Black-and-white Ruffed Lemur EEP
2015 Recommendations
(Varecia variegata)
Please contact the European studbook keeper and EEP coordinator regarding any comments.

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Species Committee

Acknowledgements
I would like to thank all the participants that send me the 2014 data and as this year for the first time that means almost all of you – thank you so much! Also thank you to all the institutions that cooperate and manage their B&W Ruffed lemurs according to the needs of the EEP. This ought to be obvious but it’s not – so thank you very much! I would also like to thank as always the country representatives Andreas Pauly, Jean-Pascal Guéry, Jitka Vokurkova and Terry Hornsey that continuously are helping and supporting the work of bringing the B&W Ruffed program back on track. Also as always thanks to Delphine Roullet and Achim Johann for support, advice and good cooperation with all the ruffed lemurs.
INTRODUCTION

Black and White Ruffed Lemurs (*Varecia variegata* sp.) are amongst the world’s most threatened animal species. The subspecies were reassessed by IUCN in 2013 and moved from endangered to critically endangered.
The European population of *V. v. subsincta* is not included in this EEP but run as a separate EEP population. Please contact Delphine Roullet, Paris Zoo, reading this subspecies.
Even though the European population of B&W Ruffed lemurs in this studbook is considered a hybrid population of *V. variegata variegata* and *V. variegata editorum* the population is still considered important as a flagship species.

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SUMMARY OF THE BLACK AND WHITE RUFFED LEMUR EEP

The overall goal of this EEP is to sustain a stable population to be able to fulfill the demand of B&W Ruffed lemurs in EAZA zoos. This species is looked upon as a Flagship species, an interesting and important species for educational purpose and as a link to conservation work in Madagascar in general. In spite of this, genetics are still considered important as the health of the population is important if we wish to keep the B&W ruffed lemurs for many years forward in the European Zoos. As B&W Ruffed lemurs in the wild are critically endangered the EAZA population must in spite of the status as a hybrid population be carefully planned and managed. There has through time been quite some debate about the classification of ruffed lemurs (Vasey, N. and Tattersall, I., (2002)* and there are still genetic research going on that might shed light on this subject in the future.

During the last two years there have been quite some transports involving B&W Ruffed lemurs according to the recommendations. The first recommended young after the more than 6 year no-breeding policy have been born and the EEP is really starting to function properly. The percentage of participants answering e-mails has gone up and reached a really satisfactory level of about 95 % in spring 2015. I sincerely thank all of you for supporting and cooperating with the EEP.

Challenges and important facts to realize
It is quite a challenge to fulfill the wishes of the participants as still too many zoos want either an active breeding pair or a male single-sex group. As a consequence there is a higher demand for breeding pairs than needed to fulfill the need for young individuals and for a long period there has been a lack of males. In spite of this the real problem that needs to be solved is the situation with surplus females.

Controlled breeding is needed: The population is in need of breeding to assure a stable population (See the Age Pyramid page 8) but still the EEP must be run with restricted breeding to avoid too high inbreeding, loss of genetic diversity and a big surplus problem. The recommendations autumn 2015 is part of the strategy of keeping the population relatively stable around 380 individuals and at the same time lowering the mean inbreeding and increasing the genetic diversity. The Recommendations autumn 2015 is the third large round of recommendations with the overall goal to get the population into controlled breeding. This round again brings more pairs together for breeding – but this time though just a few new pairs. Also recommendations for all the recommended pairs are once more breed all! In the future it’s important to realize though that not all pairs should breed every year as we would then produce a to high number of young individuals that need to be housed and also as offspring are born the genetics change and the importance of a pair is lowered.

Responsibility when breeding: There are some challenges in regard to breeding and realizing that a breeding recommendation is only for a smaller number of offspring and a zoo that is breeding must be able to keep the young for some time. A breeding pair will normally not be recommended to breed every year or through a whole lifetime. Please keep the EAZA statement of surplus management in mind and take responsibility. Every zoo needs critically to access their possibilities determined by their facility for ruffed lemurs and management tradition/culture and act accordingly to this. Sending animals out of the EEP without a recommendation is not a solution!

Ways to deal with surplus females: There are in the population actually fewer females than males (Page 8) but still there are continuously surplus females that are very difficult to find zoos for. This has to do with the fact that females are often considered / experienced as more difficult to house in single-sex groups than males. It leaves us with this problem of a constant need to place surplus females and combined with the simple fact that as we need to produce more B&W Ruffed lemurs we will of cause get more females it will become an even bigger challenge.

Female single-sex groups have been the strategy up till now but with varying success in different zoos. Female surplus could also be housed in non-breeding pairs – old female and young male or a young female with an older or neutered male. To solve the problem the EEP suggest that we find zoos interested in keeping post/non-reproductive pairs were either the male or the female is too old to reproduce or neutered. Female single sex groups are fine when it works but females kept with non-reproducing males might be a fine solution for some aggressive individuals or for zoos with a nonflexible or small facility. This strategy is used in other EEPs and could also be used for an old or sterilized female kept with a young male that might be needed for future breeding. The EEP believes we in this way can offer a relatively easy kept Flagship species for show.

In a few zoos a single female B&W ruffed lemur is housed in an exhibit with another species of lemur with great success. This might be a solution that only fits special individuals but it gives the zoo the possibility to show a number of lemur species and so this solution has more benefits than simply to house a surplus female!

Another really fine solution for surplus is practiced by some zoos that keep a breeding pair and also house a surplus single-sex group and especially if this group is a female single-sex group it helps the EEP and population management a lot.

Correct housing solves a lot of problems: Last but not least the facilities for ruffed lemurs need to be thought upon in a different way. The more flexibility we offer this species the better management in the zoos and opportunities for the EEP. When making recommendations for breeding pairs in the future the flexibility of the facility will be a factor that will be taken into account and as an important factor that will affect the decision regarding which zoos will get the breeding pairs. Please read the part HUSBANDRY NOTES concerning facility design.

Future cooperation with other Regions

It has been approved to start cooperation with other Regional programs and therefore the EEP is in contact with zoos in Canada and Australia regarding sending B&W Ruffed lemurs out of the EEP and into their breeding programs. At this moment the EEP is working on identifying animals for a zoo in Canada. Also it has been agreed with the Australian coordinator that in 2 to 3 years B&W ruffed lemurs could be identified to go to Australia. Cooperation with Latin American Zoos can’t yet be through a breeding program and therefore transfers to zoos in this region will not be prioritized as much. If there are suitable animals they could be transferred there though. It is important that it is the right animals that are chosen for this kind of transfers though. It must be individuals that are in surplus genetically that leave the EEP. It is also important to send B&W Ruffed lemurs to another Regional breeding program that are fit for a breeding program and of cause come from zoos interested in cooperating with a zoo in another Region.
HUSBANDRY NOTES

There is no actual Best Practice Guideline for Ruffed lemurs yet but one is in the making. The process was initiated at the Prosimian TAG Mid-year meeting March 2013 and the intention is to publish a guideline covering more lemurs species. There are several documents covering different species and issues of husbandry at the EAZA website, Prosimian TAG:
http://eaza.portal.isis.org/member_area/TAGs/Prosimian/default.aspx

One document is specific on ruffed lemurs covering very basic but important management issues:
http://eaza.portal.isis.org/member_area/TAGs/Prosimian/Shared%20Documents/Husbandry%20Ruffed%20lemurs%20basics.pdf

As I quite often get questions related to husbandry and as the EEP experience some difficulties related to husbandry please find here a few important and general guidelines for ruffed lemurs that will help the management in the zoos and of the studbook and EEP.

Transponders: All Black and White Ruffed lemurs must have transponders implanted to secure identification and the transponders should be read as a routine or at least every time an animal is handled. Individuals are still surprisingly often confused.

Important flexibility of the ruffed lemur facilities: The flexibility of the facilities must be high and there should be offered enough rooms inside and outside enclosures. Participants should realize that Ruffed lemurs need a more complex enclosure design than traditionally thought! Therefor present and future participants ought to keep in mind that when keeping ruffed lemurs the facility needs to be very flexible with easy possibilities to separate the animals (PICTURE 1). Separation indoor and out-door must be possible to guarantee good husbandry and to be able to cope with the normal challenges of keeping ruffed lemurs. Because ruffed lemurs might fight periodically even though in a harmonic group it should be possible for individuals to avoid each other and even to be separated by the keepers from time to time. Ideally no matter if it is for a breeding pair and their offspring or a single-sex group of ruffed lemurs there should be several rooms connected by at least two doors rather than one big room. Several rather small rooms are recommended rather than a few big! For an expected group of 3-4 ruffed lemurs ideally a minimum of three connected rooms indoor and at least one extra outside enclosure should be available. This would allow an individual to be separated for some time while the rest still have two rooms to their disposal and all individuals can be allowed access to the outside. For large groups even bigger number of rooms would be ideal. A non-breeding pair will be a much better choice for a small not flexible enclosure than a group of ruffed lemurs. If zoos had better facilities for the ruffed lemurs they would be able to cope better
with the challenges of keeping the animals and it would then be expected that the need of urgent transfer recommendations would be minimized and some of the surplus problems actually solved. Also introducing new individuals into groups is easier with a more flexible facility.

Recently I have seen a simple and very nice solution for housing ruffed lemurs. An EEP participant used a low electric fence surrounding a shed and some big trees (PICTURES 2). This could be a very fine solution for zoos interested in for example a non-breeding pair or to house a bit of surplus for some time. Please contact the EEP coordinator if you are interested in knowing more.

**Behavioral management**: A good introduction of new individuals is very likely if the new individual(s) is/are kept in the same indoor facility and in visual and auditory contact with the ruffed lemurs already there but separated by mech. Remember it might take many month but it will probably succeed with very little if any fight if done slowly with a great deal of patience. A flexible facility as described above will also here help manage the ruffed lemurs during the introduction period.

When experiencing problems with aggression in an otherwise harmonic group it often helps to isolate the dominant or bullying individual instead of moving the individual that is experiencing the trouble. After some days when the bullying individual has had a “time out” from the group it can often be reintroduced with no trouble.

Increased space has also been experienced to improve the tolerance of individuals. This could be obtained by mixing species which has been used by several zoos with success.

**Management of breeding pairs**: Breeding pairs should be kept isolated at least when the female is cycling as all too often zoos are actually not 100% sure of the pedigree of the young if kept in a large group. Separation of a breeding pair is definitely the best though not the only way to secure breeding of the right individuals. Please read carefully the text regarding breeding on page 10.

![PICTURE 2: An example of a fine and simple solution for ruffed lemurs.](Picture 2.png)

![Picture 3: 1,1 B&W Ruffed Lemurs born at MARWELL 2015 from a recommended breeding pair.](Picture 3.png)
It is still clearly visible from the Age Pyramid that the population of Black and White Ruffed Lemurs in Europe needs young animals born to avoid a potential collapse in the future. The graph still shows the signs of the no-breeding strategy from around 2005. Breeding recommendations have been given through the EEP but as have been seen before it’s not like pushing a button and then all recommended pairs produce young. It’s a process that starts up only slowly! I have though been informed of several young born in 2015 from recommended pairs so hopefully we will slowly see a better shape of the Age pyramid.

As this species live for a relatively long time we need to be careful not to breed too many offspring at once but instead follow a balanced breeding rate to get a stable population adjusted to the needs of the EAZA zoos. Preferable the lines on the Census graph should develop towards two horizontal lines with the blue line showing the males still higher than the female red line. The demand for males is somewhat higher than the demand for females.
GENETIC VALUES AND GRAPHS

The normally used goal of keeping 90% gene diversity for 100 years is not possible for the population in the EAZA zoos. The population could in theory retain 88,0% gene diversity for 100 years or 90% for 61 years.

The values to be seen in TABEL 1 showing the genetic summary are affected by the fact that the population has decreased. The breeding is only slowly getting started and hasn’t been fulfilling the plan of the Recommendation 2014 document and as a result unfortunately the Gene diversity and Gene value have decreased during 2014. Two values have been improved though. The Mean inbreeding has dropped a bit and the % Ancestry known have increased both as a result of the controlled breeding.

The mean inbreeding is still relatively high and when finding individuals for breeding pairs besides mean kinship value and rank the inbreeding of the planned offspring is therefor still considered.

If we succeed in fulfilling the recommendations in this document we will increase the gene diversity and decrease the mean inbreeding but still we will experience a drop in the population. It is expected though that the smaller population size will make it easier to find zoos for the offspring that is born over the next years.

TABEL 1: Table showing genetic summary 2014 studbook data

| Founders | 18 |
| Living Animals | 347* |
| Living Descendants | 314,20 |
| % Ancestry Known | 91% |
| % Ancestry Certain | 89% |
| Gene Diversity | 0,9324 |
| Gene Value | 0,9312 |
| Founder Genome Equivalents | 7,40 |
| Founder Genomes Surviving | 13,46 |
| Mean Inbreeding | 0,0768 |

*) This number is somewhat lower than the real number of living animals. Some are missing as they are not to be found in the studbook data and some are not getting transferred from SPARKS to PMx.
THE 2015 RECOMMENDATIONS

When recommendations have been made genetics (rank, inbreeding coefficients of potential offspring etc.), facility design, transfer distances, color pattern and other parameters have been taken into account. Please be assured it’s by no means an easy task.

As in the two former rounds of recommendations only B&W Ruffed lemurs with 100 % known pedigree are taken into account for breeding.

A few important facts to realize when keeping a breeding pair:

1) Keep pair isolated at least so that breeding is 100 % controlled or guarantee in other ways that only young from the recommended pair are born.
2) A recommendation of a breeding pair will not mean that the pair can produce young every year for the rest of their lives.
3) It should be possible to keep the offspring potentially for some time after maturing even though they can’t be expected to stay in the group forever.

Regarding color pattern

For now color pattern is still considered and when possible individuals in a pair are of the same color pattern (PICTURE 3). It is much more complex than just the obvious look of the animal but at least we will do no harm. It might be that in the future it is not considered important.

PICTURE 3: The drawing is showing the dorsal side of a: V. v. variegata, b: V. v. editorum, c: V. v. subsincta (Vasey, N. and Tattersall, I., (2002).
**TABLE 2: 2015 recommendations for each participant in the B&W Ruffed lemur EEP.**

The Table shows the recommendation for each zoo participating in the B&W Ruffed lemur EEP but also short notes of general wishes and different kinds of notes useful for the EEP coordinator. Studbook numbers are followed by M or F depending on gender, n means neutered and a, b1 and b2 refers to color pattern. The notes are for use in future planning, problems with data or cooperation, the general wish of the participating zoo, specific notes of the individuals or enclosure etc.

<table>
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<tr>
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<td>Beauval</td>
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<td>Keep T401 and T402 in single-sex group can be neutered. T401 and T402 not fit for breeding.</td>
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<td>Begelly (Folly Farm)</td>
<td>3</td>
<td>4</td>
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<td>No-breeding recommendations</td>
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<td>Bekebourne</td>
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<td>Import T451Fa from Jerez and breed with T526Ma</td>
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<td>Berlin TP</td>
<td>4</td>
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<td>0</td>
<td>Keep T558M in single-sex male group. Breed T522Fb1 with T548M. T479Mb2 to be kept in single-sex male group. T558M or T479Mb2 might get transfer recom. later depending on the recommended breeding pair. Would like to breed and keep a single-sex male group.</td>
</tr>
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<td>Blairdrum</td>
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<td>4</td>
<td>0</td>
<td>No recommendations/comments 2-4,0 (2015) when breeding surplus available  Do not want to breed, prefer male single-sex group. 4 acc. to ZIMS. Did T497 exist?</td>
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<td>Boissiere</td>
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<td>Bratislav</td>
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<tr>
<td>Broxbourne</td>
<td>3</td>
<td>4</td>
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<td>Separation recom. Do not breed animals of unk pedigree. Please contact EEP coordinator.</td>
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<tr>
<td>Brno</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Import 0,4 surplus females from NIKOLAEV. Please contact coordinator regarding studbook numbers. Interested and informed that female single-sex group or post rep pair is possible as a start</td>
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<td>Budapest</td>
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<td>No recommendations/comments 2,0 or 4,0  Prefer male single-sex group. Would like 5-10 males.</td>
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<td>Calviac</td>
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<td>2</td>
<td>0</td>
<td>2,0 out of EEP to AUXOIS on strict non-breeding loan-out agreement and responsibility for the animals stays with CALVIAC. Please send colour pattern of 0,2 females to coordinator. 1,0 for breeding later 2,0 (farther from LE VIGEN and son) to AUXOIS Would like to breed (2014). Problems keeping females together. Is the enclosure fit for breeding?</td>
</tr>
<tr>
<td>Cambrion</td>
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<tr>
<td>CEZALIER</td>
<td>2</td>
<td>0</td>
<td>Import 2,0 from CHAMPREP?</td>
<td>Max. 5,0 in enclosure. T646nMHAND problematic.</td>
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<tr>
<td>CHAMPREP</td>
<td>2</td>
<td>4</td>
<td>Send 2,0 to CEZALIER? Please contact coordinator regarding suggestion.</td>
<td>females and males kept apart</td>
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<td>CHOLCHESTER</td>
<td>1</td>
<td>1</td>
<td>T188Mb2 breed as a start with T559Fb2.</td>
<td>Would like to breed. Want to keep surplus for large walk-through exhibit. Find better male for T559Fb2 when available.</td>
</tr>
<tr>
<td>COMBE MAR</td>
<td>2</td>
<td>1</td>
<td>No breeding recommendations/ Comments. Keep female on contraception.</td>
<td>Would prefer to breed in the future. Are also keeping 2,0 rescued unknown individuals; could be neutered.</td>
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<td>COPENHAGEN</td>
<td>1</td>
<td>1</td>
<td>Breed T821Fa and T366Ma</td>
<td>Would prefer to breed</td>
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<td>DEBRECEN</td>
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<td>No breeding recommendations/ Comments. Coordinator trying to find suitable bx female for T879Mbx.</td>
<td>Would like to breed.</td>
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<td>DUDLEY</td>
<td>7</td>
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<td>Keep 1348M, 4681M, T32nM1 and T430M in single-sex group. Import T520Ma from WOBURN and breed with T331Fa as a start.</td>
<td>Would like to breed and keep a single-sex male group.</td>
</tr>
<tr>
<td>DUISBURG</td>
<td>1n</td>
<td>2</td>
<td>No recommendations/comments</td>
<td>Breed the pair again once or twice.</td>
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<td>EBERSWALD</td>
<td>3</td>
<td>1</td>
<td>Import 4593F from NIKOLAEV as companion for T781M. Strict NO breeding recommendation, mother and son.</td>
<td>Breed the pair again once or twice.</td>
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<td>No recommendations/comments. Might be asked to exchange female.</td>
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<td>Breeding with unknown descendants.</td>
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<td>FARIESTAD</td>
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<td>No-breeding recommendations/comments. Please contact coordinator as soon as possible as ZIMS data and the studbook data don't at all fit.</td>
<td>Breeding with unknown descendants.</td>
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<td>Please contact coordinator to discuss future.</td>
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<td>1,1 for breeding</td>
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<td>Export T253Ma to NYKOBING.</td>
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<td>Import T913F from MOTZKIN. Expect slow introduction.</td>
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<td>Is the enclosure fit for breeding?</td>
</tr>
<tr>
<td>Newchurch, ISLAM AD</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>Please send information on colour pattern to coordinator.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0,2 (wish from Aug 2015) T301Fx might be interesting for breeding and should stay in UK, rank 18, 13 years. Colour pattern?</td>
</tr>
<tr>
<td>JEREZ, LA FRONTE</td>
<td>4</td>
<td>5</td>
<td>0</td>
<td>Export T451F to BEKESBERNE (done?). Import T899Ma from PELISSANE to breed with T450F. Export 1,0 to PELISSANE in exchange for the T899M.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Would prefer to breed.</td>
</tr>
<tr>
<td>JERSEY</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>No recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,1 (Later) T421F Female contracepted, male old. Would like to breed.</td>
</tr>
<tr>
<td>JERUSALEM</td>
<td>1n</td>
<td>1</td>
<td>0</td>
<td>No recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No contact</td>
</tr>
<tr>
<td>JOURQUES</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>No recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Male stb 1194 old. Prefer single-sex male group in the future</td>
</tr>
<tr>
<td>KATOWICE (CHORSOW)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Breed T820M and T465F. Please send the colour patterns to the studbook keeper</td>
</tr>
<tr>
<td>KESSINGLA</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>Breed T815Fa and T367Ma</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prefer breeding pair.</td>
</tr>
<tr>
<td>LA-FLECHE</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>No recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prefer male single-sex group.</td>
</tr>
<tr>
<td>LA PALMYR</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>No recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Female kept with ring-tailed lemurs.</td>
</tr>
<tr>
<td>Location</td>
<td>Males</td>
<td>Females</td>
<td>Sex Group</td>
<td>Notes</td>
</tr>
<tr>
<td>---------------------------</td>
<td>-------</td>
<td>---------</td>
<td>-----------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>LA PLAINE , ST MARTIN</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>1,2 to non-EAZA Zoo on strict non-breeding loan-out agreement and responsibility for the animals stays with LA PLAINE</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Data of the male is not in studbook</td>
</tr>
<tr>
<td>LES SABLES</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>No recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,0 (T743 and T816) looking for a zoo with a closed enclosure or a wide water moat - any interested and able to help?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>2,0 ? Prefer male single-sex-group, could house 6,0</td>
</tr>
<tr>
<td>LE VIGEN</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>No breeding recommendation/comments. In contact with coordinator to plan future. (Animals low ranking)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Is the enclosure fit for breeding?</td>
</tr>
<tr>
<td>LILLE</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>No breeding recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Surplus females for Canada and/or Latin America?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,1 Prefer breeding pair 12. Breeding pair must be kept separated from female single-sex group. Is the enclosure fit for breeding?</td>
</tr>
<tr>
<td>LISBON</td>
<td>2</td>
<td>5</td>
<td>1</td>
<td>No breeding recommendation. Keep all females in single-sex group. If separate enclosure is available recommendation for import of breeding pair. Please contact coordinator to plan future. Coordinator send e-mail and waiting for response.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Surplus females for Canada and/or Latin America?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1,1 Is the enclosure fit for breeding?</td>
</tr>
<tr>
<td>LJUBLJANA</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>No recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Are thinking about stopping with the species but will keep the animals until they die.</td>
</tr>
<tr>
<td>LONDON RP</td>
<td>1n</td>
<td>0</td>
<td>0</td>
<td>Export T29n to AYWAILLE?</td>
</tr>
<tr>
<td>LYON</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>No breeding recommendations/comments</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Prefer single-sex male group.</td>
</tr>
<tr>
<td>MADRID</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>Breed T798M and T605F and kept separately. Keep rest of females in single-sex group.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Can breed in one enclosure and keep female single-sex group in mixed exhibit</td>
</tr>
<tr>
<td>MANOR HS. Pembrokeshire</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>Animals not in studbook - because of new name?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No recommendations/comments. Take over a male from another UK zoo? Need more info before knowing if it’s a good idea.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Would like to breed in the future.</td>
</tr>
<tr>
<td>Location</td>
<td>Code</td>
<td>Year 1</td>
<td>Year 2</td>
<td>Year 3</td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
</tr>
<tr>
<td>MARWELL</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MAUBUEUGE</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>MERVENT</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>MOTZKIN</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>MÜNSTER</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NIKOLAEV</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NOVOSIBRSK</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>NYIREGYHA</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Male</td>
<td>Female</td>
<td>Breeding Recommendation</td>
<td>Note</td>
</tr>
<tr>
<td>-------------------</td>
<td>------</td>
<td>--------</td>
<td>--------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>NYKOBING</td>
<td>2</td>
<td>3</td>
<td>Keep (and perhaps neutralize) female offspring born at NYKOBING. Old male can be castrated. Import T253Ma from FUENGIROLA and breed with T396Fa. Transfer recommendation for young male might come.</td>
<td>Would like to breed (2014). Male to be kept in closed enclosure. Breed to own enclosure?</td>
</tr>
<tr>
<td>OBTERRE</td>
<td>2</td>
<td>0</td>
<td>No recommendations/comments. Might get export recommendation for T323M.</td>
<td>Stay with male single-sex group. Will be interested in breeding if offspring is easily handed on but EEP can’t promise that.</td>
</tr>
<tr>
<td>OLOMOUC</td>
<td>1</td>
<td>1</td>
<td>Breed T856F and T152M.</td>
<td>Would prefer to breed.</td>
</tr>
<tr>
<td>OPOLE</td>
<td>0</td>
<td>1</td>
<td>No recommendations/comments</td>
<td></td>
</tr>
<tr>
<td>OSTRAVA</td>
<td>6</td>
<td>0</td>
<td>Export T69Ma to MOTZKIN.</td>
<td>1,0 spring 2016?</td>
</tr>
<tr>
<td>OVERLOON</td>
<td>3</td>
<td>0</td>
<td>No recommendations/comments</td>
<td>Don’t want to breed.</td>
</tr>
<tr>
<td>BETTEMBOURG, 'PARC MERV</td>
<td>0</td>
<td>3</td>
<td>No recommendations/comments</td>
<td></td>
</tr>
<tr>
<td>PELISSANE</td>
<td>2</td>
<td>0</td>
<td>Recommendation to export T899Ma to JEREZ. Import male from JEREZ in exchange for T899M. Import 2,0 from NIKOLAEV.</td>
<td>Prefer single-sex male group of 4,0 and will send out in exchange the important males.</td>
</tr>
<tr>
<td>PISTOIA</td>
<td>0</td>
<td>3</td>
<td>Export T531Fa or S64Fa to TOUROPARC. Please contact coordinator for choosing female. Import 1155F from TOUROPARC?</td>
<td>Prefer single-sex female group</td>
</tr>
<tr>
<td>PLAISANCE</td>
<td>1</td>
<td>2</td>
<td>No-breeding recommendation. Export T894Mx ROMANGE? Keep females together for now.</td>
<td>Would like to breed. Expect recommendation to breed later when T896 older.</td>
</tr>
<tr>
<td>PLZEN</td>
<td>0</td>
<td>2</td>
<td>No recommendations/comments</td>
<td></td>
</tr>
<tr>
<td>PONTSCROF</td>
<td>1</td>
<td>1</td>
<td>Breed T797M and T248F.</td>
<td>Would like to breed.</td>
</tr>
<tr>
<td>PUNTAVERDE</td>
<td>0</td>
<td>2</td>
<td>No recommendations/comments</td>
<td>Don’t want to breed.</td>
</tr>
<tr>
<td>QUINTASI / AVINTES</td>
<td>3</td>
<td>5</td>
<td>No-breeding recommendation. Keep T704 on contraception. Export T901M and T902M to SAINT CROIX</td>
<td>Would like to breed. Bred 2011 and 2013 to produce inbred offspring!</td>
</tr>
<tr>
<td>Location</td>
<td>ID</td>
<td>Gender</td>
<td>Actions</td>
<td>Notes</td>
</tr>
<tr>
<td>------------</td>
<td>----</td>
<td>--------</td>
<td>-----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>RANDERS</td>
<td>1</td>
<td>0</td>
<td>Import T441Fa from AMIENS and breed with T132Ma.</td>
<td>Would like to breed (2012). Male to be kept in closed enclosure.</td>
</tr>
<tr>
<td>RAMAT GAN</td>
<td>1</td>
<td>0</td>
<td>Import T677, T686 and T737 from MOTZKIN</td>
<td></td>
</tr>
<tr>
<td>RHEINE</td>
<td>2</td>
<td>0</td>
<td>No recommendations/comments</td>
<td>2,0? Might like to breed in the future.</td>
</tr>
<tr>
<td>ROMAGNE</td>
<td>5</td>
<td>0</td>
<td>No recommendations/comments</td>
<td>1,0 from PLAISANCE? Prefer single-sex male group.</td>
</tr>
<tr>
<td>SAINTE-CROIX</td>
<td>2</td>
<td>0</td>
<td>Import T901M and T902M from QUINTASI</td>
<td>Males for mixed exhibit, walk-through. LE VIGEN animals not in studbook yet.</td>
</tr>
<tr>
<td>SANTILLANA</td>
<td>0</td>
<td>1</td>
<td>Imported T453F from THOIRY as companion</td>
<td>Would like to breed, if so: need new female (female is contracepted) and a male.</td>
</tr>
<tr>
<td>SCHMIDING</td>
<td>0</td>
<td>2</td>
<td>No breeding recommendations. Comments; Please contact coordinator regarding future plans.</td>
<td>Animals sent to Latin America with no coordination of EEP. 2.2 acc. To ZIMS - 0,2 acc. To info from Zoo</td>
</tr>
<tr>
<td>SHALDON</td>
<td>2</td>
<td>0</td>
<td>Export T57M and 1931M to COMBE MAR</td>
<td>Need enclosure for other species.</td>
</tr>
<tr>
<td>SHEPERTH</td>
<td>3</td>
<td>0</td>
<td>No recommendations/comments</td>
<td>Would like to breed.12. Enclosure fit for breeding?</td>
</tr>
<tr>
<td>SO LAKE</td>
<td>11</td>
<td>8</td>
<td>No-breeding recommendations. Comments; Please contact EEP coordinator regarding future plans.</td>
<td>Are breeding not recommended with unknown sire/dam. Prefer to breed. These not important animals take up space that could be used for important individuals</td>
</tr>
<tr>
<td>SAARBRUECKEN</td>
<td>5</td>
<td>1</td>
<td>No recommendations/comments</td>
<td>Female kept with castrated son, on progesterone (female)</td>
</tr>
<tr>
<td>TALLIN</td>
<td>2</td>
<td>2</td>
<td>No breeding recommendations. Comments; have bred (inbreeding) with no recommendation. Please contact EEP coordinator to plan future.</td>
<td>Received 1,2 from NIKOLAEV (no recommendation), related animals.</td>
</tr>
<tr>
<td>THOIRY</td>
<td>1</td>
<td>1</td>
<td>No breeding recommendation. Post rep. pair.</td>
<td>Enclosure isn't fit for breeding. Would like to breed when they have got a new facility.</td>
</tr>
<tr>
<td>TORINO</td>
<td>0</td>
<td>0</td>
<td>Import 0,4 compatible females from WROCLAW</td>
<td>Would like to start</td>
</tr>
<tr>
<td>TORUN ZOO</td>
<td>0</td>
<td>3</td>
<td>No recommendation/ comments</td>
<td>Would like to breed (2014). The females fight and all transponders lost! Give new transponders and figure out who is the bully. Enclosure fit for breeding?</td>
</tr>
<tr>
<td>Location</td>
<td>Sex</td>
<td>Year</td>
<td>Recommendations/Comments</td>
<td>Comments</td>
</tr>
<tr>
<td>-------------------</td>
<td>-----</td>
<td>------</td>
<td>------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>TOURPARC</td>
<td>2</td>
<td>0</td>
<td>No-breeding recommendations. Comments; In contact with coordinator to plan future.</td>
<td>1,0 (and 0,1 later)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Export 1153Fa to PISTOIA (?). Import TS31F (might be changed to TS64Fa please contact</td>
<td>Prefer to breed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>coordinator) from PISTOIA and breed with TS71Ma. T281Fa will get recommendation later.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>T835Ma to go to single-sex male group.</td>
<td></td>
</tr>
<tr>
<td>TREGOMEUR</td>
<td>1</td>
<td>2</td>
<td>No-breeding recommendations.</td>
<td>Male castrated. Would like to breed.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>None are in the studbook as the dam and sire are not known.</td>
<td></td>
</tr>
<tr>
<td>TWYCROSS</td>
<td>3</td>
<td>2</td>
<td>Breed T614Ma and T414Fa if colour pattern fits. Next breeding 2017 (Rebuilding the</td>
<td>Could breed. 1,2 born 2015</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>enclosure)</td>
<td></td>
</tr>
<tr>
<td>LUSI-NAD-LABEM</td>
<td>4</td>
<td>1</td>
<td>No recommendations/Comments</td>
<td>3,0 in single-sex group, 1,1 in post</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td>reproductive pair</td>
</tr>
<tr>
<td>VELENCIA (BIOPARCVA)</td>
<td>2</td>
<td>0</td>
<td>No recommendations/comments</td>
<td>1,0 if from a zoo near by</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td>Would they like two ; potentially yes, but</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>please ask before recommendation.</td>
</tr>
<tr>
<td>WARSAW</td>
<td>1</td>
<td>1</td>
<td>No recommendations/comments</td>
<td>Female bx for breeding, but later</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td>Prefer breeding female for male and will</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>keep old female separated (need time to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>introduce her to other lemurs).</td>
</tr>
<tr>
<td>WOBRUNLTD</td>
<td>5</td>
<td>0</td>
<td>Export TS20Ma to DUDLEY</td>
<td>2,0 (When breeding starts)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td></td>
<td>Waiting for data for BWR006? Would agree to</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>breed if necessary.</td>
</tr>
<tr>
<td>WROCLAW</td>
<td>4</td>
<td>8</td>
<td>Breed 1457Mb1 and 1357Fb2 one more time. Breed T631Mx and T724Fbx if same colour pattern.</td>
<td>Prefer breeding. Very interesting facility</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0</td>
<td>Try with T723F if T724F will not breed. Export 0,4 compatible to TORINO</td>
<td>with low cost!</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2,0 born 2014</td>
<td></td>
</tr>
<tr>
<td>ZAGREB</td>
<td>4</td>
<td>0</td>
<td>No recommendations/comments</td>
<td>Missing data of 114016 (T25)?</td>
</tr>
<tr>
<td>ZAMOSCZSM</td>
<td>1</td>
<td>1</td>
<td>1462M, 1605F on a No breeding recommendation.</td>
<td>Contact?</td>
</tr>
</tbody>
</table>
The recommendations in TABLE 2 will result in the breeding pairs shown in TABLE 3. If all breeding pairs succeed to be put together there will be 23 pairs with an active breeding recommendation. Attempted numbers of offspring are 42 but expected number of offspring is 28.25 as age, experience, upbringing etc. have been taken into account. Gene Diversity will increase a bit (from GD$_{2014} = 0.9324$ to new GD$_{2015} = 0.9346$). It would indeed be a success as we would then (just) exceed the gene diversity value of 2013 (GV$_{2013} = 0.9345$) in spite of a smaller population size but still with a bit lower mean inbreeding.

There are recommendations for breeding pairs in BEKESBRNE and JEREZ that are not in the TABEL 3 as for some reason (probably change of name in the fed.file) the animals from JEREZ even in the studbook are not getting transferred into PMx! (I am working on this). Also it is expected that a pair will be recommended in LISBON but this hasn’t been possible to solve in time to get it into this plan for several reasons. All 3 pairs will additionally increase the genetic diversity and lower the inbreeding of the population.