

ISSUE 23, SPRING 2018

SAIGA NEWS

Published by the Saiga Conservation Alliance



Providing a six-language forum for exchange of ideas
and information about saiga conservation and ecology



Saiga art by Altana Okonova, member of the steppe wildlife club in Troitskoe village, Kalmykia

This edition
funded by:



With additional
support from:



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This publication is available online at www.saigaresourcecentre.org, www.saiga-conservation.com and www.saigak.biodiversity.ru/publications.html, and as a pdf or in hard copy on request to the Editors, in Chinese, English, Kazakh, Mongolian, Russian and Uzbek.

Feature article

An overview of the online trade in saiga antelope horns in China

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The illegal wildlife trade (IWT) online is an escalating threat to the conservation of wildlife. Acknowledging the role that they play in the issue, internet giants of China such as Baidu, Tencent and Alibaba have pledged to fight actively against IWT activities. Apart from actively removing advertisements of wildlife contrabands and closing down online communities that are in clear violation of wildlife protection laws, platform users are also mobilised to report IWT activities to enforcement authorities via built-in mechanisms. Despite these efforts, however, the IWT continues to proliferate on these platforms and in cyberspace more generally.

Saiga antelope horns are one of the most commonly observed wildlife parts traded online. Saiga antelope horns are commodified under two different trades in China: the traditional Chinese medicine (TCM) trade and the Wenwan (traditional Chinese-style collectable) trade. This means that on top of the trade in identifiable saiga antelope horns, there are also many saiga antelope horn derivatives that are modified beyond recognition. For example, under the TCM trade there are at least seven different types of ready-to-use saiga horn products advertised online (table 1). Similarly the Wenwan trade transforms saiga antelope horns into anything from tea brewing tools to jewellery (photo 1). The array of products available online highlights the popularity and versatility of saiga antelope horn as a raw material.

A legal trade in saiga antelope horn medicinal derivatives exists in China. A number of TCM local pharmaceuticals

are licensed to manufacture and sell such products under the China Wildlife Utilisation and Marking System. On Taobao's website alone (the Chinese equivalent to Amazon) there are eight branded saiga antelope horn powders fetching up to CNY 131.7 (approx. USD 20.70) per gram. Although licensed products are supposedly marked with specific labels that explicitly list the wildlife ingredient (photo 2), the lack of means to verify product legitimacy creates ambiguity allowing illegal products to enter the legal market.

Table 1. Many forms of TCM saiga antelope horn derivatives exist. To date seven types of product have been recorded on e-commerce websites.

Product description in Chinese	Product
口服液	Tonic/medicinal elixir
注射液	Injectable solution
滴丸	Pills
胶囊	Capsules
颗粒	Medicine granules
粉	Powder
棒	Stick

Where they are advertised online illegally, saiga antelope horns are described using code words to hint at the product's availability and to signpost platforms and communities where sellers and buyers gather. There are currently 14 verified code words for saiga antelope and their horns. Considering how traders have developed nine homonymous code words based on the first two characters of saiga horn's Chinese common name alone, the actual number of code words in use may be even higher. Since the

Feature article (cont.)

targeting of IWT by hosting domains is based on common product names, code words provide a hideout for traders and consumers. On Baidu forum, one of the most popular local message boards, two groups named after saiga antelope horns were shut down in 2015. This still leaves nine active groups named under code words, with some groups hosting over 25,000 members. The prevalent use of these code words is indicative of a high level of awareness of the products' illegality, but the commonplace use of

these words online suggests a thriving community of traders and consumers. Of all the saiga antelope's range countries, Russia is the most frequently reported source of horns according to online traders. Even though traders are known to cite exporting countries rather than actual sources as origins, and despite these claims remaining largely unverified, the wildlife products traded in parallel to saiga antelope horns and photographic evidence provided by traders support these claims. At the very least, Russia



Photo 1. Saiga antelope horns are increasingly exploited as Wenwan collector items. Examples include (clockwise from top centre) tea scoop, tea knife, thumb ring, cigarette holders, beads, and amulets. Although advertised by different traders, all products show red spots. "Blood material", as it is called in trade, is relatively rare and highly valued. *By Baidu.com, Jack Y.K. Lam*

appears to play a role in the trade network for saiga antelope horns.

In TCM and Wenwan markets, saiga antelope horns are valued according to a number of criteria. For example, both trades favour fresh saiga antelope horns due to the horns' tendency to decolour and crack as they age. One of the latest trends is the presence of red blood vessels in the horns. The bright red hue indicates freshness, and is seen as a rare and beautiful inclusion. Such product differentiation makes room for traders to mark up their prices. Since this red hue is more common in the horns of young saiga antelopes, the market has seen an increase in the advertising of small-sized saiga horns as a result (photo 3).

The trafficking of saiga antelope horns into China is a persistent challenge for Chinese enforcement authorities. According to the Urumqi Customs authorities, 14,900 saiga antelope horns were seized between early-2012 and mid-2014 on the border of Xinjiang Province — one of the three Chinese provinces



Photo 3. The horns of young saiga antelopes are becoming a favoured sub-type of saiga antelope horns. Some traders sell them separately from large-sized saiga antelope horns, and post photos of exclusively small-sized horns. *By Baidu.com, Jack Y.K. Lam*

neighbouring saiga antelope range countries. A review of mainstream media reports since then adds another 5,608 horns to this total. In 2015 a seizure of 1,502.5 kg of saiga horn, the largest of its kind reported thus far, was made under a cross-province multi-agency enforcement operation.

Cyberspace provides room for the demand for saiga antelope horn to persist, and for the illegal trade to propagate under disguises and legal ambiguities. The trade in saiga antelope horn is diverse and dynamic, and website-hosting domains' effort to tackle the IWT is limited by their knowledge and available resources. It is therefore important that wildlife conservationists continue to monitor illegal activities online, to engage and inform relevant stakeholders and facilitate actions.



Photo 2. Legalised saiga horn products are available online. Here a pharmaceutical company highlights the legitimacy of their branded saiga horn powder. The official CNWM label is printed with “*Cornu saigae tataricae*”— the TCM name for saiga antelope horn. *By Baidu.com, Jack Y.K. Lam*

Updates

Strategic Meeting to Advance Conservation of Central Asian Migratory Mammals

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Over the past few years, CMS has worked intensively on helping Range States to reduce barriers to animal migration, through the Central Asian Mammals Initiative (CAMI) and its implementing partners. Fences, roads and railways are a significant barrier for saigas, Mongolian gazelles, kulan (wild ass), argali and other species that move in search of food and water, as they follow seasonally changing precipitation and vegetation patterns. Maintaining such movements is crucial for the survival of these species. Activities to raise awareness of threats and ways to address them has also been a major part of the Secretariat's work under CAMI since 2014.

CAMI was created under the aegis of CMS as a framework for regional conservation action. The Programme of Work for the initiative provides a set of agreed activities to conserve 15 species of large mammal, such as the snow leopard, Marco Polo sheep, kulan, wild camel, Przewalski's horse, the saiga antelope and others. It was adopted by CMS Parties at the 11th meeting of its Conference of Parties (COP11) in 2014.

Range State representatives, scientists and conservation experts met on April 16-19 at the International Academy for Nature Conservation on the German island of Vilm to review the implementation of the CMS CAMI, and to discuss challenges and a strategy for further action. The meeting was made possible through the generous support of the German Federal Ministry of the Environment, Nature Conservation and Nuclear Safety (BMU) and was organized by the CMS Secretariat in cooperation with the German Federal Agency for Nature Conservation (BfN).

The Governments of India, the Islamic Republic of Iran, Kazakhstan, Kyrgyzstan, Mongolia and Uzbekistan reported on measures they have taken since 2014 to reduce barriers to migration, to combat poaching, to establish protected areas and to conduct scientific research.

Additionally, scientists from China, the Russian Federation and Turkmenistan reported on the conservation status and measures to safeguard CAMI species in their countries.

The saiga is a key species within the initiative, as many of the activities within CAMI address saiga conservation directly or indirectly. Workshop participants agreed that it is necessary to further strengthen trans-boundary conservation efforts and that CMS can play a major role in facilitating this process. Border fences, poaching and scientific research in trans-boundary areas were among key topics to be addressed in the near future. For saigas, the CAMI programme of work specifically contains agreed measures for governments to strengthen cross-border collaboration in the Ustiurt landscape.



Meeting participants. Photo by German Federal Agency for Nature Conservation

“Facilitating trans-boundary cooperation is the strength of CMS and is crucial to safeguard populations of migratory mammals. Fostering this cooperation amongst countries for the benefit of wildlife across the region will be the focus of CAMI in the years to come” said Bradnee Chambers, CMS Executive Secretary.

The meeting produced an overview of the implementation of the CAMI programme of work, updated information on the conservation status of CAMI species and agreed on further coordinated action until CMS COP13.

A workshop on saiga captive breeding held in Moscow

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On 28th-29th August 2017, the Russian Academy of Science’s Institute of Ecology & Evolution, San Diego Zoo and the Saiga Conservation Alliance hosted a two-day workshop to exchange knowledge and develop a strategic plan regarding the role of specialist captive breeding centres in saiga conservation.

Representatives of the saiga range states – Russia, Kazakstan, Uzbekistan, China and Mongolia - participated in the meeting. The workshop was also attended by the officials from the Ministry of Natural Resources and Environment of Russia, European and American zoos, and international conservation NGOs including IFAW, WCS and WWF.

The saiga antelope is listed as Critically Endangered by IUCN and faces severe threats in the wild, including poaching, mass mortality from disease, and linear infrastructure disrupting migration routes. Since 2010, all five populations of the species have been severely affected by at least one of these threats. The workshop participants discussed the role of captive populations of saigas in mitigating these threats, and circumstances under which captive populations of saigas can complement and reinforce conservation of wild

populations. The importance of improving the genetic composition, behaviour and physical health of the captive stock, making sure that facilities meet the highest welfare standards, and the scientific, educational and awareness-raising potential of captive populations were stressed.

The meeting ended with a commitment to develop an international network of captive breeding professionals to continue the productive exchanges of ideas and best practice which were started at the workshop.

Anyone interested to join this network should contact Jeff Holland, at j.holland@cctu.biz. The workshop report can be found here: <http://saiga-conservation.org/wp-content/uploads/2017/09/CBW-meeting-report.pdf>



Participants of the Saiga captive breeding workshop.
Photo by Alexander Esipov

Updates (cont.)

Some news from the Stepnoy Reserve in Astrakhan province, Russia

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The Stepnoy Reserve in the south of European Russia has often been a focus of attention in Saiga News. It is a protected area with unique steppe ecosystems, where the main components are feather grass and saiga antelope. Since 2002 the reserve has been actively cooperating with the International Fund for Animal Welfare, one of the world's biggest conservation NGOs, which has been known for over 20 years for its educational programmes teaching millions of people of all ages to protect animals. This cooperation inspired IFAW to organise an educational workshop on "The Relict Saiga Antelope" in the town

of Liman in Astrakhan province on 21-22 April 2018, with the support and active participation of the Russian Geographical Society, Stepnoy Reserve and Astrakhan State Biosphere Reserve.

Over 50 teachers, managers and environmental educationalists from organisations in Kalmykia and Astrakhan province accepted IFAW's invitation to take part in the event. The workshop was also attended by the local government of Liman District, Nature Management and Protection Service of Astrakhan province, and the cosmetics company Lush, which has supported a number of nature protection projects throughout Russia.



Saiga female feeding her calf. Photo by Gennady Yusin

The workshop participants received information about IFAW's educational programmes with enthusiasm. Many of these relate to saiga conservation: steps to enhance young people's environmental education; games and competitions organised in schools throughout the region; establishing steppe clubs in the Republic of Kalmykia; the work of pupils within the Ekolog (Environmentalist), Yuny Ekolog (Young Environmentalist) and other creative associations in Astrakhan province.

The colourful presentation of the Stepnoy Reserve's activities drew special interest. However, no presentation could have given an idea of what the workshop's participants saw with their own eyes during an excursion to the Reserve. The workshop participants enjoyed seeing carpets of red-listed tulips and other flowers, birds fussing about their nests (some of which were artificial ones built by the reserve's workers) ready to hatch a new brood and, of course, saigas grazing peacefully or running across the road in front of the moving car. The view from a 15-metre observation tower not far from the base truly impressed the guests. At the end of the workshop all the participants made a unanimous decision to create special groups on the social media sites Vkontakte and WhatsApp to exchange experience in educational practice, and agreed on the importance of celebrating Saiga Day regularly throughout the region.

Ten days later, when the holiday period came to Russia and most of its citizens distracted themselves from their everyday activities, the Stepnoy reserve's rangers, as usual, further intensified their strong protection of this unique reserve. At this time in May saigas give birth, which is the



Vladimir Kalmykov (left) and his colleague during the educational seminar in Stepnoi Reserve, Astrakhan region, Russia. Photo by Olya Esipova

most important event in the animals' lives. On 2 May 2018 a few female saigas were observed during a vehicle survey, anxious-seeming and standing up and lying down again, holding their heads high. Doing their best not to disturb the animals, the rangers got closer and saw two saiga babies lying down, which were still very wet and incredibly touching – 'twin girls'. Those were the very first saiga babies of the year in Stepnoy, heralding the mass calving which, given the weather was fine, was about to begin. However, before that the rangers encircled the calving area with bright blue signs, which could be seen from a considerable distance and indicated that the territory was closed during the entire calving period. The other important task they carried out was to remove dry grass from the area and plough it to prevent fires, which are quite possible in spring when strong winds and heat dry everything up. According to the reserve's specialists, the saiga rutted quite successfully in December 2017-January 2018, so there is every reason to hope that no power, human-generated or natural, can interfere with the birth process, and that the saiga population in the north-west pre-Caspian Sea area will start to grow.

Updates (cont.)

Saiga Ambassadors in Russia

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In 2018 the Saiga Conservation Alliance is celebrating the tenth anniversary of the foundation of the first steppe clubs, which are currently functioning in almost every saiga range state. To let a wider community know about the SCA and steppe clubs, as well as about Saiga Day, which is one of the most significant events in saiga range states with the potential to attract large numbers of people, the SCA launched a programme entitled 'Saiga Ambassadors'.

We began testing the Saiga Ambassadors programme in the Republic of Kalmykia, Russia, which was the first to see steppe clubs and where the Saiga Day has been regularly celebrated for many years. A delegation of saiga ambassadors consisting of Joyce Wang, Rebecca Stieveter and Bill Unger representing the Wildlife Conservation Network and Olya Esipova of the Saiga Conservation Alliance visited the Zhukov Secondary School in Troitskoye, Tselinny District, where they met members of the Tropoy Saygaka (Along the Saiga's Path) steppe club. The guests were truly impressed by a concert organised by the children and devoted to saigas. Club members exhibited their embroidery, appliqué, drawings and full-size pictures, under the theme 'Saiga, the relict of the steppe region'. At the end of the visit the participants discussed the steppe club's future plans, which include the development of cooperation with various nature conservation organisations and Kalmyk State University. On parting, the children presented the guests with hand-made souvenirs portraying Kalmykia's natural symbols.

The best way to ensure financial support is to show sponsors saigas in their natural environment. The delegation chose to visit the Stepnoy Reserve, one of the alliance's oldest and closest partners, providing its ecological communities with reliable round-the-clock protection and allowing the saiga to feel absolutely calm and happy. However, while visiting, the group of international experts was attacked by a gale, turning at times into a severe sandstorm, which did not allow them to fully admire the view of the blooming carpet of red-listed tulips and other spring flowers, watch closely the birds building their nests and, most importantly, discern saigas in the haze that had gathered on the steppe. Nevertheless, the reserve's rangers managed to relay the extraterrestrial beauty of the place with the help of vivid stories they told on the way to their field base. During dinner in one of the huts, simple but cosy and comfortable for work and recreation, the guests, though quite exhausted by



Saiga Ambassadors with members and leaders of the Tropoy Saygaka steppe wildlife club in Troitskoye village. Photo by Olya Esipova

the trip, poured a shower of questions upon the reserve's workers. What kind of protection scheme is used in the reserve? How is the protected area supported financially? Does Stepnoy cooperate with any nature conservation organisations? Can saigas be seen in the reserve at any time of the year? How do they work with the local community? Do they offer any educational programmes? The guests were given comprehensive and clear answers to all their questions. Despite the storm, which still hadn't subsided by the next morning, they managed to visit the remotest corners of the reserve, where Stepnoy staff took them to see saigas, whose dim silhouettes the guests had hoped to see in the dusty mist. Through the windows of a hide near one of the artesian wells they could see the animals more or less satisfactorily, while the view of the boundless steppe from the 15-metre observation tower completely struck the guests' imagination.

Students from secondary schools in the villages of Promyslovy and Liman arrived in the reserve for an excursion, and had an interesting conversation with the delegation. After a short lecture and a colourful presentation about saigas and the hard but highly important work the reserve staff were doing, all had an opportunity to see a series of movies shot by Russian and international filmmakers in the Stepnoy reserve.

Leaving the reserve for their next destination in Uzbekistan, the guests felt disappointed that the trip was so short and the wind so strong, but were confident that the cooperation with Stepnoy should evolve. They also noted that Saiga Day should become one of the most important events in all saiga range countries. This corresponded well



Saiga Ambassadors with members and leaders of the Tropoy Saygaka steppe wildlife club during the trip to Stepnoy Reserve. Photo by Olya Esipova

with the decision made at the "Relict Saiga Antelope" educational workshop previously organised by IFAW, which resulted in a series of Saiga Day events at the Mergulchiyev Secondary School in Adyk village on 29 April 2018 and attended by students and teachers from nine schools in Chernozemelsky District and steppe club leaders. The celebration culminated in the "Relict Saiga Antelope" ecological adventure game, where student teams familiarised the spectators with saiga biology and conservation methods in an interesting and creative manner. The game's stations were placed in Adyk's various important cultural sites so that all the villagers could watch the game. We all have reason to believe that the Saiga Day celebration will spread across new parts of the region and become a significant event influencing people's way of thinking and helping them to conserve saigas.

Updates (cont.)

Born on a Steppe

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Saiga Day is celebrated in the steppes of Karakalpakstan, Uzbekistan, early in May, because this is when saiga babies are born.

The main goal of all Saiga Day events is to increase knowledge about this unique species and broaden the minds of children and young people, with the ultimate aim of controlling poaching and conserving saiga within its habitats. In the hospitable Karakalpak land the 'saiga ambassadors' continued getting acquainted with steppe clubs, a journey which they started in Kalmykia shortly beforehand (see above).

This time, Saiga Day featured a festival entitled "Saigas from the Ice Age". During the Ice Age, saigas used to graze alongside mammoths and woolly rhinoceros and were often attacked by their natural enemies, including human hunters. Many animals of that period have become extinct because they could not adapt to the changing environment. Humans and saigas, however, have survived thanks to their high adaptive capacity, and to this day continue to live side by side. However, the cruelty of poachers who are hunting illegally for this relict antelope is proving



Young artists and Alexandra Zaslavskaya after the saiga puppet show. Photo by Olya Espipova

too much for saigas today, and the species has come close to the brink of extinction.

The idea of organising a "Saigas from the Ice Age" festival came from children at the Yukon Berengia Interpretive Centre in faraway Canada. During one of their lessons, the teachers told a story about this unique relict antelope. The animal's unusual appearance and the fact that it still inhabited the steppes of Uzbekistan, Mongolia, Kazakhstan and Russia struck the kids so much that they decided to send postcards with messages to their fellow pupils on the other side of the globe. Unlike pupils in Canada, our children are lucky to live near saigas.

The "Progress" school in Nukus was the first venue for the festival. Almost all pupils of different ages – over 2,000 children in total – took part in the events. Each class formed a team for the 'ecological express' competition, where the children demonstrated how



Saiga Ambassadors team in Uzbekistan. Photo by Olya Espipova

much they knew about saigas and its neighbours from the Ice Age, prepared a poster about saiga protection and showed their skills in their native and foreign languages, customs and traditional games. For younger children, members of the steppe club staged a puppet show in three parts: What are saigas?, About an Evil Hunter and Every Animal's Friend. The pupils played all the parts and wrote the script, full of interesting characters, kind and cruel, weak and strong, where the good finally overcame the evil and the poacher, supported by the spectators, turned into a kind-hearted man.

The next stage in the festival was a visit of the 'Saiga ambassadors' to secondary school No. 31 in the village of Kyrkkyz on the Ustyurt Plateau near saiga habitat. Teams representing three other steppe clubs in the villages of Zhaslyk and Karakalpakstan also arrived in Kyrkkyz to take part in an ecomarathon, a competition entitled Funny and Inventive People and an ecological adventure game. In the Ice Age, saigas used to travel side by side with mammoths and woolly rhinoceroses. In the same way, teams from the four steppe clubs needed to cover a distance and overcome



Saiga Day show in "Progress" school, Nukus. Photo by Olya Esipova

various obstacles, such as a primitive man with artful questions and a sabre-toothed tiger with sharp fangs. In another competition the children had to complete diverse funny missions – the combined team of saiga, mammoths and woolly rhinoceros had to find food and watering places. On their way they had to go through an obstacle course, where the children had to demonstrate all their skill, resourcefulness, team spirit and solidarity. As usual, the ultimate winners of all the competitions were friendship and a sea of positive emotions. People from Kyrkkyz village were also invited to an ecological cinema screening, where younger children could see two episodes of The Steppe Fairytale cartoon telling the adventures of a little saiga named Nosishka (lit. 'nosie') and his friends, while adult visitors could watch the documentary "At the Final Line", about the saiga's hard life and their struggle to survive 'at the points of poachers' guns'.

The Saiga ambassadors' programme also included an excursion to the town of Muynak, once washed by the waters of the Aral Sea. Currently, this is an area of environmental collapse caused by the catastrophic shrinkage of the Aral Sea, a major Central Asian body of water now on the verge of disappearance. This led to negative climatic changes, the degradation of



Saiga from the Ice Age ecological festival in Kyrk Kyz. Photo by Olya Esipova

Updates (cont.)

natural ecosystems and worsening of the local people's quality and style of life. The Saiga ambassadors went to the bottom of the former lake where, lying on the sand, were the corroded hulks of fishing boats, reminding people that through thoughtless actions we can lose anything, even a sea. Nevertheless, there was good news, too: pupils and teachers from secondary school No. 1 in Muynak are ready to defend saiga, struggle with poaching and form a steppe club.

In the meanwhile, this is not the end of the story of the postcards from the Canadian children. Kids from the Karakalpak steppe clubs also made postcards to send back to Canada, where they called on people to conserve saiga, the steppe-born 'ambassador from the past' which has made it through to the present day.

The new steppe wildlife club 'Tropoy Saygachonka'

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A new steppe wildlife club named 'Tropoy Saygachonka' (Along the Saiga Baby's path) was established at the G. K. Zhukov secondary school in Troitskoye village, Tselinny District, Republic of Kalmykia, in 2017. The club is headed by Yulia Arsenova, teacher of biology, high achiever in people's education, and Honoured Teacher of the Republic of Kalmykia and Russian Federation.

Club members organise events dedicated to the saiga antelope. The pupils compete in writing essays and poems about the saiga, making posters, drawings and leaflets and creating handmade articles using natural materials. The club's activities are highly valued, and the children often receive awards at competitions, conferences, Olympiads and art contests at local, republican and



Members of the 'Tropoy Saygachonka' steppe wildlife club. Photo by N. Pyurvenova

national levels. To become more closely acquainted with the saiga, its habitats and conservation measures, the children have visited the Yashkul' saiga captive breeding centre, the zoological and cattle breeding museum at the Kalmykia State University and the Nature Department at the Palmov National Museum. Members of the Tropoy Saygaka steppe wildlife club take

part in a wide range of environmental activities, confirming the importance of the organisation being headed by an experienced biology teacher. The staff of the Zhukov secondary school in the village of Troitskoye, and its director Roza Sanjiyeva in particular, have made a great contribution to the club's work, supporting the pupils in every way and assisting them in organising conservation events.

'Tropoy saygachonka', an environmental educational game for preschoolers

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Tropoy Saygachonka (Along the Saiga Baby's path) is a special game aiming to enhance preschoolers' environmental education, acquaint the little citizens of Kalmykia with the saiga and its habitat and facilitate their perception of the world around them. The game is based on a model of a steppe ecosystem including all its inhabitants and the main character, the saiga.

All the figures are handmade from felt on a wire frame, so that the animals can be placed in any pose, which makes the game more dynamic. While playing, children familiarise themselves with the saiga's life and learn about relationships between animals and the dangers they come across in the steppe environment. Currently, the design team are working on making saigas in their winter attire (white fur), little saiga babies and other steppe dwellers, such as wolves, foxes, corsacs, hares and so on. The presentation of the final version of the game in various children's institutions



Children making the acquaintance of saigas. Photo Aygul Aytbayeva

throughout Kalmykia is scheduled for the autumn of 2018.

The implementation of this project would have been impossible without the support of the Saiga Conservation Alliance's Small Grant Programme in 2017.

Articles

Stepnoy Reserve in Astrakhan province – a reference site for saiga monitoring

Vladimir Kalmykov, Stepnoy Reserve, Astrakhan province, Russia, limstepnoi@mail.ru

Founded in 2000 in the territory of Liman District of Astrakhan province, the Stepnoy State Nature Reserve, with an area of 109.4 thousand ha, is currently one of the key habitats for the saiga population in the north-western pre-Caspian region. Moreover, in 2007, a prohibition on livestock pasturing came into effect in part of the reserve with an area of more than 50 thousand ha, and this site was given the official status of a 'saiga breeding and population conservation zone.' This measure ensured a favourable environment for saigas, particularly during the rut and calving.

From the very first days since its foundation, specialists from a range of national and international research institutes have used the Stepnoy reserve to study the saiga and test new research methods. Since 2003, the reserve's staff have monitored the animals throughout the year as an anti-poaching measure. Visual surveys are carried out during daylight hours using vehicles and GPS. The rangers monitor the distribution and sex and age structure of all saiga groups they encounter, note the survey date and record weather conditions and other information that may be important for further analysis. This field data is entered into a database managed by researchers from the A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, for further analysis. The information is highly important for making maps of the distribution of the saiga across the reserve in different seasons, and for

developing recommendations for the conservation of the species.

The saiga population in the north-west pre-Caspian region has been under pressure for the last 20 years, and currently its population is extremely small. This resulted in the inclusion of the saiga in the Russian Federation's list of animal species and other biological resources of special value in July 2013. This means that the illegal extraction, keeping, purchase, storing, transportation, sending and selling of the saiga is penalised in conformity with Article 258.1 of the Criminal Code of the Russian Federation. The saiga is also in the list of species proposed for

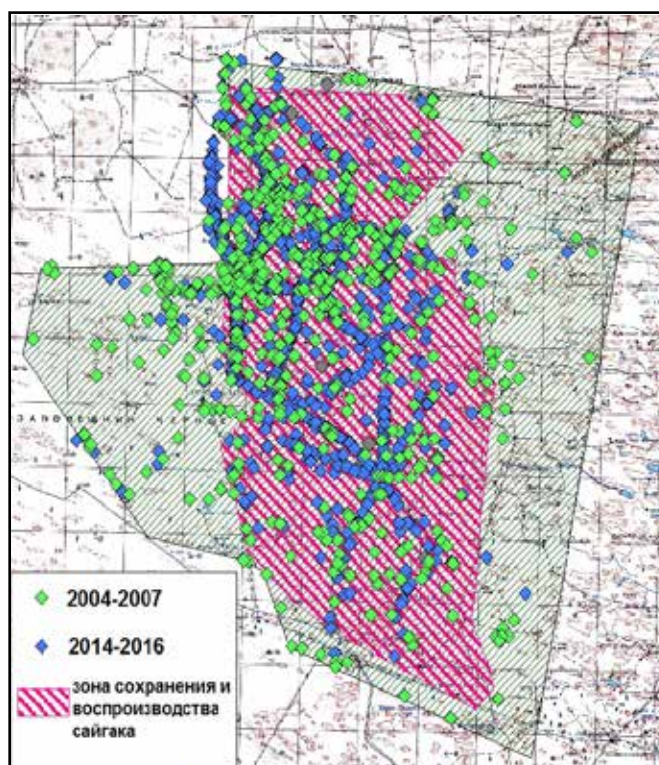


Fig. 1. Encounters with saiga in the territory of the Stepnoy Reserve in 2004-2007 and 2014-2016

Legend: Grey shading: The Stepnoy reserve. Pink shading: Saiga conservation and restoration zone.

inclusion in the new edition of the Red Data Book of the Russian Federation.

Here we present some results of the comparative analysis by Karimova et al. (2017) of data obtained between 2004 and 2007, when saiga numbers were estimated at 15-17.6 thousand individuals, and in 2014-2016, when, according to experts, there were no more than 3,500-5,000 individuals.

Saiga are resident in the Stepnoy Reserve throughout the year. In 2004-2007 saigas were recorded in almost all parts of the reserve, while in 2014-2016 they were found mostly in the 'saiga breeding and population conservation zone' (fig. 1). Probably this shift in the distribution is associated with the reduced population size and the need to stay within a less-disturbed area.

An analysis by Dubinin (2010) suggested that in this area, saigas use five key criteria in selecting a habitat: distance from a water source (explaining 35% of

the variation in saiga distributions), fire occurrence (28%), distance from cattle farms (12%), Normalised Difference Vegetation Index (a measure of vegetation amount based on greenness; 10%) and elevation above sea level (7%). Both in 2004-2007 and in 2014-2016, saigas spread evenly over the area in autumn, while in winter they preferred the north-western part of the reserve. In spring and summer (around calving time) the animals concentrated in the north in 2004-2007, while in the same seasons in 2014-2016 they occupied primarily the centre of Stepnoy reserve (fig. 2).

As typical inhabitants of open landscapes, saigas tend to aggregate into herds of various sizes. While the average number of individuals in a herd was significantly larger in 2004-2007 than in 2014-2016 ($t_{3526}=4.24$, $n_1=1069$, $n_2=2457$, $P=0.00002$), the medians are similar in both periods, at 35 and 40 respectively (table 1).

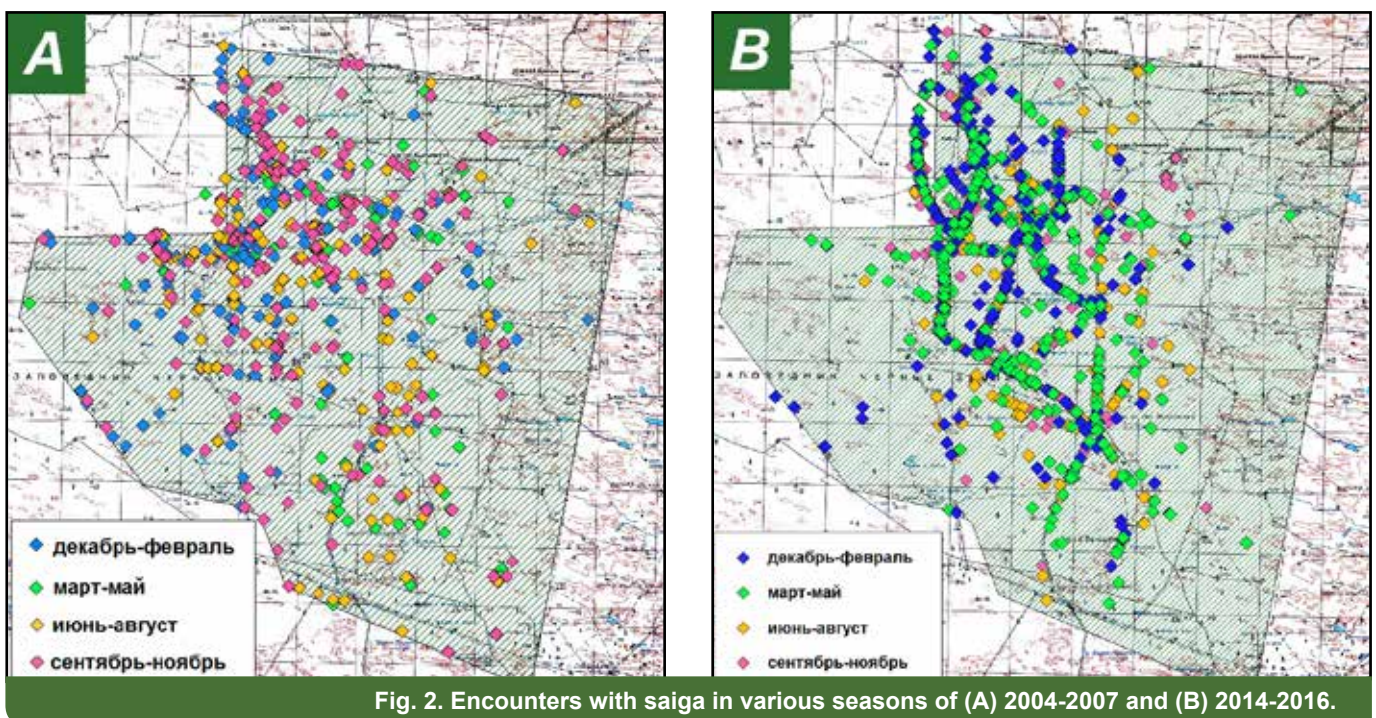


Fig. 2. Encounters with saiga in various seasons of (A) 2004-2007 and (B) 2014-2016.

Legend: Blue = Dec-Feb, green = March-May, yellow = July-Aug, pink = Sept-Nov.

Articles (cont.)

Table 1. Many forms of TCM saiga antelope horn derivatives exist. To date seven types of product have been recorded on e-commerce websites.

Year	No. of herds recorded	Herd size (No. of individuals)		
		Average±SD	Maximum	Median
2004	176	137±280	2150	38
2005	259	235±752	5000	26
2006	298	160±428	5000	39
2007	336	160±412	4250	44
2014	923	113±226	3000	40
2015	477	158±283	2500	43
2016	1057	111±233	3500	37

The distribution of individuals between herds has also changed over the last decade, with fewer large-sized herds recorded in later years (table 2). There are also more small and fewer very small herds. Probably, as their numbers drop, saiga prefer to be in larger groups, which helps them defend themselves against dangers, predators in particular.

Most of the herds recorded in the course of the monitoring were small or very small. In 2014-2016 their proportion did not vary greatly from month to month, most of the time being 84.9%-92.4% of herds, and only in April and May dropping to 71.2% and 76.9% respectively. By contrast, in the earlier period when the number of individuals was higher, the fluctuation was from 56.6% in April to 100% in July. In 2004-2007 large herds were registered throughout the year, increasing in number before calving and during the rut. In 2014-2016 large herds were recorded in April

and May, during the calving period, and in August there were some encountered near watering places.

The total number of saigas in north-western pre-Caspian region has dropped considerably. While in 2007 around 15,000 animals were recorded in the calving period and 20,000 during the rut, in 2014 there were no more than 4,000 and 2,000 individuals in the calving and rutting periods. One of the key factors causing the population decrease is the reduction in the percentage of mature males. The high demand for saiga horns and economic crisis in the early 2000s forced local people to poach, which led, by the 2002 calving season, to a shift in the population's sex and age structure and a drop in reproductive. The proportion of adult males in the region was 10.3% in 2004, 8.8% (2005), 12.7% (2006), 12.9% (2007), 5.7% (2014), 5.4% (2015), 8.1% (2016).

Table 2. Occurrence of saiga herds of various sizes in different years, %

Years	Herd size (No. of individuals)				
	<21	21-200	201-500	501-1000	>1000
2004-2007	35.3	47.9	9.6	3.3	3.8
2014-2016	30.0	55.6	9.8	3.7	1.0

A number of conservation steps taken in recent years have helped to improve the situation slightly. Proper protection, anti-poaching raids, including using high performance motorcycles, and efforts to raise the awareness of the local people have helped reduce poaching.

In conclusion it should be mentioned that over the last 10 years, the decrease in saiga numbers in this region has had little impact on the population's overall spatial distribution and behaviour. Another observation is that the increase in livestock numbers and in cattle farms in areas adjacent to the reserve, together with frequent fires, are forcing saigas to retreat for the rutting and calving periods

into the Chernye Zemli and Stepnoy Reserves, which are free from human activity. Long experience makes it clear that restoring the saiga population in this region will only be possible if the animals are protected properly throughout the current range.

The author is deeply grateful to researchers from the A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, for their assistance in saiga monitoring. We are also thankful to the Darwin Initiative, Saiga Conservation Alliance Small Grants Programme, US Fish and Wildlife Service and Russian Geographical Society for their support.

Saiga monitoring in Kazakhstan in 2017

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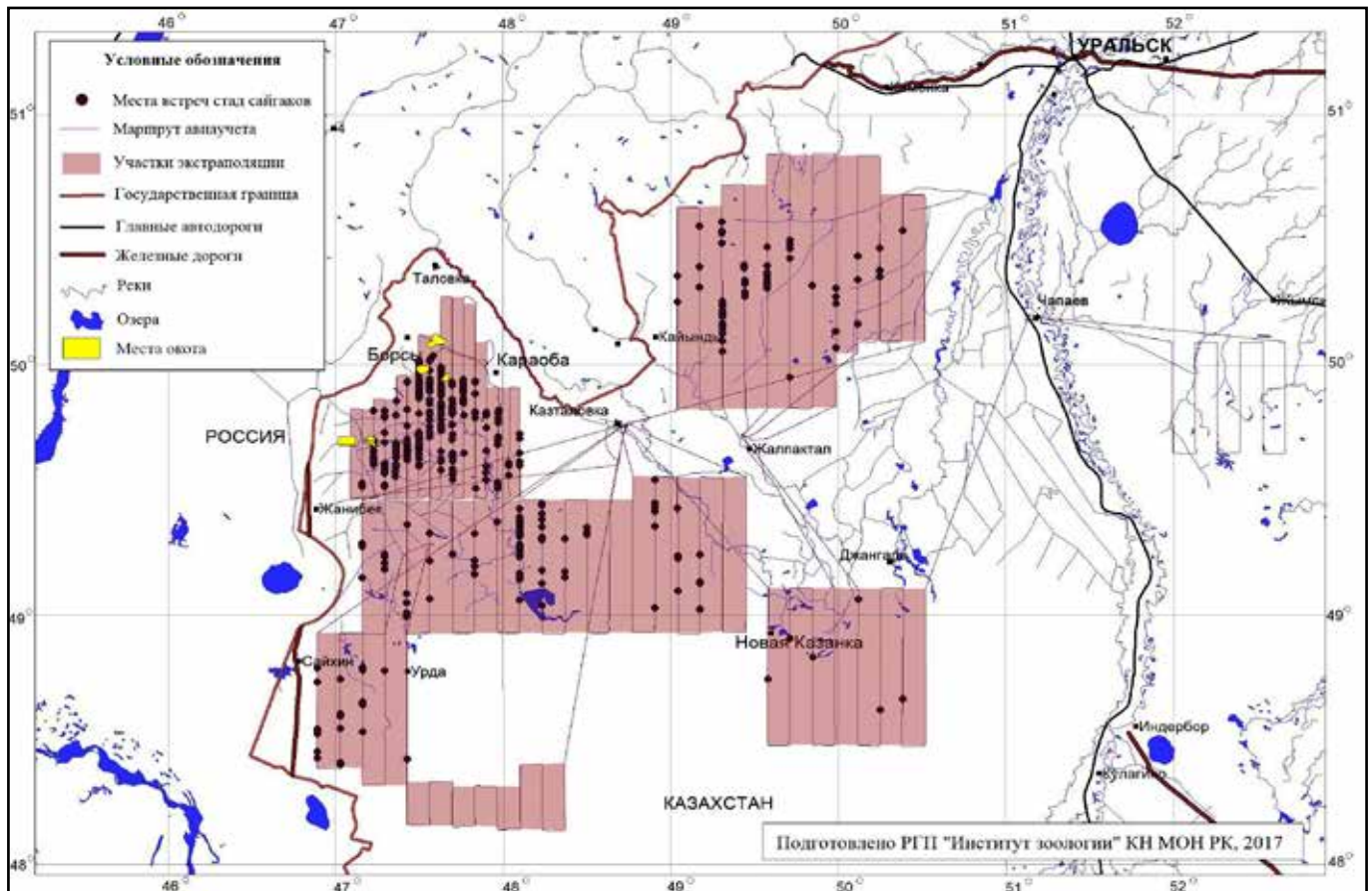
¹ Institute of Zoology, Ministry of Education and Science of the Republic of Kazakhstan teriology@mail.ru; ² Okhotzooptom, Forestry and Wildlife Committee, Ministry of Agriculture of the Republic of Kazakhstan

In 2017, an aerial survey for saigas was carried out between 11th and 30th April using two Eurocopter-145 helicopters (Betpak-dala population – 100 hours in the air; Ustyurt and Ural populations – 50 hours each; see SN issue 22). Compared to the Antonov-2 aeroplane which had been used for aerial surveys for many years, this helicopter has a number of advantages, the most important being the high level of comfort for the pilots and surveyors. However, our experience in the 2017 survey suggests that its relatively short range makes it hard to cover large areas, and it is not always possible to refuel in the steppe because tankers often cannot drive on roads softened

by spring rain. Thus, the An-2, which we have successfully used in the past, seems a better choice for future saiga aerial surveys, given the extensive territory of Kazakhstan.

At the time of the survey, the Ural population was dispersed over an area of 34,400 km², with an average density ranging between 0.03 and 16.79 individuals per km² (see map 1). The largest numbers (73.2 thousand individuals) were recorded in the north-west of West Kazakhstan province (not far from the border with Russia: see map 1). In total we estimated that the Ural population contained 98,100 thousand

Articles (cont.)



Map 1. Aerial survey of the Ural saiga population and main calving areas in 2017

Legend: Encounters with saiga (black dots); Aerial survey route (thin black lines); Inferred saiga range (in pink); State border (red); Main roads (thin black); Railways (thick black); Rivers (blue); Lakes (blue); Calving areas (in yellow).

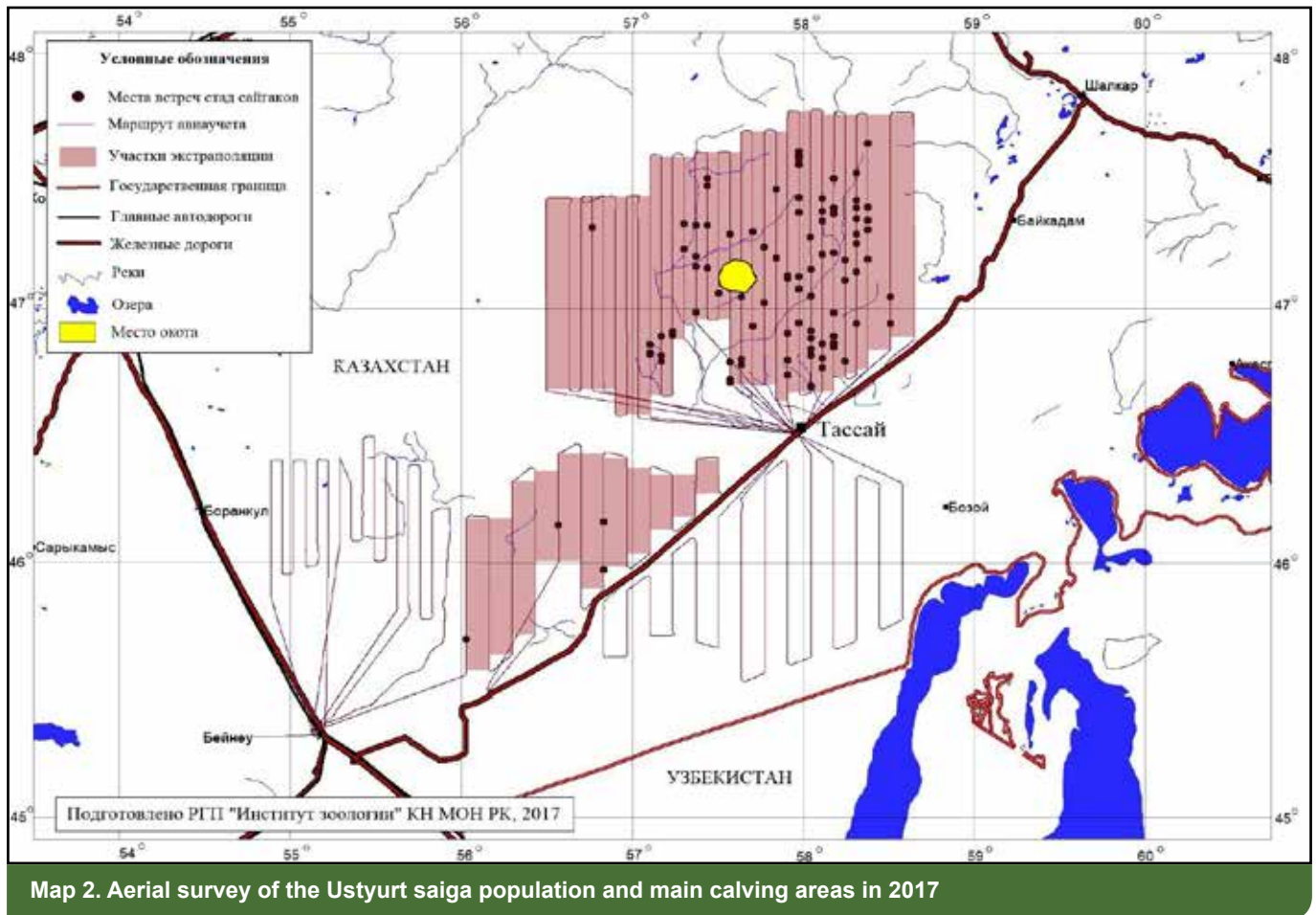
Prepared by Institute of Zoology, Science Committee, Ministry of Education and Science of the Republic of Kazakhstan, 2017

individuals, almost 28,000 more than in 2016 (70,200). The population has expanded eastwards and southwards.

The Ustyurt population covered 27,100 km² in two areas north of the Tassay railway station (see the map 2). No saigas were recorded south of the recently constructed Shalkar-Beyneu railway; according to interview data, no saiga were encountered there in the winter either, although in the previous few years the animals had migrated southwards each year to the border with Uzbekistan and beyond. The average density was 0.02 and 0.16 individuals per km², while the total was 2,700 individuals,

which is slightly more than in 2016 (1,900 individuals). Nevertheless, the number of animals in this population remains critically low.

The Betpak-dala population was spread over an area of 98,000 km², with 62,000 km² forming the western part of the range near the Shalkar-Tengiz salt pan and the Torgay and Zhilanshyk Rivers and 36,000 km² forming the eastern part near Lakes Teniz and Korgalzhin (map 3) The average density ranged from 0.23 to 7.97 individuals per km² depending on the location. The total population size was 51,700 individuals, which is 15,500 more than in 2016 (36,200). About 80% of the



Legend: see Map 1

Prepared by Institute of Zoology, Science Committee, Ministry of Education and Science of the Republic of Kazakhstan, 2017

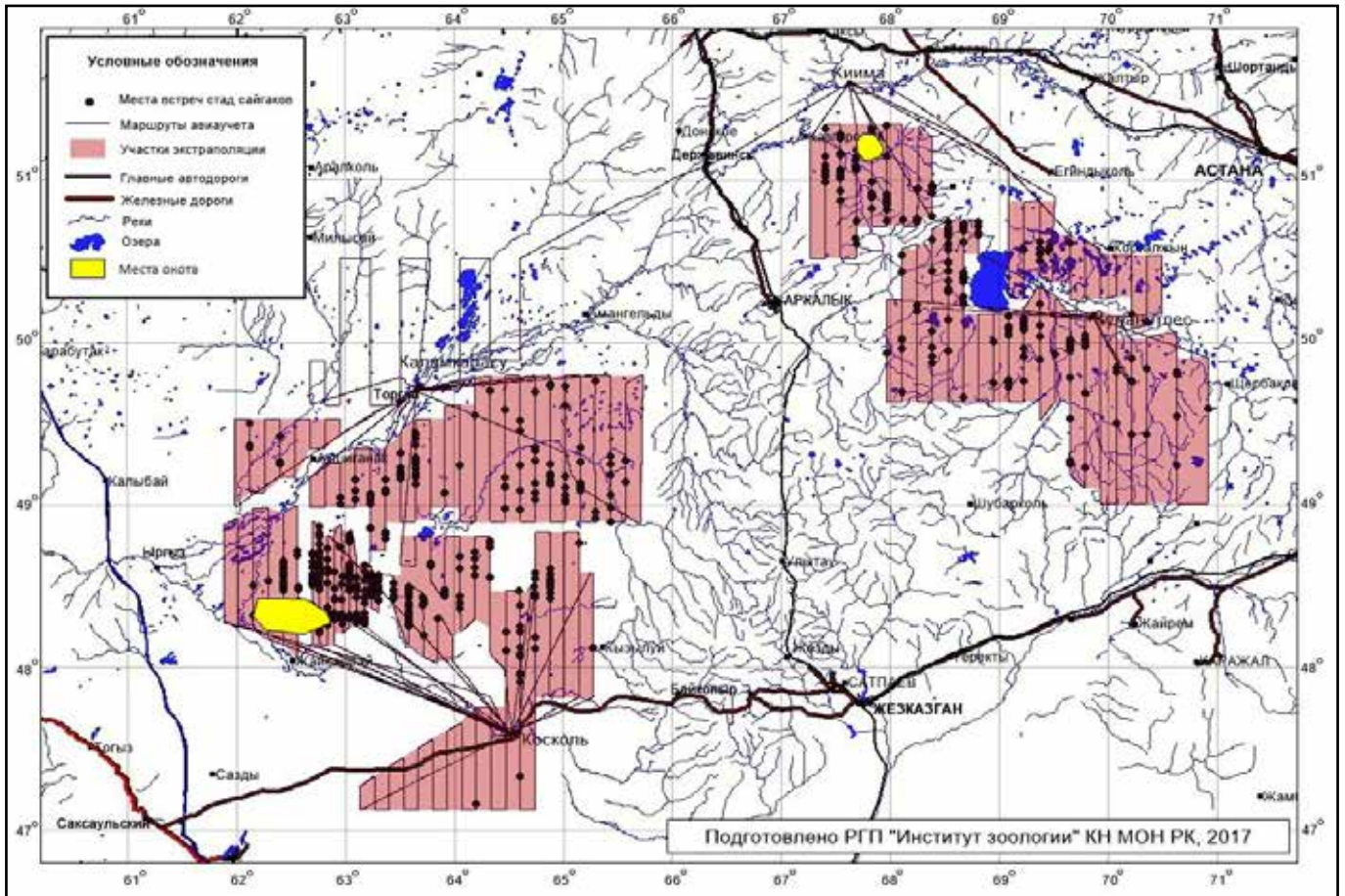
animals were recorded in the western part of the range. The saiga population is gradually growing after the 2015 mass die-off, but their range is not increasing so far.

In 2017 most saigas calved in the second dekad of May (10th-19th May), which is the normal calving period.

The Ural population calved near the villages of Borsy, Zhanabayevo and Shiger, roughly where they were observed during the aerial survey. There were four calving areas: around 10,000 individuals in 10-20 km²; roughly 40,000 individuals in 25-30 km²; about 3,000 individuals in 5 km²;

around 25,000-30,000 saigas in 15 km². The calving peak was 9th to 13th May, with the last newborn saiga recorded on 18 May. A total of 327 calves was recorded during a 23.3-kilometre walking survey (14 individuals per km²). On 127 occasions (82%) a single calf was recorded, while twins were recorded 18% of the time, giving an average calf number of 1.18/female. Of the 169 calves which were sexed, 55.2% were males. The average weight was close to that recorded in previous years: 3,77 g in males and 3,50 g in females. In the Ural population, the rut began in the first dekad of December. Six large aggregations with over 1,000

Articles (cont.)



Map 3. Aerial survey of the Betpak-dala saiga population and main calving areas in 2017

Legend: see Map 1

Prepared by Institute of Zoology, Science Committee, Ministry of Education and Science of the Republic of Kazakhstan, 2017

animals in each were recorded north of Lake Aralsor.

No large saiga aggregations were recorded by rangers in the Ustyurt population during calving, with only a few isolated groups of 20-30 individuals observed. Newborn saigas were noted in an area between the Shoshkakol saltpan and Monisay River in mid-May. In August, monitors came across 10 small herds, numbering 31 females and 19 calves, giving an average calving rate of 0.61 calves/female. Twelve of the observed females had no calves with them. Three harems were observed in early

December, comprising 7 (6 females and 1 male), 14 and 17 individuals.

Two calving grounds were recorded in the Betpak-dala population, one north-



Female saiga with three calves. Teniz Lake area, May 2017. Photo by Ye. R. Baydavletov

west of Lake Teniz (Taytetken area) and the other in the lower stretches of the Torgay River, within the Irgiz-Torgay Nature Reserve. Around 2,500 saigas were observed in the first area. The first babies appeared on 13th May, with most of them born between 16th and 18th May. The last newborn saigas were recorded on 19 May. In 132 encounters, monitors counted one calf 52% of the time, 2 calves 41.7% of the time and triplets 6% of the time (see photo). Researchers from the Irgiz-Torgay Reserve observed calving between 6th and 20th May over an area of 2,500 km², with groups of around 2,500 and 5,000 animals recorded in two locations. The rut began in early December, south-east of the Shalkar-Tengiz saltpan, with an aggregation of around 7,000 animals.

The age and sex composition of the saiga populations varied greatly depending on the region and season. For the Ural population, 306 individuals in 25 groups were recorded in photographs taken from the helicopter in April, of which 13% were male and 87% female. During a visual survey carried out in June using binoculars, 1,122 saigas were observed, in 12 groups. In total, 11.7% of the individuals were male, 51.5% female, and 36.8% juveniles. The 1,863 individuals recorded in December consisted of 14.2% males and 85.8% females and young of the year (at this time of year females and juveniles can't be distinguished from a distance).

Of the 1,231 saiga recorded from the helicopter on the Ustyurt Plateau, 8.8% were male and 91.2% female. There were 4 herds consisting entirely of males, of 4, 7, 13 and 18 individuals (see photo). Among the 99 saiga the surveyors came across in August there were only 4 males (possibly



Herd of 13 male saiga. Ustyurt Plateau, April 2017.
Photo by S. K. Saparbayev

due to the small sample size).

In Betpak-dala, in August 243 saigas were observed in 25 herds. Males comprised 5.3%, females 42% and juveniles 52.7% of the sightings. Six herds, totalling 291 saigas, were identified on photographs in December, of which 9.2% were males and 90.8% females.

The overall structure of Kazakhstan's saiga populations remains abnormal, which is caused primarily by illegal selective hunting for males.

The authors are deeply thankful to specialists from the Committee of Forestry and Wildlife (Ministry of Agriculture of the Republic of Kazakhstan), Okhotzooptom, regional territorial inspectorates, the Irgiz-Torgay and Altyn-dala Nature Reserves, Association for the Conservation of Biodiversity of Kazakhstan and Korgalzhyn Reserve, who, alongside experts from the Institute of Zoology (Ministry of Education and Science of the Republic of Kazakhstan), took part in the research.

Articles (cont.)

Mass Mortality Events: Publication of the Kazakh – British research team studies on saiga deaths

Richard Kock¹, EJ Milner-Gulland², Sarah Robinson³, Steffen Zuther⁴, Mukhit Orynbayev⁵

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Since the significant mortality events of 2010, which affected saigas in the Ural region of Kazakhstan (see Saiga News Issues 11 and 12) and in parallel with growing international and Kazakh efforts to conserve the species, a research team has evolved, engaging on both the ecological and veterinary aspects of the species' conservation needs. This built on the platform of multi-agency conservation initiatives under the coordination of the Association for the Conservation of Biodiversity (ACBK), working closely with the Committee for Forestry and Wildlife, Ministry of Agriculture and Biosafety Institute of the Ministry of Science and Education, Republic of Kazakhstan. Since 2012, the team has completed annual or biannual missions with a focus on the Betpak-dala population, including

multi-disciplinary scientists undertaking extensive expeditions to several calving sites in spring and for radio-collaring in autumn.

Standard operating procedures were developed during this time, for the investigation of mortalities and disease outbreaks, and activities included training workshops with Kazakh veterinarians and a close link with the Veterinary Reference Laboratory in Astana, the Almaty Virus Institute and international laboratories at the Pirbright Institute UK and Friedrich Loeffler Institute, Germany. The science generated has also fed into UNEP CMS protocols and guidance for disease response.

Mass mortality in 2015

The establishment of routine monitoring missions in 2012 was timely, given the sudden dramatic mass mortality event in May 2015. This was as large in percentage mortality terms as any die-off reported in the history of saiga, and was front-page news in many Kazakh and international media outlets. Having a team on the ground, small but adequately equipped, enabled the progression of the MME to be closely observed and fresh samples taken. The on-site teams reinforced quickly once the mortalities became obvious, with a second expedition to enable coverage of two aggregations that died across a vast landscape of hundreds of thousands of



square kilometres. This provided a good set of samples and observations to ensure diagnosis and a better understanding of the events leading up to the deaths.

These missions were not the end of the story, though, as a great deal of associated work was necessary, to explore the region for similar events in other species and livestock immediately after the mortalities. Data continued to be collected for the next couple of years including follow-up expeditions to the surviving saiga in Betpak dala in 2016 and 2017. These ecological data were analyzed, laboratory studies were initiated on the samples collected, and historical events and the associated environmental conditions were modelled.

Synthesis

The diagnosis of the disease that caused this catastrophic mortality of over 60% of the world's saiga and nearly 90% of those

in the stronghold of Betpak-dala was fairly clear, even in the field. However, it took months to confirm the sole pathogen involved, *Pasteurella multocida*, whilst excluding all other pathogens in global databases, using modern genomic tools. Haemorrhagic Septicaemia (HS) is the common name for the disease.

A major part of the work, and really the most important effort, was then to try to explain the underlying causation for this extraordinary event, where entire herds of up to 68,000 saiga were wiped out completely in a matter of days. This involved the research team and many supporting scientists in various laboratories and Institutions in both Kazakhstan and Europe, considering ecological and environmental factors. There was considerable pressure because of the very high level of public and scientific interest and it was important that the team ruled out all eventualities and explained the



Dead saigas in the Irgiz-Turgai reserve. Photo by Steffen Zuther.

cause clearly and scientifically. MME in mammals is rarely explained and so this was one of the first of such events to have received such comprehensive attention. The result was an extensive dataset now deposited in the UK under the National Environment Research Council open database (EIDC; see article by Sarah Robinson in this issue), and a number of publications which are now appearing. A synthesis of the events and findings was published in a peer reviewed journal, *Science Advances*.

In summary, the disease was caused by invasion of the blood stream by *P. multocida* bacteria, which we assume were commensal and latent in the majority of saiga adults, living in their tonsils. The trigger for this sudden and geographically widespread invasion appears to be weather-related. A rise in relative humidity and higher minimum temperatures (dewpoint temperatures) was observed in the environment where the saiga were calving for the ten days before the die off. This affected the behaviour of the bacteria and caused their proliferation and virulence, with subsequent toxic sepsis and death. This pattern of high relative humidity

is consistent with earlier die offs in 1981 and 1988 that are historically recorded, although the change in temperature was less marked in other years. This result was painstakingly extracted by many hours of challenging modelling and a strong team effort.

The future

The strong collaborations which developed during the investigation of the 2015 MME are still active, and we are working together to provide new insights into mass mortalities in saigas and other ungulates, as well as to support governments to improve their surveillance and rapid response protocols. For example, the work which we did around the 2015 event was useful to the Mongolian government, researchers and NGOs who investigated the epidemic of PPR which affected the Mongolian saiga population in 2016/17. We now have several young researchers working with us to understand different aspects of saiga disease, which we hope will lead to greater understanding of how best to manage future disease outbreaks for the species, as well as to new and interesting science.

The research paper synthesising the evidence about the causes of the 2015 mass mortality can be found at: <http://advances.sciencemag.org/content/4/1/eaao2314>



Richard Kock and colleagues carrying out a postmortem in the field. Photo by Steffen Zuther

Articles (cont.)

Saiga mortality and calving locations and the chemical composition of saiga forage plants: New datasets available in electronic format

Sarah Robinson, Department of Zoology, Oxford University, UK, sarah.robinson09@gmail.com

In the Soviet Union, long-term field data collection was well-funded and resulted in vast quantities of data, most of which exists only on paper in libraries or archives. Under two Leverhulme and NERC-funded projects we have used these sources, plus data from more recent fieldwork, to produce the following three electronic datasets focussing on the saiga antelope:

1. A shapefile of locations of calving sites and major mass mortality events in the Betpak-dala population;
2. A dataset of environmental conditions at a subset of these mortality and calving sites;
3. A database of the chemical composition of Central Asian forage plants, indicating species eaten by saiga.

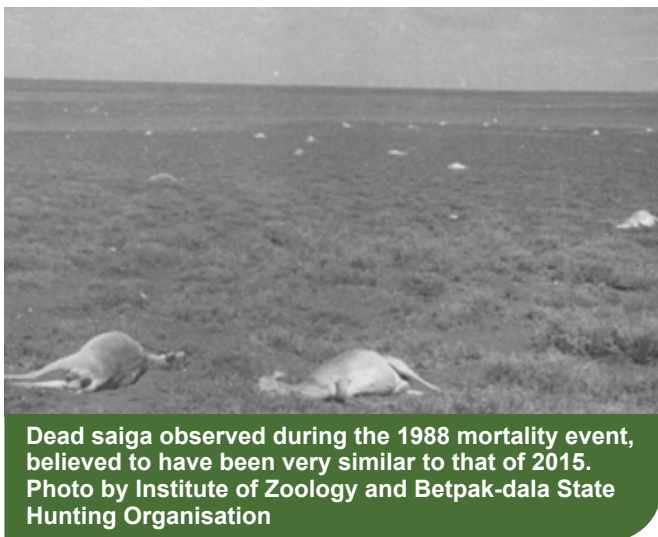
The saiga antelope is susceptible to extreme mass mortality events, with over 200,000 dead in the most recent die-off, in May 2015 (Kock *et al.*, 2018). The direct cause of most of these die-offs is haemorrhagic septicaemia

following infection by the bacteria *Pasteurella multocida*. However much remains mysterious, as this pathogen is a commensal and may be carried harmlessly by the animal before becoming virulent, probably following a change in the host environment or an environmental trigger.

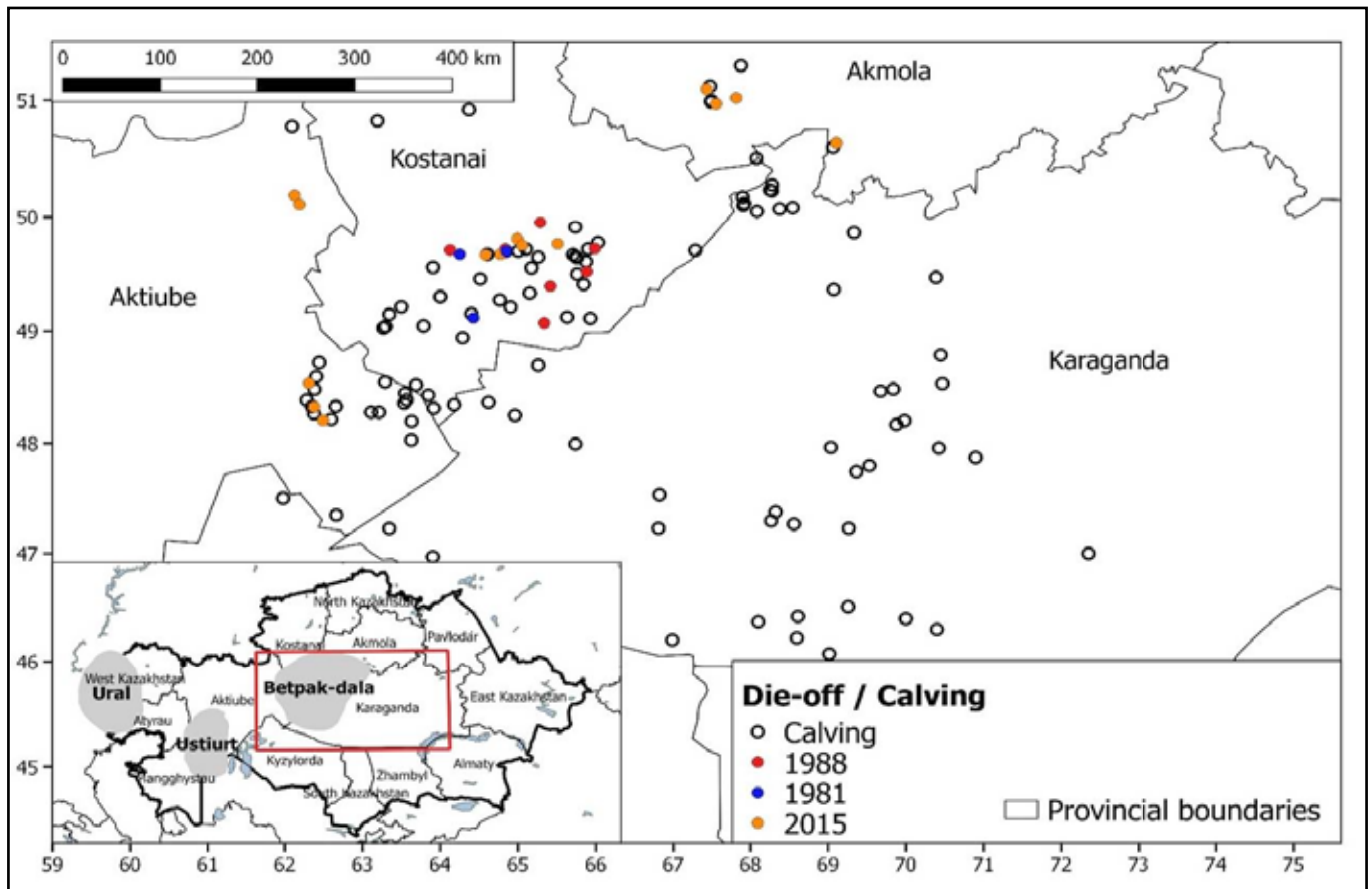
Haemorrhagic septicaemia outbreaks tend to occur in May during calving, when saigas gather in dense aggregations. Three major outbreaks have been recorded, in 1981, 1988 and 2015, each occurring at multiple sites and all in the Betpak-dala population.

The ***Shapefile of Saiga antelope die-off and calving sites in Kazakhstan*** contains these outbreak locations, plus locations of normal calving events in the Betpak-dala population for comparison. In total, the dataset contains 214 saiga die-off and calving sites obtained from field visits, aerial surveys, telemetry and literature. Locations derived from field data, aerial surveys or telemetry are polygons representing the actual size and shape of the mortality or calving sites. Locations sourced from the literature are either digitized from paper maps (available for some mortality sites), or point data around which buffers of 6km were created, representing the average size of calving aggregations.

The dataset is now available at the NERC Environmental Information Data Centre: <https://catalogue.ceh.ac.uk/documents/8ad12782-e939-4834-830a-c89e503a298b>



Dead saiga observed during the 1988 mortality event, believed to have been very similar to that of 2015. Photo by Institute of Zoology and Betpak-dala State Hunting Organisation



Map. Locations of saiga calving and mortality sites for which environmental data are available (coloured dots represent mortality sites and white dots normal calving events; Source – Kock et al. 2018).

Of the 214 locations listed in the Shapefile, 135 sites (Map) for which existing environmental data were available were used to model the probability of a die-off event, making statistical comparisons of environmental conditions at die-off and control sites (Kock et al., 2018). Data include climatic variables associated with haemorrhagic septicaemia in the literature, such as humidity, temperature, precipitation and wind speed. Indicators of vegetation biomass, phenology and length of the winter preceding calving were represented using the Normalised Difference Vegetation Index (NDVI), snow depth and snow presence data. The authors found that temperature and humidity were the factors most likely to be associated with the probability of a

mortality event.

The environmental dataset used in the modelling is entitled **Environmental conditions at saiga calving and die-off sites in Kazakhstan**, 1979 to 2016 and is available at: <https://catalogue.ceh.ac.uk/documents/912ea336-ac90-418f-be6a-7ae226e167e9>

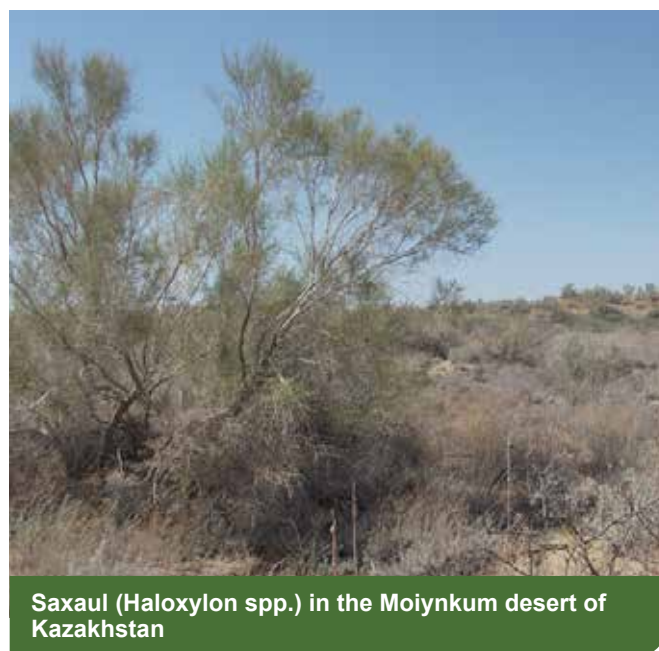
This dataset and site metadata in the above-mentioned Shapefile attribute table can be combined using the variable ID in order to merge the environmental data with additional information on the calving and mortality sites.

In related work, we also produced **English summaries of Russian language documentation of mass mortality events**

Articles (cont.)

in saiga antelope, which includes contemporary field observations as well as results of aerial surveys and veterinary investigations. These have been made available at the Saiga Resource Centre website: <http://www.saigaresourcecentre.com/literature>

The database of chemical composition of Central Asian forage plants contains just under 1000 desert and steppe species with Latin and Russian names and over 5000 related records of chemical composition, digestible protein and energy content digitised from Soviet-era publications. The database also identifies saiga food plant species from a number of Soviet and contemporary sources, which enabled use of the dataset to explore the likelihood of nutritional stress in this species at different periods of the year. The dataset is also available from



Saxaul (*Haloxylon* spp.) in the Moiynkum desert of Kazakhstan

the NERC Environmental Information Data Centre: <https://catalogue.ceh.ac.uk/documents/6a5a9a2a-730b-49f7-9e42-2295040aee56>

Genetic diversity of the saiga population in the north-western pre-Caspian during the recent decline in numbers: preliminary results

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At various stages of the saiga's evolution there have been periods of sharp population decrease resulting from global climate changes in the Pleistocene and Holocene and later from anthropogenic impact aggravated by unfavourable weather conditions. In the late 20th century, as a result of the sharp decline in numbers throughout the range, the saiga was included in the IUCN Red List as a 'critically endangered species', in Appendix II to CITES and Appendix II to the Convention on the Migratory Species of wild Animals (CMS). Saiga numbers in the isolated population of

the north-west pre-Caspian, Russia, have dropped more than 40-fold since the late 20th century. In the same period, illegal selective hunting led to a sharp decrease in the proportion of adult males in this population. This might have had a negative impact on their genetic diversity, and thereby on the species' adaptive capacity and potential viability. Currently, specialists from the molecular diagnostic methods lab of the Institute of Ecology and Evolution, Russian Academy of Sciences, are carrying out research into current genetic diversity in the North-West pre-Caspian

saiga population through estimation of the polymorphism of mitochondrial and nuclear DNA molecular markers. Previously, genetic variation of saigas from different parts of the range was described by team members, based on an analysis of a relatively short fragment of the reference area of the mitochondrial DNA (mDNA) in recent and, partially, museum samples (Kholodova et al., 2006). Also available are comparative data on the polymorphism of short fragments of the mDNA reference area in modern and ancient (Pleistocene) saigas (Campos et al., 2010), showing that genetic diversity has dropped greatly.

In the course of the research we have

developed original primers to analyse the polymorphism of a full reference area (D loop) of mDNA, characterising the diversity of maternal inheritance. In addition, the microsatellites of nuclear DNA reflecting the variation of both maternal and paternal inheritance are currently being analysed. The analysis is carried out with the help of the panel of microsatellite primers developed earlier specially for saiga.

In this work we are comparing the genetic characteristics of two sets of samples taken from the saigas inhabiting the Stepony Reserve in Astrakhan Oblast. The first set, consisting of fragments of hair and dry muscles, was collected in 1999-2000,



Saiga twins. Photo by Pavel Sorokin



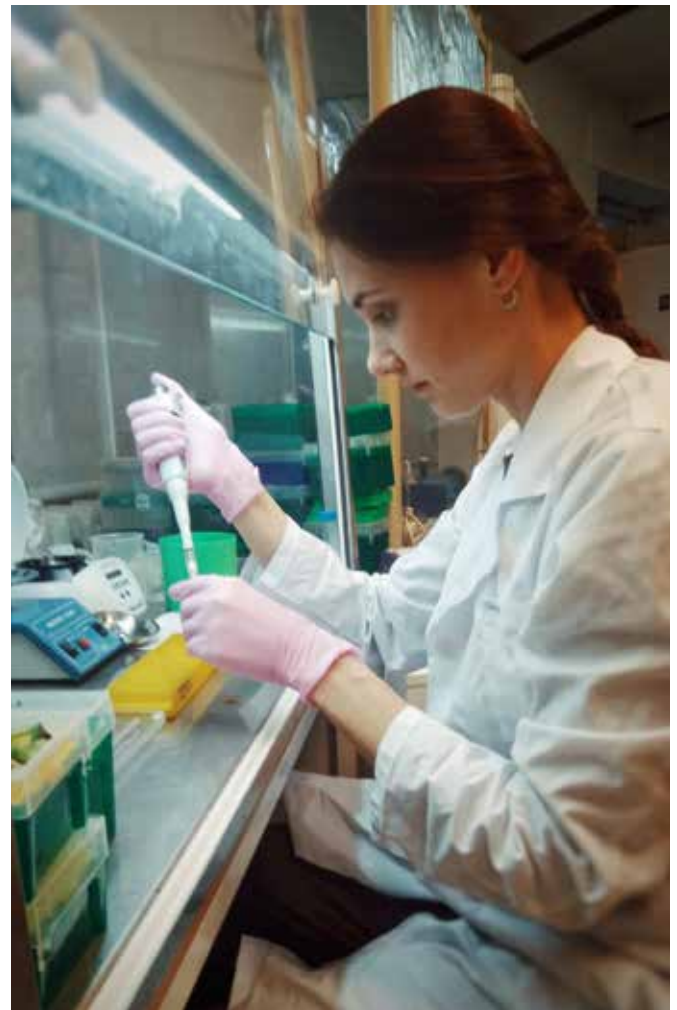
Saiga faeces ready for molecular genetic analysis.
Photo by Pavel Sorokin

when the saiga population under study had just begun to shrink. The second sample was collected from 2010 onwards. Some of the second set of samples was faeces, collected and stored following a purpose-designed method. This involves collecting the samples immediately after defecation and placing them in test tubes with 5-6x as much alcohol (95-96%) as faeces. To avoid contamination, disposable rubber gloves and clean instruments are used). The second set of samples also included dried umbilical cords taken during examination of calves in the Chernye Zemli Reserve in 2010-2011.

We have specified the nucleotide sequences of the mDNA reference area in more than 100 samples. A preliminary analysis of mDNA shows that, even after the period of steep decline in saiga numbers which has lasted for almost two decades, the population is still characterised by a relatively high genetic diversity for wild ungulates. The genetic (haplotype) diversity in the mDNA reference area was similar in both sample sets

(0.986 ± 0.009 and 0.974 ± 0.018). The nucleotide diversity values of samples taken in the beginning of the population decrease and later on are also similar (0.0297 ± 0.0147 and 0.0285 ± 0.0143). These data indicate that the level of diversity in maternal inheritance has remained relatively high throughout the study period. A detailed analysis of the microsatellites of nuclear DNA will give a fuller picture of the genetic variation in the population.

The work was supported through the Fund for fundamental investigations of the Russian Federation, №17-04-01351.



Young researcher Nadezhda Kashinina at work. Photo by Pavel Sorokin

New publications

Theng, M., Glikman, J.A., Milner-Gulland, E.J. Exploring saiga horn consumption in Singapore. *Oryx*, 2018: 1-8.

The Critically Endangered saiga antelope *Saiga tatarica* faces an uncertain future, with populations dwindling from epidemics in its range countries, and ongoing demand for its horns in the traditional Chinese medicine trade. Singapore is a major hub for the global trade in saiga horn and an important consumer country, with saiga horn products widely available in the domestic market. Despite this, little is known about the consumers that drive domestic demand. Before interventions are carried out, it is important to understand who the consumers are, and their motivations. We conducted an investigation into consumption prevalence and consumer demographics, knowledge and motivations. We surveyed 230 Chinese Singaporeans, through a combination of face-to-face interviews and self-administered questionnaires. Recent consumption incidence (in the previous 12 months) was relatively

high, at 13%. Younger respondents (18-35 years) had the highest prevalence of recent consumption (25%), often as a result of influence from an older family member or friend. Bottled saiga horn cooling water was the most popular product among recent users (50%), followed by horn shavings (31%) and tablets (13%). Awareness of conservation issues and regulations was uniformly low. Awareness raising may have an effect in reducing consumer demand in Singapore. However, given the exploratory nature of this study, it is best used to guide and inform future research underlying behavioural change interventions in a relatively understudied but important consumer group, Chinese Singaporeans.

This paper can be found at: <https://www.cambridge.org/core/journals/oryx/article/exploring-saiga-horn-consumption-in-singapore/7BB3E9739F1422D661DCDF36A9DC770A>



Saiga horn products available in Singapore: (a) whole horns, (b) shavings, (c) tablets, (d) cooling waters, and (e) a brand of cooling water available from supermarkets, which does not contain saiga horn

New publications (cont.)

Karimova, T.Yu., Lushchekina, A.A., Rozhnov V.V. Saiga in captivity: from breeding and rearing to releasing into the wild. Moscow: KMK Scientific Press Ltd., 2017. 122 pp.

Review by Valery Neronov and Marina Kholodova, A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, rusmabcom@gmail.com

This publication was prepared by researchers from A. N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, and published in late August 2017, to coincide with an international workshop on captive breeding of saigas for conservation, which was held at the Institute (see article above). The publication begins with this dedication: *'Dedicated to the memory of Boris Ivanovich Petrishchev and to all our colleagues involved in the noble cause of saiga conservation and reintroduction into the wild'*.

The critical state of biological resources and ecosystems continue to trouble the world, and it is obvious that additional steps need be taken to conserve biodiversity and ensure sustainable economic development. A special focus for the conservation and restoration of rare species is captive breeding in order to release individuals and create viable populations in the wild. Captive breeding is one of the conservation strategies proposed by members of the IUCN Species Survival Commission. Experience shows that, with some exceptions, this approach to biodiversity conservation is applicable to most critically endangered animal species. For example, Arabian oryx were successfully reared in breeding centres in the United States and Europe and reintroduced into the wild in Jordan and Oman. Among the most exemplary projects which saved species through captive breeding are those for European bison and Pere David's deer. The experience gained in rare species

conservation and restoration during the Soviet period is currently used widely in Russia and other CIS countries. Successful projects include the reintroduction of the Bactrian deer and Asiatic wild ass, and creation of breeding centres for goitered gazelles, markhor, Asiatic wild ass and Przewalski's horse and for some large predators such as brown bear, Siberian tiger and Amur leopard. This long-established practice has been generalised and systematised in the publications of A.G. Bannikov and V.Ye. Flint (1982), V.Ye. Flint (2000), O.B. Pereladova (2005), N.V. Marmazinskaya (2012), V.S. Pazhetnov (1996, 1999) and V.V. Rozhnov (2015).

Saiga populations are increasingly reported as being in a critical condition in various parts of the species' range, due to poaching, habitat encroachment and disease; unfortunately, according to experts, the situation for this wonderful animal is only getting worse. Thus, it seems quite reasonable that captive breeding programmes should be implemented more widely to conserve the species. Moreover, mastering the technology for wildlife breeding enables conservation of their gene pool, as the boundary between rare and common species is very unstable, shifts in natural ecosystems impacted by human economic activity are deep, and change can be very fast.

This review is of special interest because it analyses and generalises almost all the available literature on the history of saiga breeding in different environments (zoos, centres with semi-natural environments;

small breeding centres), with over 200 items in the bibliography alone. The review concisely covers the structure of enclosures, how to catch and transport wild individuals, feeding young and adult individuals, among other things. The work also provides some valuable information on the contemporary situation in all five saiga populations.

Saigas have been kept in zoos since the first individuals were brought to Moscow zoo in 1864. The authors analyse the achievements and challenges of keeping saigas in zoos, including compiling a database of information on all 92 zoos and parks in which saigas have ever been kept. There is also an interesting analysis of the dynamics of saiga numbers in zoos around the world between 1949 and 2016, based on data published in the International Zoo Yearbook. Despite all the effort and numerous attempts to breed saigas, there is only one zoo in the world, in Almaty, that is currently keeping this unique species.

A special section is dedicated to a detailed examination of the environments in which saigas have been kept internationally (in Russia, Ukraine, China, Kazakhstan, Uzbekistan and Mongolia). Numerous photos give a full picture of these environments. The authors conclude that modern methods of breeding, rearing and transporting animals are quite

advanced, and raising saigas in breeding centres can succeed when certain requirements are met, the main one being sufficient and regular financial support. However, it is also very important to find a location which can support spacious and safe enclosures, involve properly qualified specialists, and ensure a strong and clear legal basis for the centre.

The authors believe that breeding the species in captivity for release into the wild is a key conservation measure. Reintroducing animals raised in enclosures into the wild can restore extinct populations, maintain threatened populations and create new populations of rare species. For successful reintroduction, saigas must be released several months before the rut, and the release must be preceded by an adaptation period of one-two months in an enclosed and sufficiently spacious area very close to or within the animals' intended habitat. The researchers also stress that any attempt to restore natural saiga populations with captive-bred animals will fail unless the territory is properly protected.

The authors also consider the possibility of developing free-living or semi-free-living saiga herds as a game species, as an alternative to cattle breeding, the first successful example of which was the



Saiga herd in Askania Nova Biosphere Reserve, Ukraine. Photo by Victor Gavrilenko

establishment of a ranch for wild ungulates in Rhodesia (present-day Zimbabwe) in 1960. Among the advantages of this method are that wild animals adapt better to the environment, have lower water needs, maintain foraging mobility, have a higher food diversity (a wide range of plant species). Saigas are much preferable both ecologically and economically to domestic animals in some types of landscape, e.g. in the pastures of Chyernye Zemli in Kalmykia, Russia. They could be used as an addition to or substitute for livestock in arid zones with limited pasture resources. Alongside protected areas, wildlife ranches may contribute substantially to the preservation of the gene pool and can be regarded as a feasible approach to species conservation.

Describing measures taken to conserve saigas in their natural range, the authors highlight the challenges which arise. The tragedies that took place in Kazakhstan in 2010 and 2015 and in Mongolia in 2017, when mass die-offs caused by disease almost cancelled out the spectacular population growth recorded in the previous few years, demonstrate how fragile this unique species is. This makes it clear how important it is that all populations are large and stable enough to be able to resist catastrophes. Captive breeding may play an important part in solving this problem.

The full text of this publication (in Russian) is available at: http://saiga-conservation.org/wp-content/uploads/2017/03/saiga-in-captivity_2017.pdf



Saigas in the Centre for Wild Animals of Kalmykia. Photo by Nadezhda Pyurvenova

Saiga heroes

Today we interview Natalia Shivaldova – Ecojournalist, Director of the environmental education organisation Ecomaktab, and long term collaborator of the Saiga Conservation Alliance in Uzbekistan.



Natalia at the Practical training in San Diego

Interviewer: When were you first interested in saiga?

N.Sh.: In 2012 I took an interest in saiga protection and conservation. I had never realised before that saiga were in such dire straits and we risked losing them forever.

Interviewer: When did you begin studying saiga and working on their conservation?

N.Sh.: My colleagues, specialists in environmental protection at the Institute of Zoology, Academy of Sciences of the Republic of Uzbekistan and the Saiga Conservation Alliance, suggested that I join a team of authors to co-write an interactive coursebook for school students and a methodological guidebook for teachers. At about that time we had the idea to establish school-based children's steppe clubs. It was important to acquaint children with the saiga and kindle love for this animal in them, as well as to arouse teachers' interest in this rare species and its protection, so that we would have reliable assistants and partners close to the animal's habitats. In order to write

these educational resources I had to gain a deeper knowledge about everything related to the saiga, including its biology and habitats, and to better understand the problem of poaching and the illegal horn trade, which was leading to its population decrease. Finally, we wrote the coursebook which was translated into Karakalpak, a language spoken by the people of Karakalpakstan where the Ustyurt saiga population lives. So we achieved the initial goal; we managed to highlight the problem in an accessible and emotional way, impart a basic knowledge of saigas to children, and provide teachers with guidelines on how to organise interesting lessons.

Interviewer: Could you describe your typical day?

N.Sh.: I'm engaged in all sorts of activities, from administrative to journalistic. I travel a lot and meet many people. Among typical things I do is organising seminars and training courses for a highly diverse audience, from school and university teachers through to office workers, state officials, journalists and businessmen. For children I often organise competitions, non-standard lessons, lectures, excursions and ecological expeditions. Sometimes I sit day and night at my computer writing, designing, reading and learning. There is another activity I am involved in; supported by local communities, the Ecomaktab team is planting trees and restoring woods in the mountain regions, damaged by human activity.

Interviewer: Could you tell us an interesting story about saigas?



Ecocamp 2016. Photo by Olya Esipova

N.Sh.: Saigas inhabit regions with a sharply continental climate. The climate has grown even harsher after the loss of the Aral Sea. The area features strong temperature fluctuations and fierce winds. The weather is unpredictable. Old people in remote villages on the Ustyurt Plateau tell me that once in a very cold winter a sharp frost came after heavy snowfall to cover the snow layer with a thick and unbreakable ice crust. On the coldest days saigas were deprived of food, it was hard for them to move, so they came to people for help. They just went into their yards and stood next to their livestock. The people understood the situation and acted mercifully; they invited the animals in and fed them. The saigas survived the frost side by side with domestic animals and, as soon as the steppe was 'uncovered', they went away into the wild. This touching story confirms that, though very careful and easily scared, they nevertheless trust people. What really impressed locals in this story was how saigas made this decision and came to people for help.

Interviewer: *What are the main challenges in your work?*

N.Sh.: The challenges that heavily impede the entire business are the low awareness throughout society, from local people

through to decision makers. Unfortunately, a leftover principle predominates in many people's attitudes to environmental protection; commerce and immediate profit are their absolute priorities. We need more information and reliable printed materials. We need more human resources for the efficient control of poaching. Like animals, people migrate in search of better places to live and higher earnings. This also complicates activities within the saiga's habitats because people who we work with leave the area.

Interviewer: *What are the ways to overcome those obstacles in your work?*

N.Sh.: It is essential to raise awareness at all levels. We need to involve security agencies, such as the Customs Committee, Ministry of Internal Affairs and local authorities to increase the range of partners and like-minded people. It is important to involve local commercial organisations in nature conservation activity.

Interviewer: *Which is the best aspect of your work?*

N.Sh.: It is to watch its fruit; to see the burning eyes of children when they are drawing saigas and hear how much love and tenderness they show when



Members of the summer teachers' academy standing on the bottom of the Aral sea, Uzbekistan, 2017. Photo by Alexander Esipov

talking about the animals. To see ordinary people's growing interest, activity and initiative in the conservation of the species. We all are united by a common dream, which is to bring herds of saiga back to the steppes of Karakalpakstan.

Interviewer: *What are the prospects for your saiga conservation activities? What are the first steps that need to be taken to help this species to survive?*

N.Sh.: It is important to intensify law-making activities, consolidate the administrative code and increase answerability for the infliction of damage to this relict antelope and the entire steppe ecosystem. It is also important to detect announcements about the buying of saiga horns and to struggle with illegal horn trafficking.

Interviewer: *You have been working on the study and conservation of rare species for over a decade. What changes have taken place over these years? What are the current tendencies in this field?*

N.Sh.: It is already impossible to ignore the problem. There is a growing number

of concerned people who dream of making a contribution to the conservation of rare species. Social networks are a good means to consolidate efforts. Nevertheless, there are not enough human and technical resources available. We have not yet succeeded in changing the minds of hunters in villages near saiga habitats, which is complicated by numerous social problems in local communities. Children are our hope and support; they are very sensitive and flexible. They even succeed in changing the minds of their parents. For instance, they can uncompromisingly refuse to eat saiga meat. Nevertheless, up until recently we often found ourselves in situations where many schoolchildren couldn't identify saigas in pictures we show them. They made various suggestions, such as that it was an anteater, elephant, deer or something else. Today they are more closely acquainted with saigas and understand the species better. Now we don't think any of today's schoolboys will become poachers in future. It is much more difficult to change adults' opinion about, and attitude towards, saigas.

Acknowledgements

We would like to express our deep gratitude to all the people whose donations of money and time support the work of the Saiga Conservation Alliance. We are particularly grateful to the Convention on Migratory Species, which supported this issue of the newsletter.



SAIGA CONSERVATION ALLIANCE

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