



WSL Evaluation 2022

WSL Response to the Evaluation Report



Swiss Federal Institute for Forest, Snow
and Landscape Research WSL

WSL Institute for Snow and Avalanche Research SLF

WSL Response to the Report of WSL Evaluation 2022

23 August 2023

Responses by the WSL Directorate are provided as italicized text in grey boxes

Preamble

In this document, the WSL Directorate responds to the statements and recommendations by the international Evaluation Committee as summarized in the report of the WSL evaluation Nov. 29 – Dec. 2, 2022. The evaluation report was sent to the WSL Director by the Chair of the Evaluation Committee in February 2023. As a guideline, our response is based on the following key points:

Terms of Reference (TORs), Self-Assessment Report (SAR) and 3-day site visit in Switzerland: *The evaluation was conducted with specific focal areas as formulated in the TORs approved by the ETH Board. The core part of the evaluation was the three-day site visit by the Evaluation Committee from 29 November to 2 December 2022. The SAR supported the evaluation process by providing key information about WSL. The detailed responses presented in this document by the WSL Directorate were developed with the input from WSL's upper management.*

Overall positive feedback by the Evaluation Committee: *The WSL is very pleased to note that the Evaluation Committee's feedback is overwhelmingly positive. Both the Directorate and Evaluation Committee believe that it is important to further increase our international visibility. We agree that refining overarching methodological and theoretical foundations, as well as clarifying key concepts is a way to go forward, while it is crucial to emphasize that WSL's strength lies in our disciplinary expertise and excellence, for example, in our long-term monitoring activities. These assets empower us to make substantial contributions to both interdisciplinary and transdisciplinary research.*

In-text answers in the original Evaluation Committee report: *For the sake of clarity, the answers are preceded by the statements "agree", "partly agree" or "disagree". While we largely agree with the recommendations, there are few that we can only agree with to a limited extent or not at all after weighing up all aspects, and we give reasons for this. A few recommendations point to a lack of emphasis on important WSL assets, either in the SAR or in our presentations during the site visit. Here, we give additional explanations.*

Strategy 2035: *As of August 2023, WSL is in the middle of the strategy development process (Strategy 2035), with no final decisions yet made. Many of the Evaluation Committee's recommendations are of great importance for the Strategy 2035, others will be valuable for the further development of the WSL organization that follows the completion of the Strategy 2035. The evaluation and the committee report therefore arrived exactly at the right time. This is, however, why in several responses we refer to the Strategy 2035 instead of providing definite answers now.*

We consider both the WSL evaluation in 2022 and the underlying SAR important opportunities for our institute to present the excellent work conducted in highly relevant thematic areas, in terms of research, knowledge transfer and – of particular importance to WSL – science-based application in practice, and outreach to society and politics. We highly appreciate the feedback from the Evaluation Committee that will be of great help to consolidate and further foster WSL's national and international impact and visibility, and to keep conducting "research for people and the environment" as stated in WSL's vision.

For the WSL Directorate



Christoph Hegg, Acting Director WSL

Birmensdorf, 23 August 2023

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Executive Summary

The Review Committee recognizes that WSL conducts excellent research in its five core thematic areas (snow and ice, natural hazards, biodiversity, landscape, forest), and its research on snow is world leading. The institute is an independent, application-oriented research entity that addresses important environmental challenges for Switzerland from high pressure on the natural environment – including climate and land-use change – and the resultant needs to manage risks and lands sustainably. Based on this research there are strong stakeholder collaborations, transfer and outreach activities towards society, private actors and public authorities in Switzerland, and other institutions in the ETH domain. While WSL has a high profile for excellence internationally, there are opportunities for even greater scientific visibility and societal impact. The Review Committee acknowledges that there is productive exchange and a good equilibrium between high-quality research, transfer and outreach at WSL. The Institute presents an exemplar of how the highest standards can be met in both research and service to society.

The excellent performance of WSL calls for proactive steps to maintain this high standard, as well as to respond to societal and environmental changes that challenge Europe and beyond. The principal recommendations given by the Review Committee are to:

- Contribute further to theory and concept development across and within WSL Research Groups and disciplines.

R1 – Agree: *The development of theoretical frameworks across and within WSL research groups and disciplines is important for WSL and will be encouraged. Such frameworks are especially important for new overarching themes that we look forward to seeing emerging from the “WSL Strategy 2035” development process (in short: Strategy 2035) and that then will be addressed as part of the corresponding implementation process. Potential topics include, but are not limited to, areas where considerable amounts of data are being generated by field surveys, ecosystem experiments, and monitoring, as well as new areas of interdisciplinary research.*

- Promote further transition from multidisciplinary to transdisciplinary research through more formalized engagement of stakeholders in every step of the research process and by putting even more emphasis on the analysis of success factors and hindrances of societal change, and on the development of solutions. This transition will require a stronger emphasis on social sciences.

R2 – Agree: *The recommendation addresses three aspects that require a differentiated answer, i.e., (1) transition to transdisciplinary research, (2) emphasis on success factors and hindrances of societal change, and (3) emphasis social sciences. Recommendations with the same or similar content are formulated throughout the report.*

(1) We would like to highlight that transdisciplinary approaches (in the sense of engaging stakeholders in significant ways throughout the research process) are already an essential part of the WSL research portfolio, but we acknowledge the need to further strengthen such transdisciplinary work. WSL has a long tradition in pursuing transdisciplinary research and actively engaging stakeholders in many of its topics, a fact that might not have been sufficiently emphasized in the material provided to the evaluation committee. For example, much research in forest management and natural hazards has been developed and was/is conducted in close collaboration with representatives of cantonal and national administrations and governments. The Directorate has recently taken several initiatives to strengthen transdisciplinary research e.g., with the research program Extremes that fosters inter- and transdisciplinary research to equip Swiss stakeholders with appropriate decision-making tools and coping strategies addressing future extremes. Furthermore, the CERC which develops practical solutions for relevant problems of mountain regions caused by climate change, extreme events, and natural hazards acts as research-, knowledge- and implementation hub. However, transdisciplinary approaches might not be appropriate or needed for all research questions addressed in our research institute. We will further evolve ways forward to strengthen

transdisciplinary research approaches as well as the question regarding the optimal balance between disciplinary and transdisciplinary research for WSL to fulfil its tasks and mandates.

(2) We agree that an emphasis on the success factors and hindrances to societal change is an important topic for WSL that is closely linked to the role of social sciences addressed in the following point (3). We would like to stress here that we see ourselves as “honest brokers” in political processes. We strive to provide knowledge (incl. scenarios) to enable science-informed decision-making.

(3) We agree that WSL should aim at putting stronger focus on social sciences research, through enhancing its own capacities or through actively searching cooperations with strong external academic social science partners. We further expand on these points later in the document and thus refer to the responses to the related principal recommendations R4 and R5 in the executive summary of the report.

- Further work toward systemic landscape and risk management approaches by addressing certain gaps, notably with respect to water-related issues, agro-ecosystems and settlement patterns as integral parts of landscapes.

R3 – Agree: *This recommendation fits very much with the current thinking of WSL. The aspect of more integrated, landscape-encompassing approaches for environmental research is taken up in the Strategy 2035. Where appropriate we will seek cooperation with our partners for realization. Experiences in the frame of the Blue-Green-Biodiversity network between WSL and EAWAG (2020–2024) have confirmed a considerable potential of cooperation and added value resulting from bridging the institutionally separated joint research field of open land and water bodies.*

- Maintain the outstanding long-term monitoring programs and experiments and to expand them to include human behavior, social perceptions and human well-being.

R4 – Agree: *Indeed, the long-term monitoring programs and experiments are a unique asset of WSL. Their continued maintenance and further development are of central importance as long-term data series gain of importance with time, in particular under rapidly changing climatic and environmental conditions. We are particularly proud to have already enlarged some of the long-term monitoring activities with aspects of human behavior, social perceptions and human well-being (WAMOS, LABES, LFI-Forest & Society module). Yet, expanding long-term monitoring activities means additional resources (financial/staff) and as most of our monitoring activities are eventually mandated (and paid for) by federal and cantonal authorities, WSL is limited to contribute with projects that prove the feasibility as well as the benefits for society and mandating bodies of such extensions.*

WSL has an opportunity to employ its application-oriented research approach to more deeply consider transformational and sustainability issues regarding societal adaptation to climate change, biodiversity loss and urban population pressures. In order to increase societal impact and to support societal transformations in Switzerland, even more emphasis could be given to transfer and transformation, and to communication with influential decision makers. This should be a target of all research units at WSL. Impact could be further strengthened by involvement of a broader array of social science expertise within WSL to gain a better understanding of human-nature interactions.

R5 – Partly agree: *WSL takes the goals behind the ETH Domain's slogan "How to Best Serve Switzerland" seriously and aims to increase societal impact and provide knowledge for upcoming societal transformations. Recommendations regarding application-oriented research on societal adaptation to climate change, biodiversity loss and urban population pressures will be, in addition, considered in the Strategy 2035 that is currently developed. In this participatory process, we will also address the further development of stakeholder interactions and social science expertise in research – at present and in the future. While we agree with the need to deeply address sustainability issues, we do not agree with the general statement that all research teams should emphasize more on transfer and transformation: curiosity driven research (basic research) should not be curtailed. Outcomes of such research are, anyway, communicated on various news portals.*

The upcoming retirement of several lead scientists offers a window-of-opportunity for this adjustment toward even greater societal impact. This re-orientation can be achieved by renewing and revisiting the current portfolio of research activities in light of social and environmental transformations, working closely with stakeholders, and furthering cooperation with other research institutions.

R6 – Agree: *Here the Strategy 2035 will be crucial for identifying priority areas for WSL over the coming years. In this regard, upcoming retirements are of uttermost importance for the future strategic development of WSL, offering a window of opportunity that should not be missed. In fact, the well-established processes at WSL ensure that all vacant positions resulting from retirements or for any other reasons are not automatically replaced but assessed by the Directorate which then decides where to invest such positions most effectively. The respective research units and groups are involved in the process and can apply for their requirements and needs (replacements, redirection, new opportunities). Unfortunately, the bleak financial outlook will most likely result in a situation where WSL will not be able to replace/reinvest all freed-up positions over several years to come. In addition, a considerable part of WSL's tasks is mandated by the federal government. In those areas of WSL's activities, there is only limited flexibility.*

A reconstituted, independent international Scientific Advisory Board should play a major role in mapping opportunities for maintaining and further elevating the stature of WSL. The Review Committee also recommends establishment of a formal Stakeholder Advisory Panel, meeting regularly with the WSL Directorate, in order to extend contacts beyond individual researchers and to support the transdisciplinary approach.

R7 – Disagree: *WSL has successfully established an Advisory Board back in 2013. WSL's advisory board currently is composed of three stakeholders, in addition to seven scientific experts. This has proven to be a good balance and has been working excellently for WSL as well as for the Advisory Board. The WSL Advisory Board is a diverse board in terms of background, expertise, experiences and perspectives, on purpose. While we appreciate the concern for expanding stakeholder engagement, we do not see added value with the recommendation of establishing a formal Stakeholder Advisory Panel. We further expand on these points later in the document in different sections and thus refer to the relevant recommendations in Sections 2.2 (R16), 2.3 (R19), 3.2 (R35) and 3.5 (R42).*

1 Introduction

The institutions of the ETH Domain are evaluated regularly in an 8-year cycle. The WSL was last evaluated in 2013. The on-site visit of the Review Committee took place from Nov. 29 to Dec. 2, 2022, involving the following experts:

Volker Mosbrugger (Chair)	Germany	Senckenberg Gesellschaft für Naturforschung, Polytechnische Gesellschaft
Wolfgang Cramer	France	Institut Méditerranéen de Biodiversité et d'Écologie Marine et Continentale, CNRS
Lena Gustafsson	Sweden	Department of Ecology, Swedish University of Agricultural Sciences
Bernd Hansjürgens	Germany	UFZ Helmholtz Center for Environmental Research
Ueli Meier	Switzerland	Amt für Wald beider Basel
Joan Nassauer	USA	School for Environment & Sustainability, University of Michigan
John Pomeroy	Canada	Department of Geography & Planning, University of Saskatchewan
Julienne Stroeve	UK/Canada	University College London & Centre for Earth Observations Sciences, University of Manitoba

As a basis for the review process, the Review Committee had at its disposal the Self-Assessment Reports (SAR) volume 1 and 2 as well as various presentations, posters and discussions during the three-day on-site visit in Birmensdorf and Davos. The WSL Directorate and staff had prepared the review process professionally and supported it very openly and constructively. All supplementary information requested by the Review Committee was provided promptly.

The Terms of Reference (ToR) for the review process provided by the Directorate and the ETH Board are reproduced in SAR vol. 1 on page 8 and 9 and are summarized as follows:

“The ToRs take into account WSL’s main fields of activity: excellent research, knowledge transfer and application in practice, and outreach to society and politics. According to the provisions for evaluations within the ETH Domain, the ToRs include a set of five overarching questions on WSL’s: (1) relevance, (2) quality, (3) productivity, (4) dynamics, and (5) opportunities. In addition, they comprise a set of nine specific questions in the following five categories: (1) institutional level, (2) strategic focus, (3) long-term research and monitoring, (4) education, and (5) stakeholder involvement and role in society.”

Additional information about the ETH Domain, the review process and the ToR was provided to the Review Committee by the President of the ETH Board on the eve of the first day of the on-site review.

Based on this information, the Review Committee decided to organize its report according to the structure of the ToR to make sure that all questions of the ToR (see Appendix) are addressed. This implies that some redundancies may occur.

2 Overarching Topics

2.1 Relevance

Overall, the WSL is an excellent research institution covering multidisciplinary research, knowledge transfer, outreach and teaching, focusing on significant parts of the terrestrial environment in Switzerland.

Its direction and role as an independent institute is especially timely and important in the current era of climate and biodiversity crisis. Among its strengths are:

- The research, transfer, outreach and teaching of WSL have high relevance to science and (Switzerland's) society in a situation with accelerating changes in climate and land-use, with marked associated impacts on natural resources, biodiversity, human health and well-being.
- WSL's snow, snow hydrology and avalanche research is extremely relevant nationally and renowned globally.
- There are clear linkages between research and national/cantonal priorities in environmental policy, including forest protection, snow and avalanche risk management, biodiversity and ecological adaptations, energy transformations, planning and land use for human well-being.
- WSL conducts unparalleled long-term research within Switzerland. The large number of high-value, long-term data-sets, experiments and monitoring programs are invaluable for research and applications in current times of rapid global change and constitute a globally significant long-term monitoring program.
- WSL has built up a large research and stakeholder network in Switzerland on all levels, which is of fundamental importance to transdisciplinary opportunities, knowledge transfer and outreach activities. Thus, WSL is a strong example of how excellent research can be linked to relevant applications.

Overall, the Review Committee considers the research, transfer and outreach activities of WSL to be excellent and well-balanced.

R8 – Thanks: *We would like to thank the Evaluation Committee for this very positive assessment and in particular for the assessment that WSL's orientation and role as an independent research institute are especially timely and important.*

Recommendations:

1. The Review Committee recommends that WSL accelerates and promotes the transition from multidisciplinary to transdisciplinary research by expanding its research focus to more directly include developing transformative solutions for society. This would allow a greater emphasis on transformative, integrated sustainability science, notably related to economic change, governance and risk management of forests, biodiversity, water, snow and landscapes. This development would help WSL strengthen its influence and impact in science and society.

R9 – Partly agree: *We refer to our response to the principal recommendation in the executive summary R2 and R5, which cover the same topic.*

More specific suggestions in this context are:

- a) Since integrated landscape management will become increasingly essential in the future, cooperation with Agroscope and Eawag (and other institutions) should be made more coherent. One possible cross-cutting theme could integrate the landscape components that WSL has emphasized most: forests, snow and alpine environments with agricultural land, water and settlement patterns. A perspective could be a comprehensive view (shared across institutions) of landscapes, involving mountains, forests, croplands and pastures, water bodies, and settlement patterns including urban and peri-urban spaces, possibly using a cumulative effects approach on basin-level assessments and further emphasizing human interactions with the environment.

R10 -- Agree: *The research topic of integrated landscape management is an interesting suggestion for WSL. It is very much in line with principal recommendation R3) and will be taken up in the Strategy 2035. Cooperations between EAWAG, Agroscope and other important players in Switzerland (e.g., MeteoSwiss) have a long tradition at WSL, and we are aware of the potential to expand beyond the status quo and go further. We do very much welcome and support better integration of relevant partners in the ETH Domain and thus plan to continue our efforts to get actively involved in the Joint Initiatives in the ETH Domain strategic areas and similar potential activities.*

- b) Similarly, the role of landscape composition and properties for human well-being necessitates WSL to continue their efforts to fully integrate societal dimensions such as landscape perception, health, and quality of life. Studies of human preferences, landscape perception and behavioral change could be more fully integrated with study of biodiversity, forest structure, snow and alpine environments as well as the effects of human action on those environments.

R11 – Agree: *WSL will continue its efforts to integrate societal dimensions such as landscape perception, health, and quality of life into its application-oriented research and outreach activities, where appropriate also in collaboration with partners. The suggestion will be considered in the Strategy 2035.*

- c) The successful long-term monitoring programs and experiments need to be maintained, and equally well managed in the future. The Review Committee recommends that long-term monitoring of human behavior, social perceptions and human well-being be considered as spatially integrated elements of an expanded long-term monitoring effort (see recommendation section “Long-term Research and Monitoring”).

R12 – Agree: *Thank you very much for supporting WSL’s successful long-term monitoring programs and experiments. This aspect has already been addressed in our response to the principal recommendation R4 in the executive summary and we refer to our answer there.*

2. Despite much research on climate change impacts on various sectors, WSL needs to develop a coherent view on issues related to adaptation to and mitigation of climate change for all its Research Groups, Units and Programs, including interactions with settlement patterns and mountain water resources, flooding and drought impacts of climate change.

R13 – Agree: *Adaptation to and mitigation of climate change are topics of utter importance to WSL, especially since WSL strives to be relevant for society. A coherent overarching view is a prerequisite to develop further modern and effective decision support tools. In the recent past, these topics have already gained much attention and one step in this direction was taken by establishing the research program Extremes. A coherent approach to those topics will be further considered and focused on in the Strategy 2035. Finally, we see in this recommendation also a close connection to the principal recommendation R3 in the executive summary and we refer to our answer there.*

2.2 Quality and Productivity

The overall research quality and productivity at WSL is excellent, although with some variability across the Research Units. The Review Committee especially notes WSL’s high international and national visibility in the fields of “snow” and “forests”. It appreciates that many WSL staff members do an impressive job in teaching and knowledge transfer activities resulting in high stakeholder satisfaction. This is made possible by the many individual contacts of WSL researchers and stakeholders, many of which have been established for a long time. The outreach activities have a high quality in traditional formats (events, books, policy briefs, working groups, advisory groups, committees, etc.).

R14 – Thanks: *Thank you for attesting WSL high quality and productivity in research, teaching and knowledge transfer and confirming high stakeholder satisfaction.*

Recommendations:

1. WSL's outreach activities are dynamic, and efforts are made to more fully employ new, changing ways to communicate with the public. Further efforts are needed to engage in mainstream and popular means of communication, and to diversify them depending on type of stakeholder and target group, including youth. To support key policy-makers and more effectively reach current stakeholders, short web-summaries of studies, conveying the most important conclusions, would be helpful. There is ample potential to employ popular social media to reach an even larger share of the public.

R15 – Agree: *We agree that communication activities are immensely important for WSL. However, we are already investing a lot of efforts and resources to support mainstream and popular means of communication and to address different target groups, something we might not have sufficiently stressed in the Self-Assessment Report and during the evaluation site-visit in Switzerland. For example, WSL is active on all major “serious” social media (LinkedIn, YouTube, Twitter, Instagram, Facebook), maintains several online portals for specific target groups (e.g., waldwissen.net, White Risk app, swissfungi.wsl.ch, swisslichens.wsl.ch) and explores new means with the ETH Domäne Joint Initiative Translational Center for Biodiversity Conservation. The detailed suggestions of the Evaluation Committee will be considered in the next update of the WSL communication strategy following the Strategy 2035 and implemented within WSL's financial possibilities. We will focus on exploiting our hitherto good experiences with various communication tools and are well aware of additional efforts needed.*

2. The Review Committee recommends developing a more regular stakeholder management platform in order to promote coordination, synergies, make stakeholder contacts extend beyond individual researchers, and assess “lessons learned” (see section “Stakeholder Involvement and Role in Society”). This might take the form of a Stakeholder Advisory Panel that meets regularly with the Directorate (see recommendations section “Stakeholder Involvement and Role in Society”).

R16 – Partly agree: *We agree that the further development of stakeholder interaction is an important aspect for WSL's impact. WSL will therefore carefully consider the recommendation on developing a more regular stakeholder management as part of the Strategy 2035.*

WSL distinguishes two levels for addressing stakeholders, i.e., overarching stakeholder concerns that can be addressed at the level of an advisory board and sectoral stakeholder aspects being addressed with a targeted effort. On a sectoral level, already well-established platforms maintained by WSL include for example the ‘Waldschutz Schweiz’ with a dense stakeholder-research exchange on pathogens and pest in Swiss forests, the annual ‘Forum für Wissen’ with annual or bi-annual topical events (German and French) on a wide array of WSL-topics, the ‘SwissForestLab-Dialogue’ with stakeholder events on forest research and demands, yearly meetings with all stakeholders of avalanche warning, and a permanent focus group on avalanche prevention. The constitution of the CERC as a joint activity of the Canton of Grison and WSL (plus the ETH Zurich) illustrates the outstanding results of longstanding and trusting relationships with a stakeholder. In addition, already now many research projects where WSL is centrally involved are actually supervised by sounding boards and/or advisory panels from practice. This is a well-established practice.

On the overarching level, we do not consider a stakeholder advisory panel to be a promising solution and see much more benefits in a single Advisory Board constituted with both scientific experts and stakeholders as currently is the case. WSL has made very good experiences with the integration of different concerns to WSL in one single board. We consider this mixed board an important contribution to ensure a spirit of transdisciplinary.

2.3 Dynamics

The Research Groups, administered by Research Units, are the fundamental intellectual and operational units of WSL. Since bottom-up thinking and action appears to be supported and promoted by the Directorate, Research Groups represent a key-element of WSL's dynamics. An important structure fostering collaboration across Research Groups is the Programs, which are particularly successful if they receive support by external funding (e.g. BGB). The Review Committee appreciates that in some cases

new directions of research and infrastructure are initiated bottom-up (e.g. the DROUGHT-CH initiative, eDNAlab). To promote the agility of WSL's research, the Directorate announces calls for support of particularly relevant research, for which collaborators from different Research Groups can apply. The Review Committee supports this approach and encourages continuation of such internal calls. The Research Centers as joint ventures between WSL and other institutions or stakeholders represent another successful structure and draw on members of different Research Units, further ensuring multi-disciplinary collaborations and permitting transdisciplinarity. PhD students and post-doctoral fellows, typically co-supervised with university faculty, and often pursuing new directions related to WSL expertise, are essential to the intellectual dynamics of WSL.

R17 – Thanks: *We are pleased that the Evaluation Committee confirms the importance of essential elements of the WSL organization.*

Recommendations:

1. The Review Committee encourages the Directorate to include ambitious strategic and transformational thinking and concepts when steering the implementation of the next WSL strategic plan (see section "Strategic Focus"). The Review Committee appreciates that innovative ideas can be developed in bottom-up processes, including stakeholder involvement, which iteratively evolve in conversation with the Directorate, and ultimately may lead to the Directorate's top-down support through seed money for programs and technical equipment.

R18 – Agree: *Ambitious and transformational thinking (in the sense of thinking of how to create change towards more sustainability) are essential for WSL when steering the implementation of the strategic development. WSL is striving for it, and the current Strategy 2035 is committed to this thinking/mindset and concept.*

2. To strengthen the strategic component and the link of WSL's activities to global concepts and discussions concerning sustainability, transdisciplinary and landscape research, the Review Committee recommends that WSL reconstitutes its Scientific Advisory Board in order to more actively support the Directorate and staff in shaping WSL's future and elevating its international prominence.

R19 – Partly agree: *The renewal of the advisory board is a process that has been started. The current list of members is available here: <https://www.wsl.ch/en/about-wsl/organisation/management-and-executive-board/advisory-board.html>. Three new members have taken up their position in early summer, while three members have stepped down in July 2022 after the last in-person Advisory Board meeting in conjunction with the Koni Steffen Symposium. Further retirements and replacements are planned for next year. Future opportunities identified in the Strategy 2035 will be considered in the selection of new potential members of the WSL Advisory Board.*

3. To further promote collaboration within WSL and to allow identification of immediately achievable research synergies, new formats of interactions (e.g. regular retreats involving all Research Units and staff from all WSL locations) may prove useful. Easily accessible workspaces/meeting places to complement the existing regular informal conversations in the cafeteria may further strengthen internal cooperation.

R20 – Agree: *Diverse formats of interactions foster the identification of research synergies and promote collaboration. Examples are the newly established annual or bi-annual 2-day retreats of the research unit leaders with the Directorate to discuss strategic science-related aspects of WSL, or the WSL research day, where all research and support units, programs and centers present selected parts of their work. The further development of such formats is a standing, long-term task that has, is and will carefully be considered by the Directorate. While retreats are already practiced in some research units or programs, new formats such*

as annual science slam conferences or joint research agendas will be tested in the next few years. In the current process of evaluating space requirement (in connection with evaluation of need for a new building) and subsequent building activities, meeting spaces are recognized as an essential element to facilitate collaborative work at WSL and the process to optimize the situation is well underway.

2.4 Opportunities

Overall, the WSL Directorate and its scientists appear to respond appropriately to new scientific challenges.

R21 – Thanks: *We would like to thank the Evaluation Committee that it considers WSL's response to new challenges to be appropriate.*

Considering the necessity to mitigate and adapt to the complex (global) environmental crisis, the Review Committee sees the following opportunities (partly already addressed under section "Relevance") that should now be pursued further in a well-structured strategic process:

- Transformation/transformational research needs to be addressed within a transdisciplinary approach: this is a task for all WSL Units. It could be fostered by an expansion of the types and availability of social science disciplines to be engaged in conception, conduct, and implementation of transformational research.

R22 – Agree: *Indeed, transformation research needs transdisciplinary approaches. We have experience and expertise in many research units that could be further strengthened and expanded. This aspect has been addressed in our response to principal recommendation in the executive summary R2 and we refer to our answer there.*

- The challenges of sustainability (i.e. harmonizing people, planet, prosperity) and One Health (human and environment) need to be addressed more systematically. This will also contribute to internal coherence, improve the opportunities for interdisciplinary collaboration among the different WSL units as well as the links to the international discourse.

R23 – Partly agree: *WSL essentially dedicates its research to challenges of sustainability. Within the Strategy 2035, we aim to identify two to three overarching themes, broadly addressing challenges of sustainability, which will allow to bundle activities for enhanced visibility, coherence and links to international discourse.*

While it is clear that WSL will continue to conduct research on various aspects of health (e.g., human health, plant health) in the future, it is not decided whether the "One Health" approach is suitable as a key overarching topic for WSL. This will depend on the results of the strategy process and thus remains to be seen.

- As mentioned previously (see recommendations section "Relevance") linkages to agriculture/Agroscope and water/EAWAG should be reviewed systematically: programs like the Blue-Green Biodiversity, which is based on collaborations with EAWAG, may serve as a blueprint. To achieve this, an integrated landscape-oriented and river basin-scale approach must be more fully and pervasively pursued. This cannot fully be realized if agro-ecosystems or water-related landscape issues – across land use types – are not addressed. Specifically, a gap in mountain groundwater studies is identified in Swiss research – since groundwater connects hydrological processes during low flows from high mountains to populated valleys, this is something that WSL should consider filling.

R24 – Partly agree: WSL already has many close ties to and collaborations with EAWAG and Agroscope. Related contacts and processes will be strengthened over the coming years. For example, the joint Agroscope/WSL Cadenazzo research campus in Ticino, Southern Switzerland, assists the interaction with Agroscope. See also our response to principal recommendation R3 in the executive summary of the committee report.

We disagree that a gap in mountain groundwater studies exists in Swiss research. This topic is well addressed at the ETH and the cantonal universities, and collaboration between WSL and these actors takes place where suitable.

- WSL scientists should be encouraged to write syntheses/reviews. This could also point to synergies between Research Units as a means to strengthen internal and international cooperation. Such compilations are of particular value to stakeholders since they can reduce uncertainty of major findings compared to individual studies.

R25 – Agree: Syntheses and reviews are essential products in science and for practice. WSL has in all its core themes a long tradition in leading such efforts or contributing to them. One example is the Hydro-CH2018 hydrological scenarios (<https://www.nccs.admin.ch/nccs/en/home/climate-change-and-impacts/schweizer-hydroszenarien.html>), where a large team of WSL researchers contributed to synthesizing the knowledge of the effects of climate change on Swiss water bodies in a project led by the FOEN. Another example is the ad-hoc research framework to comprise the effects of the exceptional summer drought on forests and hydrology in Switzerland in the years 2018–2020 (see special issue in the Swiss Forestry Journal, 2022). In addition, WSL regularly publishes WSL Fact Sheets (of about 4 to 16 pages) where key findings from WSL research are summarized and guidelines for best practice approaches are provided to a wide range of stakeholders. More recently, the BGB-Initiative resulted in a number of overarching syntheses that addressed theoretical questions. WSL is committed to further encourage engagement in such efforts. For example, the newly established Translational Center in Biodiversity Conservation, a competence center for biodiversity co-lead by WSL and ETH Zurich will, jointly with key Swiss stakeholders, identify topics for knowledge transfer, perform syntheses and translate, communicate and distribute synthesis products for different target audiences.

- The Review Committee encourages further discussion to develop theoretical frameworks for current and future research projects. This may be especially important for PhD-students and junior scientists, but also essential for more experienced researchers, and a way of strengthening exchange of ideas between various groups.

R26 – Agree: The development of theoretical frameworks across units and for research projects is important for WSL as a research institute. Such frameworks are particularly relevant for new overarching themes that are expected to emerge from the Strategy 2035. Results will be applied in the implementation process following the Strategy 2035, in fall 2023. We also refer to our answer to the principal recommendation R1 in the executive summary.

- WSL considers aspects of climate change, urbanization, water and biodiversity crisis in many of its project and monitoring activities – however a deeper and more coherent approach to the needs of stakeholders for information on adaptation to these trends, as well as to their mitigation should be developed.

R27 – Partly agree: We agree that WSL research needs to address the needs of stakeholders in the context of adaptation to climate change, urbanization, water and biodiversity crises. However, since different stakeholder groups have distinct needs, a single coherent approach seems not to be applicable for all groups and concerns. See also the answer to the principal recommendation R2 in the executive summary of the report.

A considerable number of the senior scientists at WSL will retire during the next few years. This transition is both a challenge to the continuity of work at WSL and an opportunity to adapt WSL to a changing society, with new research requirements. Here also a well-structured strategic process needs to be implemented where a reconstituted Scientific Advisory Board may be of considerable help.

R28 – Agree: *Upcoming retirements are of uttermost importance for the future strategic development of WSL, offering a window of opportunity that should not be missed. This has been addressed in our response to the principal recommendation in the executive summary R6 and we refer to the detailed text there.*

3 Specific Questions

3.1 Institutional Level

WSL's organization and management correspond to a multi-layer matrix with bottom-up and top-down elements. It is correspondingly highly complex and difficult for outsiders to understand. The Review Committee found that this works well in practice because of its flexibility and appreciation by those involved.

The infrastructure, as far as visited by the Review Committee, is excellent and appreciated by both scientists and stakeholders. A clear decentralization is noticeable. The possibility to initiate new infrastructures through internal calls for support is an important way to uphold the high standard, exemplified by the upcoming eDNA lab.

WSL's strategies to promote equity, diversity, inclusion, and scientific integrity appear appropriate. Overall, job satisfaction is very high, according to a recent survey.

R29 – Thanks: *Thank you for this positive evaluation.*

Recommendations:

1. Notwithstanding the fact that the organizational and management structure appears to be working well, the Review Committee recommends that consideration be given to how the structure might be adjusted to foster synergies, improve manageability, and make WSL more transparent.

R30 – Agree: *A process of organizational development addressing these questions is planned for 2024. Structural elements such as centers and programs are established or will be addressed if adequate. Related processes and alternative structures will be evaluated following completion of the Strategy 2035 process.*

2. The Review Committee recommends developing a strategic concept for the further development of the technological infrastructure in order to generate further scientific and economic added value.

R31 – Partly agree: *A central strategy for all technological infrastructure is not realistic due to the breadth of topics covered by WSL and the range of associated requirements and needs. We agree, however, that all decisions for the development of the technological infrastructure should be based on coherent strategic considerations. To ensure this, WSL has a procedure in place that requires that every infrastructure proposal of CHF 50,000 or more must be justified in relation to WSL's research strategy. It is then up to the Directorate to decide on the investment.*

3. The Review Committee supports continued internal calls for project support as a way to support further, innovative infrastructure development.

R32 – Agree: *We plan to continue these calls and optionally also targeted calls with specific thematic foci. Larger contributions and/or increased engagement in joint initiatives of the ETH domain may, however, limit resources for such WSL-internal strategic initiatives and strategic project funding in times of overall tighter budgets.*

3.2 Strategic Focus

The WSL included in its assessment initial thoughts about planned future activities (section 8 of SAR vol 1). The Review Committee appreciates these thoughts and sees a particular relevance for the strengthening of future activities oriented toward societal transformations. Such activities already exist in several Research Units (the research on biodiversity-damaging subsidies in Switzerland or on de-growth may be seen as examples). However, when considering the huge challenges of humanity - climate change, urbanization, biodiversity loss and resource scarcity, an even stronger orientation towards co-developing knowledge with society may be necessary. WSL should consider how these issues of socio-environmental transformation can be taken up across the Institute and what the role of WSL in energizing societal processes could be.

R33 – Agree: *This aspect has been addressed in our response to principal recommendation in the executive summary R2 and we refer to our answer there. In brief, we agree to strengthen our efforts in monitoring and analyzing human behavior in order to develop better tailored and efficient implementation tools and solutions. Still, we see ourselves as “honest brokers” in political processes. Thus, we strive to provide knowledge (incl. scenarios), with which society and politics can take decisions based on scientific knowledge.*

Recommendations:

1. The planned future activities presented in SAR vol. 1 are sufficiently specific to provide direction and at the same time sufficiently generic to allow WSL to respond to new developments. To develop a thorough analysis of the research needs of a rapidly changing world and in view of the upcoming retirement of several Research Unit leaders, the Review Committee recommends that a strategic concept be developed early on for filling new positions.

R34 – Agree: *This is already implemented since the decision on creating and filling a new position is always based on a justification that contains elements of a strategic concept. In complex situations the Directorate requests a more detailed concept that outlines the strategic fit of the new position in the WSL. As mentioned above, the well-established processes at WSL ensure that all vacant positions as a result of retirements or for any other reasons are not automatically replaced but assessed by the WSL Directorate. It is then up to the Directorate to decide where to invest such freed-up positions most pressing and most effectively. The respective research units and groups are involved in the process and can apply for their requirements and needs (replacements, redirection, new opportunities).*

2. A reconstituted Scientific Advisory Board should be an integral part of this process to identify international opportunities, gaps and continuity needs. The Scientific Advisory Board could also help improve follow-up and assessment of the success of the strategic plans. Currently many research projects and groups evolve from the success in acquiring grants of individual researchers, and this success should be considered in assessing and preparing strategic plans.

R35 – Agree: *WSL has successfully established an Advisory Board back in 2013. WSL's Advisory Board currently is composed of three stakeholders, in addition to seven scientific experts. This has proven to be a good balance and has been working very well for WSL as well as for the Advisory Board. This board consists of members with broad range of areas of expertise, personal as well as institutional backgrounds, etc. It was on purpose that the Advisory Board includes renowned scientists and experts from the cantonal and federal administrations, i.e., key stakeholders of WSL. WSL also has a tradition to thoroughly involve the Advisory Board in key strategic aspects of WSL's mid- to long term development. We agree that the reconstituted advisory board (see also our responses to similar recommendations in Sections 2.3 (R19) and 3.5 (R42)) provides an opportunity to review the strategic positioning of WSL in the national and international research environment. The Advisory Board is involved in the Strategy 2035, in line with the well-established process for this board advising the WSL Directorate on strategic aspects for now nearly 10 years.*

3. Further recommendations concerning the “Strategic Focus” can be found under the section “Opportunities”.

3.3 Long-term Research and Monitoring

Long-term experiments and the associated infrastructure contribute decisively to WSL's outstanding research. The Review Committee recognizes that these components are of uniquely great value not only as an integral part of WSL research, but also for serving interests of stakeholders and in the international public domain.

R36 – Thanks: *WSL appreciates that the Evaluation Committee recognizes the uniquely great value of the long-term experiments and the associated infrastructure.*

Recommendation:

- The Review Committee recommends that long-term monitoring of societal perceptions and human well-being be considered as spatially integrated elements of an expanded long-term monitoring effort (see recommendation 1c section “Relevance”).

R37 – Agree: *We agree with this recommendation for monitorings in which the inclusion of human aspects brings additional benefits. Indeed, in terms of long-term monitoring of human behavior, social perception and human well-being WSL has already established several projects (e.g., WAMOS, LABES). This aspect has also been addressed in our response to the principal recommendation R4 in the executive summary and to recommendation R12 in Section 2.1. We thus also refer to our answers provided there.*

3.4 Education

WSL is highly engaged in teaching at ETH Zürich, EPFL, and other universities and in the training of Masters and PhD students. The young scientists the Review Committee met at the poster session were all enthusiastic, competent and highly motivated, and they rated their research environment and supervision at the WSL as very good. The senior scientists appear to be free to find their personal balance between research and teaching and to respond to the teaching requirements of the universities. The balance between their science responsibilities and the workload that is associated with teaching, even considering the advantages of getting involved in exchange with other university colleagues, students and PhD candidates, may need consideration.

R38 – Agree: *WSL appreciates that the Evaluation Committee recognizes WSL's high engagement in teaching and the satisfaction of the PhD students. We are aware that the balance between research work and teaching is a challenging task and has to be kept in mind in the light of increasing student numbers at the ETH Zurich and the EPFL. The issue is well-known, and the topic is being discussed at the highest level among the 4RIs and the two schools, ETH Zurich and EPFL.*

Recommendations:

1. While all research staff indicated that they found teaching rewarding, greater recognition of their important intellectual contributions by the institutions where they are teaching is desirable, for example by awarding more adjunct professorships.

R39 – Agree: *Greater recognition of WSL researcher's contributions to teaching is desirable, and we would greatly appreciate the awarding of more adjunct professorships. While this has been discussed before we will again bring it into discussions and also consider it in our internal considerations for the annual performance review (MbO) and other evaluation processes. The issue has also been raised at the level of the ETH Board with the two schools and solutions are being discussed, as mentioned in the intro to Section 3.4 (R38).*

2. Not all PhD students have access to a structured PhD-program at their respective universities. The Review Committee recommends developing a separate, WSL-based PhD program to compensate for this deficiency, if needed, and to incorporate this component in the PhD guidelines developed a few years ago.

R40 – Partly agree: *Most doctoral students are integrated into structured PhD programs or activities in their degree granting institutions (mostly ETH, EPFL and Swiss Universities). For PhD students registered at a foreign university, the situation is less satisfactory. Therefore, a structured program as is common at universities would therefore lead to redundancies and place too great a strain on the resources of most doctoral students. Instead, WSL has put together a program of complementary offers that is available to all: The PhD Association meets the need for community building through social activities and self-organized workshops and excursions. A wide range of courses on all topics around publishing and technical aspects is available. As part of the LEAD Campus initiative (go live in 2024) recommendations for transferable skills' courses are currently being developed. All these offers can be booked on a case-by-case basis by the PhD students. Online training (likely to be compulsory) on Research Integrity is currently under consideration. Furthermore, WSL offers counselling services strengthen the PhD student's resilience, self-reflection and the capacity to deal with personal and interpersonal challenges.*

3.5 Stakeholder Involvement and Role in Society

As noted previously, the Review Committee considers WSL's large, long-established stakeholder network in Switzerland to be one of its great strengths. Currently, user engagement seems to work very well and is proactive and responsive at the project level and also at the Director level when resources are requested so that projects can develop a specific solution. This functionality must be preserved. Since the current stakeholder networks depend on research scientists that are expected to retire during the next few years, the potential loss of institutional memory of stakeholder linkages is a real concern. Further, existing long established networks between researchers and stakeholders may need to adjust to respond to the needs of new stakeholder groups and societal actors.

R41 – Thanks: *WSL appreciates that the Evaluation Committee considers WSL's large long-established stakeholder network in Switzerland to be one of its great strengths. It is a paramount goal of WSL to preserve this, considering the change in stakeholder needs and the upcoming retirement of researchers that are strongly engaged with stakeholders.*

Recommendation:

- As mentioned previously, stakeholder engagement should be coordinated and regularized as part of the WSL research process through a formal Stakeholder Advisory Panel that reports to the Director and Directorate and has accountability from the Director for responding to requests for solutions. This may also strengthen policy advice from WSL to governments. Mechanisms need to be implemented to ensure relevance of stakeholder engagement, capturing new stakeholders and actors.

R42 – Disagree: *This aspect has already been partly addressed in our response R7 to the related principal recommendation in the executive summary of the report. The WSL Advisory Board is a diverse Board in terms of background, expertise, experiences and perspectives, on purpose. While we appreciate the concern for expanding stakeholder engagement, we disagree with the recommendation of establishing a formal Stakeholder Advisory Panel for several reasons: (1) WSL's stakeholders are diverse (different federal departments, cantons, municipalities, topic related interest groups etc.). We doubt that one stakeholder advisory board could coordinate the needs from all these diverse stakeholders. (2) The current practice with adapted/targeted regular formalized interactions with specific stakeholders such as, e.g., with the forest stakeholders in the SwissForestLab and the users of the avalanche warning, is more suitable, more effective*

and overall more successful. (3) WSL's Advisory Board currently is composed of three stakeholders, in addition to seven scientific experts. This has proven to be a good balance and has been working very well for both the WSL and the Advisory Board (see input to the SAR).

For the Review Committee:

A handwritten signature in black ink, appearing to read 'V. Mosbrugger', with a stylized flourish at the end.

Volker Mosbrugger
Frankfurt, 2023/02/17

4 Appendix

Terms of reference (ToRs)

I. Overarching questions

- (1) Relevance: Are WSL's research, knowledge transfer/application, and outreach activities relevant to science, practice and society/policy, and are they overall well balanced?
- (2) Quality: Are WSL's research, knowledge transfer/application, and outreach activities well recognized internationally and nationally?
- (3) Productivity: How substantial are the amount and diversity of WSL's research, knowledge transfer/application, and outreach activities at the national and international levels?
- (4) Dynamics: Is WSL flexible enough to respond to emerging issues of scientific and societal relevance and to pursue promising opportunities? Are WSL's collaborative programs an agile tool to achieve the goals stated in its mission statement?
- (5) Opportunities: Does the Peer Review Committee see emerging topics of scientific or societal relevance in WSL's core research, knowledge transfer/application, and outreach themes that should be added to WSL's portfolio?

II. Specific questions

Institutional level

- (a) Do WSL's organizational and management structures best serve the topics and crosscutting issues that need to be addressed to fulfill its mandate?
- (b) Does WSL's physical and digital infrastructure provide the necessary support for research, knowledge transfer/application, and outreach?
- (c) How successful/adequate are WSL's efforts to promote diversity, an inclusive environment, and scientific integrity?

Strategic focus

- (d) How relevant are the strategic topics and corresponding activities that WSL would like to address in the future? Does the Peer Review Committee identify further key aspects that should be considered?
- (e) Are WSL's collaborations across its research units, with partners in the ETH Domain, and with partners at the cantonal, national and international levels appropriate and well balanced to address its strategic topics?

Long-term research and monitoring

- (f) Does WSL put its long-term monitoring activities and infrastructure appropriately in value in its research, knowledge transfer/application, and outreach?
- (g) Are the long-term research and monitoring activities well positioned to address current and future challenges?

Education

- (h) Does WSL adequately contribute its specific knowledge and expertise to teaching activities at universities?

Stakeholder involvement and role in society

- (i) How balanced, interconnected and adequately responsive to stakeholder needs are WSL's research, knowledge transfer/application, and outreach activities?