



Species

ISSUE 63

2022 Report of the IUCN Species Survival Commission and Secretariat



The IUCN Species Survival Commission (SSC)

The IUCN Species Survival Commission (SSC) is a science-based network of thousands of volunteer experts from almost every country of the world, all working together toward achieving the vision of “a just world that values and conserves nature through positive action to both prevent the loss and aid recovery of the diversity of life on earth.”

Members of SSC belong to one or more of near 200 Specialist Groups, Red List Authorities, Action Partnerships, Task Forces, and Conservation Committees that make up the Network, each focusing on a taxonomic group (plants, fungi, mammals, birds, reptiles, amphibians, fishes, and invertebrates), national species, or a disciplinary issue, such as sustainable use and livelihoods, translocation of species, wildlife health, climate change, and conservation planning.

Framed by the Species Conservation Cycle, SSC’s major role is to provide information to IUCN on biodiversity conservation, the inherent value of species, their role in ecosystem health and functioning, the provision of ecosystem services, and their support to human livelihoods. This information is fed into the IUCN Red List of Threatened Species.

2021-2025 Species Strategic Plan

The IUCN Species Strategic Plan encompasses the joint work of the IUCN Species Survival Commission and a number of partnerships to achieve more than 2,700 targets proposed by the Network during the 2021-2025 quadrennium.

To accomplish those targets, the Species Conservation Cycle was established, which is the conceptual framework for the Network activities. The Species Conservation Cycle’s main purpose is to guide efforts for valuing and conserving biodiversity through three essential components that are linked to each other:

ASSESS: Understand and inform the world about the status and trends of biodiversity.

PLAN: Develop collaborative, inclusive and science-based conservation strategies, plans and policies.

ACT: Convene and mobilise conservation actions to improve the status of biodiversity.



Their implementation requires two transversal components:

NETWORK: Enhance and support our immediate network and alliances to achieve our biodiversity targets.

COMMUNICATE: Drive strategic and targeted communications to enhance our conservation impact.

SSC Species Report

Annual progress in the implementation of the 2021-2025 Species Strategic Plan is documented in the SSC *Species Report*, which consists of a comprehensive description and analysis of the activities and results generated by the members of the SSC Network each year. Each SSC Group contributes to this document by providing a yearly summarised description of their achievements, which is presented in stand-alone reports.

Structure of the IUCN SSC Stand-alone Report

Stand-alone reports summarize the activities conducted and results generated by each group member of the SSC. Following, is the structure of the stand-alone report and the contents under each session.

Title of the SSC Group

Photograph(s) of the Chair / Co-Chairs

Group information

Includes names of Chair / Co-Chairs, Vice-Chairs, Deputy Chairs, Red List Authority Coordinators and Program Officers, their institutional affiliations, number of members and social networks currently active.

Logo of the SSC Group

Mission statement

Includes the mission of the group.

Projected impact for the 2021-2025 quadrennium

Includes the description of the impact on species conservation resulting from the implementation of the targets formulated by the group for the 2021-2025 quadrennium.

Targets for the 2021-2025 quadrennium

Includes the targets planned by the SSC Group for the 2021-2025 quadrennium ordered alphabetically by component of the Species Conservation Cycle. Each target is labeled with a numerical code (e.g., T-001, T-012) that identifies it in the SSC DATA database and its status for the reported year is indicated (Not initiated, On track or Achieved).

Activities and results

Includes the targets for which activities were conducted and results were generated during the reported year, ordered alphabetically, first by component of the Species Conservation Cycle, and second by Activity Category. Description of activities and results includes the indicator that best describes progress, its associated quantitative or qualitative result, and the narrative description of the activity conducted or result obtained. Each activity or result reported is linked to the Key Species Result to which it is mainly associated (e.g., KSR#1, KSR#5).

Acknowledgements

Includes the acknowledgements to funding agencies, partners, and persons who contributed to the progress of the targets of the group.

Summary of achievements

Summarises information of the group's strategic plan for the quadrennium and progress achieved implementing targets for all the components of the Species Conservation Cycle during the reported year.

Example for the recommended citation:

Sigala-Rodríguez, JJ, and Spear, S. 2023. 2022 Report of the Viper Specialist Group. In: Nassar, JM, García, L, Mendoza, L, Andrade, ND, Bezeng, S, Birkhoff, J, Bohm, M, Canteiro, C, Geschke, J, Henriques, S, Ivande, S, Mileham, K, Ramos, M, Rodríguez, A, Rodríguez, JP, Street, B, and Yerena, E (Eds.). 2022 Report of the IUCN Species Survival Commission and Secretariat. International Union for Conservation of Nature. 12 pp.

Animalia

Fungi

Plantae

National Species

Disciplinary

Action Partnership

Task Force

Red List Authority

Committee

Center for Species Survival

IUCN SSC Viper Specialist Group



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110

SOCIAL MEDIA AND WEBSITE

Facebook: @viperspecialistgroup

Instagram: @viper_iucn

Twitter: @viper_IUCN

Website: <https://viperconservation.org>

Mission statement

The Viper Specialist Group (VSG) is a platform from which conservation biologists can work to increase our scientific understanding of viper biology and implement conservation actions to prevent declines and extinctions.

Projected impact 2021–2025

This quadrennium marks the period where our group explodes in activities to preserve viper species and habitats. A thorough reorganisation of our group to start working based on committees, together with a new website and a more active role in social networks, has allowed us to propose 76 targets for the quadrennium that will impact positively the knowledge and conservation of viper species globally.

Targets 2021–2025

ASSESS

T-002 Identify knowledge gaps in species assessments.
Status: On track

T-010 Project the impact of climate change on selected species of vipers in Mesoamerica and obtain missing ecological information for poorly known viper species in Mesoamerica.
Status: On track

T-011 Analyse the use of short distance translocation for rattlesnakes as a strategy to mitigate conflict with humans.
Status: On track

T-012 Develop an understanding of the potential effects of climate change in the North American region on viper activity, distribution, range shift and interactions with other members of the biological community.
Status: On track

T-013 Examine how environmental factors and habitat influence activity patterns, reproduction and defensive behaviour in different regions of southern California.
Status: On track

T-014 Examine the efficacy using intra- and extra-home range translocations to manage human-rattlesnake conflicts at state properties in West Virginia, with Timber/canebrake Rattlesnakes (*Crotalus horridus*) through 2022.
Status: Not initiated

T-016 Use long-term monitoring data of eastern Diamondback Rattlesnakes (*Crotalus adamanteus*) to examine how rattlesnakes respond to habitat changes in military training areas.
Status: Not initiated

T-017 Assess the snake diversity of Meghri Ridge, Syunik Province, Armenia.
Status: Not initiated

T-018 Assess the status of pathogens, such as atadenovirus, nidovirus and cryptosporidiosis, in viperids of the southeast.
Status: On track

T-020 Conduct population monitoring of montane populations of rattlesnakes in the Huachuca Mountains, to determine baseline population of *Crotalus lepidus* and *Crotalus willardi* and assess impacts of grazing and herpetological tourism on the area.
Status: On track

T-021 Document the population ecology and natural history of *Crotalus durissus cascavella* in Brazil, determine risks for human-snake conflict and how to reduce negative effects, and assess pathogen risk in populations.
Status: On track

T-022 Understand urban population ecology of the eastern Diamondback Rattlesnake (*C. adamanteus*) around Florida Gulf Coast University and assess current risks to populations from a known exotic pentastomid.
Status: On track

T-023 Serve as sample and data repository for rattlesnake research.
Status: Not initiated



T-024 Continue the eastern Diamondback Rattlesnake (*C. adamanteus*) long term research project on habitat selection, population ecology, vital demographic rates, conservation genetics, natural history and health assessments at Jekyll Island, Georgia.
 Status: On track

T-025 Determine if hazing of rattlesnakes could be an effective strategy to mitigate nuisance snake conflicts with humans.
 Status: Not initiated

T-026 Conduct long-term mark-recapture monitoring of rattlesnake populations in Arizona.
 Status: Not initiated

T-027 Assess ecology, behaviour, habitat use (including using telemetry techniques), reproduction and human conflict mitigation for the Chocoan Bushmaster (*Lachesis acrochorda*).
 Status: On track

T-028 Use whole genome sequence data to assess the genetic costs of living in small, isolated populations in eastern Massasauga Rattlesnakes (*Sistrurus catenatus*).
 Status: On track

T-029 Use whole genome sequence data to assess the genetic costs of living in small, isolated populations of Timber/canebrake Rattlesnakes (*C. horridus*) in Ohio.
 Status: On track

T-030 Continue ongoing long-term analysis of demography and status of Timber/canebrake Rattlesnakes (*C. horridus*) at the northern extent of their geographic range.
 Status: On track

T-031 Update distribution maps for African vipers.
 Status: On track

T-032 Assess the neutralizing capacity of antivenoms against Mesoamerican viper venoms.
 Status: Not initiated

T-035 Identify Black-headed Bushmaster (*Lachesis melanocephala*) distribution in relation to human presence.
 Status: On track

T-037 Continue working with the Mangshan Pit Viper (*Protobothrops mangshanensis*) and Deinagistrodon project in national parks in China.
 Status: Not initiated

T-038 Continue work on the *Protobothrops jerdonii* complex.
 Status: Not initiated

T-039 Analyse phylogeny and evolutionary morphology of New World pitvipers.
 Status: Achieved

T-040 Launch surveys to obtain natural history information for *Vipera latastei* and *Vipera monticola*.
 Status: On track

T-041 Launch surveys to obtain natural history information for all Anatolian vipers.
 Status: On track

T-043 Conduct field studies to collect data on distribution of Halys Pit Viper (*Gloydius halys*) in Russia.
 Status: Achieved

T-044 Conduct national monitoring of Meadow Viper (*Vipera ursinii*).
 Status: On track

T-045 Conduct regional atlas project (Lazio Region) of the Meadow Viper (*V. ursinii*) and *Vipera aspis*.
 Status: On track

T-046 Search potential sites of yet-to-be discovered Greek Meadow Viper (*Vipera graeca*) populations.
 Status: Not initiated

T-047 Collect and compile statistics on snakebite envenomation in Siberia and the Far East (Russia).
 Status: Not initiated

T-055 Review current systematics of Asian pitvipers.

Status: On track

T-056 Assess conservation status of other island endemics.

Status: On track

T-058 Review contribution to mortality from roadkill/deliberate killing of vipers.

Status: Not initiated

T-059 Assess true extent of human conflict/snakebite involving vipers.

Status: On track

T-062 Complete Red List assessments for as many species of vipers in the world as possible.

Status: On track

T-063 Conduct reassessments of the Red List status for the more than 70 species of vipers in Mexico.

Status: On track

T-072 Gather baseline data for conservation management of Broad-banded Temple Pitviper (*Tropidolaemus laticinctus*) in Sulawesi.

Status: Not initiated

PLAN

T-003 Develop a Viper Action Plan with specific actionable items.

Status: On track

T-073 Establish a breeding colony of eastern diamondback rattlesnakes and Timber/canebrake Rattlesnakes (*C. horridus*) to support reformed rattlesnake roundups.

Status: On track

T-075 Complete and publish the VSG strategic plan.

Status: Not initiated

T-077 Perform a conservation gap analysis for South American vipers.

Status: Achieved

T-078 Launch surveys to obtain natural history information for Nose-horned Viper (*Vipera ammodytes*) complex.

Status: Not initiated

T-079 Launch surveys to obtain natural history information for *V. ursinii ursinii*.

Status: On track

T-081 Implement *ex situ* viper conservation programmes in the South American region.

Status: Not initiated

T-083 Identify priority sites for the conservation of vipers and promote the creation of areas for the conservation of vipers in each region.

Status: On track

T-085 Conduct Pindos Mountain alpine meadow restoration.

Status: Not initiated

T-086 Establish Montane Rattlesnakes Conservation Working Group.

Status: On track

T-087 Develop bag limits/hunting guidelines for states that do not currently have regulations for viperid species.

Status: On track

ACT

T-005 Prepare a database on killing (e.g. deliberate killing/roadkills) and illegal trade of vipers throughout the region (Asia) at local and national levels to identify the trends of threats to vipers from those activities.

Status: On track

T-088 Examine effects of urban development on rattlesnakes.

Status: On track

T-089 Conduct long-term ecological research on Tiger Rattlesnakes (*Crotalus tigris*) in the Sonoran Desert.

Status: On track

T-090 Study ecology of Prairie Rattlesnake (*Crotalus viridis*) populations at the southern extreme of their distribution in Southwest New Mexico.

Status: On track

T-091 Assess snake fungal disease (SFD) in free-ranging rattlesnakes of the American Southwest (North American Region).

Status: Not initiated

T-092 Survey general recovery of *V. ursinii ursinii* habitats in 'Campo Imperatore', the core area of its distribution in Gran Sasso and Laga Mountains National Park (Central Italy).

Status: On track

T-093 Protect Greek Meadow Viper (*V. graeca*) populations with highest threats.

Status: Not initiated

T-094 Reduce number of rattlesnake roundups and pressure on local populations of various rattlesnake species.

Status: On track

T-095 Establish the Eastern Diamondback Working Group.

Status: On track

T-096 Address inaccessibility in science through Bridge the Gap – a programme designed to establish mentors for youth and provide hands-on opportunities and experiences in science and reptile conservation.

Status: On track

T-097 Train the general public, military installations, zoos, consultants and researchers how to safely contain, reduce pathogen transmission, and relocate venomous reptiles to reduce human-snake conflict.

Status: On track

T-098 Examine ecology and conservation of the federally threatened New Mexico Ridge-nosed Rattlesnake (*Crotalus willardi obscurus*).

Status: On track

T-099 Study spatial ecology of Armenian Mountain Viper (*Montivipera raddei*) in two different landscapes: human-modified vs. recovered-natural.

Status: Not initiated

NETWORK

T-001 Increase representativity in membership.

Status: On track

T-006 Develop effective partnerships between zoos and VSG.

Status: On track

T-008 Increase the efficiency and amount of internal and external communication.

Status: On track



The 2022 Venomous Herpetology Symposium successfully took place in San Antonio, Texas, USA, September 14-17, 2022: It was coordinated by the Rattlesnake Conservancy and brought together professionals from several countries for a series of engaging presentations, panel discussions and continuing education opportunities, this was target 101 and the photograph shows VSG Co-Chairs Steve Spear and Jesus Sigala in the discussion about VSG and viper conservation
Photo: VSG

COMMUNICATE

T-004 Create a new website about the Viper Specialist Group with taxonomic updates to make this information more widely available.
Status: On track

T-101 Host the Venomous Herpetology Symposium (<https://www.venomsymposium.com>).
Status: On track

T-102 Restructure the editorial board of the Viper Specialist Group newsletter to restart its publication.
Status: Not initiated

T-103 Increase the efficiency and amount of internal and external communication.
Status: On track

T-104 Increase communication between *ex situ* programmes.
Status: On track

T-107 Connect youth with the natural world and instil an appreciation and deeper understanding of rattlesnakes and other misunderstood species through STEM Station – a programme that teaches science in the outdoors.
Status: On track

T-108 Establish distance learning opportunities that teach students about rattlesnake ecology and conservation through a comprehensive curriculum that aligns with state educational standards.
Status: On track

T-109 Run Conservation Camp – a ground-breaking youth programme meant to give students experiences in habitat evaluation, environmental monitoring and wildlife surveys to foster a connection with the natural world and instill a deeper understanding of rattlesnakes and other misunderstood species.
Status: On track

T-110 Create outreach materials that can be customised by region for living with vipers.
Status: On track



The Meadow Viper (*Vipera ursinii*) is being studied and monitored in Italy as part of targets 44, 45, 79 and 92
Photo: Konrad Mebert, member of the European VSG region



Activities and results 2022

ASSESS

Red List

T-062 Complete Red List assessments for as many species of vipers in the world as possible. (KSR 6)

Number of new Red List assessments published per species group, region, and biological realm on the IUCN Red List of Threatened Species: 1

Result description: In October 2022, the Instituto Chico Mendes de Conservação da Biodiversidade (ICMBio) coordinated, together with the South American coordinator of VSG, a short assessment workshop in which 22 recently described snakes species were assessed, including three endemic vipers, *Bothrops germanoi*, *Bothrops jabrensis* and *Bothrops oligobalius*.

T-063 Conduct reassessments of the Red List status for the more than 70 species of vipers in Mexico. (KSR 6)

Number of species groups that are comprehensively reassessed in a timely manner: 1

Result description: We started with the assessment of the species of vipers in the genera *Mixcoatlus* and *Ophryacus* in the first semester of 2022, and will continue in 2022 and 2023 with the other Mexican viper species.

Research activities

T-011 Analyse the use of short-distance translocation for rattlesnakes as a strategy to mitigate conflict with humans. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: We are still analysing data for the translocation project. Potentially we will have the results at the end of 2023.

T-012 Develop an understanding of the potential effects of climate change in the North American region on viper activity, distribution, range shift and interactions with other members of the biological community. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: We are still collecting data across the range for the prairie rattlesnake project. We have established three focal sites for prairie rattlesnakes at the north, central, and southern portion of their range. We continue to collect data of behaviour and spatial ecology with respect to temperature and other environmental variables.

T-018 Assess the status of pathogens, such as atadenovirus, nidovirus and cryptosporidiosis, in viperids of the southeast. (KSR 5)

Number of scientific publications about species research that acknowledge SSC affiliation: 1

Result description: Our disease monitoring research is currently ongoing, with samples having been collected initially from crotalid species throughout the southeast and then further expanded to other venomous snake species native to this region. Additionally, our team has recently secured a scientific collections permit in the state of Colorado and has successfully obtained samples from rattlesnake species in that area.

T-020 Conduct population monitoring of montane populations of rattlesnakes in the Huachuca Mountains, to determine baseline population of *C. lepidus* and *C. willardi* and assess impacts of grazing and herpetological tourism on the area. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: The project is currently in the planning phase with the intent to begin fieldwork in 2024.

T-021 Document the population ecology and natural history of *C. durissus cascavella* in Brazil, determine risks for human-snake conflict and how to reduce negative effects and assess pathogen risk in populations. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: This project is currently ongoing, and we expect more data to be available in the late spring of this year. Recently, the research team received a captured male rattlesnake from the Mulungu Rescuers, a local assistance group. The snake was measured, weighed, sexed, and researchers attached a tracking device and released the snake back in the field. This snake, like several others, will be tracked by the research team to better understand the natural history of the species, obtain range information and help fill data gaps.

T-022 Understand urban population ecology of the Eastern Diamondback Rattlesnake (*C. adamanteus*) around Florida Gulf Coast University and assess current risks to populations from a known exotic pentastomid. (KSR 5)

The Eastern Diamondback Rattlesnake (*Crotalus adamanteus*), the largest rattlesnake in North America is being studied and monitored as part of our targets 16, 22 and 24

Photo: Justin Elden, member of the North American VSG region.



Plain Mountain Adder or the Hornless Adder (*Bitis inornata*) is a photogenic viper from South Africa
Photo: S. Parusnath, member of the African VSG region

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: The Rattlesnake Conservancy's grant funding cycle for this project has ended, but we maintain a positive relationship with Dr Metcalf and his team of researchers at Florida Gulf Coast University (FGCU) and are supportive of their work. From the most recent update we received on the project; the population of Eastern Diamondback Rattlesnakes appear to be stable around FGCU. They often utilize edge habitats near roads/sidewalks, likely for thermoregulatory benefits and access to prey items such as rodents and rabbits that are abundant on campus. The largest threat to this population appears to be from human development and fragmentation of habitat rather than pathogens or parasites.

T-027 Assess ecology, behaviour, habitat use (including using telemetry techniques), reproduction and human conflict mitigation for the Chocoan Bushmaster (*L. acrochorda*). (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: Fieldwork searching for snakes, with the collaboration of locals in two more reserves: Tesoro Escondido Reserve, Los Yaltes Reserve, and Itapoa reserve, as well as the Cotacachi Cayapas National Park, creating a corridor of about 15,000 Ha. Report of dead snakes in reserves and areas of influence. Two communities in the area of influence of Los Yaltes and three communities from Itapoa Community benefited from workshops.

T-028 Use whole genome sequence data to assess the genetic costs of living in small, isolated populations in Eastern Massasauga Rattlesnakes (*S. catenatus*). (KSR 5)

Number of scientific publications about species research that acknowledge SSC affiliation: 1

Result description: Work continues to use WGS data to assess relationships between neutral and functional diversity and to use genome-scale data to assess options for genetic rescue between donor and receipt populations of this species.

T-031 Update distribution maps for African vipers. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: During this quarter, we will be trained in the data handling procedure, and reach out to African membership to actually do the data vetting and verification during the current year, so that the models can be produced and mapped.

T-035 Identify Black-headed Bushmaster (*L. melanocephala*) distribution in relation to human presence. (KSR 5)

Number of scientific publications about species research that acknowledge SSC affiliation: 1

Result description: We have a manuscript in preparation that presents a current species distribution model based on recent observations and we continue to collect observations from our network of contacts. We also conducted some short field searches in July 2022 from areas where we had previously received reports.

T-037 Continue working with the Mangshan Pit Viper (*P. mangshanensis*) and Deinakgistrodon project in national parks in China. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 0

Result description: As COVID-19 restrictions had not been lifted in 2022, this project has yet to begin. There are no intentions of cancelling the project yet. Likely progress to be made in 2024. The San Diego Zoo has expressed an interest in doing an *ex situ* project with Mangshan Pit Viper as well and we are exploring this option for the future.

T-038 Continue work on the *P. jerdonii* complex. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 0

Result description: As COVID-19 restrictions had not been lifted in 2022, this project has yet to begin. There is a high probability that sampling for this project will happen in July 2023, depending on several factors, but that is the intention.

T-039 Analyse phylogeny and evolutionary morphology of New World pitvipers. (KSR 5)

Number of scientific publications about species research that acknowledge SSC affiliation: 1

Result description: An article entitled 'Total-evidence phylogeny and evolutionary morphology of New World pitvipers (Serpentes, Viperidae, Crotalinae)' was published online in the journal *Cladistics* in January 2023 (<http://doi.org/10.1111/cla.12522>). In this article, we present a phylogeny of NW pitvipers obtained from morphological data

and DNA sequences from mitochondrial and nuclear genes. Our results support a single colonization event of the Americas by pitvipers, and a cladogenetic event into a Neotropical clade and a North American/Neotropical clade. Results shed light on the previously unstable position of some taxa. The morphological character analyses demonstrated that an important phylogenetic signal is contained in characters related to head scalation, the jaws and the dorsum of the skull, and allowed us to detect morphological convergences in external morphology associated with arboreality.

T-040 Launch surveys to obtain natural history information for *V. latastei* and *V. monticola*. (KSR 5)

Number of scientific publications about species research that acknowledge SSC affiliation: 0

Result description: We have proceeded to update the IUCN Red List assessments for *V. latastei* and *V. monticola*. Preliminary assessments were communicated as an oral presentation at the 21st European Herpetological Meeting (Martínez-Freiría F, Fahd S, Pleguezuelos JM, 2022. September 2022; Belgrade, Serbia). The assessment for *V. latastei* has been re-evaluated in the IUCN ERL Pulse and should be available online very soon. This assessment considered unpublished information from a population monitoring study that has been developed since 2018 in north-western Portugal. We expect to implement this type of population monitoring on an Iberian scale with the help of amateur herpetologists and the support of both Portuguese (APH) and Spanish (AHE) herpetological societies. The assessment for *V. monticola* is currently being redacted considering the new information on natural history and distribution gathered for this species with the fieldwork conducted in 2022.

T-044 Conduct national monitoring of Meadow Viper (*V. ursinii*). (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: The conservation status of Meadow Viper: has been upgraded, from Vulnerable to Endangered, according to reference: Rondinini, C., Battistoni, A., Teofili, C. per il volume (compilatori). (2022). 'Lista Rossa IUCN dei vertebrati italiani 2022'. Comitato Italiano IUCN e Ministero della Transizione ecologica, Roma. A series of surveys in the areas inhabited by the species has been carried out (seven surveys in the National Park of the Sibillini Mountains).

T-045 Conduct regional atlas project (Lazio Region) of the Meadow Viper (*V. ursinii*) and *V. aspis*. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 1

Result description: The data are being finalised and the texts and maps are being drafted.

T-046 Search potential sites of yet-to-be discovered Greek Meadow Viper (*V. graeca*) populations. (KSR 5)

Number of research projects completed or supported by SSC members per taxonomic group and region: 0

Result description: Since 2012 we have discovered several new populations and published several papers on the genetics, distribution, threats, fragmentation, and the effect climate change will have on these mountaintop populations. There are a few mountain populations in Greece that we suspect exist and would like to search for but have not had any new funding or plans to search these sites in 2023. Hopefully, over the next 4-5 years we will be able to find some last remaining populations that would most likely be at some of the highest risk of extinction.

T-055 Review current systematics of Asian pitvipers. (KSR 5)

Number of scientific publications about species research that acknowledge SSC affiliation: 0

Result description: The analysis is a bit further ahead; we even have obtained financial resources to enable an NGS approach to the analysis of potential hybrid zones identified in the *T. albolabris* complex. We will continue with the analysis based on mitochondrial and morphometric data to elucidate the relationships of the group.

T-056 Assess conservation status of other island endemics. (KSR 5)

Number of scientific publications about species research that acknowledge SSC affiliation: 0

Result description: We are continuing to collect data and perform pit viper (Crotalinae) multilocus phylogenetic analysis.

T-059 Assess true extent of human conflict/snakebite involving vipers. (KSR 5)

Number of scientific publications about species research that acknowledge SSC affiliation: 0

Result description: We continue to expand the geographical coverage of monitoring to other districts and states in accompaniment with Vishal Santra's organization.

PLAN

Planning

T-003 Develop a Viper Action Plan with specific actionable items. (KSR 8)

Number of conservation plans/strategies developed: 0

Result description: The post-pandemic period has been a time for updating and reactivating projects, and we are all keeping busy, so we still have to balance schedules to get the plan up and running.

T-073 Establish a breeding colony of eastern diamondback rattlesnakes and Timber/canebrake Rattlesnakes (*C. horridus*) to support reformed rattlesnake roundups. (KSR 8)

Number of taxa (defined as species or subspecies) covered by a range-wide plan or strategy, or by a collection of plans or strategies, developed with SSC: 1



The Large-scaled PitViper (*Trimeresurus macrolepis*) from India is one of many vipers with a convoluted taxonomic history, being assigned in genera as *Peltopelorus*, *Trigonocephalus*, *Lachesis* and *Craspedocephalus* at different times
 Photo: Wolfgang Wuster, member of the European VSG region and coordinator of the VSG Taxonomy Committee

Result description: The Rattlesnake Conservancy previously donated native rattlesnake species to be housed at the Chehaw Park and Zoo in Albany, Georgia as a part of their captive colony of native rattlesnakes. The zoo currently houses a collection of approximately 15 individuals including eastern Diamondback Rattlesnakes and Canebrake rattlesnakes. The Rattlesnake Conservancy met with the AZA Herp Tag to emphasize the need for zoos to be breeding these species to ensure that there is an ethical supply of captive native species for this type of educational events.

T-075 Complete and publish the VSG strategic plan. (KSR 8)

Number of conservation plans/strategies developed: 0

Result description: As in Target 003, the post-pandemic period has been a time for updating and reactivating projects and we are all keeping busy, so we still have to balance schedules to get the plan up and running.

T-078 Launch surveys to obtain natural history information for Nose-horned Viper (*V. ammodytes*) complex. (KSR 8)

Number of taxa (defined as species or subspecies) covered by a range-wide plan or strategy, or by a collection of plans or strategies, developed with SSC: 0

Result description: Launch surveys to obtain natural history information for the Nose-horned Viper complex.

T-079 Launch surveys to obtain natural history information for *V. ursinii ursinii*. (KSR 8)

Number of taxa (defined as species or subspecies) covered by a range-wide plan or strategy, or by a collection of plans or strategies, developed with SSC: 1

Result description: During 2022 we carried out four survey sessions (s.s.) of *V. u. ursinii* in the “Fonte Vetica” study area (s.a.), and 11 s.s. in the “Pietranzoni” s.a. (all in the Gran Sasso and Laga Mountains National Park) with time-constrained research method (cf. Luiselli & Akani, 2002). In the same areas Dr Bălint Uveges and his team, from Bangor University, carried out other 6 s.s. for ecological, genetic and venom research. All those sessions had positive results (one to four specimens per session) and data-analyses are underway who are having interesting scientific conclusions. During 2022 colleagues of Studio Naturalistico Hyla s.r.l. carried out two s.s. of *V. u. ursinii* in “Monte Colventoso”, “Passo Cattivo” and “Monte Zampa” in plots of 0.2 km² inside the Sibillini National Park with time-constrained research. In the same National Park, they also carried out six s.s. on random transects.

Policy

T-085 Conduct Pindos Mountain alpine meadow restoration. (KSR 9)

Number of MEA meetings attended by the SSC group: 1

Result description: No *in situ* actions have been taken here. However, research has been conducted to set the stage for such a project if it were to be funded.

T-086 Establish Montane Rattlesnakes Conservation Working Group. (KSR 9)

Number of Multilateral Environmental Agreement meetings attended by the SSC group: 1

Result description: The Montane Rattlesnakes Conservation Working Group has been established and meets quarterly to discuss current and future research needs. At the last meeting the working group held, Tom Jones of the Arizona Game and Fish Department joined and discussed the future project to monitor *C. lepidus* and *C. willardi*. The AZGFD is supportive of this project. Most recently, the Trinational Initiative between the US, Canada and Mexico identified a need for range documentation of montane rattlesnakes in Mexico. Mexican counterparts are likely to be underfunded for the project. The Rattlesnake Conservancy is currently seeking funding to help support this effort and plans to continue hosting meetings and facilitating this group.

ACT

Conservation actions

T-088 Examine effects of urban development on rattlesnakes. (KSR 10)

Number of threatened species benefiting from *in situ* conservation action: 1

Result description: Projects are ongoing. We are working on several manuscripts that will eventually be published.

T-092 Survey general recovery of *V. ursinii ursinii* habitats in “Campo Imperatore”, the core area of its distribution in Gran Sasso and Laga Mountains National Park (Central Italy). (KSR 10)

Number of threatened species benefiting from *in situ* conservation action: 1

Result description: The ante-operam monitoring phase has been completed and the executive project is practically ready. In the area affected by a devastating fire in the past (2017), the damage to the tree-shrub vegetation will be mitigated and shelters-hibernacula will be built for *V. ursinii* in 11 different sectors. These will be made up of a pile of stones and timber found on site, with a basement part and a suitable above-ground part to avoid alterations by the numerous large ungulates present in the vast surrounding area.

T-093 Protect Greek Meadow Viper (*V. graeca*) populations with highest threats. (KSR 10)

Number of threatened species benefiting from *in situ* conservation action: 0

Result description: We have identified these populations. There is nothing ongoing to actually protect them. The team has ideas of *in situ* and *ex situ* conservation actions that could help these. These ideas will require funding.

T-094 Reduce the number of rattlesnake roundups and pressure on local populations of various rattlesnake species. (KSR 10)

Number of threatened species benefiting from *in situ* conservation action: 1

Result description: The Rattlesnake Conservancy remains committed to finding

solutions to eliminate rattlesnake roundups. Our efforts currently are aimed at securing funding to pursue lobbying with state legislators in Texas to establish bag limits and hunting guidelines in the state. In the southeast, we continue to support the efforts of events like the ‘Whigham Rattlesnake Roundup’ which has reformed from a rattlesnake roundup and uses only captive animals with a focus on education and conservation. We are saddened to report that the ‘Claxton Rattlesnake Festival’ is still currently insistent on collecting wild rattlesnakes for their event, and therefore we do not support the event. During the 2022 festival, all conservation organizations at the event pulled support upon report of the unnecessary utilization of wild-caught snakes despite their agreement to transition to an all-captive event. One snake that was collected for the event died shortly after, and one required veterinary attention due to several broken ribs and vertebrae, presumably as a result of the way it was handled. Their refusal to surrender the collected snakes to GADNR as agreed upon should also be noted.

T-095 Establish the Eastern Diamondback Working Group. (KSR 10)

Number of threatened species benefiting from *in situ* conservation action: 1

Result description: The Eastern Diamondback Rattlesnake Working Group has been established and meets quarterly to discuss current and future research needs. Participants are currently developing a Conservation Action Plan for the eastern diamondback rattlesnake and expect to have an early draft available for review by partners in late 2023.

T-096 Address inaccessibility in science through Bridge the Gap – a programme designed to establish mentors for youth and provide hands-on opportunities and experiences in science and reptile conservation. (KSR 11)

Number of projects providing evidence that use is sustainable per taxonomic group and region: 1

Result description: The SCIFA Program or Science for All, formerly known as Bridge the Gap, continued to host cohorts of students into the early summer of 2022. The program was temporarily placed on hold due to a staff medical emergency that required extended leave but will resume later this year.

Technical advice

T-089 Conduct long-term ecological research on Tiger Rattlesnakes (*C. tigris*) in the Sonoran Desert. (KSR 10)

Number of technical consultations provided to support conservation actions: 1

Result description: Projects are ongoing. We are working on several manuscripts that will eventually be published.

T-090 Study ecology of Prairie Rattlesnake (*C. viridis*) populations at the southern extreme of their distribution in Southwest New Mexico. (KSR 10)

Number of technical consultations provided to support conservation actions: 1

Result description: Projects are ongoing. We are working on several manuscripts that will eventually be published.

T-097 Train the general public, military installations, zoos, consultants and researchers how to safely contain, reduce pathogen transmission, and relocate venomous reptiles to reduce human-snake conflict. (KSR 10)

Number of technical consultations provided to support conservation actions: 1

Result description: During 2022, The Rattlesnake Conservancy provided training to approximately 200 new students in six different states across the United States. These training programmes were provided to state and Federal agencies, researchers, developers (including renewable energy companies), medical practitioners, veterinarians and other members of the public. These training courses continue to foster a culture of safety in venomous handling and further our conservation goals through



Bothriechis aurifer, a pitviper found in Mesoamerica listed in the Red List as Vulnerable
Photo: Justin Elden

human-snake conflict mitigation by enabling individuals to respond to venomous snakes in their communities safely and ethically.

T-098 Examine ecology and conservation of the federally threatened New Mexico Ridge-nosed Rattlesnake (*C. willardi obscurus*). (KSR 10)

Number of technical consultations provided to support conservation actions: 1

Result description: Projects are ongoing. We are working on several manuscripts that will eventually be published.

NETWORK

Synergy

T-006 Develop effective partnerships between zoos and VSG. (KSR 1)

Number of ‘funding’ partners established and maintained: 0

Result description: The VSG *ex situ* committee has reached out to the IUCN Conservation Planning Specialist Group and initiated planning to conduct a Viper Integrated Collection Assessment and Planning (ICAP) workshop, ideally sometime in 2023.

COMMUNICATE

Communication

T-101 Host the Venomous Herpetology Symposium (<https://www.venomsymposium.com>). (KSR 13)

Number of SSC members’ presentations developed in relation to specific taxonomic groups: 1

Result description: The 2022 Venomous Herpetology Symposium successfully took place in San Antonio, Texas from September 14th through 17th, and brought together professionals from several countries for a series of engaging presentations, panel discussions and continuing education opportunities.

T-107 Connect youth with the natural world and instil an appreciation and deeper understanding of rattlesnakes and other misunderstood species through STEM Station – a programme that teaches science in the outdoors. (KSR 13)

Number of SSC members’ presentations developed in relation to specific taxonomic groups: 1

Result description: STEM Station is an ongoing education program that aims to get children outside and engaged in the natural world through a series of interactive, hands-on lessons throughout north-east Florida. The program was temporarily placed on hold due to a staff medical emergency that required extended leave but will resume later this year.

T-108 Establish distance learning opportunities that teach students about rattlesnake ecology and conservation through a comprehensive curriculum that aligns with state educational standards. (KSR 13)

Number of communication products using innovative tools: 1

Result description: The Rattlesnake Conservancy has established multiple educational resources which support state and national science standards. These activities are designed to teach students how to identify native species, learn how to safely coexist alongside potentially dangerous wildlife and recognize the ecological benefits that they provide. These activities are available to parents and educators for free download on our website at: savethebuzz-tails.org/educator-resources.

T-109 Run Conservation Camp – a ground-breaking youth programme meant to give students experiences in habitat evaluation, environmental monitoring and wildlife surveys to foster a connection with the natural world and install a deeper understanding of rattlesnakes and other misunderstood species. (KSR 13)

Number of SSC members’ presentations developed in relation to specific taxonomic groups: 1

Result description: Conservation Camp was temporarily placed on hold due to a staff medical emergency that required extended leave but will resume in 2024.

T-110 Create outreach materials that can be customised by region for living with vipers. (KSR 13)

Number of print communications materials distributed in relation to specific taxonomic groups: 0

Result description: No direct progress on this, but we did initiate the snakebite committee with SSG and one of their objectives will be working on this target.

Scientific meetings

T-103 Increase the efficiency and amount of internal and external communication. (KSR 12)

Number of scientific meetings: 1

Result description: We created an email listserv that allows messages to go to all subscribed members.

Summary of achievements

Total number of targets 2021–2025: 76

Geographic regions: 12 Global, 2 Africa, 42 America, 9 Asia, 12 Europe

Actions during 2022:

Assess: 22 (KSR 5, 6)

Plan: 7 (KSR 8, 9)

Act: 10 (KSR 10, 11)

Network: 1 (KSR 1)

Communicate: 6 (KSR 12, 13)

Overall achievement 2021–2025:

