way" values for inbreeding used average MK values and were set to 0.210 and 0.2500, respectively. The 'balanced ranks' MK difference method was used.

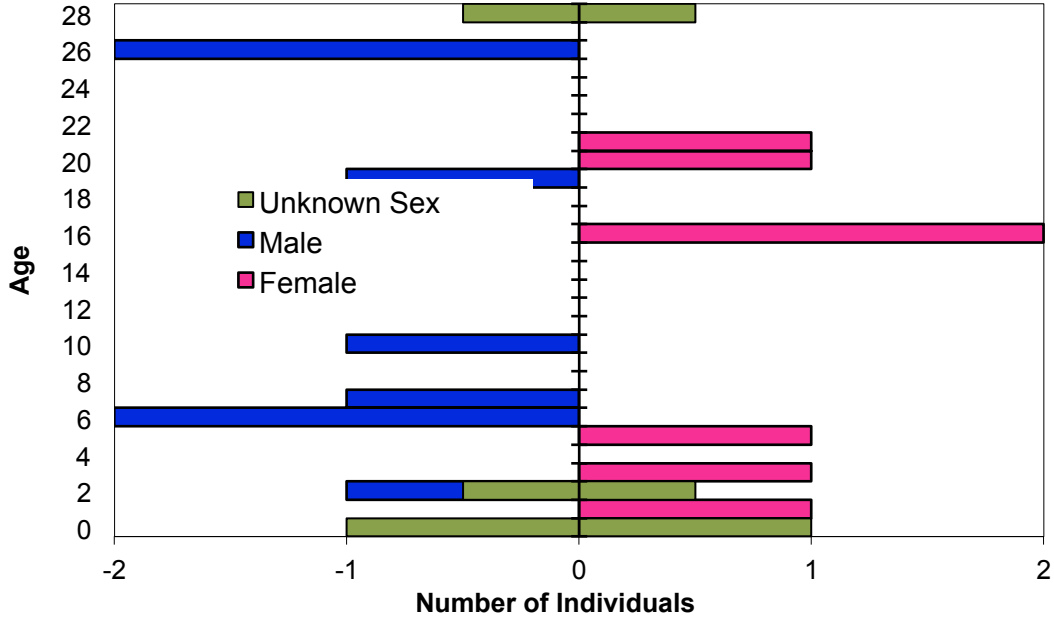
MateRx for Verreux's eagle owl in N. American institutions

Birds of unknown sex are assigned as both male and female and highlighted in yellow.

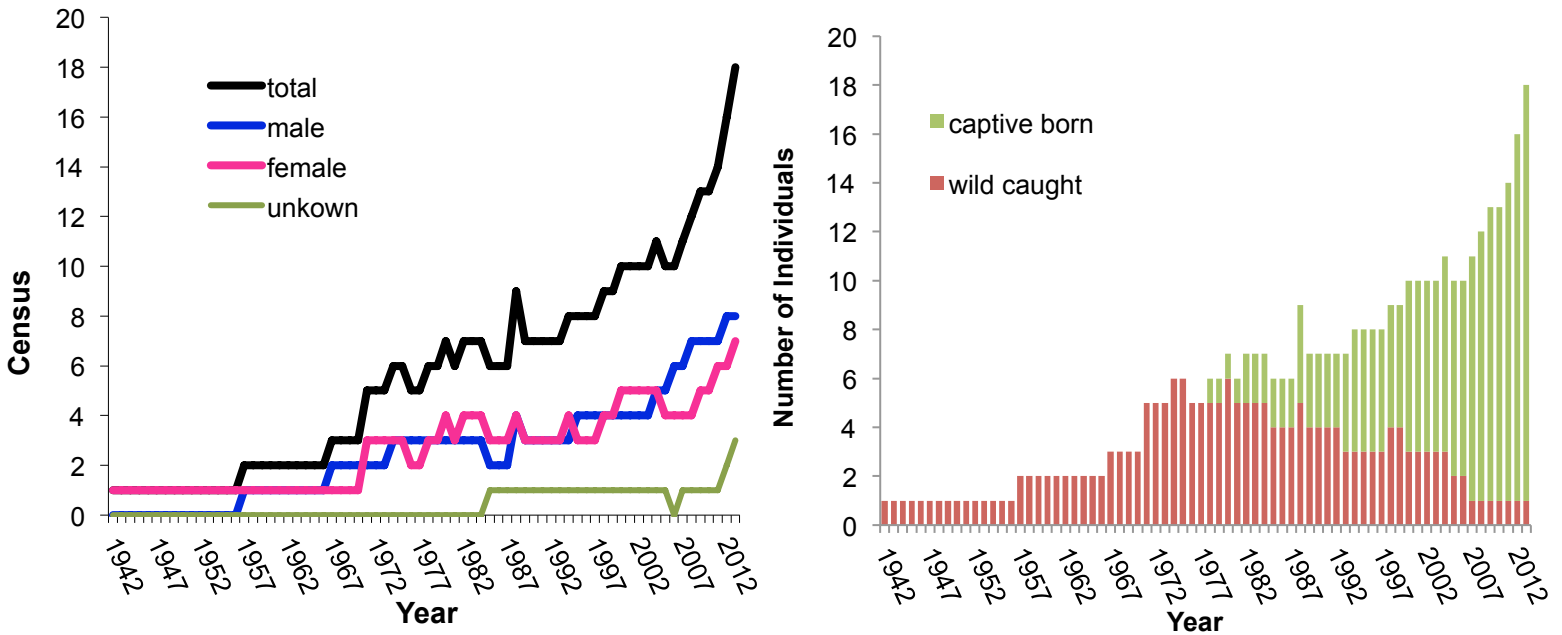
	Females ->	20	40	28	17	18	21	38	27	39	29
Males	BREED: 1,2,3,4 AVOID: 5,6,"-"	ATLANTA	ATLANTA	DALLAS	FORTWORTH	JACKSONVL	JACKSONVL	PORTLAND	SD-WAP	TRACY AV	WORLDBIRD
19	ATLANTA	5	-	-	-	-	6	-	-	-	-
24	ATLANTA	-	-	-	2	2	3	-	-	-	-
40	ATLANTA	-	-	-	4	4	6	-	-	-	-
30	DALLAS	-	-	-	2	2	3	-	-	-	-
14	FORTWORTH	4	6	6	2	2	1	6	6	6	6
22	FT WAYNE	-	-	-	2	2	3	-	-	-	-
13	SD-WAP	3	6	6	-	-	1	6	6	6	6
25	SD-WAP	-	-	-	2	2	3	-	-	-	-
26	SD-WAP	-	-	-	2	2	3	-	-	-	-
39	TRACY AV	-	-	-	4	4	6	-	-	-	-
29	WORLDBIRD	-	-	-	4	4	6	-	-	-	-

Appendix A Age Pyramid and Census

Age Pyramid of the currently managed Verreaux's eagle owl population in N. America (19 animals (8 males, 7 females, 4 unknown))



Census of Verreaux's eagle owl in N. America by sex (left) and by birth type (right).



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

Appendix B Genetic Statistics and Mean Kinship (MK) List

	2013	Current Potential
Founders	6	1 additional
Founder genome equivalents (FGE)	2.27	4.24
Current gene diversity (GD %)	78.01	88.21
Population mean kinship (MK)	0.2199	-----
Mean inbreeding (F)	0.0147	-----
% pedigree known before assumptions and exclusions	50	-----
% pedigree known after assumptions and exclusions	100	-----
% pedigree certain after assumptions and exclusions	100	-----
Effective population size/census size ratio (Ne / N)	0.157	-----

Males

ID	MK	% Known	Age	Location
14	0.0000	100	26	FORTWORTH
13	0.1930	100	26	SD-WAP
22	0.2390	100	10	FT WAYNE
24	0.2390	100	7	ATLANTA
25	0.2390	100	6	SD-WAP
26	0.2390	100	6	SD-WAP
30	0.2390	100	2	DALLAS
19	0.2426	100	19	ATLANTA

Females

ID	MK	% Known	Age	Location
21	0.1250	100	16	JACKSONVL
17	0.1719	100	21	FORTWORTH
18	0.1719	100	20	JACKSONVL
20	0.2059	100	16	ATLANTA
27	0.2390	100	5	SD-WAP
28	0.2390	100	3	DALLAS
38	0.2390	100	1	PORTLAND

Unknown Sex

ID	MK	% Known	Age	Location
29	0.2390	100	2	WORLDBIRD
39	0.2390	100	0	ATLANTA
40	0.2390	100	0	ATLANTA

Appendix C

Summary of Data Exports

MateRx report compiled under PopLink V. 2.4 & Population Management X Version 1.2

Projects: xxOwl_Verreux_May2013

Report compiled under Population Management X Version 1.2

Comments: for May 2013 MateRx summary

Studbook information:

Data compiled by: R. Harrison Edell

Data current thru: March 12, 2013

Scope of data: North America

Demographic data from:

C:\Documents and Settings\asputnam\My Documents\PMx\PMx_Projects\Owl_Verreux \PMx Export\ Owl_Verreux.csv

Demographic filter conditions:

Locations = NAMERICA.fed

During 1/1/1970 - 5/13/2013

Status = Living

Genetic data from:

C:\Documents and Settings\asputnam\My Documents\ PMx\PMx_Projects\ Owl_Verreux \PMx Export\ Owl_Verreux.ped

Genetic filter conditions:

Locations = NAMERICA.fed

During 1/1/1970 - 5/13/2013

Status = Living

Appendix D Assumptions and Exclusions

Assumptions

SB#	Sire	New Sire	Dam	New Dam	Notes
36	UNK	WILD1	UNK	WILD2	RUSHDEN birds may be related. Birds 36 and 37 assumed to be full-sibs but unrelated to the rest of the N. American population.
37	UNK	WILD1	UNK	WILD2	RUSHDEN birds may be related. Birds 36 and 37 assumed to be full-sibs but unrelated to the rest of the N. American population.
11	UNK	WILD	UNK	WILD	Assume unrelated to the rest of the N. American population, as this is the only bird transferred out of WASSENAAR.

Exclusions

ID	Sex	Age	Reason
31	UNK	28	Unknown pedigree