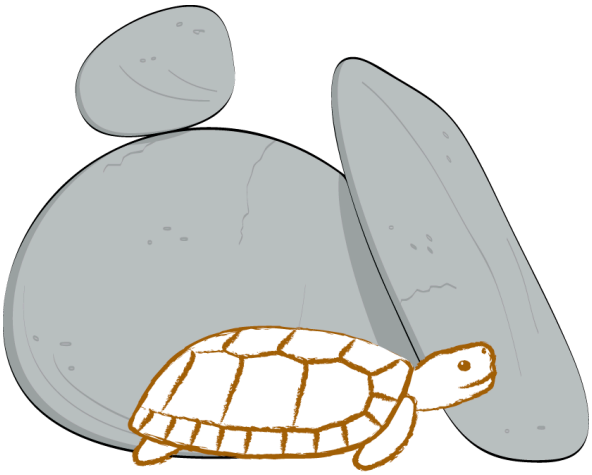
Dwarf Tortoise Conservation



Annual Report

2018

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January 2019

CONTENTS

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Dwarf Tortoise Conservation (previously Homopus Research Foundation) is a non-commercial organisation entirely run by volunteers. The aim of the foundation is to gather and distribute information on dwarf tortoises, to facilitate their survival in the wild. This aim is achieved through scientific field studies, and through the development and study of captive studbook populations. Our results are published in scientific and popular outlets.

1. INTRODUCTION AND ACHIEVEMENTS IN 2018

Dwarf Tortoise Conservation aims to facilitate the long-term survival of dwarf tortoises (*Chersobius* spp. and *Homopus* spp.) in the wild, by gathering and distributing information about their biologies and by the formation of genetically healthy *ex situ* populations. Dwarf Tortoise Conservation is the successor of the Homopus Research Foundation, which was renamed in 2018, following the resurrection of the genus *Chersobius* (previously *Homopus*). In 2018, several activities contributed to the aim of Dwarf Tortoise Conservation. The current report presents an overview of achievements in 2018, as well as activities planned for 2019 and thereafter. Moreover, the actual studbook populations for *Chersobius signatus*, *Homopus areolatus* and *Homopus femoralis* are described, focussing on changes that occurred in 2018. All previous annual reports since 1995 can be found on the website of Dwarf Tortoise Conservation.

1.1. Policies and permanent action points

From time to time, Dwarf Tortoise Conservation communicates policies and permanent action points to the participants in the *Chersobius* and *Homopus* studbooks and to other stakeholders. To avoid losing sight of these important issues, they are listed here.

- *Dwarf Tortoise Conservation and illegal activities (1 May 2011)*
  Dwarf Tortoise Conservation strongly condemns illegal activities. All *Chersobius* and *Homopus* registered in the studbooks and at studbook locations have legal and traceable origins. Each participant is responsible for the paperwork for his or her tortoises and will not fraud. Dwarf Tortoise Conservation will fully collaborate with authorities in case of legal investigations, providing backgrounds of studbook tortoises, DNA samples, etc. Moreover, illegal activities noted within the studbooks will be actively reported to the authorities, to facilitate prosecution. Obviously, participants involved in illegal activities will be unable to continue their participation.

- *DNA samples from deceased wild-caught and F1 offspring* C. signatus *(22 November 2015)*
  In case a *C. signatus* individual that was caught in the wild in 2015 or any of its F1 offspring dies, two DNA samples (e.g., tail or feet clips) will be collected immediately. One sample will be stored in 70% ethanol, and the other one will be dried using silica gel. Samples will be stored in the dark, out of reach of heat sources and sunlight. Keepers of *C. signatus* collected in 2015 or their offspring are advised to keep 70% ethanol and silica gel at hand to be prepared in case any animal would die unexpectedly.

- *Volunteer tasks at the European Studbook Foundation (23 May 2016)*
  The board of the European Studbook Foundation is always in need of volunteers to help with specific tasks. The overall work load has been broken down into smaller tasks to enable volunteers to engage in the foundation without needing to accept a formal position for indeterminate period of time. Studbook participants with time to spare are invited to contact the European Studbook Foundation directly.

- *Information exchange with the studbook coordinator (20 December 2017)*
  Changes (births, deaths, transfers, physical and e-mail addresses, etc.) should be sent to the studbook coordinator by e-mail, and not via social media. The e-mail address that should be used is studbookhomopus@gmail.com.

- *Registration of* H. areolatus *(January 2018)*
  Because offspring *H. areolatus* produced in the studbook has been transferred outside the studbook (i.e., were lost to follow-up), there is a risk that genetically related tortoises will be registered in the studbook as unrelated founders. To avoid this, the studbook will not accept new founders with unknown or uncertain origin.

1.2. Outstanding action points in the 2017 annual report

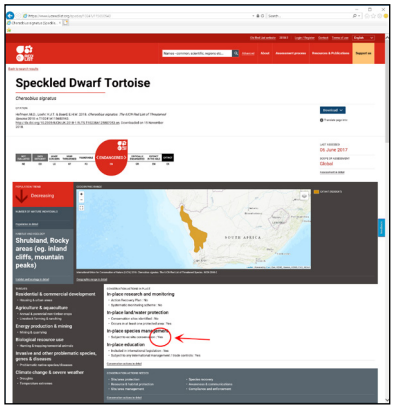
The following table summarises plans in the 2017 annual report, with results obtained in 2018.

Outstanding action points in 2017 annual report and results in 2018	**Due**
Manuscripts submitted on:	
• parasite infestations in wild *C. signatus*;	31-12-2018
• eggshell ultrastructure in wild and captive *C. signatus*;	31-12-2018
• captive husbandry and breeding of *C. signatus* (Mertensiella).	28-02-2018
2018: A manuscript on eggshell ultrastructure was submitted, reviewed, revised and accepted in 2018. The other two manuscripts have not yet been submitted. A field note on wild reproduction in *Chersobius boulengeri* was also submitted and published in 2018, and a note on captive reproduction and growth in *H. femoralis* was submitted. See Chapter 6.	
Manuscript co-authored on:	
• ultrasound recordings in *C. signatus*.	31-12-2018
2018: The manuscript was co-authored, submitted, reviewed, revised, accepted and published in 2018. See Chapter 6.	
Studbook management plan for *C. signatus* updated due to elevated IUCN conservation status	30-06-2018
2018: The studbook management plan was updated, distributed among studbook participants and South African authorities for review, revised and posted on the website.	
First sampling period in field study on *C. boulengeri* conducted	Feb/Mar-2018
2018: In February–March, 6-weeks of sampling was conducted. Based on the results (e.g., no gravid females), a second 6-weeks of sampling was conducted in October–November. See Paragraph 1.5.	
Website updated due to resurrection of the genus *Chersobius*	31-12-2018
2018: The entire website was updated to reflect the new taxonomy of the dwarf tortoises.	

Further achievements that are worth listing:

- Dwarf Tortoise Conservation and its *C. boulengeri* project were updated in the Dutch National Academic Research and Collaborations Information System.

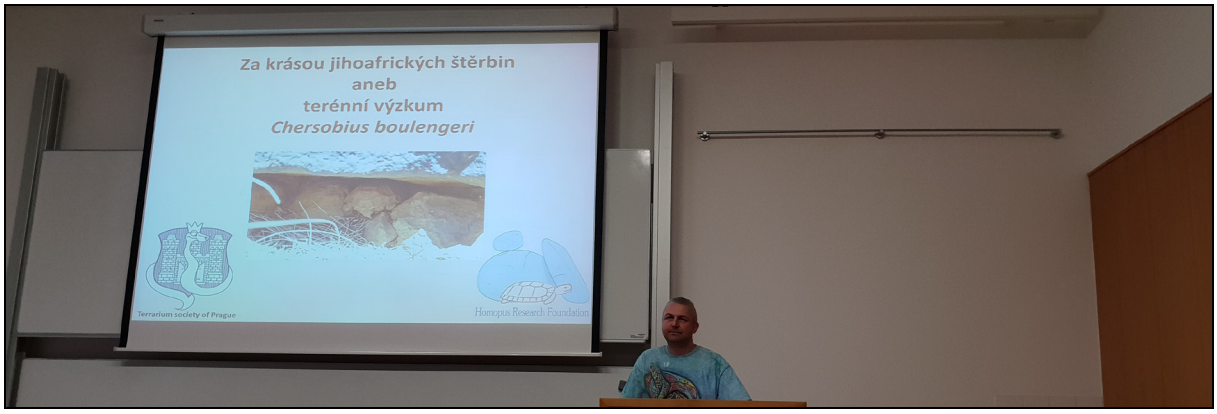
- Co-authored IUCN Red List assessments were published for *C. boulengeri* and *C. signatus* (both taxa are now considered Endangered). *Homopus areolatus* and *H. femoralis* remain in the Least Concern category, *Chersobius solus* remains Vulnerable. For *C. signatus*, the IUCN Red List acknowledges the *ex situ* conservation efforts at Dwarf Tortoise Conservation.



- Reprints of papers produced by Dwarf Tortoise Conservation were distributed through ResearchGate, with up to 13 downloads per week. In addition, reprint requests were received from several individuals in Italy and the USA.

- Review requests were received from:
  - IUCN Red List (several southern African chelonians);
  - African Herp News;
  - private author from South Africa (friendly review).

- Presentations were held:
  - Erfahrungen mit Flachschildkröten der Gattung *Homopus*
    (meeting for the German-speaking community of studbook participants, Switzerland, June).
  - Update on the *C. boulengeri* field project
    (Charles University, Prague, March and November;
    Prague Zoo, April;
    Czech herpetologists meeting, Prysk, November;
    Dutch Turtle and Tortoise Society, Maarn, November).
  - Educational lecture for young children
    (Kindergarten, Jürgenstorf, August 2018).



- A request was received to present a talk about Dwarf Tortoise Conservation and its collaboration with zoos and scientific institutions for zoo keepers in 2019.

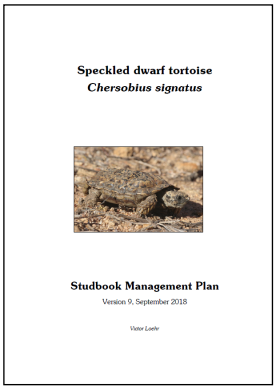
- Information requests were received regarding:
  - a permit application for commercial export of dwarf tortoises from South Africa;
  - distinguishing captive-bred from wild-caught tortoises, and species-specific information on extent of profitability of breeding, to help implement CITES Decision 17.291 a ii);
  - housing internationally confiscated dwarf tortoises at Dwarf Tortoise Conservation;
  - keeping and breeding dwarf tortoises at zoos in the USA;
  - hibernation of wild dwarf tortoises in South Africa;
  - opportunities to participate in the Dwarf Tortoise Conservation studbooks;
  - use of queen bee tags to mark captive chelonians;
  - documentary about Namaqualand by a UK production company;
  - use of radio transmitters in wild *H. femoralis*;
  - use of South African biodiversity data by Dwarf Tortoise Conservation (survey by South African National Biodiversity Institute);
  - influence of financing bodies on scientific research (survey by Dutch national newspaper).

- Photographic material was provided to an app developer (Field Guide to Wildlife of South Africa, Penguin Random House, South Africa).

- Husbandry recommendations for *C. signatus* were expanded with a paragraph about egg incubation.

- The Dwarf Tortoise Conservation website received a major update. The name of the organisation was changed from Homopus Research Foundation to Dwarf Tortoise Conservation. In addition, the website was updated to reflect the new taxonomy of dwarf tortoises (i.e., resurrection of the genus *Chersobius*). Furthermore, the page on the *C. boulengeri* field project was regularly updated to include links to various progress reports and movie clips, the list of publications was updated, as were all studbook overviews.

1.3. Studbook management plan Chersobius signatus



The first version of the studbook management plan for *C. signatus* was finished in 2013, and the plan was updated in 2016. It provides directions for the development of the studbook in the next years and decades and will be updated every five years. The plan will also be updated after every supplementation of the studbook with new founders and after each change in the IUCN conservation status of the taxon. The annual reports of Dwarf Tortoise Conservation will report annual progress of the realisation of the studbook management plan.

In 2018, the studbook management plan was updated for the second time, due to the changed IUCN conservation status of *C. signatus* (Vulnerable to Endangered). The plan was also expanded with a table showing gene flow in the

captive population, indicating that the population originally comprised 20 founders. The genes of two founders have disappeared from the captive population before they were transferred to captive-bred generations. All other founders, except two males, have produced 2–22 offspring, and 35% of the founders have transferred their genes into a second (F2) generation. The table will help managing the genetic composition of the captive population.

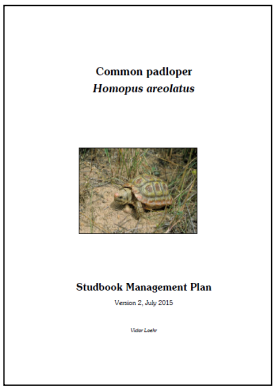
Three of the five available founder couples reproduced in 2018. The other two couples had reproduced previously, but produced eggs but no hatchlings in 2018. Until now, the 10 founders imported in 2015 have produced a total of 16 surviving offspring. Unfortunately, one female that had been imported in 2015 (number 159) died in 2018 (see Chapters 3 and 5 for details), after producing two offspring. No bloodlines went extinct. Eventually, the single founder males that remained after the deaths of founder females 155 and 159 should be coupled to captive-bred females 161 and 162, to safeguard the genes of the males and of the ancestors of the captive-bred females (i.e., WILD x 159) in the population. Further genetic material that requires preservation originates from a wild-caught female that was lost to follow-up (female 60; genetic material present in tortoise numbers 82, 86−89, 92).

The current focus of the studbook is on optimising husbandry conditions and incubation techniques to annually breed all present founder couples and all F1 couples for which offspring is needed. Locations with adult couples and consent to breed should optimise husbandry, and if necessary exchange individuals, to promote breeding results. In case of unsuccessful incubation, possible causes that should be considered are too high incubation temperatures (e.g., not using a calibrated thermometer) and too high humidity (e.g., resulting in cracked eggshells). All locations should regularly review their husbandry conditions and incubation techniques, using the information in Chapter 5 (see also previous annual reports) and current husbandry guidelines.

Overall, the current genetic quality of the studbook population is good (i.e., no inbreeding and reasonable genetic variation) and in line with the goal for the studbook described in the studbook management plan. Based on the current development of the captive population, additional founders should be added to the population not sooner than 2021. At that time, the studbook management plan will also be updated.

1.4. Studbook management plan Homopus areolatus

The first version of the studbook management plan for *H. areolatus* was finished in 2015 and the plan will be updated every five years. It follows the same format as the studbook management plan for *C. signatus*. A major difference between the two plans is that nearly all tortoises in the studbook on *H. areolatus* are privately owned, meaning that the development of the captive population (i.e., the execution of the studbook management plan) is directly in hands of the studbook participants, whereas the studbook coordinator has only a facilitating role.

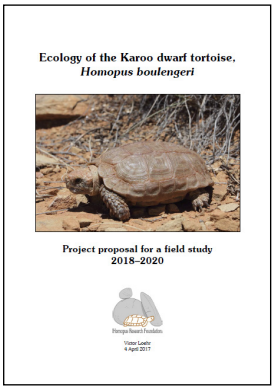


In 2018, the development of the captive population took an uncertain direction, because a large number of offspring was produced by founders that might be genetically related (i.e., 234 x 123/128/129). If these founders are indeed related, the percentage live studbook tortoises in the studbook resulting from inbreeding would rise from 1% on 1 January to 9% on 31 December 2018. However, if the founders are not related, the percentage would be 0% on 31 December 2018. To clarify the degree of inbreeding in the studbook, genetic relationship between founders 234, 123, 128 and 129 will be investigated in 2019.

Several efforts contributed to the goal of the studbook to minimise inbreeding and to develop a genetically healthy captive population; a transfer of unrelated founders 4 and 40 increased opportunities for reproduction by this couple, and additional strategic transfers were prepared to form unrelated couples. Furthermore, male 58 was separated to stop the increasing over-representation of bloodline 58 x MULT4. Based on the current studbook management plan, the general advise to all studbook participants remains to not combine offspring from the same bloodline and to avoid inbreeding. The studbook coordinator will continue to monitor and make recommendations regarding genetically preferred combinations of tortoises or bloodlines.

1.5. Progress field study on Chersobius boulengeri

Upon the unexpected discovery of a wild *C. boulengeri* population in February 2017 (currently the



only verified population of this species), great efforts were made to instantly prepare a broad ecological field study. In 2018, much of the available time at Dwarf Tortoise Conservation was invested in the preparation (e.g., fund raising, recruiting volunteers, planning, purchasing research materials) and execution of three 6-week sampling periods, in February–March 2018, October–November 2018 and February–March 2019. Both 2018 periods were successfully completed, with more than 50 *C. boulengeri* found and marked, for 799 observations so far. We were able to radiograph gravid females and to determine detailed activity budgets. Two illustrated progress reports were produced and posted on the project website. An introductory movie clip about the project and two movie clips portraying feeding and oviposition were posted as well. Field notes about reproduction in *C. boulengeri* were published in African Herp News in 2017 and 2018 (see Chapter 6).

It has become clear that the original study approach will be unable to fully reveal the diet of *C. boulengeri*. The 12-week sampling in December–March 2017/2018 that would be used for dietary work was exchanged for two shorter sampling periods, focusing on reproduction, spring activity and mark-recapture. In 2019, the feasibility of an alternative, genetic approach to reveal the species' diet will be explored. A genetic approach has become financially viable due to funding received in 2017–2018.

A continuing struggle is to get to and from the remote study site over degrading gravel roads, particularly during the rainfall season. In February 2018, all volunteers unexpectedly had to stay over at a local farm after heavy rainfall, and in October 2018 successive punctures required long walks and hitch-hiking. Consequently, valuable field time was lost. To reduce the loss of field time, some of the remaining project budget will be used to supplement volunteer contributions to car rental and fuel, so that vehicles can be used that are better suited for low-quality gravel roads.

This study is a co-production of Dwarf Tortoise Conservation and an independent South African researcher (Toby Keswick). Moreover, the study collaborates with the University of the Western Cape (South Africa; Retha Hofmeyr), Utrecht University (Netherlands; Ineke Westerhof) and the Northern Cape Department of Environment and Nature Conservation (South Africa). In 2018, two Master's students (Veterinary Department, Utrecht University, Netherlands) investigated activity budgets and thermoregulation. Several organisations and individuals have generously provided funds, discounted prices, or in-kind contributions to the project:

- Knoxville Zoo (Quarters for Conservation Program)
- Turtle Conservation Fund and Conservation International
- Holohil Systems Ltd.
- Dutch-Belgian Turtle and Tortoise Society
- British Chelonia Group
- Pedak

- Jan Barth
- Kurt Engl
- Silja Heller
- Brian Henen
- Retha Hofmeyr
- Lutz Jakob
- Johann Klutz
- Martijn Kooijman
- Matthias Kupferschmid
- Koos and Coby Loehr
- Frank van Loon
- Marcel and Lydia Reck
- Peter Sandmeier
- Uwe Seidel
- Paul van Sloun

2. PLANS FOR 2019 AND THEREAFTER

The table below lists results anticipated for 2019 and thereafter, with progress indicated:

Result	Due	Current status
Manuscripts submitted on:		
• parasite infestations in wild *C. signatus*;	31-12-2019	Manuscript in preparation
• captive husbandry and breeding of *C. signatus* (Mertensiella);	31-12-2019	Not yet started
• thermoregulatory behaviour in *C. boulengeri*;	31-12-2019	Data available
• tick infestation in a European indoor dwarf tortoise collection.	31-12-2020	Not yet started
Third sampling period in field study on *C. boulengeri* conducted	Feb/Mar-2019	Sampling period prepared
The importance of each live *C. signatus* categorised relatively to the goal of the studbook, to facilitate management	31-12-2019	Not yet started
Genetic relationships between *H. areolatus* 234, 123, 128 and 129 investigated	31-12-2019	Not yet started
Fourth sampling period in field study on *C. boulengeri* conducted	Feb/Mar-2020	Not yet started
Studbook management plan *H. areolatus* updated	31-12-2020	Not yet started
5.5 *C. signatus* collected in the wild and added to the captive population[1]	31-12-2021	Not yet started

[1] Conditional are granted permits, tortoise activity, and field personnel.

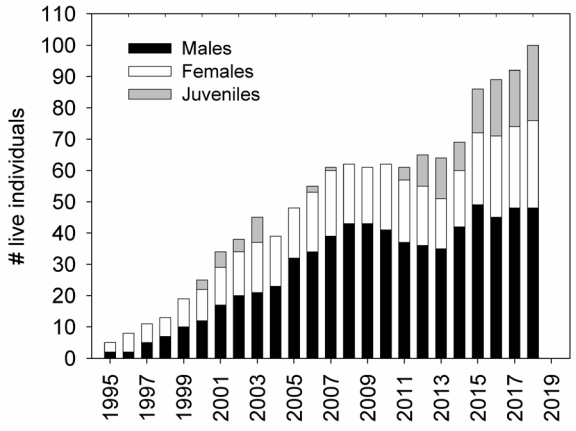
3. STUDBOOK SUMMARIES

To keep the studbook registrations up to date, it is vital that all studbook participants keep the coordinator informed of any changes. In the studbooks on *C. signatus* and *H. femoralis*, each participant has accepted this obligation in a formal agreement between participant and Dwarf Tortoise Conservation. Regardless of the agreements, most participants are very motivated and inform the coordinator spontaneously when changes occur throughout the year. Others choose to wait until information is requested by the coordinator at the end of each year. However, sometimes participants remain silent for an entire year or longer, despite repeated requests from the studbook coordinator. In order to keep track of where these communication flaws occur, the annual reports include a list of unresponsive locations. This will make it easier for the reader to assess the validity of studbook information per location and will facilitate the coordinator when approaching a silent participant. In 2018, locations A100 (*H. areolatus*), A115 (*C. signatus*), A127 (*H. areolatus*) and Amsterdam Zoo (*C. signatus*) have been unresponsive.

Chersobius signatus

Live specimens on 1 January 2018:
92 (excluding 16 specimens lost to follow-up)
Number of locations on 1 January 2018:
41 (13 countries, including 2 zoos)
New registrations:
0
Births:
13, at 7 locations
Deaths:
4 (1 wild-caught, 3 captive-bred), at 4 locations

Live specimens on 31 December 2018:
100 (excluding 17 specimens lost to follow-up)
Live inbred specimens on 31 December 2017:
0
Number of locations on 31 December 2017:
46 (14 countries, including 4 zoos)

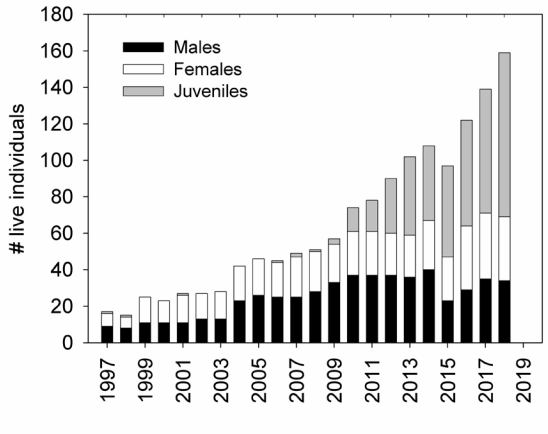


In 2018, the largest natural (i.e., excluding the new registrations of founders in 2015) population growth occurred in more than 10 years. This was mainly due to mortality being lower than in previous years. Sixty-two percent of the offspring originated from wild founders. None of the 2018 offspring resulted from inbreeding. Despite the large number of births, there were additional locations with adult couples and consent to breed where no offspring was produced. Therefore, the potential population growth was considerably larger than the growth that materialised. See Paragraph 1.3 for an interpretation of the 2018 results in light of the goal for the studbook described in the studbook management plan for *C. signatus*.

A major loss was the death of a female founder collected in 2015. This female suffered from a ruptured follicle in the ovary followed by (likely secondary) acute pneumonia (see location Dwarf Tortoise Conservation in Chapter 5). The other deaths were three captive-bred juveniles, one of which died three days after birth, and another one had been weak (i.e., small body size, soft shell) since birth. One captive-bred tortoise was lost to follow-up when it disappeared from its outdoor enclosure.

Homopus areolatus

Live specimens on 1 January 2018:
139 (excluding 34 specimens lost to follow-up)
Number of locations on 1 January 2018:
20 (10 countries, including 2 zoos)
New registrations:
0
Births:
26, at 5 locations
Deaths:
8, at 3 locations (all captive-bred)



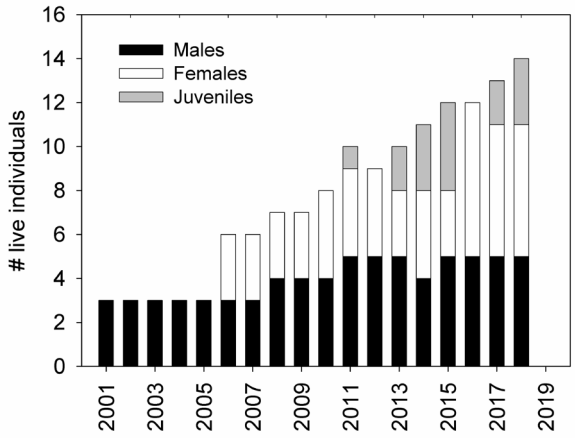
Live specimens on 31 December 2018:
159 (excluding 34 specimens lost to follow-up)
Live inbred specimens on 31 December 2018:
≤15 (possibly tortoise numbers 235, 239–241, 245–255)
Number of locations on 31 December 2018:
23 (10 countries, including 2 zoos)

The studbook population continued to show strong growth as a result of an increase of the number of juveniles. Unfortunately, the founders of 54% of the hatchlings born in 2018 might be genetically related. Consequences in light of the goal in the studbook management plan are described in Paragraph 1.4.

Eight captive-bred *H. areolatus* (1–8 years old) died, seven of which originated from the over-represented bloodline 58 x MULT4. The causes of death remain unknown.

Homopus femoralis

Live specimens on 1 January 2018:
13
Number of locations on 1 January 2018:
6 (4 countries)
New registrations:
0
Births:
1
Deaths:
0



Live specimens on 31 December 2018:
14
Live inbred specimens on 31 December 2018:
0
Number of locations on 31 December 2018:
6 (4 countries)

The studbook population of *H. femoralis* slightly grew in 2018. One hatchling was produced at the same location that had produced all previous offspring, and no deaths occurred. Two locations keep subadult couples and may produce F2 offspring in the future. However, (captive) *H. femoralis* have a very slow growth rate (a note was submitted for publication, see Chapter 6). Genetic variation in the population is extremely limited, but the main focus of the studbook is to accumulate and publish data on reproduction and growth.

4. ACTUAL STUDBOOK OVERVIEWS

The tables below give an overview of all live tortoises that are available in the studbooks on *C. signatus*, *H. areolatus* and *H. femoralis*. The tables do not include dead tortoises and tortoises lost to follow-up. Full overviews of all tortoises registered in the studbooks may be downloaded from the website.

Chersobius signatus: live and available studbook population. MULT1 are specimens 18 and 19, MULT2 specimens 20 and 21, MULT3 are specimens 13 (with MULT4 = 9) or 37 and MULT4 are specimens 9 or 38. UNK1 and UNK2 are unknown specimens outside of the studbook.

Stud #	Sex	Hatch Date	Sire	Dam	Location	Date	Local ID	Event
A10								
148	M	16 Sep 2015	35	36	A10	16 Sep 2015	_____	Hatch
					DTC	16 Sep 2015	_____	Ownership
153	M	????	WILD	WILD	SPRINGBOK	22 Sep 2015	NONE	Capture
					DTC	22 Sep 2015	_____	Ownership
					A10	23 Sep 2015	_____	Loan to
158	F	????	WILD	WILD	SPRINGBOK	22 Sep 2015	NONE	Capture
					DTC	22 Sep 2015	_____	Ownership
					A10	23 Sep 2015	_____	Loan to
170	?	21 Sep 2016	153	158	A10	21 Sep 2016	_____	Hatch
					DTC	21 Sep 2016	_____	Ownership
176	?	30 Apr 2017	153	158	A10	30 Apr 2017	_____	Hatch
					DTC	30 Apr 2017	_____	Ownership
177	?	18 Aug 2017	153	158	A10	18 Aug 2017	_____	Hatch
					DTC	18 Aug 2017	_____	Ownership
178	?	11 Nov 2017	153	158	A10	11 Nov 2017	_____	Hatch
					DTC	11 Nov 2017	_____	Ownership
190	?	6 Jun 2018	153	158	A10	6 Jun 2018	_____	Hatch
					DTC	6 Jun 2018	_____	Ownership
191	?	21 Aug 2018	153	158	A10	21 Aug 2018	_____	Hatch
					DTC	21 Aug 2018	_____	Ownership
193	?	6 Sep 2018	153	158	A10	6 Sep 2018	_____	Hatch
					DTC	6 Sep 2018	_____	Ownership
Totals: 2.1.7 (10)								
A37								
86	M	~20 Apr 2006	25	60	A37	~20 Apr 2006	_____	Hatch
Totals: 1.0.0 (1)								
A40								
43	F	29 Sep 2002	1	2	DTC	29 Sep 2002	_____	Hatch
					A40	6 Jun 2003	_____	Loan to
91	M	3 Aug 2007	37	38	DTC	3 Aug 2007	_____	Hatch
					A40	14 Nov 2009	_____	Loan to
Totals: 1.1.0 (2)								
A42								
41	M	25 Jul 2002	1	3	DTC	25 Jul 2002	III-14	Hatch
					A08	19 Apr 2003	_____	Loan to
					A60	12 Oct 2009	_____	Loan to
					A42	22 Jan 2010	_____	Loan to

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   166    F     7 Jun 2016      35      36  A10         7 Jun 2016 ______     Hatch
                                            DTC         7 Jun 2016 ______     Ownership
                                            A42         1 Apr 2018 ______     Loan to
Totals: 1.1.0 (2)
--------------------------------------------------------------------------------

A50
     1    M       ????        WILD    WILD  SPRINGBOK  27 Sep 1995   NONE     Capture
                                            DTC        30 Sep 1995      I     Transfer
                                            A25        12 Jun 2004 ______     Loan to
                                            A50         8 Mar 2009 ______     Loan to

    35    M       ????        WILD    WILD  SPRINGBOK   4 Oct 2001   NONE     Capture
                                            DTC         6 Oct 2001 ______     Transfer
                                            A07        16 Dec 2001 ______     Loan to
                                            A10        26 Oct 2012 ______     Loan to
                                            A50        16 Jul 2016 ______     Loan to

    36    F       ????        WILD    WILD  SPRINGBOK   3 Oct 2001   NONE     Capture
                                            DTC         6 Oct 2001 ______     Transfer
                                            A07        16 Dec 2001 ______     Loan to
                                            A10        26 Oct 2012 ______     Loan to
                                            A50        16 Jul 2016 ______     Loan to

   174    ?    31 Aug 2017      35      36  A50        31 Aug 2017 ______     Hatch
                                            DTC        31 Aug 2017 ______     Ownership
Totals: 2.1.1 (4)
--------------------------------------------------------------------------------

A51
   147    M    28 Aug 2015      35      36  A10        28 Aug 2015 ______     Hatch
                                            DTC        28 Aug 2015 ______     Ownership
                                            A51        10 Sep 2016 ______     Loan to
Totals: 1.0.0 (1)
--------------------------------------------------------------------------------

A52
   132    M    23 Oct 2013      35      36  A10       ~23 Oct 2013 ______     Hatch
                                            DTC        23 Oct 2013 ______     Ownership
                                            A52        11 Apr 2015 ______     Loan to
Totals: 1.0.0 (1)
--------------------------------------------------------------------------------

A55
   151    M       ????        WILD    WILD  SPRINGBOK  22 Sep 2015   NONE     Capture
                                            DTC        22 Sep 2015 ______     Ownership
                                            A55        23 Sep 2015 ______     Loan to

   156    F       ????        WILD    WILD  SPRINGBOK  22 Sep 2015   NONE     Capture
                                            DTC        22 Sep 2015 ______     Ownership
                                            A55        23 Sep 2015 ______     Loan to

   165    ?    27 Oct 2016     151     156  A55        27 Oct 2016 ______     Hatch
                                            DTC        27 Oct 2016 ______     Ownership

   175    ?     9 Aug 2017     151     156  A55         9 Aug 2017 ______     Hatch
                                            DTC         9 Aug 2017 ______     Ownership

   182    ?    11 Apr 2018     151     156  A55        11 Apr 2018 ______     Hatch
                                            DTC        11 Apr 2018 ______     Ownership

   184    ?    24 Jun 2018     151     156  A55        24 Jun 2018 ______     Hatch
                                            DTC        24 Jun 2018 ______     Ownership

   185    ?    28 Jun 2018     151     156  A55        28 Jun 2018 ______     Hatch
                                            DTC        28 Jun 2018 ______     Ownership
Totals: 1.1.5 (7)
--------------------------------------------------------------------------------

A57
   150    M       ????        WILD    WILD  SPRINGBOK  22 Sep 2015   NONE     Capture
                                            DTC        22 Sep 2015 ______     Ownership
                                            A57        23 Sep 2015 ______     Loan to

   164    ?    15 Jun 2016      10      79  A57        15 Jun 2016 ______     Hatch
                                            DTC        15 Jun 2016 ______     Ownership
Totals: 1.0.1 (2)
--------------------------------------------------------------------------------

A59
    51    M     1 Jul 2003       1       2  DTC         1 Jul 2003  II-13     Hatch
                                            A41         2 Nov 2003 ______     Loan to
                                            A59        13 Sep 2008 ______     Loan to

   113    M    16 Jun 2010      37      38  DTC        16 Jun 2010 ______     Hatch
                                            A59         3 Dec 2011 ______     Loan to

   152    M       ????        WILD    WILD  SPRINGBOK  22 Sep 2015   NONE     Capture
                                            DTC        22 Sep 2015 ______     Ownership
                                            A59        22 Sep 2015 ______     Loan to

   157    F       ????        WILD    WILD  SPRINGBOK  22 Sep 2015   NONE     Capture
                                            DTC        22 Sep 2015 ______     Ownership
                                            A59        22 Sep 2015 ______     Loan to
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   172    ?     1 Aug 2017     152     157  A59         1 Aug 2017 ______     Hatch
                                          DTC         1 Aug 2017 ______     Ownership

   183    ?    30 Jun 2018     152     157  A59        30 Jun 2018 ______     Hatch
                                          DTC        30 Jun 2018 ______     Ownership
Totals: 3.1.2 (6)
-------------------------------------------------------------------------------------

A63
    37    M       ????        WILD    WILD  SPRINGBOK   3 Oct 2001   NONE     Capture
                                          DTC         6 Oct 2001 ______     Transfer
                                          A25         6 Oct 2001 ______     Loan to
                                          DTC        12 Jun 2004 0612-I     Transfer
                                          A63        17 Apr 2016 ______     Loan to

    38    F       ????        WILD    WILD  SPRINGBOK   3 Oct 2001   NONE     Capture
                                          DTC         6 Oct 2001 ______     Transfer
                                          A25         6 Oct 2001 ______     Loan to
                                          DTC        12 Jun 2004 612-II     Transfer
                                          A63        17 Apr 2016 ______     Loan to

Totals: 1.1.0 (2)
-------------------------------------------------------------------------------------

A65
   142    F    15 May 2015      37      38  DTC        15 May 2015 ______     Hatch
                                          A65        19 Jan 2018 ______     Loan to
Totals: 0.1.0 (1)
-------------------------------------------------------------------------------------

A66
    11    M    10 Nov 1997       1       3  DTC        10 Nov 1997  III-4     Hatch
                                          A06        22 Nov 1998 ______     Loan to
                                          A07         5 Jul 2000 ______     Loan to
                                          A16        16 Sep 2000 ______     Loan to
                                          A83        14 Mar 2015 ______     Loan to
                                          A66        23 Oct 2016 ______     Loan to

   149    F    17 Sep 2015      35      36  A10        17 Sep 2015 ______     Hatch
                                          DTC        17 Sep 2015 ______     Ownership
                                          A66         1 Nov 2017 ______     Loan to
Totals: 1.1.0 (2)
-------------------------------------------------------------------------------------

A68
     9    F    30 Nov 1996       1       2  DTC        30 Nov 1996   II-1     Hatch
                                          A68        15 May 2014 ______     Loan to

    99    M    21 May 2008      37      38  DTC        21 May 2008 ______     Hatch
                                          A68         5 Jun 2010 ______     Loan to

   100    M    24 Jun 2008      37      38  DTC        24 Jun 2008 ______     Hatch
                                          A68         5 Jun 2010 ______     Loan to
Totals: 2.1.0 (3)
-------------------------------------------------------------------------------------

A76
   114    M     4 Jul 2010      37       9  DTC         4 Jul 2010 ______     Hatch
                                          A76       ~27 Jun 2011 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A78
    71    M    25 Jun 2005      44       7  A10        25 Jun 2005 ______     Hatch
                                          DTC        25 Jun 2005 ______     Ownership
                                          A58         6 May 2008 ______     Loan to
                                          A10        22 Jan 2012 ______     Loan to
                                          A78        10 Mar 2012 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A79
    10    M    22 Oct 1997       1       2  DTC        22 Oct 1997   II-3     Hatch
                                          A10         4 Aug 2001 ______     Loan to
                                          A31         7 May 2002 ______     Loan to
                                          A33         8 Nov 2002  UHURU     Loan to
                                          A57         6 Apr 2008 ______     Loan to
                                          A79        17 May 2016 ______     Loan to

    79    F     9 Aug 2006      37      38  DTC         9 Aug 2006 ______     Hatch
                                          A57         5 Nov 2009 ______     Loan to
                                          A79        17 May 2016 ______     Loan to

   181    ?   ~ 1 May 2018      10      79  A79         1 May 2018 ______     Hatch
                                          DTC         1 May 2018 ______     Ownership

   189    ?    28 Oct 2018      10      79  A79        28 Oct 2018 ______     Hatch
                                          DTC        28 Oct 2018 ______     Ownership
Totals: 1.1.2 (4)
-------------------------------------------------------------------------------------
```

```
A80
   121    M    23 Sep 2011      35      36  A07        23 Sep 2011 ______     Hatch
                                            DTC        23 Sep 2011 ______     Ownership
                                            A67        18 Nov 2011 ______     Loan to
                                            A80        19 Jan 2016 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A84
    74    M    31 Jul 2005       1       3  A25        31 Jul 2005 ______     Hatch
                                            DTC        31 Jul 2005 ______     Ownership
                                            A55        24 Mar 2007 ______     Loan to
                                            A84        12 Mar 2016 ______     Loan to

    96    F    30 Jul 2007      35      36  A07        30 Jul 2007 ______     Hatch
                                            DTC        30 Jul 2007 ______     Ownership
                                            A61        13 Apr 2008 ______     Loan to
                                            A64        10 May 2009 ______     Loan to
                                            A55        12 Sep 2009 ______     Loan to
                                            A84        12 Mar 2016 ______     Transfer

   163    F    10 Aug 2016      74      96  A84        10 Aug 2016 ______     Hatch
                                            DTC        10 Aug 2016 ______     Ownership

Totals: 1.2.0 (3)
-------------------------------------------------------------------------------------

A91
   123    M    24 Jun 2012      37      38  DTC        24 Jun 2012 ______     Hatch
                                            A91        13 Dec 2014 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A94
    88    M   ~15 Nov 2005      25      60  A37       ~15 Nov 2005 ______     Hatch
                                            DTC       ~15 Nov 2005 ______     Ownership
                                            A69        30 Aug 2010 ______     Loan to
                                            A39        24 Nov 2011 ______     Loan to
                                            A63        17 Mar 2014 ______     Loan to
                                            A94        11 Mar 2017 ______     Loan to

   120    F   ~19 Sep 2011      44       7  A10       ~19 Sep 2011 ______     Hatch
                                            DTC       ~19 Sep 2011 ______     Ownership
                                            A94         4 Oct 2013 ______     Loan to

   139    F     1 Sep 2014      35      36  A10         1 Sep 2014 ______     Hatch
                                            DTC         1 Sep 2014 ______     Ownership
                                            A63        13 Mar 2016 ______     Loan to
                                            A94        11 Mar 2017 ______     Loan to
Totals: 1.2.0 (3)
-------------------------------------------------------------------------------------

A103
    94    M    27 Aug 2007      44       7  A10        27 Aug 2007 ______     Hatch
                                            DTC       ~27 Aug 2007 ______     Ownership
                                            A82        10 Mar 2012 ______     Loan to
                                            A92        18 Mar 2013 ______     Loan to
                                            A103        8 Mar 2014 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A104
     7    F    24 Dec 1996       1       3  DTC        24 Dec 1996  III-3     Hatch
                                            A06        22 Nov 1998 ______     Loan to
                                            A07         5 Jul 2000 ______     Loan to
                                            A18        14 Dec 2001 ______     Loan to
                                            A31         6 May 2002 ______     Loan to
                                            A10         8 Dec 2002 ______     Loan to
                                            A65        11 Nov 2012 ______     Loan to
                                            A104       12 May 2014 ______     Loan to

    44    M    31 Oct 2002      35      36  A07        31 Oct 2002 ______     Hatch
                                            DTC        31 Oct 2002 ______     Ownership
                                            A10        24 Jul 2004 ______     Loan to
                                            A65        11 Nov 2012 ______     Loan to
                                            A104       12 May 2014 ______     Loan to

Totals: 1.1.0 (2)
-------------------------------------------------------------------------------------

A105
    82    M    26 Dec 2005      25      60  A37        26 Dec 2005 ______     Hatch
                                            DTC        26 Dec 2005 ______     Ownership
                                            A71        30 Aug 2010 ______     Loan to
                                            A85         5 Mar 2014 ______     Loan to
                                            A105        9 Oct 2014 ______     Loan to

   138    F    22 Aug 2014      35      36  A10        22 Aug 2014 ______     Hatch
                                            DTC        22 Aug 2014 ______     Ownership
                                            A105       15 Apr 2016 ______     Loan to
Totals: 1.1.0 (2)
-------------------------------------------------------------------------------------
```

```
A109
   111    M    13 May 2010      37      38  DTC        13 May 2010 ______     Hatch
                                            A39         3 Dec 2011 ______     Loan to
                                            A63        17 Mar 2014 ______     Loan to
                                            A109      ~25 Jan 2015 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A110
    14    M    22 Oct 1998       1       3  DTC        22 Oct 1998  III-5     Hatch
                                            A07        22 Nov 1998 ______     Loan to
                                            A16        16 Sep 2000 ______     Loan to
                                            A110       14 Mar 2015 ______     Loan to

   107    F    21 Jul 2009      35      36  A07        21 Jul 2009 ______     Hatch
                                            DTC        21 Jul 2009 ______     Ownership
                                            A67        13 Mar 2010 ______     Loan to
                                            A59         8 Mar 2014 ______     Loan to
                                            A94        12 Mar 2016 ______     Loan to
                                            A110       11 Mar 2017 ______     Loan to

   179    ?    15 Dec 2017      14     107  A110       15 Dec 2017 ______     Hatch
                                            DTC        15 Dec 2017 ______     Ownership

   186    ?    12 Aug 2018      14     107  A110       12 Aug 2018 ______     Hatch
                                            DTC        12 Aug 2018 ______     Ownership

   187    ?    26 Mar 2018      14     107  A110       26 Mar 2018 ______     Hatch
                                            DTC        26 Mar 2018 ______     Ownership
Totals: 1.1.3 (5)
-------------------------------------------------------------------------------------

A111
   110    F    23 Mar 2010      44       7  A10        23 Mar 2010 ______     Hatch
                                            DTC       ~23 Mar 2010 ______     Ownership
                                            A58        10 Nov 2011 ______     Loan to
                                            A10        22 Jan 2012 ______     Loan to
                                            A81        22 Feb 2012 ______     Loan to
                                            A111        3 May 2015 ______     Loan to
Totals: 0.1.0 (1)
-------------------------------------------------------------------------------------

A112
   131    M     4 Oct 2013      35      36  A10         4 Oct 2013 ______     Hatch
                                            DTC         4 Oct 2013 ______     Ownership
                                            A112       12 Sep 2015 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A113
   126    M    16 Aug 2012      37       9  DTC        16 Aug 2012 ______     Hatch
                                            A113       13 Jun 2015 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A114
   124    M    30 Jun 2012      37       9  DTC        30 Jun 2012 ______     Hatch
                                            A114       12 Sep 2015 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------

A115
    87    M   ~15 Oct 2005      25      60  A37       ~15 Oct 2005 ______     Hatch
                                            A115       21 Nov 2015 ______     Transfer

    89    M    18 Jan 2007      25      60  A37        18 Jan 2007 ______     Hatch
                                            A115      ~21 Nov 2015 ______     Transfer

    92    M    10 Aug 2007      25      60  A37        10 Aug 2007 ______     Hatch
                                            DTC       ~10 Aug 2007 ______     Ownership
                                            A115       21 Nov 2015 ______     Loan to
Totals: 3.0.0 (3)
-------------------------------------------------------------------------------------

A116
    42    F    20 Aug 2002       1       2  DTC        20 Aug 2002  II-11     Hatch
                                            A08        19 Apr 2003 ______     Loan to
                                            A116       31 Jan 2016 ______     Loan to

    73    M     2 Aug 2005      37      38  DTC         2 Aug 2005  HSS73     Hatch
                                            A08        18 Apr 2009 ______     Loan to
                                            A116       31 Jan 2016 ______     Loan to

   125    M     7 Jul 2012      74      96  A55         7 Jul 2012 ______     Hatch
                                            DTC         7 Jul 2012 ______     Ownership
                                            A90         1 Mar 2013 ______     Loan to
                                            A55        25 Aug 2015 ______     Loan to
                                            A116       31 Jan 2016 ______     Loan to

   171    ?     1 Aug 2017      73      42  A116        1 Aug 2017 ______     Hatch
                                            DTC         1 Aug 2017 ______     Ownership
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   188    ?    16 Oct 2018      73      42  A116       16 Oct 2018 ______     Hatch
                                            DTC        16 Oct 2018 ______     Ownership
Totals: 2.1.2 (5)
-------------------------------------------------------------------------------------------

A117
   137    M    21 Jun 2014      35      36  A10        21 Jun 2014 ______     Hatch
                                            DTC        21 Jun 2014 ______     Ownership
                                            A117        8 Apr 2016 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------------

A120
   145    M    20 Jun 2015      35      36  A10        20 Jun 2015 ______     Hatch
                                            DTC        20 Jun 2015 ______     Ownership
                                            A120       10 Sep 2016 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------------

A122
   112    M     8 Jun 2010      37       9  DTC         8 Jun 2010 ______     Hatch
                                            A72        29 Oct 2010 ______     Loan to
                                            A83        16 Aug 2012 ______     Loan to
                                            A122       10 Dec 2016 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------------

A124
   146    F     6 Jul 2015      35      36  A10         6 Jul 2015 ______     Hatch
                                            DTC         6 Jul 2015 ______     Ownership
                                            A124       10 Sep 2016 ______     Loan to
Totals: 0.1.0 (1)
-------------------------------------------------------------------------------------------

A128
   144    M    20 Jun 2015      74      96  A55        20 Jun 2015 ______     Hatch
                                            DTC        20 Jun 2015 ______     Ownership
                                            A128       14 Feb 2018 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------------

A130
   168    F    18 Sep 2016      35      36  A10        18 Sep 2016 ______     Hatch
                                            DTC        18 Sep 2016 ______     Ownership
                                            A130       20 Apr 2018 ______     Loan to
Totals: 0.1.0 (1)
-------------------------------------------------------------------------------------------

A131
   169    ?     7 Sep 2016      35      36  A10         7 Sep 2016 ______     Hatch
                                            DTC         7 Sep 2016 ______     Ownership
                                            A131       20 Apr 2018 ______     Loan to
Totals: 0.0.1 (1)
-------------------------------------------------------------------------------------------

A132
   106    M    20 May 2009      35      36  A07        20 May 2009 ______     Hatch
                                            DTC        20 May 2009 ______     Ownership
                                            A67        13 Mar 2010 ______     Loan to
                                            A80        19 Jan 2016 ______     Loan to
                                            A132        9 Oct 2018 ______     Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------------

A133
   167    F    26 Aug 2016      35      36  A10        26 Aug 2016 ______     Hatch
                                            DTC        26 Aug 2016 ______     Ownership
                                            A129        1 Apr 2018 ______     Loan to
                                            A133        7 Oct 2018 ______     Loan to
Totals: 0.1.0 (1)
-------------------------------------------------------------------------------------------

AMSTERDAM - Amsterdam Zoo
    77    F    13 Jul 2006      44       7  A10        13 Jul 2006 ______     Hatch
                                            DTC        13 Jul 2006 ______     Ownership
                                            A63        14 Aug 2010 ______     Loan to
                                            AMSTERDAM   2 May 2014 ______     Loan to

   115    M     6 Jul 2011      37       9  DTC         6 Jul 2011 ______     Hatch
                                            AMSTERDAM   6 Nov 2012 R12043     Loan to

   117    M    12 Jun 2011      37       9  DTC        12 Jun 2011 ______     Hatch
                                            AMSTERDAM   6 Nov 2012 R12042     Loan to
Totals: 2.1.0 (3)
-------------------------------------------------------------------------------------------
DTC - Dwarf Tortoise Conservation
   154    M       ????        WILD    WILD  SPRINGBOK  22 Sep 2015   NONE     Capture
                                            DTC        22 Sep 2015 ______     Transfer

   161    F    26 Jan 2016    WILD     159  DTC        26 Jan 2016 ______     Hatch

   162    F    25 Feb 2016    WILD     159  DTC        25 Feb 2016 ______     Hatch
Totals: 1.2.0 (3)
-------------------------------------------------------------------------------------------
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PLZEN - Plzen Zoo
   136    F     2 Sep 2014      37       9  DTC          2 Sep 2014 ______      Hatch
                                            PLZEN       27 Sep 2016 725101     Loan to
Totals: 0.1.0 (1)
-------------------------------------------------------------------------------------------

WROCLAW - Wroclaw Zoo
   119    M   ~20 Apr 2011      44       7  A10        ~20 Apr 2011 ______      Hatch
                                            DTC        ~20 Apr 2011 ______      Ownership
                                            A84          8 Sep 2012 ______      Loan to
                                            WROCLAW     19 May 2018 ______      Loan to
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------------

WUPPERTAL - Wuppertal Zoo
    72    M    24 Jul 2005   MULT3   MULT4  DTC         24 Jul 2005    ?-1      Hatch
                                            A65         17 Oct 2009 ______      Loan to
                                            WUPPERTAL    3 Sep 2018 ______      Transfer

   118    F     1 May 2010      44       7  A10          1 May 2010 ______      Hatch
                                            DTC        ~ 1 May 2010 ______      Ownership
                                            A58         10 Nov 2011 ______      Loan to
                                            A10         22 Jan 2012 ______      Loan to
                                            A79         22 Feb 2012 ______      Loan to
                                            WUPPERTAL    6 May 2018 ______      Loan to
Totals: 1.1.0 (2)
-------------------------------------------------------------------------------------------
===========================================================================================
TOTALS: 48.28.24 (100)
```

Homopus areolatus: live and available studbook population. MULTX are groups of unregistered specimens at locations outside of the studbook, except MULT4 consists of tortoise numbers 59 and 60, and MULT7 consists of tortoise numbers 190 and 191. UNKX are specimens at locations outside of the studbook. UNK6 and UNK7 may originate from bloodline 58 x MULT4, consequently, tortoise numbers 235, 239, 240, 241, 245, 246, 247, 248, 249, 250, 251, 252, 253, 254 and 255 might be an inbred individuals.

```
===========================================================================================
Stud # | Sex | Hatch Date | Sire  | Dam   | Location | Date       | Local ID | Event    |
===========================================================================================

A10
    62    F   ~25 Nov 2007       5       4  A10        ~25 Nov 2007 ______      Hatch
                                            DTC        ~25 Nov 2007 ______      Ownership
                                            A44         27 Mar 2011 ______      Loan to
                                            A10         25 Jul 2014 ______      Transfer

    94    M     7 Jul 2009      16      17  A16          7 Jul 2009 ______      Hatch
                                            A44          5 Jun 2010 AUGUST      Transfer
                                            A10        ~25 Jul 2014 ______      Transfer

    95    M   ~15 Jan 2010      58   MULT4  A46        ~15 Jan 2010 ______      Hatch
                                            A89        ~ 1 Jun 2012 ______      Loan to
                                            A56        ~ 1 Jun 2012 ______      Loan to
                                            A99         27 Jul 2013 ______      Loan to
                                            A10          9 Jun 2018 ______      Transfer

   125    M    31 Jan 2012      58   MULT4  A46         31 Jan 2012 ______      Hatch
                                            A99          1 Sep 2016 ______      Loan to
                                            A10          9 Jun 2018 ______      Transfer

   186    ?    15 Sep 2015      94      62  A10         15 Sep 2015 ______      Hatch

   201    ?    16 Aug 2016      94      62  A10         16 Aug 2016 ______      Hatch

   223    F         ~ 2010    WILD    WILD  WILD       ~10 Oct 2017   NONE      Capture
                                            A10        ~11 Oct 2017 ______      Loan to
                                            DTC        ~11 Oct 2017 ______      Ownership

   224    ?    29 Apr 2017      94      62  A10         29 Apr 2017 ______      Hatch
                                            DTC         29 Apr 2017 ______      Ownership

   225    ?     4 May 2017      94      62  A10          4 May 2017 ______      Hatch
                                            DTC          4 May 2017 ______      Ownership

   229    ?    15 Jul 2017      94      62  A10         15 Jul 2017 ______      Hatch

   230    ?    30 Jul 2017      94      62  A10         30 Jul 2017 ______      Hatch
                                            DTC         30 Jul 2017 ______      Ownership
   232    ?    19 Sep 2017      94      62  A10         19 Sep 2017 ______      Hatch
                                            DTC         19 Sep 2017 ______      Ownership

   233    ?    21 Sep 2017      94      62  A10         21 Sep 2017 ______      Hatch

   256    ?    11 Jun 2018      94      62  A10         11 Jun 2018 ______      Hatch

   257    ?    18 Jun 2018      94      62  A10         18 Jun 2018 ______      Hatch
                                            DTC         18 Jun 2018 ______      Ownership
```

258	?	17 Aug 2018	94	62	A10	17 Aug 2018	_____	Hatch
259	?	17 Aug 2018	94	62	A10	17 Aug 2018	_____	Hatch
					DTC	17 Aug 2018	_____	Ownership
260	?	29 Aug 2018	94	62	A10	29 Aug 2018	_____	Hatch
					DTC	29 Aug 2018	_____	Ownership
261	?	1 Oct 2018	94	62	A10	1 Oct 2018	_____	Hatch
262	?	28 Aug 2018	94	62	A10	28 Aug 2018	_____	Hatch

Totals: 3.2.15 (20)

A16

17	F	????	WILD	WILD	A16	30 Aug 1994	_____	Transfer
39	M	9 Apr 2003	16	17	A16	9 Apr 2003	_____	Hatch
48	M	23 Mar 2004	16	17	A16	23 Mar 2004	_____	Hatch
49	F	25 Mar 2004	16	17	A16	25 Mar 2004	_____	Hatch
50	F	8 Aug 2004	16	17	A16	8 Aug 2004	_____	Hatch
51	M	19 Aug 2004	16	17	A16	19 Aug 2004	_____	Hatch
52	F	25 Aug 2004	16	17	A16	25 Aug 2004	_____	Hatch
54	M	10 Jun 2005	16	17	A16	10 Jun 2005	_____	Hatch
55	M	27 Jun 2005	16	17	A16	27 Jun 2005	_____	Hatch
56	F	6 Oct 2005	16	17	A16	6 Oct 2005	_____	Hatch
57	F	3 Nov 2005	16	17	A16	3 Nov 2005	_____	Hatch
108	M	8 Mar 2010	47	37	A44	8 Mar 2010	_____	Hatch
					A16	4 Jun 2010	_____	Transfer
109	F	8 Mar 2010	47	37	A44	8 Mar 2010	_____	Hatch
					A16	4 Jun 2010	_____	Transfer
115	?	30 May 2010	16	17	A16	30 May 2010	_____	Hatch
116	?	31 May 2010	16	17	A16	31 May 2010	_____	Hatch
122	?	2 Jul 2011	16	17	A16	2 Jul 2011	_____	Hatch
134	?	27 Apr 2012	16	17	A16	27 Apr 2012	_____	Hatch
135	?	25 Aug 2012	16	17	A16	25 Aug 2012	_____	Hatch
146	?	9 Apr 2013	16	17	A16	9 Apr 2013	_____	Hatch
147	?	9 Apr 2013	16	17	A16	9 Apr 2013	_____	Hatch
152	?	11 Jun 2014	16	17	A16	11 Jun 2014	_____	Hatch
153	?	11 Jun 2014	16	17	A16	11 Jun 2014	_____	Hatch
157	?	6 Sep 2014	55	109	A16	6 Sep 2014	_____	Hatch
182	?	26 Jul 2015	108	56	A16	26 Jul 2015	_____	Hatch
184	?	18 Aug 2015	108	56	A16	18 Aug 2015	_____	Hatch
188	?	17 Aug 2016	MULT 6	17	A16	17 Aug 2016	_____	Hatch
189	?	18 Aug 2016	MULT 6	17	A16	18 Aug 2016	_____	Hatch
217	?	8 May 2017	108	56	A16	8 May 2017	_____	Hatch
218	?	18 May 2017	108	56	A16	18 May 2017	_____	Hatch
219	?	24 Jun 2017	108	17	A16	24 Jun 2017	_____	Hatch
227	?	22 Aug 2017	108	56	A16	22 Aug 2017	_____	Hatch

Totals: 6.7.18 (31)

A37

22	M	????	WILD	WILD	UNKNOWN	????	NONE	Capture
					A20	????	_____	Transfer
					A21	17 Oct 2000	_____	Transfer
					A37	15 Sep 2002	1	Transfer
23	F	????	WILD	WILD	UNKNOWN	????	NONE	Capture
					A20	????	_____	Transfer
					A21	17 Oct 2000	_____	Transfer
					A37	15 Sep 2002	2	Transfer
24	F	~ 1993	UNK1	UNK2	A20	~ 1993	_____	Hatch
					A21	17 Oct 2000	_____	Transfer
					A37	15 Sep 2002	3	Transfer

46	M	30 Sep 2004	22	24	A37	30 Sep 2004	______	Hatch
107	F	8 Mar 2010	47	37	A44	8 Mar 2010	______	Hatch
					A37	5 May 2010	______	Transfer
111	F	29 Mar 2010	47	37	A44	29 Mar 2010	______	Hatch
					A37	7 Jun 2010	______	Transfer
172	M	5 Jan 2014	22	24	A37	5 Jan 2014	______	Hatch
173	M	12 Jan 2014	22	24	A37	12 Jan 2014	______	Hatch
174	F	15 Aug 2014	22	24	A37	15 Aug 2014	______	Hatch
175	F	15 Jan 2015	22	24	A37	15 Jan 2015	______	Hatch
177	M	15 Feb 2012	22	24	A37	15 Feb 2012	______	Hatch
178	F	15 Feb 2009	22	24	A37	15 Feb 2009	______	Hatch
179	F	15 Feb 2005	22	24	A37	15 Feb 2005	______	Hatch
180	F	15 Feb 2004	22	24	A37	15 Feb 2004	______	Hatch
183	F	11 Aug 2015	22	24	A37	11 Aug 2015	______	Hatch
211	?	8 Feb 2016	22	24	A37	8 Feb 2016	______	Hatch
212	?	17 Mar 2016	22	24	A37	17 Mar 2016	______	Hatch
213	?	18 Mar 2016	22	24	A37	18 Mar 2016	______	Hatch
263	?	~15 Apr 2018	22	24	A37	~15 Apr 2018	______	Hatch
264	?	~15 Apr 2018	22	24	A37	~15 Apr 2018	______	Hatch

Totals: 5.10.5 (20)

A42

35	M	9 Jul 2002	16	17	A16	9 Jul 2002	______	Hatch
					A42	~30 Sep 2005	______	Loan to

Totals: 1.0.0 (1)

A44

130	F	16 Mar 2012	94	62	A44	16 Mar 2012	______	Hatch
132	M	18 Jul 2012	94	62	A44	18 Jul 2012	______	Hatch
133	F	13 Aug 2012	94	62	A44	13 Aug 2012	______	Hatch
					DTC	13 Aug 2012	______	Ownership
149	M	27 Apr 2013	94	62	A44	27 Apr 2013	______	Hatch
					DTC	27 Apr 2013	______	Ownership

Totals: 2.2.0 (4)

A46

58	M	????	WILD	WILD	A46	9 Sep 1997	03	Transfer
59	F	????	WILD	WILD	A46	9 Sep 1997	01	Transfer
60	F	????	WILD	WILD	A46	25 Mar 1999	02	Transfer
200	?	6 Feb 2016	58	MULT4	A46	6 Feb 2016	______	Hatch
203	?	21 Feb 2016	58	MULT4	A46	21 Feb 2016	______	Hatch
242	?	27 Jan 2018	58	MULT4	A46	27 Jan 2018	______	Hatch
243	?	28 Jan 2018	58	MULT4	A46	28 Jan 2018	______	Hatch
244	?	7 Feb 2018	58	MULT4	A46	7 Feb 2018	______	Hatch

Totals: 1.2.5 (8)

A48

93	M	7 Jul 2009	16	17	A16	7 Jul 2009	______	Hatch
					A44	5 Jun 2010	______	Transfer
					A48	13 Jun 2010	______	Transfer
					DTC	15 May 2017	______	Ownership

Totals: 1.0.0 (1)

A59

187	F	17 Sep 2015	94	62	A10	17 Sep 2015	______	Hatch
					DTC	17 Sep 2015	______	Ownership
					A59	12 Sep 2016	______	Loan to

Totals: 0.1.0 (1)

```
A66
     4    F       ????       MULT1   MULT2  KRAAIFONT     ????          ______     Hatch
                                            DTC        21 Nov 1997      IV      Transfer
                                            A10        27 Oct 2004      ______  Loan to
                                            WUPPERTAL  13 Sep 2014 R14018     Loan to
                                            DTC        18 Jan 2018      ______  Ownership
                                            A66         6 Feb 2018      ______  Transfer

    40    M       ????        WILD    WILD  WUPPERTAL  28 Mar 1991 91586B     Loan to
                                            DTC        18 Jan 2018      ______  Ownership
                                            A66         6 Feb 2018      ______  Transfer

    79    M   ~15 Mar 2007      58   MULT4  A46       ~15 Mar 2007      ______  Hatch
                                            A54       ~15 Jun 2008      ______  Loan to
                                            DTC       ~15 Jun 2008      ______  Ownership
                                            A66        11 Apr 2015      ______  Loan to

    81    F   ~15 Mar 2007      58   MULT4  A46       ~15 Mar 2007      ______  Hatch
                                            A54       ~15 Jun 2008      ______  Loan to
                                            DTC       ~15 Jun 2008      ______  Ownership
                                            A66       ~11 Apr 2015      ______  Loan to
Totals: 2.2.0 (4)
-------------------------------------------------------------------------------------------

A73
    69    M   ~22 Apr 2004      58   MULT4  A46       ~22 Apr 2004      ______  Hatch
                                            A56       ~21 May 2006      ______  Loan to
                                            A73        19 Jun 2010      ______  Transfer

    71    F   ~ 6 Mar 2004      58   MULT4  A46       ~ 6 Mar 2004      ______  Hatch
                                            A56       ~21 May 2006      ______  Loan to
                                            A73        19 Jun 2010      ______  Transfer
Totals: 1.1.0 (2)
-------------------------------------------------------------------------------------------

A77
    84    M   ~ 7 Feb 2008      58   MULT4  A46       ~ 7 Feb 2008      ______  Hatch
                                            A77         2 Jun 2011      ______  Transfer

    85    M   ~ 7 Feb 2008      58   MULT4  A46       ~ 7 Feb 2008      ______  Hatch
                                            A77         2 Jun 2011      ______  Transfer
Totals: 2.0.0 (2)
-------------------------------------------------------------------------------------------

A94
   185    ?    12 Sep 2015      94      62  A10        12 Sep 2015      ______  Hatch
                                            DTC        12 Sep 2015      ______  Ownership
                                            A94        12 Sep 2016      ______  Loan to
Totals: 0.0.1 (1)
-------------------------------------------------------------------------------------------

A99
   126    M     1 Feb 2012      58   MULT4  A46         1 Feb 2012      ______  Hatch
                                            A99         1 Sep 2016      ______  Transfer

   128    F     3 Feb 2012      58   MULT4  A46         3 Feb 2012      ______  Hatch
                                            A99         1 Sep 2016      ______  Transfer

   129    F     4 Feb 2012      58   MULT4  A46         4 Feb 2012      ______  Hatch
                                            A99         1 Sep 2016      ______  Transfer

   234    M       ????        UNK6    UNK7  A86           ????          ______  Hatch
                                            A99       ~ 1 May 2014      ______  Transfer

   250    ?     6 Jun 2018     234     123  A99         6 Jun 2018      ______  Hatch
Totals: 2.2.1 (5)
-------------------------------------------------------------------------------------------

A100
    96    M   ~18 Jan 2010      58   MULT4  A46       ~18 Jan 2010      ______  Hatch
                                            A56       ~ 1 Jun 2012      ______  Loan to
                                            A89       ~ 1 Jun 2012      ______  Loan to
                                            A100      ~13 Jul 2013      ______  Transfer

   138    M   ~27 Jan 2013      58   MULT4  A46       ~27 Jan 2013      ______  Hatch
                                            A99       ~ 1 Sep 2016      ______  Loan to
                                            A100       19 Mar 2017      ______  Transfer

   141    M   ~17 Feb 2013      58   MULT4  A46       ~17 Feb 2013      ______  Hatch
                                            A99       ~ 1 Sep 2016      ______  Loan to
                                            A100      ~19 Mar 2017      ______  Transfer

   145    F   ~26 Mar 2013      58   MULT4  A46       ~26 Mar 2013      ______  Hatch
                                            A99       ~ 1 Sep 2016      ______  Loan to
                                            A100       14 Nov 2017      ______  Transfer

   226    ?    11 May 2017      94      62  A10        11 May 2017      ______  Hatch
                                            A100        8 Sep 2018      ______  Transfer
   228    ?    13 Jul 2017      94      62  A10        13 Jul 2017      ______  Hatch
                                            A100        8 Sep 2018      ______  Transfer
Totals: 3.1.2 (6)
-------------------------------------------------------------------------------------------
```

A121

190	F	????	WILD	WILD	A121	8 Apr 2016	______	Transfer
191	F	????	WILD	WILD	A121	8 Apr 2016	______	Transfer
192	M	????	WILD	WILD	A121	8 Apr 2016	______	Transfer
194	F	~ 8 Apr 2016	192	MULT7	A121	8 Apr 2016	______	Hatch
195	?	~ 8 Apr 2016	192	MULT7	A121	8 Apr 2016	______	Hatch
196	?	~ 8 Apr 2016	192	MULT7	A121	8 Apr 2016	______	Hatch
210	F	~ 2006	WILD	WILD	A121	1 Dec 2016	______	Transfer
214	?	21 Mar 2017	192	MULT 7	A121	21 Mar 2017	______	Hatch
215	?	21 Mar 2017	192	MULT 7	A121	21 Mar 2017	______	Hatch
216	?	21 Mar 2017	192	MULT 7	A121	21 Mar 2017	______	Hatch

Totals: 1.4.5 (10)

A125

127	M	2 Feb 2012	58	MULT4	A46	2 Feb 2012	______	Hatch
					A99	1 Sep 2016	______	Loan to
					A125	1 Oct 2017	______	Transfer
136	F	~18 Jan 2013	58	MULT4	A46	~18 Jan 2013	______	Hatch
					A99	1 Sep 2016	______	Loan to
					A125	1 Oct 2017	______	Transfer
162	?	29 Jan 2014	58	MULT4	A46	29 Jan 2014	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
164	?	20 Feb 2014	58	MULT4	A46	20 Feb 2014	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
165	?	20 Feb 2014	58	MULT4	A46	20 Feb 2014	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
167	?	27 Feb 2014	58	MULT4	A46	27 Feb 2014	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
169	?	13 Feb 2015	58	MULT4	A46	13 Feb 2015	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
170	?	20 Feb 2015	58	MULT4	A46	20 Feb 2015	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
171	?	20 Mar 2015	58	MULT4	A46	20 Mar 2015	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
197	?	4 Feb 2016	58	MULT4	A46	4 Feb 2016	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
198	?	4 Feb 2016	58	MULT4	A46	4 Feb 2016	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
199	?	4 Feb 2016	58	MULT4	A46	4 Feb 2016	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
202	?	20 Feb 2016	58	MULT4	A46	20 Feb 2016	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
204	?	22 Feb 2016	58	MULT4	A46	22 Feb 2016	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
205	?	3 Mar 2016	58	MULT4	A46	3 Mar 2016	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
206	?	4 Mar 2016	58	MULT4	A46	4 Mar 2016	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
220	?	1 Feb 2017	58	MULT4	A46	18 Oct 2017	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer

221	?	2 Feb 2017	58	MULT4	A46	2 Feb 2017	______	Hatch
					A99	11 Jun 2018	______	Loan to
					A125	9 Sep 2018	______	Transfer
235	?	5 Sep 2017	234	129	A99	5 Sep 2017	______	Hatch
					A125	9 Sep 2017	______	Transfer
239	?	16 Mar 2018	234	128	A99	16 Mar 2018	______	Hatch
					A125	24 Jun 2018	______	Transfer
240	?	27 Mar 2018	234	123	A99	27 Mar 2018	______	Hatch
					A125	8 Dec 2018	______	Transfer
241	?	26 Apr 2018	234	128	A99	26 Apr 2018	______	Hatch
					A125	9 Sep 2018	______	Transfer
245	?	16 Mar 2018	234	128	A99	16 Mar 2018	______	Hatch
					A125	24 Jun 2018	______	Transfer
246	?	1 May 2018	234	128	A99	1 May 2018	______	Hatch
					A125	9 Sep 2018	______	Transfer
247	?	25 May 2018	234	129	A99	25 May 2018	______	Hatch
					A125	9 Sep 2018	______	Transfer
248	?	26 May 2018	234	129	A99	26 May 2018	______	Hatch
					A125	9 Sep 2018	______	Transfer
249	?	29 May 2018	234	123	A99	29 May 2018	______	Hatch
					A125	9 Sep 2018	______	Transfer
251	?	20 Jun 2018	234	129	A99	20 Jun 2018	______	Hatch
					A125	9 Sep 2018	______	Transfer

Totals: 1.1.25 (27)

A126

139	?	~ 6 Feb 2013	58	MULT4	A46	~ 6 Feb 2013	______	Hatch
					A99	~ 1 Sep 2016	______	Loan to
					A126	~13 Mar 2017	______	Transfer
144	?	~26 Mar 2013	58	MULT4	A46	~26 Mar 2013	______	Hatch
					A99	~ 1 Sep 2016	______	Loan to
					A126	~13 Mar 2017	______	Transfer
163	?	29 Jan 2014	58	MULT4	A46	29 Jan 2014	______	Hatch
					A99	1 Sep 2016	______	Loan to
					A126	13 Mar 2017	______	Transfer
168	?	10 Mar 2014	58	MULT4	A46	10 Mar 2014	______	Hatch
					A99	1 Sep 2016	______	Loan to
					A126	13 Mar 2017	______	Transfer

Totals: 0.0.4 (4)

A127

142	M	~ 4 Mar 2013	58	MULT4	A46	~ 4 Mar 2013	______	Hatch
					A99	~ 1 Sep 2016	______	Transfer
					A127	9 Sep 2017	______	Transfer

Totals: 1.0.0 (1)

A134

253	?	21 Aug 2018	234	129	A99	21 Aug 2018	______	Hatch
					A134	21 Oct 2018	______	Transfer
254	?	22 Aug 2018	234	129	A99	22 Aug 2018	______	Hatch
					A134	21 Oct 2018	______	Transfer

Totals: 0.0.2 (2)

A135

124	M	24 Jan 2012	58	MULT4	A46	24 Jan 2012	______	Hatch
					A99	1 Sep 2016	______	Loan to
					A135	8 Dec 2018	______	Transfer
255	?	31 Aug 2018	234	128	A99	31 Aug 2018	______	Hatch
					A135	8 Dec 2018	______	Transfer

Totals: 1.0.1 (2)

A136

252	?	4 Jul 2018	234	129	A99	27 Sep 2018	______	Hatch
					A136	8 Dec 2018	______	Transfer

Totals: 0.0.1 (1)

```
A137
   143    M   ~10 Mar 2013      58   MULT4  A46       ~10 Mar 2013 ______     Hatch
                                            A99       ~ 1 Sep 2016 ______     Loan to
                                            A125      ~ 1 Oct 2017 ______     Loan to
                                            A137        9 Dec 2018 ______     Transfer
Totals: 1.0.0 (1)
-------------------------------------------------------------------------------------------

TCBCC - Turtle Conservancy Behler Chelonian Center
   207    ?    11 Apr 2016      10      11  TCBCC      11 Apr 2016 AREO10     Hatch

   209    ?    15 May 2016      10      11  TCBCC      15 May 2016 AREO09     Hatch

   236    ?     4 Apr 2017      10      11  TCBCC       4 Apr 2017 AREO12     Hatch

   237    ?    17 Apr 2017      10      11  TCBCC      17 Apr 2017 AREO13     Hatch

Totals: 0.0.4 (4)
-------------------------------------------------------------------------------------------
===========================================================================================
TOTALS: 34.35.90 (159)
```

Homopus femoralis: live and available studbook population.

```
===========================================================================================
Stud # | Sex | Hatch Date | Sire  | Dam   | Location | Date      | Local ID | Event    |
===========================================================================================

A10
     2    M       ????        WILD    WILD  A28         ~ Jan 2001 ______     Transfer
                                            A08        23 Dec 2001 ______     Loan to
                                            A10        30 Jul 2006 ______     Loan to

     7    M     7 Jun 2008       3       4  DTC         7 Jun 2008 ______     Hatch
                                            A10        22 Oct 2014 ______     Loan to
Totals: 2.0.0 (2)
-------------------------------------------------------------------------------------------

A50
    16    F    26 Jun 2015       3       4  DTC        26 Jun 2015 ______     Hatch
                                            A50         9 Sep 2017 ______     Loan to
Totals: 0.1.0 (1)
-------------------------------------------------------------------------------------------

A55
     8    M    30 Jun 2010       3       4  DTC        30 Jun 2010 ______     Hatch
                                            A55        26 Jun 2014 ______     Loan to

    10    F    28 May 2011       3       4  DTC        28 May 2011 ______     Hatch
                                            A55        27 Jun 2015 ______     Loan to
Totals: 1.1.0 (2)
-------------------------------------------------------------------------------------------

A59
    12    M    12 Jul 2013       3       4  DTC        12 Jul 2013 ______     Hatch
                                            A59         2 Aug 2015 ______     Loan to

    13    F    15 Jun 2014       3       4  DTC        15 Jun 2014 ______     Hatch
                                            A59        10 Sep 2016 ______     Loan to
Totals: 1.1.0 (2)
-------------------------------------------------------------------------------------------

A84
    14    F    18 Jun 2014       3       4  DTC        18 Jun 2014 ______     Hatch
                                            A84        10 Sep 2016 ______     Loan to

    15    F    19 Jun 2014       3       4  DTC        19 Jun 2014 ______     Hatch
                                            A84        10 Sep 2016 ______     Loan to
Totals: 0.2.0 (2)
-------------------------------------------------------------------------------------------

DTC - Dwarf Tortoise Conservation
     3    M       ????        WILD    WILD  A28         ~ Jan 2001 ______     Transfer
                                            DTC        23 Dec 2001    III     Loan to

     4    F       ????        WILD    WILD  BEAUF W     16 Mar 2006   NONE     Capture
                                            DTC        19 Mar 2006 ______     Transfer

    17    ?    26 Jun 2017       3       4  DTC        26 Jun 2017 ______     Hatch
    18    ?     8 Jul 2017       3       4  DTC         8 Jul 2017 ______     Hatch

    19    ?    26 Jun 2018       3       4  DTC        26 Jun 2018 ______     Hatch
Totals: 1.1.3 (5)
-------------------------------------------------------------------------------------------
===========================================================================================
TOTALS: 5.6.3 (14)
```

5. SPECIFIC INFORMATION FROM STUDBOOK PARTICIPANTS

Location A10

A sudden and massive outbreak of *Ornithodorus compactus* ticks was experienced at my European indoor facilities. The cause of this outbreak and the origin of the ticks remains unknown. There were no newly imported (African) animals in the collection at the time of the outbreak (last import dated from 2015). Ticks were present in such large numbers that they could be readily detected visually as well as secondarily based on the behaviour of the tortoises. Most ticks were found on captive-bred *C. signatus* and very few were present on (wild-caught) adults and on *H. areolatus*, *H. femoralis* and *Psammobates oculifer*. The ticks could easily be removed with forceps. Treatment is still ongoing. An estimated total of 4000 ticks has been removed during six months of treatment (i.e., removal of ticks with forceps and killing them in alcohol). Initially, more than 1000 ticks were removed in a single treatment, but this has decreased to 60 tick nymphs per treatment. Tortoises were very stressed after initial treatment and did not appear for days. Current treatments are much shorter and less stressful.

In the year prior to the outbreak, several captive-bred *C. signatus* had been transferred to other studbook locations. All locations were contacted to check the animals for ticks. No ticks were discovered, so the outbreak probably started after the last transfer. A manuscript will be written to publish this rare occasion.

Location A44

One female *H. areolatus* laid two eggs late this year (17 November). Temperatures were 17°C at night and 24°C degrees during the day. A spotlight was on for more than 10 hours a day, providing a hotspot of 35°C.

Location A46

Over the years, increased aggression has been observed in *C. solus* and *H. areolatus*. In *H. areolatus*, the male started to bite the females in their hind limbs after rainfall/sprinkling. The male did not prefer a specific female. In *C. solus*, an old female is most aggressive towards other females. Sometimes biting continues for more than an hour. Captive-bred male *C. solus* have been observed to bite other males too, but to a lesser degree.

In August, *H. areolatus* sexes were separated to reduce overrepresentation of the bloodline in the studbook. This will also enable to test how long female *H. areolatus* can produce fertile eggs after mating. In its new enclosure, the male suffered from a tick infestation. The male was fine after treatment. The photos show a similar tick infestation in *C. solus*.


*Die Schildkröten (*Homopus areolatus *und* Chersobius solus*) die wir halten wurden grösser und älter über die Jahre und haben nun angefangen sich gegenseitig zu beissen. Bei* H.areolatus *hat das Männchen angefangen angefangen die Weibchen in die Oberschenkel der Hinterfüsse zu beissen. Dies geschieht entweder nach Regenfaellen und/oder wenn das Freigehege besprinkelt/besprüht wird. Dabei wird keines der Weibchen bevorzugt.* Chersobius solus *zeigte dieses Verhalten während der vergangenen Jahre nicht. Seit vergangenem Jahr wurde jedoch ein Beissverhalten öfter/regelmässiger beobachtet. Das Interessante dabei ist:* Chersobius solus *biss gleichgeschlechtliche Exemplare häufiger. Die 'ältesten' und schon über viele Jahre gehaltenen Weibchen zeigten dabei das aggressivste Verhalten und haben sich zeitweise länger als eine Stunde ineinander verbissen! Auch der männliche Nachwuchs hat nun angefangen sich von Zeit zu Zeit zu beissen. Allerdings zeigen sie dieses spezielle Verhalten in einem wesentlich 'angenehmeren' Weg.*

Seit August haben wir die Homopus areolatus*-Zuchtgruppe getrennt und das Männchen ist seither in einem unterschiedlichen Freigehege untergebracht. Alles ging gut, bis auf ein aufkommendes Zeckenproblem im neuen Gehege. Vielleicht wurde das Männchen geschwächt? Nach einer speziellen Behandlung scheint alles wieder in Ordnung zu sein. Wir werden nun sehen wie lange die zurück gebliebenen Weibchen in der Lage sind befruchtete Eier abzusetzen.*

An observation was made of *H. areolatus* feeding on dry leaves of *Kalanchoe thyrsiflora*. The tortoises appeared to prefer the old, dry leaves of this plant. The same behaviour was observed in *C. solus*.


Location A55

One of the eyes of a male *C. signatus* was closed and swollen on 18 May. After visiting a specialist veterinarian, the eye was treated until 13 June. On that date, the wound was cleaned and treatment continued. On 6 July, the eye was clean and appeared normal.

Location A59

The wild-caught couple *C. signatus* continued to produce eggs that resulted in offspring.

Location A66

Appendix 1 contains full reports on *C. signatus* and *H. areolatus* in German.

Location A68

Chersobius signatus female 9 produced an egg at a secluded site that represented a typical nesting site for this species. Unfortunately, the embryo died before hatching.

Location A73

New outdoor enclosures that are raised from the ground and have heating lamps were completed for *H. areolatus*. A female *H. areolatus* was digging a nest in the beginning of November after transferring it from the outdoor to the indoor enclosure, without producing any eggs. A radiograph revealed that the female was not gravid.

Location A79

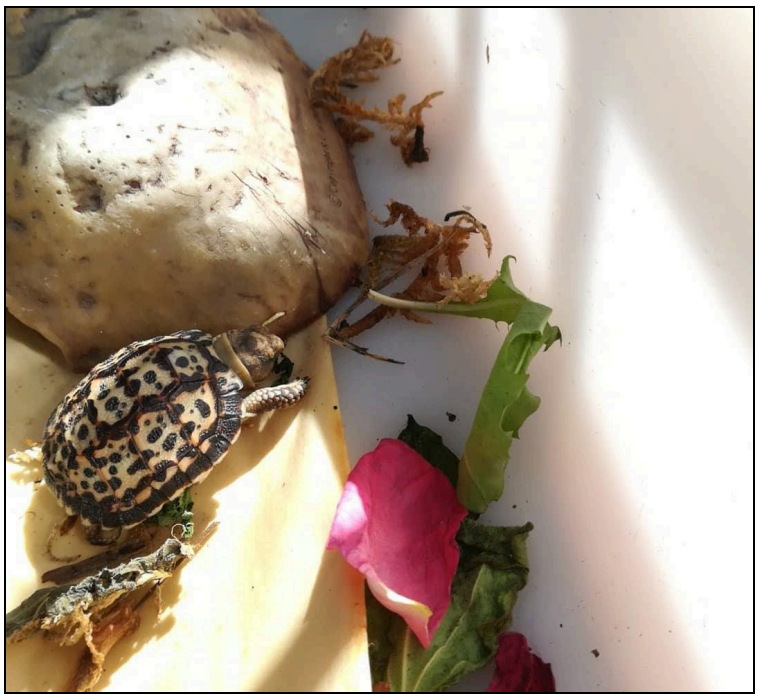
Two hatchling *C. signatus* were born, one of which hatched in the adult enclosure. The nest was hidden by an overhanging rock. The hatchling born in the adult enclosure had a light-coloured carapace, and remains of the yolk sac were still attached to the plastron (photo right). The remains were treated with iodine and the hatchling was transferred to a dry enclosure. It is being soaked once or twice per week until the yolk remains will fall off. Both hatchlings appear to have a preference for dried food plants. They eat little fresh herbs (except *Taraxacum* sp. and *Plantago* sp.). The adults eat fresh as well as dried food.

Location A84

Chersobius signatus female 96 produced a two-egg clutch on 1 March. Unfortunately, one egg broke during nesting. The captive-bred *H. femoralis* females at my location are growing nicely, but had to be separated because one individual dominated the other, resulting in a reduced growth rate.

Location A110

A hatchling *C. signatus* did not produce faeces for a very long time, making the view of its first faeces very enjoyable.



This hatchling hatched from an egg that was incubated at a higher temperature than 33°C, as indicated by a calibrated thermometer that had initially not been used. The hatchling appears to have several deformations (e.g., the right eye appears to lack or to be covered by skin) that might have been caused by the high incubation temperature.

Location A116

A female *C. signatus* produced two clutched unburied and both eggs were broken. A third clutch was buried normally, but it was overlooked and hatched in the adult enclosure.

Location HRF

On 30 March, wild-caught male 150 was exchanged with wild-caught male 154 because the former male did not mate with wild-caught female 159. Immediate mating followed. However, on 14 April, the female produced a sticky, transparent fluid from the cloaca. On 16 April, the left hindlimb did not function properly and the female was brought to a specialist veterinarian. Unfortunately, the female died before it reached the veterinarian. A post-mortem indicated a broken follicle and pneumonia as primary cause of death. It is possible that the pneumonia developed secondarily when follicular material reached the lungs.

6. NEW PUBLICATIONS

The following overview summarises all manuscripts and articles that were submitted, accepted, published, or under review in 2018. A full list of publications authored or co-authored by Dwarf Tortoise Conservation is available at the website.

Subject	Submitted	Accepted	Published	Journal
Reproductive investments of a small, arid zone tortoise *Chersobius signatus*: follicle and egg development	2018	2018	2018	Acta Zoologica (English)
Testudinidae, *Chersobius boulengeri* (Duerden 1906), Karoo padloper. Reproduction.	2018	2018	2018	African Herp News (English)
Ultrastructure of eggshells from wild and captive speckled dwarf tortoises, *Chersobius signatus*	2018	2018		Herpetologica (English)
Homopus femoralis (greater padloper). Reproduction and growth.	2018			Herpetological Review (English)

7. FINANCIAL REPORT

All project expenses in 2018 were for the field study on *C. boulengeri* (see Paragraph 1.5), and were mostly covered by funding that had been received from the Turtle Conservation Fund/Conservation International, British Chelonia Group and private individuals (see Paragraph 1.5) in 2017. Substantial additional funding was received from Knoxville Zoo, Dutch Turtle and Tortoise Society, and private individuals in 2018, which was in part allocated to cover expenses in 2019. The reservation for 2019 will enable us to genetically investigate the diet of *C. boulengeri* and to supplement volunteer contributions to car rental and fuel costs (see Paragraph 1.5).

All non-project expenses were covered by a private donation by the board of Dwarf Tortoise Conservation.

Revenues Net amount €	Item	***Expenses*** Amount €	Item
Projects		*Projects*	*Field ecology of* Chersobius boulengeri
4,168	Remaining funds from 2017	2,680	Transmitters
2,000	Donation Dutch Turtle and Tortoise Society	1,248	Telemetry receiver + antenna
4,591	Donation Knoxville Zoological Gardens	155	Backpacks for field equipment
530	Donations (6) private individuals	149	Field camera for dietary and reproductive recordings
		75	Cooler box and transport boxes
		72	Various field materials
		67	Radiography
		65	Field radios
		62	Flashlight for inspection of rock crevices
		58	Plant identification books
		38	Snake hooks to remove tortoises from crevices
		13	Permits
		6,607	Reservation expenses 2019
11,289	Subtotal	11,289	Subtotal
Other		*Other*	
1,979	Donation private individual to cover overhead costs	787	Introductory movieclip *Chersobius boulengeri* project
		753	Relation gifts: cotton bags Dwarf Tortoise Conservation
		333	Notary costs for change of articles of association
		107	Annual costs bank account
1,979	Subtotal	1,979	Subtotal
13,268	Total	13,268	Total

8. PERMIT OVERVIEW

The activities reported in this annual report would not have been possible without the following permits issued by the South African and Namibian authorities:

Collecting and exporting of C. boulengeri

- Collecting permit FAUNA 0952/2018 (Northern Cape Department of Environment and Nature Conservation)
- CITES exporting permit 217387 (Northern Cape Department of Environment and Nature Conservation)

Collecting and exporting of C. signatus

- Collecting permit 331/95 (Western Cape Nature Conservation Board, South Africa)
- Collecting permit 28/2001 (Northern Cape Nature Conservation, South Africa)
- Collecting permit 053/2015 (Northern Cape Department of Environment and Nature Conservation)
- CITES exporting permits 16579 and 281/95C (Department of Environmental Affairs and Tourism, South Africa)
- CITES exporting permit 148487 (Northern Cape Department of Environment and Nature Conservation)
- Permit to move animals/animal products 2001/10/3/A (Department of Agriculture, South Africa)

Collecting and exporting of H. femoralis

- Collecting permit AAA004-00010-0035 (CapeNature, South Africa)
- CITES exporting permit 58679 (Department of Environmental Affairs and Tourism, South Africa)
- Health declaration dated 17-03-06 (Department of Agriculture, South Africa)

Exporting of H. areolatus

- Exporting permit 49683 (Ministry of Environment and Tourism, Namibia)
- CITES exporting permit 8830 (Ministry of Environment and Tourism, Namibia)
- CITES exporting permit 3558 (Ministry of Environment and Tourism, South Africa)
- Health certificate 13\1\4\2\ 09/2- 1676/04 (Ministry of Agriculture, Water and Rural Development, Namibia)
- Various additional permits issued to individual studbook participants (Namibia)

Field study and surveys on C. boulengeri

- Research permits 755/05, 43/2005 and 35/2005 (Northern Cape Nature Conservation, South Africa)
- Research permit 245/2/2015 (Northern Cape Department of Environment and Nature Conservation, South Africa)
- Research permit FAUNA 0950/2017 (Northern Cape Department of Environment and Nature Conservation, South Africa)
- Research permits FLORA 0066/2017 and FLORA 0067/2017 (Northern Cape Department of Environment and Nature Conservation, South Africa)

Field studies on C. signatus

- Research permits 137/99, 84/99, 019/2001, 010/2001, 46/2003, 26/2003, 8/2003, 168/2003, 43/2003, 158/2003, 633/2003, 25/2003, 158/2004 and 633/2004 (Northern Cape Nature Conservation, South Africa)
- Research permits 428/2002 and 41/2002 (Western Cape Nature Conservation Board, South Africa)
- Research permits 152/2012 and 153/2012, 460/2013 and 052/2015 (Northern Cape Department of Environment and Nature Conservation, South Africa)

Field study on H. femoralis

- Research permit AAA-004-000185-0035
- Research permit AAA-004-00020-0028
- Research permit AAA-004-000392-0035
- Research permit AAA-004-00027-0028

Appendix 1

Reports from location A66.