

## Swiss Natural History Collections Network (SwissCollNet)

Annual Report 2023

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## 1. Activity report

### 1.1. Launch of individual projects in collections in Switzerland

SwissCollNet has granted 68 projects in 53 public institutions with natural history collections in 21 cantons in Switzerland (**Appendix I**). By September 2022, all 44 projects of the first call for project proposals were started. From the second call for project proposals, additional 24 projects were granted and the grantees all have started working on the projects in March 2023 at latest.

By February 2024, SCNAT has received 7 final reports of projects terminated during the year 2023 as well as 48 intermediate (activity and financial for all projects terminating after April 1, 2024) and 10 financial reports (only financial for all projects terminating before April 1, 2024). Another 2 final reports will be submitted before July 2024 (for an overview see **Appendix I**).

All projects will be terminated by the end of August 2024 at the latest and final reports are due by October 31<sup>st</sup>, 2024. (**Appendix I**).

All reports have been reviewed by the members of the Board of Experts and two Steering Board members.

Out of the 7 projects terminated, 6 projects were of short period (10 months in average). Nevertheless, an impressive number of results could be generated. 15 scientific publications, 18'623 specimens and 1366 type specimens digitised, 150 new type specimens detected, 7755 pictures or scans taken, 3676 specimens reidentified and 32'779 specimens reconditioned. The investments in total for these projects were 260'000 CHF from SwissCollNet and 307'400 CHF matching funds.

Projects granted out of the first call for proposals are well advanced. The major challenge of recruitment of personnel could be overcome with cost-neutral extensions of the projects. In many collections, non-expected material was detected during the reorganisation and reconditioning of the specimens or specimens were saved from destruction (**Figure 1**). Furthermore, new species for Switzerland were recognized and new species for science could be described as well as new type specimens were identified so far in a number of projects in different taxonomic groups. Many young scientists could be hired and a lot of knowledge transfer is occurring between experienced taxonomists and young scientists and students. At the level of digitisation, many grantees are describing a great benefit of the projects to the handling of data and the standardisation of data registration within their institutions. Some institutions already are in possession of an online-database of their institutions to publish data and images of their collections. Enrichment and publication of collection information on their online-portals has led to many new interactions and collaborations with international scientists. Also, loan requests were reported to be increased and where 3D-scans have been published, the necessity to ship precious specimens could be decreased (**Figure 2**). Challenges mentioned in the first intermediate reports have mostly been overcome.

Projects granted out of the second call are also advancing well and similar results can be expected as for the first call of projects. Of particular interest are projects dedicated to the curation, organisation and identification of minerals as well as the work with anatomical collections, since new questions are arising in regard to data standardisations and data models, as well as legal and ethical rules to be considered for the latter. Grantees regularly report participation at international conferences and preparation of manuscripts to share the knowledge gained within the SwissCollNet projects or even the participation in advanced SNSF-projects.

For two projects, the reviewing experts have raised questions in regard to the achievements of milestones. The grantees of these projects have been invited to a physical meeting to evaluate more in detail the results obtained so far and to take measures to reach the milestones of the projects.

For all the other projects no major challenges were detected, although standardisation of specimen data seems to be an issue, especially for collection of Earth sciences and anthropology. On the whole, big progress in data registration and harmonisation can be expected for many collections and in many institutions.

[https://swisscollnet.scnat.ch/de/running\\_projects](https://swisscollnet.scnat.ch/de/running_projects)



**Figure 1:** Illustration of reconditioning work in the SCN135-ZH project, main grantee Alexander Kocyan. A specimen of *Cantharellus tubaeformis* was formerly preserved in a glycerine mixture (left), which has become opaque in colour over the years. The green glass plate was added as a contrasting effect (visible only after restoration on the right).



**Figure 2:** 3D scan of insect from project SCN140-ZH, Greeff, Keller, Bernasconi, Litman; Three dimensional digitization of insect type collections.

## 1.2. Collection survey

With the collection survey, SwissCollNet will provide an inventory list of natural history collections and related information of institutions participating in the SwissCollNet-initiative. Furthermore, the collection surveys represent a tool for the institutions to monitor their collections in regard to curational aspects such as information on the number of specimens, digitization status, quality of conservation etc. Third, the information provided by the institutions will be deposited in the Global Registry of Scientific Collections (GRSciColl) and in the Swiss Virtual Natural History Collection (SVNHC). Fourth, the information will be presented in a scientific publication. Institutions applying for a project supported by SwissCollNet had to

submit the collection survey at least for the specimens, which are subject of the project. In total, 113 curators have handed in metadata of their collections.

Publication of metadata on GRSciColl as well as on the webpage of SwissCollNet requests standardisation of the information provided by the curators. This work is done by the staff of the Swiss node of GBIF in collaboration with the curators. In 2023, the GBIF staff was intensively involved in the development of the IT-infrastructure for natural history collection data aggregation (SVNHC). Nonetheless, they managed to update GRSciColl with information about the 40 Swiss institutions with collections and participating in the SwissCollNet-initiative and the registration of one third of the collection units (355 in total) curated in these institutions. The Swiss node of GBIF will strongly focus on this project early in 2024 with the goal to have the inventory data ready in July 2024 at latest.

In March 2023, a scientific article showing a rough overview of collection units curated in different countries in the world was published in the scientific journal *Science* with the participation of three Swiss institutions (Johnson et al. 2023). On the basis of the information of the collection survey, SwissCollNet is preparing an article with detailed information on the natural history collections in Switzerland. A manuscript draft has been initiated in 2023. The final manuscript will be published in 2024 in the *European Journal of Taxonomy*.

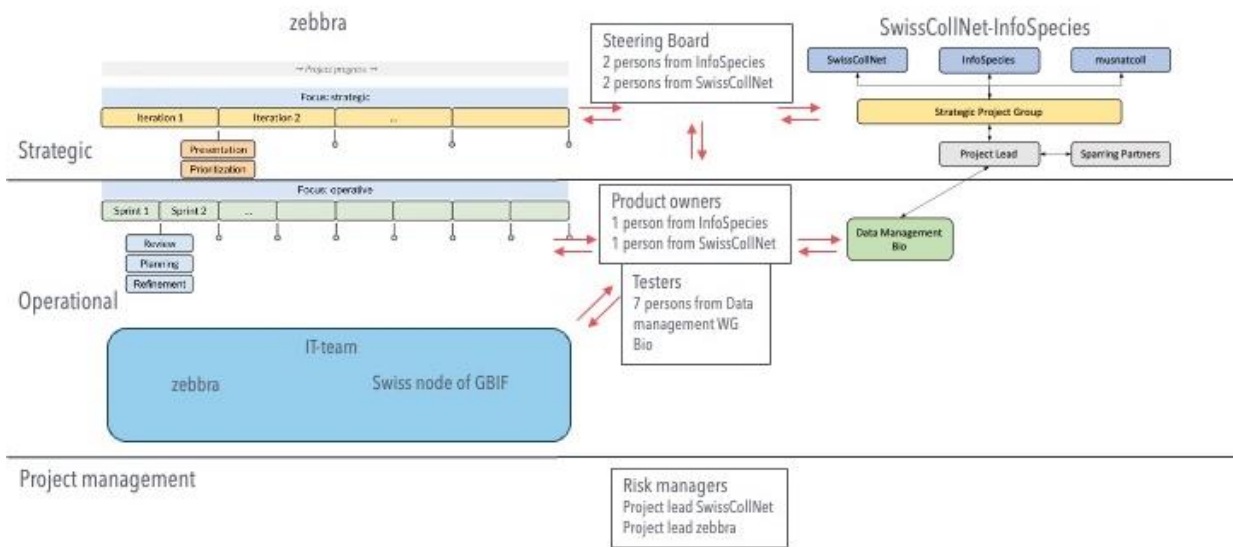
[https://swisscollnet.scnat.ch/de/implementation/collection\\_survey](https://swisscollnet.scnat.ch/de/implementation/collection_survey)

### 1.3. Development of the data aggregator and long-term solution for the SVNHC

In order to facilitate the access to natural history collection data held in Swiss public institutions, SwissCollNet has planned to build a data aggregator and an online portal, where natural history collections data will be integrated, interconnected and digitally available (SVNHC). Based on a preparatory study, the Steering Board of SwissCollNet has decided in 2022, to collaborate with InfoSpecies. A project concept, project organisation and project plan have been elaborated and an agreement of collaboration has been signed by the two partners in June 2023 (**Appendix II**).

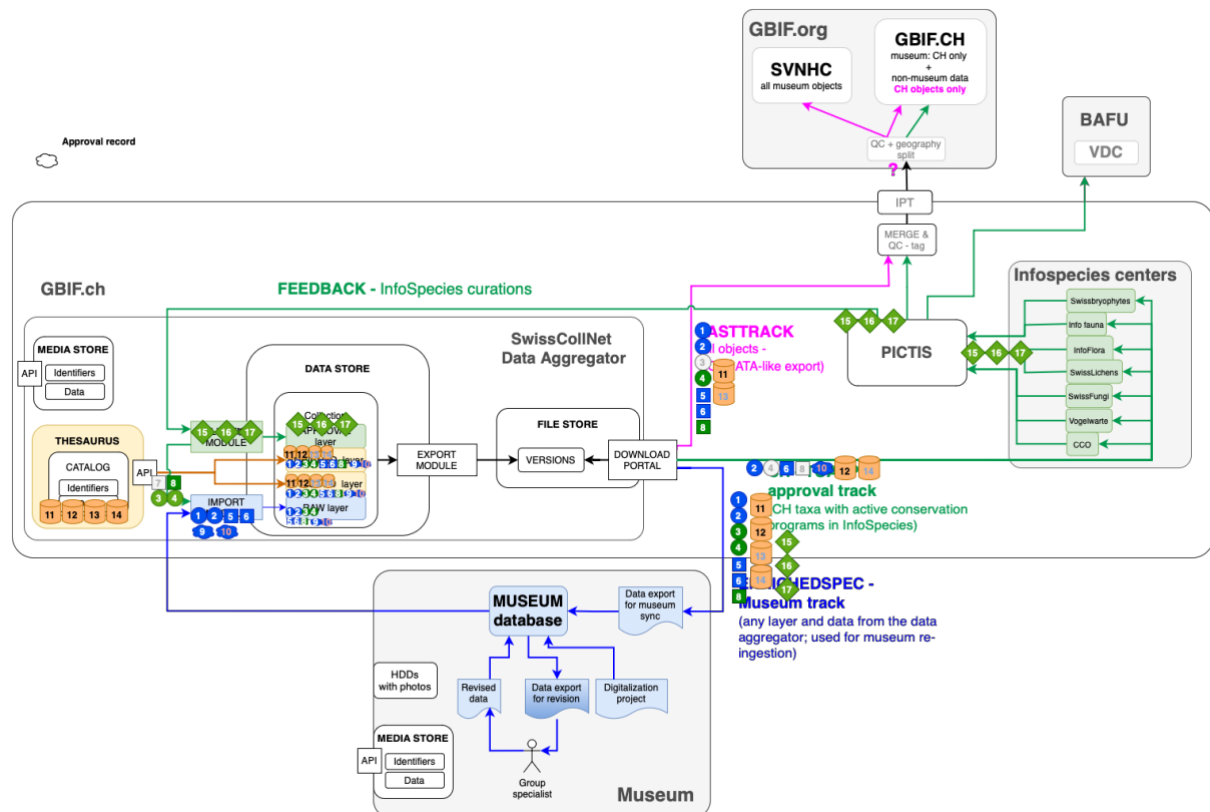
Prior to signing the collaboration agreement, technical assessments on the existing infrastructure of the Swiss node of GBIF were made early in 2023 and a first draft of an IT-architecture plan was elaborated in collaboration with InfoSpecies in order to integrate digital information of biological and paleontological collections and collection specimens into the IT-landscape of the Swiss node of GBIF and the data centers for biodiversity observation data (9 data centers under the umbrella of InfoSpecies). Thereafter, a call for tender for the recruitment of an external IT-company was formulated. After a check of 14 different IT-companies by members of InfoSpecies, the University of Applied Sciences Graubünden, an IT-specialist of the natural history museum in Geneva and members of the Board of Experts of SwissCollNet, 9 IT companies were invited to submit an offer for the development of the data aggregator for natural history collections data. Out of these, 5 companies have submitted an application and 3 companies have been invited for an interview after evaluation of all offers by the expert group mentioned above (9 persons).

The project was started on May 30<sup>th</sup> with the participation of the members of the different project groups (see project organization in **Appendix II**) and the selected IT-company zebbra in a kick-off meeting. The technical development of the data aggregator was divided into an evaluation phase for the set-up of the project organization, roles of project members, decision making and communication, as well as the sharpening of the project goals, followed by 6 iteration phases for the development of a minimal viable product and a prototype of the data aggregator and two roll-out iterations for refinements of the prototype. The project organization is composed by a steering body, product owners and testers and an IT team (**Figure 3**). Project and risk management are performed by the project lead of zebbra and the project lead of SwissCollNet.



**Figure 3:** Project organization of the IT-part of the data aggregator and web-portal SVNHC project.

By the end of 2023, the evaluation phase and three iteration phases have been completed. By that time, the data model, data import, data standardization and enrichment and data export have been developed and have been tested in the minimal viable product for further refinement of the IT-architecture and integration into the landscape of national and international databases (Figure 4).



**Figure 4:** IT-architecture of the natural history collection data aggregator for biological collections (SwissCollNet Data Aggregator) and other connected databases. Arrows and signs with numbers represent data flows and data enrichment possibilities. The data are 'living' in different environments, such as the databases of the collection institutions (Museum), the SwissCollNet Data Aggregator and databases of the InfoSpecies data center summarized in the Swiss node of GBIF (GBIF.ch), federal databases as well as in the international databases (GBIF.org).

For the aggregation of collection data of Earth sciences, collaborations with CETAF and GeoCASE have been intensified in 2023. Thomas Burri from the Natural History Museum of Bern has participated in an international workshop organized by CETAF for users of GeoCASE, in order to get an insight of the organizational and technical properties of this service. Thereafter, several scenarios have been drafted and discussed with developers of GeoCASE, in order to aggregate and integrate data from Earth Science specimens from Swiss institutions within GeoCASE and to build a Swiss online-portal for Earth Science collections housed in Switzerland. With this, most of the conceptual work for a collaboration with CETAF has been prepared in 2023.

In addition, SwissCollNet has intensified international collaboration within TDWG, the working group for biodiversity information standards, historically known as the Taxonomic Databases Working Group. Since a few years, TDWG has also integrated Earth Sciences with a task group for Earth Sciences and Paleobiology, where Switzerland is represented by several members of SwissCollNet.

Since internationally, many developments are occurring for standardization and aggregation of data from Earth Science collections, SwissCollNet has decided to follow the developments in 2024, before taking a final decision for the aggregation and publication of data generated in SwissCollNet projects on Earth Sciences and for Earth Science data from Switzerland in general.

[https://swisscollnet.scnat.ch/de/collection\\_data/data\\_aggregation](https://swisscollnet.scnat.ch/de/collection_data/data_aggregation)

#### 1.4. National strategy 2025-2035

A national Strategy for natural history collections has been drafted by members of the BoE, based on a questionnaire that was sent to collection-holding institutions. Contents of a national Strategy for natural history collections have also been discussed with the participants of the SwissCollNet Workshop 2023 (see 1.5). The draft was further developed in 2023 and results of the working group discussions from the annual workshop have been integrated. In addition, the draft has been discussed at the Annual meeting 2023 of MusNatColl (Verband der naturwissenschaftlichen Museen und Sammlungen der Schweiz und Liechtenstein).

[https://swisscollnet.scnat.ch/de/implementation/national\\_strategy\\_2025\\_35](https://swisscollnet.scnat.ch/de/implementation/national_strategy_2025_35)

#### 1.5. Network development and training

In January 2023, the annual workshop of SwissCollNet could be held for the first time as a physical meeting. Besides an overview of SwissCollNet activities, several grantees of SwissCollNet have presented their project approaches as well as preliminary results. Also, a presentation was given about standardization of collection specimen data and the application of the data standard Darwin Core. In the afternoon, the participants were invited to discuss about and work on the National Strategy for Natural History Collections in Switzerland 2025-2035 in smaller working groups. The results of the discussions were then presented to the plenum by one member of every working group.

With more than 120 participants from 50 institutions and museums, the workshop was very well frequented and many lively discussions, scientific and methodological exchanges were conducted during the sessions and during the breaks.

The next annual workshop was planned for January 2024. In summer, the natural history collection community was asked to submit inputs for presentations and was invited to apply for an oral presentation of their SwissCollNet project. Based on the feed-back of many participants, the program was set for a whole day event. In the morning, oral inputs were scheduled to inform the community about progress in the development of the data aggregator for natural history collections and the collection inventory and scientific publication. Furthermore, three principal investigators of projects were invited to present their results. The afternoon was dedicated to data preparation, standardization and publication. Several grantees have prepared workshops, which were held in parallel sessions, followed by two plenary sessions and a wrap-up of the day. By December 2023, 150 persons from 52 institutions and museums were registered for participation at the workshop. As special guests an international delegation of the Canadian Forest Service, "Natural Resources Canada" representing a similar project of the Canadian government as well as a member of the

Hochschule Darmstadt had registered and have participated at the workshop.

<https://swisscollnet.scnat.ch/de/exchange/workshops>

## 1.6. Communication

Information about SwissCollNet, its scientific community, its projects and activities are summarized on the SwissCollNet webpage. The webpage has been regularly updated in 2023. Especially, all projects running in collection institutions are presented one by one with a lay summary in French or in German. Furthermore, a section on collection data management, aggregation and publication has been added.

SwissCollNet has also published 3 newsletters in 2023.

Several articles about discoveries and results of SwissCollNet-projects in collection institutions have been published regularly in national and local media over the year 2023. Furthermore, SwissCollNet is publishing one to several short stories, describing discoveries in natural history collections during the work on projects financed by SwissCollNet on the webpage (out of the box). The stories are also regularly taken up by local media. Results of a SwissCollNet project were presented in the Tagesschau Hauptausgabe of the SRF.

[https://swisscollnet.scnat.ch/de/out\\_of\\_the\\_box](https://swisscollnet.scnat.ch/de/out_of_the_box)

## 1.7. Establish funding body SwissCollNet/SVNHC

A multitude of options have been discussed and are about to be examined and interlinked in order to transform the SwissCollNet-initiative and its outcomes into a more stable, long-term organization, since a data base of national dimension and international significance is being achieved. One of these options was the development of the SwissSpecimen concept, which was submitted with the support of the University of Geneva to the Roadmap Research Infrastructure 2022 call for the development of biological research infrastructures for the period 2025-2028. Although the relevance of this comprehensive project was noticed and highly scored by most reviewers, the project was not selected for the last round of evaluation of the RI 2025-2028 process. The concept of SwissSpecimen will not be dropped, but will be enhanced and further developed for later submissions in the frame of future Biology roadmaps from 2028 on. Discussions on the next Biology Roadmap have indeed resumed in March 2024.

In parallel, members of the Steering Board of SwissCollNet and members of the executive committee of MusNatColl have drafted a common vision for collaboration and the set-up of a joint association for the Swiss community working with natural history collections. This concept paper addresses goals and tasks as well as a budget to run an operational body, as well as options of funding. It has been presented to the executive boards of SCNAT and MusNatColl and will be further developed in 2024.

The IT-infrastructure for biological specimen data from collections will be fully integrated into the IT-landscape of the Swiss node of GBIF. The FOEN has mandated the data center for species information info fauna since 2002 to maintain a Swiss node of the Global Biodiversity Information Facility GBIF. The task of GBIF.ch is to mobilise data on biodiversity at national and international level and make it available to the national and international community. As natural history collection data complement observation data collected by the data information centers of InfoSpecies, the FOEN has modestly increased the funds for the Swiss node of GBIF for the maintenance of the data infrastructure and for human resources, due to a bigger load of data to be managed. However, this financial increase will not cover further developments for the prototype of the data aggregator that will result from the SwissCollNet-initiative. Furthermore, the FOEN will bring to life a Steering Body for the Swiss node of GBIF, in which representatives of the natural history collection community will be members.

## 1.8. International participation in DiSSCo

SwissCollNet will pursue the goal to have Switzerland as an official member of DiSSCo at the time it becomes an operational ERIC infrastructure in 2025. With Musnatcoll, the Association of Natural History Museums and

Collections in Switzerland and Liechtenstein, being part of the preparation of the initiative and with Ana Casino, CSO Deputy Director of DiSSCo also a member of the Steering Board of SwissCollNet, the Swiss natural history collection community has established first connections to this extraordinarily important European initiative. Thus, MusNatColl is an Associate member of DiSSCo since 2022, and represents the consortium of thirty-eight Swiss institutions during the general meetings.

## 1.9. References

Johnson K.R., Owens, I.F.P, the Global Collection Group (2023) *Science* 379, 6638: pp 1192-1194.

## 2. Financial report

### 2.1. Budget of funds provided by the SERI and of in-kind contributions

The budget of the SwissCollNet initiative includes federal contributions and contributions from the partner institutions, which have to make up 50% of the entire costs of SwissCollNet. Grantees of individual projects in public institutions will contribute with at least an equal amount of funds (cash/in-kind) to their projects. Contributions of experts participating in projects led by SwissCollNet directly, such as the collection survey, the national strategy for natural history collections, the construction of the SVNHC, education and training etc. are calculated on a fixed rate.

- SwissCollNet Management includes expenses in the Scientific Unit at SCNAT such as salaries, overhead and infrastructure costs, travelling costs of board and SCNAT members as well as material costs of projects carried out by the SwissCollNet boards and the Scientific Unit.
- Transfer for projects in collections are the costs and matching funds for the 68 individual projects of the grantees and co-grantees, which were selected in the two project calls.
- Data infrastructure includes all cost for the construction of a national data aggregator to aggregate and display the data of collection specimens.

The annual financial installement for 2023 from the confederation was 3'236'900 CHF, matching funds were estimated to be 3'526'500 CHF. The budget has been divided in three categories (**Table 1**).

For the category 'SwissCollNet management', 579'000 CHF federal funds and 469'600 CHF matching funds were budgeted.

For the category 'Transfer for projects in collections', 2'357'900 CHF were budgeted for federal funds as well as for matching funds.

For the data infrastructure category, 300'000 CHF federal funds were budgeted. Matching funds were predicted to be 699'000.

<b>Budget SwissCollNet</b>	<b>2023 SCNAT</b>	<b>2023 Matching funds</b>
<b><i>SwissCollNet Management</i></b>		
Management, coordination	514'000	177'600
Workshops and conferences	20'000	40'000
Collection strategy	10'000	108'000
Collection survey	5'000	120'000
Long-term SVNHC	15'000	24'000
Training experts	15'000	0
<b>Total management</b>	<b>579'000</b>	<b>469'600</b>
<b><i>Transfer for projects in collections</i></b>		
<b>Total projects of calls</b>	<b>2'357'900</b>	<b>2'357'900</b>
<b><i>Data infrastructure</i></b>		
SVNHC data-repository	300'000	699'000
<b>Total data infrastructure</b>	<b>300'000</b>	<b>699'000</b>
<b>Total</b>	<b>3'236'900</b>	<b>3'526'500</b>

**Table 1:** Annual budget 2023, SCNAT represents federal contributions, matching funds represent cash and in-kind contributions of participants of the initiative SwissCollNet.

## 2.2. Expenses of funds provided by the SERI and in-kind contributions

Expenses of 2023 are summarised for federal contributions and in-kind/in-cash contributions of the participants of SwissCollNet (**Table 2**). Total expenses of federal funds in 2023 were 3'776'917.53 CHF. The total of matching funds in the form of in-kind and in-cash contributions of the participants of SwissCollNet were 5'868'653 CHF.

Items	2023 SCNAT	Item	Matching funds	Yearly contributions (h)	CHF / h
<b>SwissCollNet Management</b>		<b>SwissCollNet Management</b>			
Salaries	197'686.80	Governance SB	62'775	232.5	270
Social charges	38368.3	Governance BoE	24'400	122	200
Overhead	57'117.65	Workshops and conferences	33'600	168	200
Job advertisements	898.65	Collection survey	42'000	210	200
Travelling costs SU	763.85	National Collection strategy	12'800	64	200
Travelling costs board members	839.10	Long-term SVNHC	29'200	146	200
Workshops and conferences	5'025.90				
External infrastructure (whizive)	6'527.25				
Communication	337.75				
Bank account	4.00				
<b>Total SwissCollNet Management</b>	<b>307'569.25</b>	<b>Total SwissCollNet Management</b>	<b>204'775</b>	<b>942.5</b>	
<b>SwissCollNet infrastructure for data aggregation</b>		<b>SwissCollNet infrastructure for data aggregation</b>			
Contracts with third parties	270'732.55	SVNHC strategic project group	25'380	94	270
Material costs	0.00	SVNHC bio data management WG	45'200	226	200
Travelling project group members	854.50	SVNHC geo data management WG	14'100	70.5	200
		SVNHC IT-staff GBIF	97'580	574	170
		investments infrastructure GBIF (2021)	248'000		
<b>Total Infrastructure for data aggregation</b>	<b>271'587.05</b>	<b>Total Infrastructure for data aggregation</b>	<b>430'260</b>	<b>964.5</b>	
<b>SwissCollNet Transfer project calls</b>		<b>SwissCollNet Transfer project calls</b>			
Transfer project calls	3'197'761.23	Funded projects in institutions	5'219'818		
		Evaluation reports of funded projects	13'800	69	200
<b>Total transfer project calls</b>	<b>3'197'761.23</b>	<b>Total transfer project calls</b>	<b>5'233'618</b>		
<b>Total contributions SwissCollNet</b>	<b>3'776'917.53</b>	<b>Total matching funds</b>	<b>5'868'653</b>		

**Table 2:** Annual expenses and matching funds of SwissCollNet 2023. SCNAT represents federal funds provided by the SERI, Matching funds are the in-cash and in-kind contributions of SwissCollNet participants.

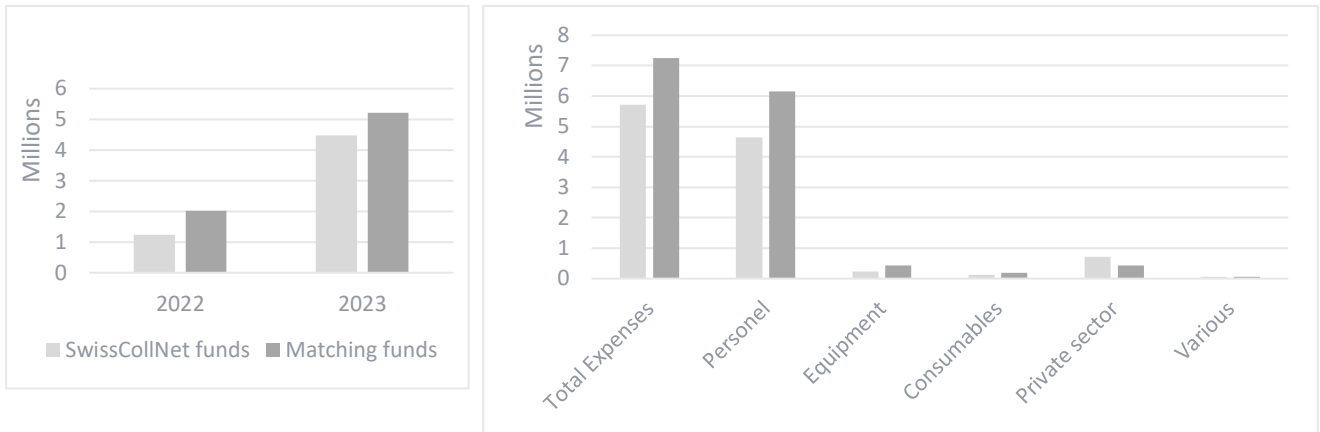
For the management of the initiative, the annual workshop, communication as well as infrastructure costs for the project management tool and overhead costs for SCNAT, 307'569.25 CHF federal funds were spent. In-kind contributions of SwissCollNet participants were 204'775 CHF in the management category. The contributions were made for the governance of the initiative, contributions to the annual workshop as well as the analyses of the collection survey and work on the national strategy and the set-up of a future organisation of SwissCollNet.

The development of the data infrastructure was 271'587.05 CHF of federal funds in total. Contracts with third parties (IT-company, UAS-GR, InfoSpecies) represent the main costs. 854 CHF were spent for travelling of working-group members to workshops in Bern, as well as the participation of Thomas Burri at a CETAF workshop to learn about GeoCASE. In-kind contributions were 430'260 CHF in total, representing contributions of working-group members and the IT-staff of the Swiss node of GBIF, as well as of investments the Swiss node of GBIF has made in the already existing infrastructure in 2021. The same amount of previous investments made in 2022 by the Swiss node of GBIF will be considered as in-kind contributions in 2024.

A total of 3'203'934.35 CHF were transferred to the project grantees in 2023. A total of 1'477'682.15 CHF of final installments will be paid to the grantees in May 2024 (for details see **Appendix III**).

Expenses and balances for the individual projects in collection institutions are presented for the years 2022 and 2023 (**Appendix IV**). The total of SwissCollNet funds spent in the individual projects was 1'241'546 CHF in 2022 and 4'464'858 CHF in 2023. The cash/in-kind investments (matching funds) for the individual projects were 2'023'292 CHF in 2022 and 5'219'818 CHF in 2023.

In both years, the in-kind investments were higher than the expenses of SwissCollNet. Most funds were invested for personnel costs. Equipment, consumables and various costs were in a smaller range (**Figure 5**).



**Figure 5.** Total SwissCollNet funds (bright) and matching funds (dark) invested in the individual projects in 2022 and 2023 (left) and divided into the different categories.

### 2.3. Balances and cash flow of funds provided by the SERI and of in-kind contributions in 2023

Expenses of federal funds were compared to the budget established for 2023 (Table 3).

SwissCollNet 2023	Budget SCNAT	Expenses SCNAT	Balance
<b>SwissCollNet Management</b>			
Salaries	254'300	197'686.80	56'613.20
Social charges	51'900	38368.3	13'531.70
Overhead	73'500	57'117.65	16'382.35
Job advertisements	0	898.65	-898.65
Travelling costs SU	0	763.85	-763.85
Travelling costs board members	5'000	839.10	4'160.90
Workshops and conferences	20'000	5'025.90	14'974.10
External infrastructure (whizive)	10'000	6'527.25	3'472.75
Communication	5'000	337.75	4'662.25
Bank account	0	4.00	-4.00
Prospective projects	114'300	0.00	114'300.00
Collection survey	5'000	0.00	5'000.00
National collection strategy	10'000	0.00	10'000.00
Collection management (material costs)	10'000	0.00	10'000.00
Training (material costs)	5'000	0.00	5'000.00
Sustainability SwissCollNet (material costs)	15'000	0.00	15'000.00
<b>Total Management</b>	<b>579'000</b>	<b>307'569</b>	<b>271'431</b>
<b>SwissCollNet infrastructure for data aggregation</b>			
Contracts with third parties	290'000	270'732.55	19'267.45
Material costs	5'000	0.00	5'000.00
Travelling project group members	5'000	854.50	4'145.50
<b>Total infrastructure for data aggregation</b>	<b>300'000</b>	<b>271'587</b>	<b>28'413</b>
<b>SwissCollNet Transfer project calls</b>			
<b>Total Transfer project calls</b>	<b>2'357'900</b>	<b>3'197'761.00</b>	<b>-839'861.00</b>
<b>Total contributions SwissCollNet</b>	<b>3'236'900</b>	<b>3'776'917</b>	<b>-540'017.30</b>

**Table 3.** Balance of federal funds in 2023. The budgeted total amount of money corresponds to the annual instalment of the SERI. Expenses of SwissCollNet are compared to the annual budget of 2023.

The SwissCollNet management category shows a positive balance of 271'431 CHF of federal funds. Lower salary and overhead costs than expected are due to a reduction of the personnel in the Scientific Unit of SwissCollNet by April 1, 2023. Also, expenses of projects such as the national collection strategy and the collection survey were mainly covered by in-kind contributions.

The data infrastructure category shows a positive balance of 28'413 CHF, partially due to less traveling costs of working group members than expected and to a slightly delayed start of the collaboration with an external IT-company.

The transfer for projects category shows a negative balance of 839'861 CHF. This is due to the payment of the second instalment to many grantees in 2023 (**Appendix III**).

In summary, the expenses of federal funds for SwissCollNet in 2023 were 540'017 CHF higher than budgeted. This negative result is covered by provisions resulting from the positive balance in 2022.

Investments of cash/in-kind contributions (matching funds) were compared to the budget established for 2023 (**Table 4**).

Item	Budget Matching funds	Investments matching funds	Balance
<b>SwissCollNet Management</b>			
Governance SB	129'600	62'775	66'825
Governance BoE	48'000	24'400	23'600
Workshops and conferences	40'000	33'600	6'400
Collection survey	120'000	42'000	78'000
National Collection strategy	108'000	12'800	95'200
Long-term SVNHC	24'000	29'200	-5'200
<b>Total management</b>	<b>469'600</b>	<b>204'775</b>	<b>264'825</b>
<b>SwissCollNet infrastructure for data aggregation</b>			
SVNHC strategic project group	81'000	25'380	55'620
SVNHC bio data management WG	120'000	45'200	74'800
SVNHC geo data management WG	100'000	14'100	85'900
SVNHC IT-staff GBIF	150'000	97'580	52'420
investments infrastructure GBIF (2021)	248'000	248'000	0
<b>Total infrastructure for data aggregation</b>	<b>699'000</b>	<b>430'260</b>	<b>268'740</b>
<b>Transfer project calls</b>			
Evaluation reports of funded projects	0	13'800	-13'800
Funded projects in institutions	2'357'900	5'219'818	-2'861'918
<b>Total Transfer project calls</b>	<b>2'357'900</b>	<b>5'233'618</b>	<b>-2'875'718</b>
<b>Total matching funds</b>	<b>3'526'500</b>	<b>5'868'653</b>	<b>-2'342'153</b>

**Table 4.** Balance of cash/in-kind contributions (matching funds) in 2023 for the three categories 'SwissCollNet Management', 'Transfer for projects in collections' and 'Data infrastructure'.

In the category SwissCollNet management slightly less than half of the predicted in-kind contributions were invested. The governance of the initiative was less time consuming than planned, since a lot of work was reallocated to specific working groups. Also, less time could be invested in the projects of the collection survey and the national collection strategy than planned.

In the category infrastructure for data aggregation, big efforts were made by the three working groups (strategic, data management bio and data management geo). Furthermore, the IT-staff of the Swiss node of GBIF has contributed enormously to the development of the data aggregator. Although the budgeted in-kind contributions were much higher than the investments made, in-kind contributions nearly doubled the federal funds spent this year for the data aggregator project.

In the category transfer project calls, no budget was foreseen for the evaluation of the intermediate reports by the members of the Board of Experts. The in-kind contributions for this task were 13'800 CHF. Within the 68 projects running in the collection institutions, in-kind and in-cash contributions in 2023 were 5'219'818 CHF (for details see **Appendix IV**).

## 2.4. Balances and cash flow of funds provided by the SERI and of in-kind contributions 2021-2023

Total available federal funds for the SwissCollNet initiative were 12'306'200 CHF, of which 8'695'325 CHF have been spent in the years 2021-2023 (Table 5), leaving a positive balance of 811'775 CHF on December 31, 2023 and of 3'610'875 CHF for the remaining time of the initiative.

Item	Budget total	Expenses 21-23	Balance
<b>SwissCollNet Management</b>			
Management, coordination	1'799'994	942'021	857'973
Workshops and conferences	55'000	5'026	49'974
Collection survey	16'000	0	16'000
National collection strategy	19'000	0	19'000
Long-term SVNHC	15'000	0	15'000
Formation and training	25'000	0	25'000
<b>Total management</b>	<b>1'929'994</b>	<b>947'047</b>	<b>982'947</b>
<b>SwissCollNet infrastructure for data aggregation</b>			
<b>Total infrastructure for data aggregation</b>	<b>1'000'000</b>	<b>358'147</b>	<b>641'853</b>
<b>Transfer project calls</b>			
Data transfer	515'019	0	515'019
Projects of calls	8'861'187	7'390'131	1'471'057
<b>Total Transfer project calls</b>	<b>9'376'206</b>	<b>7'390'131</b>	<b>1'986'076</b>
<b>Total SwissCollNet funds</b>	<b>12'306'200</b>	<b>8'695'325</b>	<b>3'610'875</b>

Table 5. Balance of federal funds for the SwissCollNet initiative at the end of the year 2023. The financial cutbacks from initially attributed 12.37 Mio. CHF (63'800 CHF in total) have been distributed in percentage within the three categories.

The in-kind/in cash contributions for 2021-2023 are 9'044'781 CHF (Table 6). The remaining cash/in-kind contributions (matching funds) to be provided by the participants of the initiative are 4'392'222 CHF to reach the budgeted amount. For an exact match of federal contributions and matching funds, the participants still have to contribute 3'261'419 CHF, since the budget of matching funds is 1'130'803 CHF higher than total federal funds.

Item	Budget total	Expenses 21-23	Balance
<b>SwissCollNet Management</b>			
Management, coordination	1'000'400	340'648	659'752
Workshops and conferences	120'000	55'200	64'800
Collection survey	630'400	332'945	297'455
National collection strategy	384'000	21'200	362'800
Long-term SVNHC	96'000	39'900	56'100
Formation and training	40'000	3'200	36'800
<b>Total management</b>	<b>2'270'800</b>	<b>793'093</b>	<b>1'477'707</b>
<b>SwissCollNet infrastructure for data aggregation</b>			
<b>Total infrastructure for data aggregation</b>	<b>1'417'600</b>	<b>564'803</b>	<b>852'797</b>
<b>Transfer project calls</b>			
Evaluation of projects and reports	80'000	443'775	-363'775
Projects of calls	9'668'603	7'243'110	2'425'493
<b>Total Transfer project calls</b>	<b>9'748'603</b>	<b>7'686'885</b>	<b>2'061'718</b>
<b>Total Matching funds</b>	<b>13'437'003</b>	<b>9'044'781</b>	<b>4'392'222</b>

Table 6. Balance of matching funds for the SwissCollNet at the end of the year 2023.

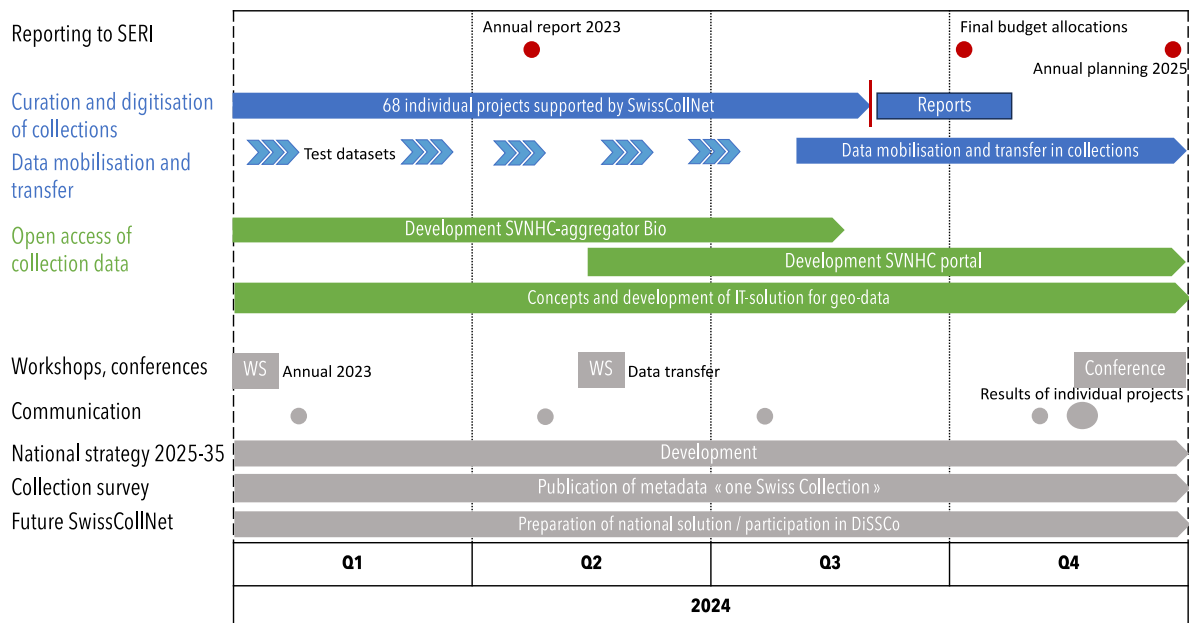
In conclusion, federal funds spent so far are 8'695'325 CHF, matching funds contributed are 9'044'781 CHF.

### 3. Synthesis and outlook for activities planned in 2024

In summary, in the third year of SwissCollNet the grantees of SwissCollNet projects and their staff have been significantly advancing collection management and digitisation in their institutions and in collaboration with their project partners. Many methodological and taxonomic exchanges have occurred and many young scientists were trained daily in the individual projects. On the other hand, big efforts of many persons from the natural history collection network and from InfoSpecies, especially persons working for the Swiss node of GBIF allowed fast progress of the development of the data infrastructure. Furthermore, connections between InfoSpecies, MusNatColl and SwissCollNet were strengthened and strategic goals of the three entities have been aligned in regard to curation of natural history collections and object data.

Thus, milestones of 2024 will mainly be finishing-up all individual projects in the numerous collection institutions. A conference to present the results of the 68 projects is planned at the end of 2024 or early in 2025. A further very important goal is to deliver a prototype of the collection data infrastructure and to perform extensive tests to aggregate the digital information about collection specimens resulting from the projects. Towards the end of the year, data mobilisation in the institutions and transfer of data to the data aggregator will be a major focus. A workshop for data transfer will be organised in late spring. The development of the SVNHC online-portal will start, as soon as there are a number of data-sets available in the data aggregator. Also, the registration of all the collection units of Swiss Natural History Collection institutions in the Global Registry for Scientific Collections GRSciColl and the publication of the article 'One Swiss Collection' will occur. Communication about the SwissCollNet-initiative will be intensified as results out of the projects are progressively emerging. In the frame of the Roadmap for research infrastructures 2028-2031, efforts for the participation of Switzerland in the ERIC infrastructure DiSSCo and in the establishment of data infrastructures for biological specimens in Switzerland will be intensified (**Figure 6**).

In conclusion, the third year of the SwissCollNet initiative was very satisfactory with many fruitful results representing a strong basis for future activities planned in 2024 and beyond.



**Figure 6:** Milestones and projects of SwissCollNet in 2024. Implementation of the projects supported by SwissCollNet (in blue), will take place in the collection-holding institutions. All other activities (green, gray) will be directly steered and coordinated by SwissCollNet.

## 4. Glossary

BoE	Board of Experts SwissCollNet
CETAF	Consortium of European Taxonomic Facilities
DiSSCo	Distributed System of Scientific Collections
GBIF.org	Global Biodiversity Information Facility
GBIF.ch	Swiss Node of GBIF
GeoCAsE	Geoscience Collections Access Service
GRSciColl	Global Registry of Scientific Collections
InfoSpecies	Swiss Information Center for Species
Musnatcoll	Verband der naturwissenschaftlichen Museen und Sammlungen der Schweiz und Liechtenstein
SB	Steering Board SwissCollNet
SCNAT	Swiss Academy of Sciences
SERI	State Secretariat for Education, Research and Innovation
SVNHC	Swiss Virtual Natural History Collection
SwissCollNet	Swiss Natural History Collections Network

## 5. Appendices

### Appendix I

Overview of the 68 projects granted by SwissCollNet (see additional file Appendix I\_all projects)

### Appendix II

Agreement of collaboration with InfoSpecies (see additional file AppendixII\_collaboration)