

ICELAND

TOWARD AN INTEGRATED WILDFIRE RISK MANAGEMENT DIAGNOSTIC AND RECOMMENDATIONS REPORT

TAFF

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AAR	After-Action Review
CCA	Climate Change Adaptation (Aðlögun að loftslagsbreytingum)
CPC	Civil Protection Committee (Almannavarnanefnd)
CPSC	Civil Protection and Security Council (Almannavarnaráð)
DCPEM	Department of Civil Protection and Emergency Management (Almannavarnadeild ríkislögreglustjóra)
DRM	Disaster Risk Management (Áhættustjórnun hamfara)
EFFIS	European Forest Fire Information System
EoE	Exchange of Experts
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FDI	Fire Danger Index
FFMC	Fine Fuel Moisture Code
FPA	Fire Protection Association
FRS	Fire and Rescue Service
FWI	Fire Weather Index
GFDRR	Global Facility for Disaster Reduction and Recovery
HCA	Housing and Construction Authority (Húsnæðis- og mannvirkjastofnun), www.hms.is
HeliTack	Helicopter Tactical Attack Crew
IBC	Intermediate Bulk Container
ICE-SAR	Icelandic Association for Search and Rescue (Slysavarnafélagið Landsbjörg)
ICG	Icelandic Coast Guard (Landhelgisgæslan)
IMO	Icelandic Meteorological Office (Veðurstofa Íslands)
IRCA	Icelandic Road and Coastal Administration (Vegagerðin)
IWFRM	Integrated Wildfire Risk Management (Samþætt áhættustjórnun vegna gróðurelda)
LFDI	Lowveld Fire Danger Index
M&E	Monitoring and Evaluation
NBS	Nature-Based Solution(s)
NCI	Natural Catastrophe Insurance
NCIP	National Commissioner of the Icelandic Police (Ríkislögreglustjóri)
PSEMF	Power System Emergency Management Forum (Neyðarsamstarf raforkukerfisins NSR)
NRA	National risk assessment
NSII	Natural Science Institute of Iceland (Náttúrufræðistofnun Íslands) www.ni.is
NCII	Natural Catastrophe Insurance of Iceland (Náttúruhamfaratrygging Íslands)
OECD	Organization for Economic Co-operation and Development
PPE	Personal Protective Equipment
PRAF	Peer Review and Assessment Framework
PSSC	Public Safety Science Council (Vísindaráð almannavarna)
R&D	Research and Development
rescEU	European Union Civil Protection Mechanism's Emergency Response Capacity
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction
SOP	Standard Operating Procedure
TacAd	Tactical Wildfire Adviser
TAFF	Technical Assistance and Financing Facility
TSO	Transmission System Operator
UCPM	Union Civil Protection Mechanism
WUI	Wildland-Urban Interface (mörk byggðar og náttúru)

Note: This report uses ministries/institutions' names as of April 13, 2025 with the names given in the respective institutions website, <https://www.government.is/ministries/agencies/>

SELECT KEY TERMS

Wildfire: Any unplanned or uncontrolled fire affecting natural, cultural, industrial, and residential landscapes (UNDRR adapted from FAO). An unusual or extraordinary free-burning vegetation fire that poses significant risk to social, economic, or environmental values. It may be started maliciously, accidentally, or through natural means (UNEP).¹ The term 'wildfire' is more general than 'forest fire' and includes fires that affect other vegetation types, such as grasslands and shrublands.

Forest fire: Unwanted fires burning forests and wildlands.²

Bush fires: The same meaning as wildfire but is the term used in Australia, New Zealand, and Africa. It is an unplanned fire in a vegetated area (as opposed to an urban area).³

Other descriptive types of wildfires:⁴

- **Accidental fire:** Fires resulting unintentionally from human actions.
- **Arson fire:** Fires set intentionally and maliciously.
- **Controlled fire:** Fires that are managed for specific purposes, usually with precautions.
- **Uncontrolled fire:** Fires that are not managed or controlled, typically wildfires.
- **Natural fire:** Fires caused by natural events, such as lightning or as a result of volcanic activity.
- **Prescribed fire/mild fire:** Intentionally set and controlled fires for land management.

Community-based fire management (CBFiM): Fire management approach based on the inclusion of local communities in the proper application of fire, fire prevention, and in preparedness and suppression of wildfires. CBFiM approaches can play a significant

role in fire management, especially in most parts of the world where human-based ignitions are the primary source of wildfires that affect livelihood, health and security of people. The activities and knowledge that communities generally practice and apply are primarily those associated with prevention. They include planning and supervision of activities, joint action for prescribed fire and fire monitoring and response, applying sanctions, and providing support to individuals to enhance their fire management tasks.⁵

Integrated wildfire risk management (IWFRM): The approach relies on coordinated use of resources, integrated policy frameworks, collaboration of stakeholders, society-wide engagement, and capacity development. This approach is gaining prominence given climate change impacts as well as the demand and need to address the wildfire challenge in an integrated and holistic manner.

Wildfire risk: Assessed by considering vulnerable areas where people, ecological systems, and socio-economic assets are exposed to fire danger.⁶

Exposure: The situation of people, infrastructure, housing, production capacities, and other tangible human assets which are located in hazard-prone areas.

Vulnerability: The conditions determined by physical, social, economic, and environmental factors or processes which increase the susceptibility of an individual, a community, assets, or systems to the impacts of hazards.

Wildlands/wilderness areas: Areas governed by natural processes. They are composed of native habitats and species and are large enough for the effective ecological functioning of natural processes. These areas are unmodified or only slightly modified

¹ Definition as per Casarelli, V., and J. Mysiak. 2023. Union Civil Protection Mechanism - Peer Review Programme for Disaster Risk Management: Wildfire Peer Review Assessment Framework (Wildfire PRAF). [Link](#).

² Tedim, F., G. Xanthopoulos, and V. Leone. 2015. "Forest Fires in Europe: Facts and Challenges." In *Wildfire Hazards, Risks and Disasters*, 77-99. Elsevier.

³ Price, O. 2019. "Bushfires." In *Encyclopedia of Wildfires and Wildland-Urban Interface (WUI) Fires*, edited by S. Manzello. Cham: Springer. [Link](#).

⁴ Huidobro, G., L. Giessen, and S. L. Burns. 2024. "And It Burns, Burns, Burns, the Ring-of-Fire: Reviewing and Harmonizing Terminology on Wildfire Management and Policy." *Environmental Science & Policy* 157: 103776.

⁵ Food and Agriculture Organization (FAO). 2024. *Integrated Fire Management Voluntary Guidelines Principles and strategic actions*. Second edition. Forestry Working Paper, No. 41. Rome. [Link](#).

⁶ Oom, D., D. de Rigo, H. Pfeiffer, A. Branco, D. Ferrari, R. Grecchi, T. Artés-Vivancos, et al. 2022. *Pan-European Wildfire Risk Assessment*. EUR 31160 EN. Luxembourg: Publications Office of the European Union. doi:10.2760/9429. JRC130136.

and without intrusive or extractive human activity, settlements, infrastructure, or visual disturbance.⁷

Wildland-urban interface (WUI): Areas where human development meets or intermingles with wildland vegetation. These areas often face heightened wildfire risk.⁸

Firebreak:⁹ Man-made areas with a reduced fuel load that act as barriers to stop or slow down fire spread.

Early warning system (EWS): An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication, and preparedness activities that enable individuals, communities, governments, and businesses, and others to take timely action to reduce disaster risks in advance of hazardous events. *Annotation: Multi-hazard EWSs address several hazards and/or impacts of similar or different type in contexts where hazardous events may occur alone, simultaneously, in a cascading manner, or cumulatively over time, taking into account the potential interrelated effects.*

Nature-based solutions:¹⁰ Solutions “inspired by, supported by, or copied from nature” and which “simultaneously provide environmental, social, and economic benefits and help to build resilience” by bringing “more and more diverse nature and natural features and processes into cities, landscapes, and seascapes” (EC).

Building code: A set of ordinances or regulations and associated standards intended to regulate aspects of the design, construction, materials, alteration, and occupancy of structures which are necessary to ensure human safety and welfare, including resistance to collapse and damage.

Contingency plan / (emergency) response plan: A plan preparing an organization to be ready to respond effectively in the event of an emergency.

Coping capacity: The ability of people, organizations, and systems to manage adverse conditions,

risks, or disasters using available skills and resources.¹¹

Resilience: The ability of a system and its components to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, ensuring the preservation, restoration, or improvement of its essential basic structures and functions.¹²

‘Build back better’ (BBB) principle:¹³ The use of recovery, rehabilitation, and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating disaster risk reduction measures into the restoration of physical infrastructure and societal systems and into the revitalization of livelihoods, economies, and the environment. *Annotation: The term ‘societal’ is not to be interpreted as a political system of any country.*

Reconstruction: The medium- and long-term rebuilding and sustainable restoration of resilient critical infrastructures, services, housing, facilities, and livelihoods required for the full functioning of a community or a society affected by a disaster, aligning with the principles of sustainable development and ‘build back better’, to avoid or reduce future disaster risk.

Rehabilitation: The restoration of basic services and facilities for the functioning of a community or a society affected by a disaster.

⁷ Wild Europe. 2013. A Working Definition of European Wilderness and Wild Areas. [Link](#).

⁸ Silva, J. S., ed. 2010. Towards Integrated Fire Management: Outcomes of the European Project Fire Paradox. Joensuu, Finland: European Forest Institute.

⁹ Casartelli and Mysiak 2023.

¹⁰ Definition as per Casartelli, V., and Mysiak, J. 2023. Union Civil Protection Mechanism - Peer Review Programme for disaster risk management: Wildfire Peer Review Assessment Framework (Wildfire PRAF). [Link](#).

¹¹ European Union. 2023. Wildfire Peer Review Assessment Framework. [Link](#).

¹² World Bank. 2021. Economics for Disaster Prevention and Preparedness: Investing in Disaster Risk Management in Europe Makes Economic Sense, Background Report. [Link](#).

¹³ Definition as per the NSDRR 2024–2035, GoR. [Link](#).

EXECUTIVE SUMMARY

While Iceland is known for risks arising from volcanos, earthquakes, avalanches, and extreme weather events; but with changes in land use, growing vegetation, and impacts of climate change, the country faces an increasing risk of wildfires.¹⁴ Iceland is experiencing an increase in tree and bush vegetation, linked to afforestation efforts, improved growing conditions, and a significant reduction in sheep grazing. These factors contribute to a higher fuel load, particularly in areas such as campsites or recreational areas. At the same time, Iceland is warming more rapidly than other European regions. Since 1980, the trend has increased to 0.47°C per decade which is almost three times faster than the global average warming rate during the same period.¹⁵ With global warming, the conditions that help prevent wildfires—such as consistent precipitation and moist vegetation—are becoming less reliable, putting Iceland at higher risk.

The increased risk of wildfires in Iceland requires a proactive management and mitigation efforts at all levels. Iceland has already been affected by wildfires, which in some cases brought irreversible damage. Between 2006 and 2021, at least 26 wildfires occurred on the island and burned more than 7,450 ha of land.¹⁶ In 2006, in the Mýrar region (in West Iceland), a wildfire burned over 6,700 ha of wetland, making this the largest wildfire ever recorded in Iceland; it took four days to be extinguished and forced several farmers to evacuate to protect their livestock. In 2021, a wildfire in the Heiðmörk conservation and recreation area near Reykjavík, critical for the capital's water supply, burned 56.5 ha of land, prompting authorities to issue the country's first-ever 'danger alert' for wildfires. In 2023 and 2024, fields of moss caught on fire in the Grindavík area triggered by volcanic activity in the Reykjanes Peninsula.

This report summarizes the results of a diagnostic review of wildfire risk and management capacity in Iceland, and includes technical recommendations that can guide policy discussions, decisions, and actions in the immediate/short term as well as the medium to long term. The review followed the Union Civil Protection Mechanism (UCPM) Wildfire Peer Review Assessment Framework (PRAF)¹⁷ and the principles of IWFRM. It considered capacity across multiple dimensions, including governance, planning, understanding of risk, prevention, early warning and public awareness, preparedness and emergency response, recovery and post-disaster financing. Drawing on desk reviews, consultations with stakeholders, and expert analysis, each chapter reviews current status, challenges, and opportunities for improvement.

The section below highlights 10 key findings, and 10 key recommendations, with the underlying structural analysis provided in the respective chapters of this report.

¹⁴ See "Select Key Terms" above for definitions. In Iceland, wildfires are associated with vegetation/bush/moss in addition to forests.

¹⁵ Icelandic Meteorological Office (IMO). 2018. Climate Report 2018: The Third Report on Impacts of Climate Change in Iceland. [Link](#).

¹⁶ Fire brigades went into action 516 times in the years 2018-2022 because of wildfires. For information on registration by the fire brigades and actions taken because of wildfires, see: HMS "Stóraukin hættu á gróðureldum á Íslandi." February 16, 2022. [Link](#).

¹⁷ European Union. 2023. Wildfire Peer Review Assessment Framework. [Link](#).

1.

Iceland is in a unique position to improve its management of wildfire risk to protect people's lives, lessen impacts on the natural and physical environment, and manage financial implications. The combination of climate change, changes in land use, and legislative gaps has introduced significant new vulnerabilities, risks, and challenges, that require urgent attention from policy makers and society. This gap in prevention and preparedness is reminiscent of Iceland's experience with avalanches between the mid-1970s and the mid-1990s, when several tragic incidents occurred before comprehensive risk zoning and mitigation strategies were adopted. As wildfires become a more significant hazard, it is critical for the country to take action.

2.

The current environment is characterized by strong interest and momentum among various stakeholders, emerging data and analytics, various initiatives, and knowledge gained from past wildfire emergency response. Authorities, institutions, scientists, and the public are starting to recognize wildfire risk as a significant threat at both national and local levels, particularly in areas that have experienced fires already. An important contribution has been the engagement of the multi-institutional working group on wildfires, led by the Housing and Construction Authority (HCA), which has outlined various gaps and opportunities across the competencies of different stakeholders and developed publicly available resources.¹⁸ The HCA has also developed a textbook for firefighters for wildfire response (to be published within 2025),¹⁹ and is also in the process of updating its "Brunagátt" database for overseeing municipalities' resources for fire protection.

3.

While Iceland has a robust legal framework covering the management of multiple natural hazards, the existing framework has not yet been fully adapted to consider wildfire-specific challenges. Wildfires are not fully recognized as a natural hazard in primary and secondary legislation/

regulations. This results in gaps concerning the legal basis for appropriate strategic planning and resource allocation, reforms, actions, investments, and technical capacities, ultimately limiting the range of activities that can be undertaken by relevant actors. Specifically, legal ambiguity limits the inclusion of wildfire in the national meteorological service's warning system.

4.

Despite various ongoing efforts, Iceland does not yet have a vision for improving wildfire risk management, nor have stakeholders agreed on relevant priorities. In parallel to continuing efforts that are already being made across a range of stakeholders, it will be important for decision-makers and stakeholders who can play an active role in wildfire risk management to agree on a strategic roadmap. This can be done in alignment with other policy priorities, including those related to climate adaptation and mitigation of climate change, national security, and strengthened social resilience.

5.

Information relevant to understanding and managing wildfires is being collected and analyzed, yet it is not systematic and does not inform actions across wildfire risk management. Several institutions collect information relevant for wildfire risk assessments, planning, preparedness, response, and recovery including the Natural Science Institute of Iceland (NSII), universities, the Icelandic Meteorological Office (IMO), and the HCA. However, no consolidated database or platform is available to stakeholders, nor are there up-to-date quantitative wildfire risk assessments. There are several opportunities to strengthen the understanding of wildfire risk by consolidating and leveraging various sources of data and research initiatives, using new technologies, and ensuring that these are reflected in an updated national risk assessment (NRA) and upcoming climate risk assessment. This effort could contribute to the development of robust wildfire science in Iceland.

¹⁸ HCA Working Group on Wildfires. 2018. Committee's Report on Wildfires (in Icelandic) [link](#). The website www.grotureldar.is, developed by the working group, provides a range of information about wildfires, prevention, and response.

¹⁹ Translated and adapted from Swedish Civil Contingencies Agency (MSB). 2022. Guidance on forest fire extinguishing.

6.

The IMO has strong technical capacities to monitor natural hazards and has in place a contingency plan for wildfires; notified events trigger the issuance of a site-specific forecast to aid responders. Building on the excellent existing capacities, much can also be done to improve fire detection and monitoring, as well as early warning systems, using the technological/target options available. For example, the IMO's capabilities and the E-112 emergency system could be enhanced with wildfire-specific indicators.

7.

Wildfire-related public awareness and self-preparedness is nascent among the population on wildfire is nascent; however, there are many opportunities to scale up, especially through promotion of a bottom-up approach to increase outreach. In parallel to strengthening bottom-up efforts of associations and municipalities, efforts could be made to develop a comprehensive risk awareness and communication strategy- with different planned activities, target groups, outreach methods, and funding sources- to guide the implementation of various activities, such as public campaigns, a Fire Smart Iceland campaign, and so on. The website www.grodueldar.is offers a wide range of information about wildfires, prevention, and response, and could be further developed, in parallel with various other ongoing communication-/awareness initiatives.

8.

Iceland has several pilot activities related to wildfire prevention, but these are not yet conducted strategically or in a prioritized manner corresponding to wildfire risk. Several municipalities invest in actions that consider wildfire risk, and there is a range of small-scale efforts by associations. However, there is no specific, dedicated program or funding for scaling up wildfire prevention that considers the needs of municipalities and fosters innovative approaches in a targeted manner in areas at risk, such as FireSmart communities or nature-based solutions (NBS). Preventive actions should be aligned with broader strategies linked to climate change adaptation and mitigation, sustainable landscape management, and management of areas and settlements in the proximity of wildland areas.

9.

Action and coordination during fires has been strong thanks to a robust emergency response and coordination system, but more needs to be done to upgrade capacities for wildfire. Firefighting units have been improving their capabilities to manage the increasing wildfire risk, particularly in the already affected areas. There are opportunities to systematically strengthen both basic and specialized capacities – for example, by strengthening human resources (through training and international exchanges), and by improving specialist firefighting equipment across but also in particularly in areas of increasing wildfire risk. A range of decision-support tools can also enhance the safety and effectiveness of responders (e.g., applications, wildfire analysis tools, AI-assisted software solutions). The experience of the lava cooling interventions around Grindavík, overseen by the Department of Civil Protection and Emergency Management (DCPEM), provides entry points for further action.

10.

Currently, there is no specific guidance for recovery and rehabilitation efforts following major wildfires. Ongoing efforts to strengthen post-disaster recovery planning also provide an entry point to address this gap, for example, by including wildfire after-action reviews (AARs) and other available strategies. Developing a systematic understanding of the impacts of wildfires may inform future actions to improve response to and financial preparedness for wildfires.

THERE ARE SEVERAL ENTRY POINTS and opportunities for improving wildfire risk management in Iceland. These are listed below by category and summarized in [Table 1](#).

GOVERNANCE AND PLANNING

- 1. Agree on a strategic roadmap** with key immediate/short- and medium to long term priorities among stakeholders. This can reflect responsibilities and mandates as of now and indicate ambition to update/expand responsibilities.
- 2. In parallel, update the legal framework and coordination mechanisms**, at a minimum to integrate wildfire risk into the existing laws and frameworks, while working on more ambitious reforms that may require more time.
- 3. Enhance coordination across stakeholders in Iceland** – for example, by strengthening and adjusting the scope of current coordination mechanisms. At the same time, leverage opportunities at hand for international cooperation and exchange on wildfire analysis and prevention, preparedness and response, including research and training.

ANALYSIS AND COMMUNICATION

- 4. Improve understanding of wildfire risk** by consolidating and leveraging various sources of data, research, and tools, focusing particularly on known high-risk areas in the immediate future; ensure that analysis is reflected in the future updated NRA and climate risk assessment.
- 5. In parallel, lay the groundwork for more detailed wildfire risk assessment**, and for sustainable sharing and communication of wildfire risk information – e.g., through a platform or system - with various stakeholders and their mandates.
- 6. Improve monitoring of wildfire risk** by developing a wildfire danger index and enhance available data and tools for early detection.

PREVENTION

- 7. Adapt landscape management, land use planning, and climate change adaptation (CCA) actions to reflect wildfire risk information and risk management tools**, and accordingly, pilot and scale up a range of activities led by different entities, including bottom-up approaches. In parallel, develop a public awareness and communications strategy and pursue awareness activities focusing on different target audiences with the help of different stakeholders and tools.
- 8. Undertake preventive actions**, such as forest/landscape management, wetland restoration (removing drainage structures that are no longer needed) and NBS (re-wetting), firebreaks, clearing and prescribed burns, introduction of escape routes, ensuring of water resource connections, and awareness activities, such as information campaigns.

PREPARATION AND RESPONSE

- 9. Increase capacities for preparedness and response**, including basic and specialized training, human resources, and equipment. There are several initiatives that can be scaled up immediately.
- 10. In parallel, scale up preparation and testing of response plans**, and enhance self-preparedness of society in coordination with different stakeholders.

Table 1. Ten key recommendations for improving wildfire risk management in Iceland

Source: World Bank team.

<p>GOVERNANCE & PLANNING</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Agree on a common vision and roadmap (action plan); confirm lead and contributing entities for implementing agreed priorities as well as funds.</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Update laws and regulations with respect to known gaps, identify further key reform areas, and establish appropriate coordination mechanisms.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Enhance coordination across stakeholders in Iceland, as well as international cooperation and exchange on wildfire analysis and prevention, preparedness, and response, including research and training.</p>
<p>ANALYSIS & COMMUNICATION</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Improve wildfire risk understanding: consolidate existing information across institutions, conduct rapid wildfire risk scenarios for high-risk areas, and systematically use post-fire analysis</p>	<p>MEDIUM TO LONG TERM</p> <p>Deepen wildfire risk understanding: develop a wildfire risk assessment methodology and a full risk assessment considering climate change impacts; develop a wildfire risk information system (platform) to serve various entities.</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Improve monitoring of wildfire risk: develop a wildfire danger index and enhance available data and tools for early detection.</p>
<p>PREVENTION</p>	<p>MEDIUM TO LONG TERM</p> <p>Adapt landscape management, land use planning, and climate change adaptation actions to reflect wildfire risk information and risk management tools; pilot and scale up a range of activities led by different entities, including bottom-up approaches.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Develop a public awareness and communications strategy and pursue activities for target groups with the help of different stakeholders and tools.</p>	
<p>PREPARATION & RESPONSE</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Scale up preparation and testing of response and recovery plans, and enhance self-preparedness of society in coordination with different stakeholders.</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Increase capacities for preparedness and response, including basic and specialized training, human resources, decision-support tools, and equipment.</p>	

CONTEXT

While Iceland has historically focused on the management of risks of volcanos, earthquake, and extreme weather events, the country now faces an increasing risk of wildfires. Historically, the country's landscape and cool, wet climate, combined with more intensive land use (grazing), made large-scale wildfires rare. Recent events, including fires triggered by volcanic activity in the Reykjanes Peninsula and increasing instances of vegetation fires during prolonged dry periods, have highlighted the need to improve wildfire risk management in Iceland. The National Climate Action Plan (2020) underscores the growing danger of wildfire linked to extended periods of drought, combined with rising global temperatures. Iceland is warming more rapidly than other European regions. Since 1980, the warming trend has increased to 0.47°C per decade, which is almost three times faster than the global average warming rate during the same period.²⁰

The current situation presents a unique opportunity for Iceland to proactively improve its risk management practice to protect people's lives and minimize impacts on the environment.

OBJECTIVE AND METHODOLOGY

The analysis generally follows the UCPM Wildfire PRAF,²¹ adjusted to Iceland's context. The framework provides a structured approach for assessing wildfire risk management capabilities at different levels. The tool is aligned with EU policy requirements and terminology used within the UCPM. The framework consists of seven thematic areas and relevant subtopics, including governance, risk assessment, risk management planning, prevention, preparedness, emergency response, recovery, and lessons learned (see Box 1). It is noted that the framework covers both ex-ante areas, such as risk assessment and prevention, as well as ex-post areas like emergency response and recovery; and that some of the areas may overlap. In applying the framework, countries can choose to focus on specific areas or conduct a comprehensive review across all themes and adjust based on the local context and stakeholder feedback. The framework emphasizes the involvement of various stakeholders in the review process.

Box 1. UCPM Wildfire PRAF and its key thematic areas

- 1. Governance** examines the governance structure for wildfire risk management at both the national and subnational levels. It analyzes existing strategic frameworks, interagency coordination mechanisms, risk financing arrangements,²² and systemic resilience measures. Particular attention is given to the relationships and responsibilities among key stakeholders involved in wildfire management
- 2. Wildfire Risk Assessment** examines wildfire risk assessment processes at the national and subnational levels, focusing on identification, analysis, and evaluation stages. It reviews how assessment results are communicated to stakeholders and the public.
- 3. Wildfire Risk Management Planning** examines the planning processes for wildfire risk management at the national and subnational levels. It analyzes stakeholder engagement, methods for identifying and prioritizing risk management measures, monitoring and evaluation (M&E) systems, and alignment with related planning frameworks.
- 4. Wildfire Prevention** examines preventive measures designed to reduce wildfire risks and mitigate consequences for people, the environment, property, and cultural heritage. It analyzes the framework for implementing preventive measures, including landscape management practices, fire use regulations and enforcement, innovation and knowledge services, and risk communication strategies.

²² In this assessment, post-disaster risk financing is considered under the recovery/lessons learned section.

²⁰ IMO (Icelandic Meteorological Office). 2018. Climate Report 2018: The Third Report on Impacts of Climate Change in Iceland. [Link](#).

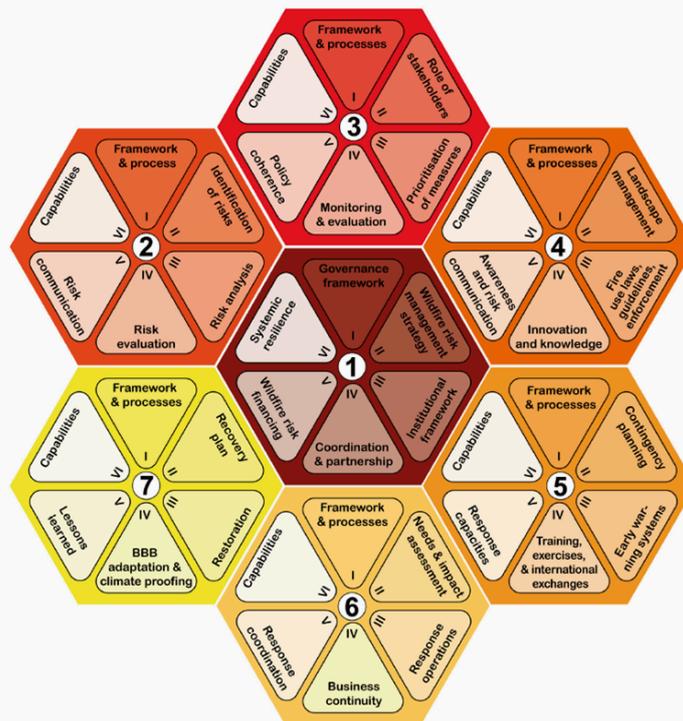
²¹ European Union. 2023. Wildfire Peer Review Assessment Framework. [Link](#).

5. Wildfire Preparedness examines preparedness measures for establishing readiness and response capabilities for wildfire events. It analyzes processes for identifying and implementing preparedness actions, including contingency planning, early warning systems, training and exercises, international exchanges, and response capacity development.

6. Wildfire Emergency Response examines response activities during wildfire events, focusing on needs assessment, impact evaluation, response operations, and coordination processes across agencies and jurisdictional levels.

7. Wildfire Recovery and Lessons Learned examines recovery and review processes following major wildfire events. It analyzes the implementation of recovery and restoration plans, build-back-better initiatives, and lessons learned procedures to identify best practices and improve risk management measures for enhanced resilience.

Source: European Union 2023.



The diagnostic analysis and technical recommendations are also aligned with the IWFRM principles, which are being adopted by many countries in Europe and beyond. IWFRM is a holistic approach to managing wildfire risks that involves the coordinated use of governance, resources, strategies, and policies to identify and assess, reduce/mitigate/prevent, prepare for, respond to, and recover from wildfires. While there is no single definition, this approach generally emphasizes collaboration among various stakeholders, including government agencies, local communities, environmental organizations, and the private sector. IWFRM is an evolving approach that is being adapted in the context of climate change and growing wildfire risk. Using new research, technological advancements, and collaborative strategies, IWFRM aims to create safer, more resilient communities in the face of wildfire risks. Several countries, including Portugal, Greece, Spain, Italy, Croatia, France, and more recently Finland and Sweden, are moving toward adopting an IWFRM approach.

In general, key elements of IWFRM correspond to the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030. The wildfire PRAF also follows IWFRM principles. There are also other analytical frameworks, including the 5R (Review and Analysis, Risk Reduction, Readiness, Response, and Recovery) approach of the Food and Agriculture Organization of the United Nations (FAO) which promote comprehensive and cross-cutting IWFRM approaches. In recent years, the Organisation for Economic Co-operation and Development (OECD) has conducted several wildfire reviews, also advocating for IWFRM.

The key expected benefits of adopting an IWFRM include the following:

- Economic, social, and environmental: Investment in prevention and preparedness reduces the economic impact of wildfire disasters over time. Proactive measures reduce the incidence and severity of wildfires, protecting lives, property, and natural resources.²³
- Improved management and capacities: Improved communication and cooperation among various agencies and stakeholders leads to more effective wildfire management.

- Resilience for the future: Communities are better prepared to withstand and recover from wildfires, ensuring long-term sustainability.

APPLICATION OF METHODOLOGY

The report draws on desk reviews, consultations with stakeholders, and expert analysis. Each chapter provides details on the current status, what works well, and the key gaps and opportunities (recommendations) going forward. In line with the detailed structured analysis, a list of key recommendations for improving wildfire risk management in Iceland is provided. These recommendations can form part of a roadmap and can guide immediate as well as medium- to long-term actions.

Initial stakeholder analysis and desk research were complemented by site visits, including to areas affected by wildfires in the Grindavík area, Grábrókarhraun, and Mýrar, and on-site discussions with the firefighting chiefs in charge of the response during those events. The team visited high-risk locations, including Skorradalur, a dense recreation home area and a popular vacation destination for tourists, and Kerið, a major tourist attraction, as well as firefighting stations including that of Brunavarnir Árnessýslu in Selfoss.

In addition to site visits, 35 consultation meetings were held with key stakeholders.²⁴ A complete list of interviewed stakeholders is provided in Annex 4. Consultations focused on understanding each entity's current and potential future roles in fire risk management. This included the identification of known or perceived capability challenges and envisioning what challenges or opportunities they could face in the coming years – with a particular emphasis on demographic and climatic changes. Discussions explored existing responsibilities and potential opportunities for stakeholder engagement for improved wildfire risk management in Iceland.

²³ World Bank and European Commission. 2021. Investment in Disaster Risk Management in Europe Makes Economic Sense. [Link](#).

²⁴ This number covers the total number of consultations conducted in the two missions. For the fire chief association and ministry of infrastructure, consultations took place twice (1 during the first mission and 1 during the second). Thus 35 consultations took place for 33 stakeholders.



Figure 1 - Top
Site visit to the Grindavík area, October 2024
Source: World Bank Team.

Figure 2 - Middle
Discussion with the Fire Chief Commander on the Response Coordination Strategy during major wildfire events in Iceland, October 2024
Source: World Bank Team.

Figure 3 -Bottom
Site visit to Kerid area, October 2024
Source: World Bank Team.

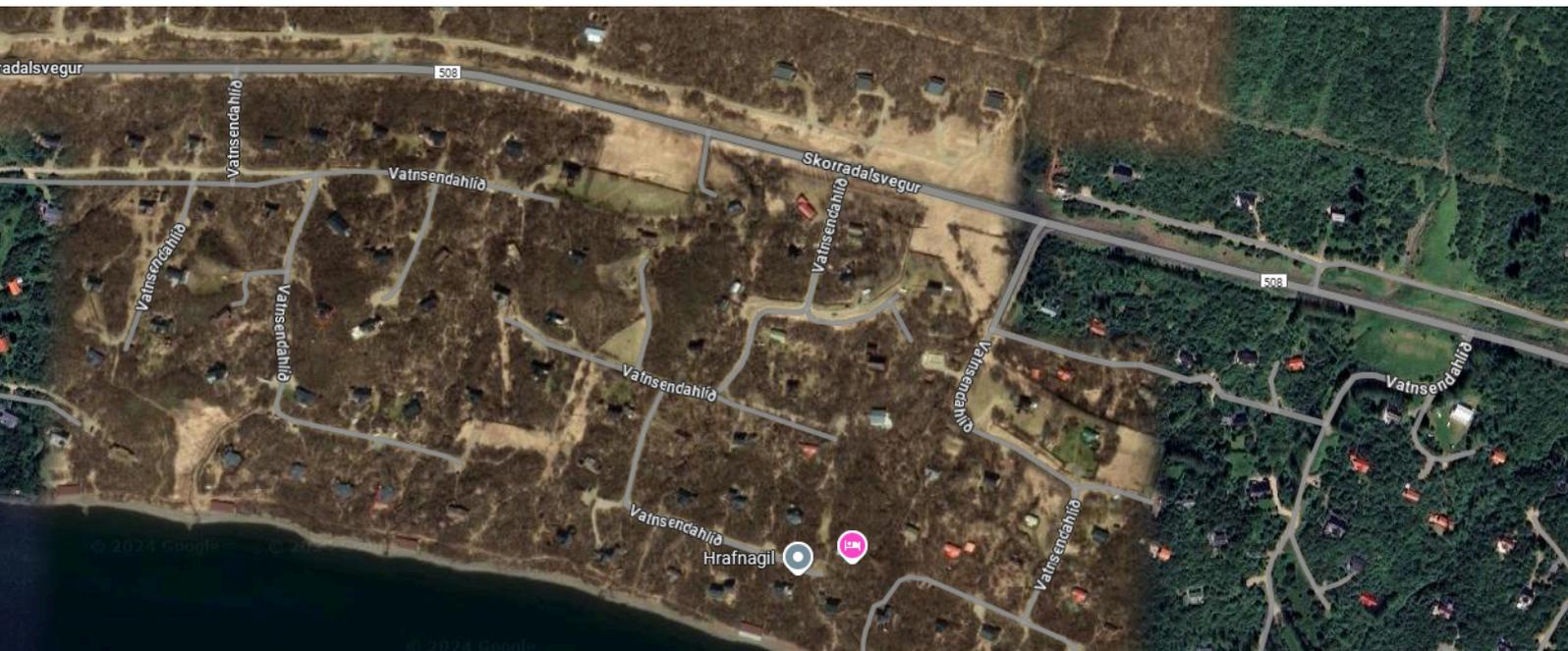


Figure 5- Bottom
Wildland-urban interface (WUI) in a typical Recreation Home Area

Source: Google Maps, October 2024.

Figure 4- Top
Site visit to Recreation Home Area in Skorradalur, October 2024

Source: World Bank Team.

WILDFIRE RISK MANAGEMENT GOVERNANCE

GOVERNANCE CONSIDERS STRUCTURES for wildfire risk management at both the national and subnational levels. It analyzes existing strategic frameworks (that is, a strategy), institutional frameworks (responsibilities and relationships), interagency coordination mechanisms and partnerships, and systemic resilience measures. This chapter starts with the civil protection/disaster risk management (DRM) stakeholders and then the broader IWFRM-relevant stakeholders.

CIVIL PROTECTION FRAMEWORK

The Civil Protection Act no. 82/2008 establishes the governance framework for DRM in Iceland.

According to the law, the task of the Icelandic civil protection is to prepare, organize, and implement civil protection measures aimed at preventing and, to the extent possible, limiting physical injury or damage to the health of the public and damage to the environment and property, whether it results from natural catastrophes or from human actions, epidemics, military action, or other causes. It also provides emergency relief and assistance for any injury or damage that may occur or has occurred.

National coordination of all civil protection starts with the Civil Protection and Security Council (CPSC).

The CPSC is composed of key government ministers, CEOs of vital institutions, and other relevant representatives like the Icelandic Search and Rescue Organization (ICE-SAR), the Red Cross, emergency telecommunication, and representatives of the local authorities. It sets the strategic direction of civil protection in the country. Within the government, the Ministry of Justice holds the authority over the civil protection portfolio. Authorized by the Minister, the National Commissioner of the Icelandic Police (NCIP), through the DCPEM, is in charge of daily activities related to prevention, preparedness, response, and recovery from emergencies. The DCPEM coordinates the civil protection system and provides support and coordination when local levels are overwhelmed, in line with Iceland's decentralized governance system. At a local level, the local police chiefs steer actions, and the DCPEM supports. In addition, the NCIP is in charge of all other matters concerning state security in connection with events, cases, or situations that may endanger the security of the constitutional order and the general public. Iceland also benefits from the existence of the Public Safety Science Council (Vísing)

daráð almannavarna, PSSC) as an informal forum to ensure an effective science-policy interface on strategic and operational issues during real-time emergencies.

While national coordination ensures the strategic direction necessary for the functioning of the civil protection system and its further development, the actual implementation is decentralized.

Iceland is divided into nine policing regions, with a regional police chief in each one.²⁵ Police chiefs have overall operational management responsibility for incidents related to civil protection and emergency management. Through their Civil Protection Committees (CPCs), municipalities hold the primary responsibility for assessing local risks and developing emergency response plans. During a state of emergency, site management is overseen by the responsible police commissioner for that area through the coordination and command centers established for that purpose. There are 62 municipalities in Iceland²⁶, which together are covered by the 9 police administrative areas. Coordination and command centers include CPC members, and all other relevant stakeholders needed for the response.

Fire brigades established by the municipalities, in accordance with the Act on Fire Protection no. 75/2000 and relevant regulations, are among the parties in the first line of defense to respond to emergencies.

²⁷ Municipalities are obliged to ensure the provision of minimum requirements for equipment, accommodation, and manpower of the fire service so that it can perform effectively. Further supporting the fire brigades' work is the HCA, under the Ministry of Infrastructure, responsible for setting up fire service standards and overseeing their work and development, although HCA has no role in the allocation of budgets to support the fire brigades as this is the responsibility of the municipalities.

The Fire Chiefs Association is an informal but influential network of all the fire chiefs in the country. It

²⁵ There are the Capital Region Police, the Sudurnes Police, the Westman Islands Police, the South Iceland Police, the East Iceland Police, the Northeast Iceland Police, the Northwest Iceland Police, the West Iceland Police, and the West Fjord Police.

²⁶ Icelandic Association of Local Authorities Database in August 2024

²⁷ There are 62 municipalities and 32 fire brigade regions with 34 fire brigades.

provides a forum for all fire chiefs to come together and discuss topics of importance, relevance, and influence on the further development of the fire rescue service in general. Their views and understanding of wildfire risk are crucial for the entire risk management cycle.

The Icelandic Coast Guard (Landhelgisgæslan, ICG) is a civilian law enforcement agency tasked with search and rescue operations, maritime safety and security surveillance, and law enforcement in Iceland's surrounding waters operating according to Act no. 52/2006 on the Icelandic Coast Guard. The ICG collects, analyzes, and shares information in close collaboration with neighboring countries, aiming to maintain an accurate real-time overview to safeguard maritime safety and security. The ICG's ships, maritime surveillance aircraft, and helicopters are specifically designed and equipped to facilitate swift responses in emergencies, such as rescuing people in distress at sea or on land, providing urgent medical transportation, and assisting vessels within the nation's jurisdiction. The ICG manages rescue helicopters, offshore patrol boats, coastal vessels, and maritime surveillance aircraft. With respect to IWFRM, the ICG assists the fire brigades in moving personnel and equipment to the scene, as well as in putting out fires (helicopters and buckets).

The ICE-SAR is a nonprofit, noncommercial, volunteer-based organization founded in 1928, dedicated to protecting lives and enhancing readiness through community engagement and training. It operates according to Act no. 43/2003 on rescue teams and rescue workers. ICE-SAR operates 93 SAR units across Iceland with a further 37 units focused on accident prevention.²⁸ Its mandate is established by legislation; it includes support to public safety, emergency medical services, and rescue-related activities. Funded 15 percent from the government (as an independent organization) and 85 percent from public donations, ICE-SAR plays a crucial role in ensuring the safety and well-being of all individuals in emergency situations throughout Iceland. ICE-SAR can provide transport and logistical support, operating under the leadership of fire chiefs during wildfire incidents.

The Icelandic Red Cross (Rauði kross Íslands) was established in 1924 and has about 70 employees, 20,000 members, and around 3,000 active volunteers, with 44 branches and national headquarters/operations command. It operates according to Act no. 115/2014 on the Icelandic Red Cross and the

symbols of the Red Cross, the Red Crescent, and the Red Crystal. Since its inception, the organization has played a pivotal role in healthcare, social services, and humanitarian aid in Iceland. Additionally, the Icelandic Red Cross acts as a support body to the Icelandic government, particularly in areas such as disaster and emergency response as well as refugee services. During major emergencies, the Icelandic Red Cross takes on the responsibility of establishing humanitarian assistance centers for those affected. Reception facilities are usually set up in local schools across communities nationwide, as well as community centers, hotels, or sports facilities, depending on the circumstances. Here, individuals receive first aid, including psychological first aid, food, clothing, and temporary shelter until they are able to return home or transition to more permanent housing. The Icelandic Red Cross owns and runs the ambulance service in the country, operating based on specific working arrangements with the Ministry of Social Affairs and Labour and the Emergency Number 112.

The Emergency Number E-112 Neyðarlínan operates the E-112, the National Emergency Number, the National Emergency Telecommunication Service (using the Terrestrial Trunked Radio system, or TETRA for short), and the Iceland Maritime Traffic Service. The Neyðarlínan is owned by the Icelandic State and operates according to Act no. 40/2008 on coordinated emergency telecommunication response. It operates 24/7, year-round, and accepts calls relating to all emergencies, that is, accidents, fires, search and rescue, and others. The emergency operators give online assistance to callers and call out response parties, that is, police, fire services/brigades, paramedics, ICE-SAR, and others, depending on the emergency. It operates an alert database and has access to database maps with all registered properties countrywide.

A list of key legislation governing civil protection in Iceland is included in [Annex 1](#).

KEY STAKEHOLDERS

Based on stakeholder mapping, in addition to the above-listed civil protection actors, the following organizations²⁹ hold specific mandates/roles and/or are relevant in the context of IWFRM:

²⁸ ICE-SAR has about 4,200 members, 13 rescue ships, and 30–40 smaller vessels.

²⁹ In line with the Government of Iceland's website. [Link](#).

The Ministry of Justice (Dómsmálaráðuneytið) through its mandate over civil protection, search and rescue, and law enforcement.

- **DCPEM** through its role as a coordination body in national Civil Protection Management according to Act no. 82/2008 on Civil Protection.
- **Police district chiefs** (lögreglustjóraembætti) through their role as chair of local CPCs in cooperation with the municipalities according to Act no. 82/2008 on Civil Protection.

The Ministry for Environment, Energy, and Climate (Umhverfis-, orku- og loftslagsráðuneytið) formulates and enforces the Icelandic government policy for environmental affairs. The ministry supervises affairs pertaining to nature in Iceland, conservation and outdoor recreation, the national parks of Iceland, climate change, the protection of animals, wildlife management, pollution prevention, planning and building matters, fire prevention,³⁰ weather forecasting and avalanche protection, surveying and cartography, forestry and soil conservation, environmental monitoring, and surveillance. The ministry has several services/agencies under its jurisdiction. It also houses an interministerial working group on climate action.

- **The Icelandic Meteorological Office** (Veðurstofa Íslands, IMO) is responsible for monitoring, analyzing, and forecasting natural hazards such as volcanic eruptions, extreme weather events, avalanches, and floods according to Act no. 70/2008 on the IMO. It also has an advisory role for the DCPEM and is a key element of the national early warning system, ensuring public safety and supporting disaster risk reduction. The IMO also conducts research on climate patterns, glaciers, hydrology, and climate change impacts, collecting data to support scientific studies and inform evidence-based decision-making.
- **The Natural Science Institute of Iceland** (Náttúrufræðistofnun Íslands, NSII) conducts basic research in the country's zoology, botany, and geology and is responsible for systematic documentation of Iceland's nature according to Act no. 60/1992 on the Icelandic Institute of Natural His-

tory and Natural History Museum Centres as well as the respective regulations. It maintains databases on nature in Iceland and is charged with maintaining a broad overview of nature conservation and natural resource allocation and providing advice and instruction thereon. It also has a broad monitoring and educational role. It keeps a register of major wildfires (from 2006) and maintains a habitat-type map for the country. The NSII cooperates with academic bodies as well as Land and Forest, the IMO, and HCA.

- **The Environment and Energy Agency of Iceland** (Umhverfis- og orkustofnun Íslands) was established in January 2025 according to Act no. 110/2024 with a merger of the Environment Agency and the Icelandic Energy Authority. It monitors air quality (in conjunction with IMO) and is active in reviews of environmental impact assessments and planning, issuing of permits, circular economy and waste issues, water management, and others.³¹
- **Land and Forest** (Land og skógur) (formerly known as the Icelandic Forest Service and Land Reclamation, Skógræktin og Landgræðslan³²) operates according to Act no. 66/2023 on Land and Forest as well as Act no. 33/2019 on Forests and Forestry and Act no. 155/2018 on Land Reclamation. Its mandate encompasses risk management planning for forests and land use, including identification of wildfire risks, land degradation, and climate change impacts. It ensures compliance with environmental regulations across both private and public projects while promoting sustainable planning practices that protect forest biodiversity. The agency focuses on state-owned land afforestation as well as farmer afforestation (on private lands). It oversees achievement of the national target to have one percent forestry cover by 2030 and up to 5 percent of native birch woodland.³³ It acts as Iceland's representative body for international forest-related cooperation.
- **The Icelandic Forestry Association** (Skógræktarfélag Íslands) is a national umbrella organization for local and regional forestry associations throughout Iceland. It supervises and plays a part in various specific forestry projects, providing guidance and information to its member associa-

³⁰ The Presidential Decree on the Division of Government Affairs between the Ministries in the Government of Iceland. 2018 No. 119, December 7, specifies in Article 9.3a that the ministry shall handle matters concerning “vegetation and soil protection, including fire management and prevention of wildfires.” [Link](#).

³¹ A list is included on the website (in construction): [Link](#).

³² [Island.is](#). Land and Forest Iceland Common Strategy. [Link](#).

³³ Existing database: [Link](#).

tions (such as the Icelandic Forest Owners Association), businesses, and the general public. While not directly involved in risk management planning, it supports risk mitigation practices through promoting responsible forestry management. By focusing on forest management and research, the association helps identify potential risks, including wildfires and climate change impacts on forests.

- **The Forest Owners Association** (Landssamtök skógaeigenda) is a national umbrella organization, as a union to represent the views and concerns of forest owners as well as forest farmers.³⁴ In 2021, the association was merged with the Farmers Association (Bændasamtök Íslands). The organization oversees forestry management, promotes risk awareness, and keeps forest owners informed of the latest developments. In the case of wildfire, the association relies heavily on the fire brigades for response, with the forest owners' role being limited.
- **Landsnet** (Landsnet) is the transmission system operator (TSO) and manages the control of the electricity system as described in the Electrical Energy Act no. 65/2003 part III. This law also describes the duties of electric energy producers and distributors. Among those duties is participation in the Power System Emergency Management Forum (PSEMF), which is led by Landsnet, and the writing of emergency response plans. The legislation stipulates the right of the respective electricity companies to respond to possible wildfire threats to the electric power system due to the overgrowth of trees (art. 21).

The Ministry of Industries (Atvinnuvegaráðuneytið) is responsible for all matters related to agriculture, fisheries and fish farming, general business tourism, consumer issues and other fields of industries.

- **The Icelandic Tourist Board** (Ferðamálastofa) is an independent authority to license travel agents and tour operators and operates according to Act no. 96/2018 on the Tourist Board. As part of this, the authority annually audits about 5–10 percent of safety plans that those who operate tours must have in place.

- **The Icelandic Touring Association** (Ferðafélag Íslands) is a civil organization set up in 1927 to promote hiking and nature-based leisure activities in Iceland. It operates a network of 40 mountain huts that offer basic accommodation to hikers. It has about 15,000 members, with 12 permanent staff. It collaborates with the forest service in cutting trees and clearing land. It has experience with evacuations and works with ICE-SAR in these instances. Response plans have been developed for flash floods and volcanic eruptions but to date nothing on wildfires. It produces books and guides. Another touring association of similar capacity is Útivist touring association, established in 1975.

It is noted that there are also civil groups, volunteer groups as well as private sector organizations that contribute to elements relevant to IWFRM.

The Ministry of Infrastructure (Innviðaráðuneytið) houses several departments³⁵/authorities, which are relevant for IWFRM. The ministry is responsible for transportation, i.e., road, air and sea traffic and its planning as well as municipalities, regional development and electronic communication and network security.³⁶ Its transport authority has some responsibility in that it has managed the construction of defense walls to divert lava flows from roads and other key infrastructure.

- **The Icelandic Regional Development Institute** (Byggðastofnun) is an independent state-owned institute, ultimately overseen by the Minister of Infrastructure. Byggðastofnun's mission is to promote rural settlement and economic development, focusing on creating equal employment and housing opportunities for all residents. To fulfill its mission, Byggðastofnun prepares, organizes, and funds projects while also providing loans aimed at strengthening regional settlement, enhancing employment, and fostering innovation in business and industry. Under a future IWFRM approach, the institute could have a role in linking prevention efforts/projects with regional development plans.
- **The Transport Authority** (Samgöngustofa) has the responsibility to handle administration and supervision relating to matters of aviation, mar-

³⁴ Forest farmers a diverse group of farmers with different emphasis from exclusively forest farming through mixed farming over to agricultural focus.

³⁵ The Ministry has four Departments, as follows: Department of Housing and Planning; Department of Local Government and Regional Affairs; Department of Policy and Budgeting; and the Department of Transport and Infrastructure.

³⁶ It does not have responsibility for the energy infrastructure, water infrastructure, or telecoms infrastructure.

itime, and road traffic safety and the safety and supervision of transport infrastructure and navigation systems according to Act no. 119/2012. It promotes safe, sustainable, convenient, and economical transport as well as development of transport in accordance with social and environmental goals.

- **The Iceland Road and Coastal Administration** (Vegagerðin) is an operational agency under the Ministry of the Interior, but it is a separate state-owned company with responsibility for the construction, operation and maintenance of 13,000km (about 8077.83 mi) of the main road network, as well as harbors, lighthouses and ferries (these latter are always outsourced). It promotes safe, sustainable, convenient, and economical transport as well as the development of transport in line with social and environmental goals.
- **Municipalities:** There are 62 municipalities, and they vary greatly in size; Reykjavík is the largest municipality (in terms of population and income) while some have fewer than 100 inhabitants. Municipalities oversee the appointment of their CPCs, drafting risk assessments and response plans. There are currently nine local civil protection districts and 21 CPCs³⁷. Each civil protection committee formulates its policy and organizes its activities according to the Act on Civil Protection. Municipalities are also responsible for establishing the fire rescue service within their jurisdiction and are mandated to ensure minimum working conditions for their functionality. Spatial and land use planning also falls under their jurisdiction (Local Government Act no. 138/2011 on municipalities).
- **The Icelandic Association of Local Authorities (Municipalities)** (Samband íslenskra sveitarfélaga) is the forum for cooperation between the local authorities. It was established in 1945; all local authorities in the country are members of the association. The association protects the interest of municipalities domestically and abroad, provides information to its members on specific aspects of local governance, and publishes materials related to the local authorities.

The Ministry of Social Affairs and Housing (Félags- og húsnæðismálaráðuneytið) is responsible

for social affairs, housing and construction, planning, labor issues as well as immigration and refugee issues.

- **The HCA** is tasked with setting the standards for the fire service and overseeing its preparedness for response (Act no.137/2019). As part of its work, it collects and analyzes data on fires, including wildfires, and on the existing response resources within the fire brigade. This provides an overview of the age and the status of the fire equipment, staffing levels, and training followed by the personnel which supports the long-term planning for the development of the fire service itself. The HCA can recommend the provision of increased resources for fire services/brigades but does not fund them. The HCA operates a formal working group addressing wildfire preparedness.
- **The National Planning Agency** (Skipulagsstofnun) is responsible for the administration and implementation of the Planning Act and the Act of Environmental Impact Assessment. The National Planning Agency gives advice on planning issues, assists local authorities in preparing spatial plans, and reviews and approves spatial plans produced by local authorities.
- **The Association of Recreation Homeowners** (Landssamband sumarhúsaeygenda) is active per the act on Recreational Development and Lease of Land for Recreational Facilities. The association protects the interests of member associations and individual members, promotes nature conservation, has taken part in the HCA working group on wildfire prevention, and has contributed to the website www.grotureldar.is.

The Ministry of Health (Heilbrigðisráðuneytið) oversees the overall health system, including provision of services and infrastructure.³⁸ The Chief Epidemiologist monitors smoke and pollution events when public health is at risk.³⁹ The Chief Epidemiologist heads the Division of Health Security and Communicable Disease Control and operates under the Communicable Diseases Act, reporting directly to the Minister of Health. These analyses are supplemented with tracking the demand for medications for breathing problems, which also allows it to intervene with new supplies if needed. The Chief Epidemiologist has, in consultation with the Director of Health and the Medicines Agency, alerted the MoH

³⁷ Almannavarnir (Civil Defense). [Link](#).

³⁸ The scope of the work of Public Health in Iceland is defined by the Communicable Diseases Act No. 19/1997, last amended in 2021.

³⁹ The Chief Epidemiologist has, in consultation with the Director of Health and the Medicines Agency, alerted the MoH to low stock levels of such medications when necessary.

to low stock levels of such medications when necessary. The Ministry of Health has prepositioned certain quantities of personal protective equipment (PPE), including face masks, which can be distributed to the population through the civil protection system. Emergency stockpiles are overseen by the Chief Epidemiologist, as per Regulation No. 817/2012 and the Communicable Diseases Act (Article 7).⁴⁰

The Ministry of Education and Children (Mennta- og barnaráðuneytið) is responsible for general education, child protection, child welfare, and youth and sports.⁴¹ The ministry is part of an interministerial working group on climate action. There is a Green Schools initiative; the Ministry of Education collaborates with Land and Forest in generating educational material. It oversees the mandatory curriculum.

- **Southland College** (Fjölbrautarskóli Suðurlands) recently merged with the Horticultural Department of the Agricultural University and since 2019 it offers courses for the public and different associations on wildfire prevention and response in cooperation with members of the HCA working group.

The Ministry of Culture, Innovation and Higher Education (Menningar-, nýsköpunar- og háskólaráðuneytið) is responsible for art and culture, the Icelandic language, museums, media, science and research, higher education and innovation.

- **The Agricultural University of Iceland** (Landbúnaðarháskóli Íslands) is a public institution providing education on farming and forestry activities, with some 400 students.⁴² The university provides education in planning as one of the four areas of activity (agricultural science, environmental sciences, planning, landscape architecture).
- **The University of Iceland** (Háskóli Íslands) has been the hub for scientific research since 1918 and offers a wide variety of study paths for diploma, BSc, MSc, or doctoral degrees. It plays a

vital role in research and innovation. Some university staff are already engaged in fire research, and there are opportunities to strengthen capacities with respect to fire ecology and management, potentially providing essential fire information to the authorities, that is, fire regimes, fire effects, fire analysis and evaluation, post-fire management, and so on.

The Ministry of Finance and Economic Affairs (Fjármála- og efnahagsráðuneytið) is responsible for social security and pensions, economics and public finances, support for home purchases and interest rate compensation, state human resources, state operations and assets, and state information technology issues.

The Natural Catastrophe Insurance (Náttúruhamfaratrygging Íslands, NCI) operates according to Act no. 55/1992 on Natural Catastrophe Insurance. It is a public institution whose task is to insure the main value against certain natural disasters, that is, volcanic eruptions, earthquakes, landslides, avalanches, and floods (water); it has almost 100 percent penetration. Properties, regardless of their location, must compulsorily be insured against fires, with the exception of houses below 15 m². Premiums are collected alongside fire insurance. The following structures must also be insured, even if they are not fire-insured: heating facilities, water supplies, sewage facilities, harbor facilities, electricity installations, and telephone and telecommunications installations owned by municipalities or the State Treasury. Wildfires do not come within the scope of NCI because they are not classified among the natural hazards. Act no. 55/1992 does not include a definition of forest as an insurable asset.

Key legislation specifically addressing wildfires includes those listed in [Annex 1](#).

⁴⁰ Pursuant to Article 7 of Regulation No. 817/2012, the Chief Epidemiologist shall oversee the delivery, distribution, and use of emergency stockpiles of medicines listed in Annex I of Appendix 1, and other necessary equipment in the country to respond to health threats such as epidemics or other hazards. The Chief Epidemiologist has maintained PPE stockpiles for healthcare use, including surgical masks, FFP2/3 masks, face shields, and goggles—but not gas masks. These PPE items are generally not intended for public distribution and are not stocked in quantities sufficient for that purpose. FFP2/3 masks do offer protection against dust, but not gas pollution, and surgical masks protect against neither.

⁴¹ Primary level schools are under the municipalities. Secondary level schools are directly under the ministry.

⁴² Agricultural University of Iceland. Nature and Forest (in Icelandic). [Link](#); through reorganization of the university, wildfire prevention was moved to the Highschool Fjölbrautarskóli Suðurlands in Selfoss South Iceland, together with the horticultural and forestry department. at Reykir in Hveragerði Sout Iceland.

REVIEW AND RECOMMENDATIONS

What Works Well

Several elements related to overall governance are already in place and can be further leveraged through reforms. These include the following:

- **Importance of wildfires recognized:** Across different stakeholders, there is an awareness and willingness to proactively increase resilience to wildfire risk. For example, starting from the last link in the chain—the fire and rescue services (FRS)—a sense of urgency has already been created within their communities. The civil society organizations consulted, such as the Forest Owners Association, Recreation Homeowners Association, and tour operators, have already been sensitized to the topic and are ready and willing to contribute to the management of wildfire risk. A significant contribution to the discourse on IWFRM in Iceland has come from the multi-institutional working group focused on wildfires, chaired by the HCA.
- **Legislation:** Wildfires are mentioned in legislation (Decree of President)⁴³ related to the Ministry of Environment and the National Risk Assessment from 2011.⁴⁴ The Act on Fire Management and Prevention of Wildfires no. 40/2015 and the respective regulation no. 325/2016 have been updated with respect to wildfires. The existing civil protection legislation is in place, covering wildfire events in a similar manner to other emergencies. Within the legal framework, Landsnet/TSO of the Electric Power Grid has, for example, already taken action to allow the TSO to clear vegetation in cases of landowner's inactions, as part of wildfire risk prevention/management.
- **System and coordination:** There is a robust civil protection and emergency management system in place. Also, a functioning national and local coordination structure for DRM and civil protection is in place and can easily absorb the topic of wildfire risk management without creating additional

layers of bureaucracy. Initial multi-sectoral/institutional coordination in the form of a working group on wildfires (led by the HCA) has brought key stakeholders together. This group has identified several gaps and opportunities in the various competencies of stakeholders and has aided in the development of publicly available resources, showing also the readiness of government services to be engaged on this topic. Relevant entities include Eldvarnabandalagið, an association of insurance companies, ICE-SAR, the fire chiefs, the firefighters and paramedics, and municipal area fire brigades.⁴⁵ Brunatæknifélagið is an association of professionals and others interested in fire protection.⁴⁶

- **Institutional capacities:** There are already existing institutional capacities, with substantial experience related to volcanoes, lava flows, and other hazards, as well as initial experience with wildfires, both of which can be leveraged to increase wildfire resilience. There is also a dedicated informal structure in the government to support the science-policy interface (PSSC⁴⁷), and researchers are increasingly aware of research needs related to wildfire risk.
- **Actions:** While there is no specific strategy or plan, several initiatives and efforts are being taken with more details provided in the following chapters. For example, two wildfire response plans⁴⁸ have been developed by the DCPEM in cooperation with the respective municipalities. The National Forests (Land and Forest, formerly Skógræktin) has issued guidance on forestry with respect to wildfires. The IMO also conducts a range of monitoring activities despite limitations in the current framework and resources (see below).

Challenges

- **Legislation:** There are gaps in the framework. Importantly, wildfires have not been considered a specific natural hazard in previous risk assessments and legislation. National legislation does not specify a list of hazards, only referring to natural hazards in general. Act no. 70/2008 on the Meteorological Office of Iceland defines the mon-

⁴³ Althingi.is. 2025. Forsetaúrskurður um skiptingu stjórnarmálefna milli ráðuneyta í Stjórnarráði Íslands (Presidential Decree on the Division of Government Affairs between ministries in the Government of Iceland).

⁴⁴ Almannavarnir (Civil Defense). 2011. Áhættuskoðun almannavarna 2011 (Civil Protection Risk Assessment 2011) [Link](#).

⁴⁵ <https://eldvarnabandalagid.is/>.

⁴⁶ BTI. Um BTI (About BTI). [Link](#).

⁴⁷ An informal cooperation venue of the DCPEM and the science community. See Almannavarnir (Civil Defense). Vísindaráð almannavarna (Scientific Council of Civil Defense). [Link](#).

⁴⁸ Almannavarnir (Civil Defense). Gróðureldaáætlanir (Civil Defense Plans). [Link](#).

itoring and warning role of the IMO regarding weather and weather-related aspects as well as earthquakes, volcanic eruptions, landslides, flooding, and avalanches. The monitoring role is unclear since wildfires in Iceland are not defined as a natural hazard and are generally not ignited by weather even if weather-related aspects can increase their intensity. Hence the role of the IMO and other institutions is unclear. Potential updates on Act no. 75/2000, Act no. 70/2008, and other legislation are needed to fill gaps. There is a need to spell out more specific roles, for example, with respect to responsibilities for research/monitoring/warnings, conducting/updating a national risk assessment (amendment pending for update to the law on Civil Protection in autumn 2025, for example, Act no. 82/2008), clarifying roles of the Ministry of Environment with respect to prevention, and/or updating with respect to climate change and potential associated risks (for example, the Planning Act, 2012). Also, there are some gaps in the regulations and protocols related to civil protection and emergency response (such as engagement of volunteers, police response, coordination on the front lines with ICE-SAR) which do not fully consider wildfire risk. This is also stated in the 2023 report on natural hazards in Iceland.⁴⁹

- **Strategic framework:** There is no consolidated/national IWFRM strategy or a roadmap with identified priorities and an overview of the different expected contributions among the relevant stakeholders.
- **Coordination:** The working group for wildfires under the HCA has produced materials as noted above, the most recent ones dating to 2019. Inter-institutional coordination on wildfires and/or engagement with academia and civil groups seems ad hoc. There are no specific research programs, grants, or research priorities related to fire science/wildfire risk, indicating a clear need for a more systematic approach to the subject.

Opportunities

- **Legislation:** There are opportunities to strength-en the legal framework by updating legislation with known gaps (for example, as noted above), provide greater clarity for specific roles

(for example, national risk assessment, prevention planning, implementation), and/or expand into areas relevant for IWFRM (such as relating to prescribed burns; developing a specific law on wildfires). For example, the Act on Fire Protection is predominantly focused on structural fires; however, it does not exclude its application to wildfires. This application could be further strengthened and hence support the regulatory agency of the fire service (HCA) to gradually adjust the standards in terms of equipment, training, and tactics to take account of the growing risk of wildfires. Some regulations and protocols related to civil protection and emergency response as well as the Act on the IMO (as noted above) need updating to consider the wildfire risk context. The process of integrating climate change elements into the national legislation may also provide opportunities to update legislation and fully/ explicitly acknowledge wildfire risk (for example, the Planning Act no. 123/2010).

- **Strategic framework:** Building on existing research and experience, develop a national wildfire risk management roadmap (or action plan), with a vision, key priorities in the immediate/short-, as well as medium- and long-term, with funds confirmed for the implementation of priority actions, as well as for analysis, M&E, coordination, and dissemination of results and lessons learned. The strategy and the plan should reflect a cross-sectoral and inclusive approach and consider the engagement of a range of stakeholders, including associations, academia, civil groups, and volunteers, and contribute to regular coordination among these groups as well as uptake of the IWFRM principles across relevant sectors and levels. Existing structures—associations, working groups, PSSC, and others—should be utilized in this process. Additionally, the learning curve can be shortened by examining identified challenges and opportunities in other countries – particularly those in Northwestern Europe or in newly fire-prone countries – and aligning Iceland’s approach to IWFRM with existing policy recommendations at European level.⁵⁰
- **System:** The existing national emergency response and coordination structures provide a solid foundation that could systematically integrate wildfire risk management, similar to the approach to other hazards, making wildfire fully

⁴⁹ Government of Iceland. 2023. Natural Hazard. Status Assessment and Challenges Regarding the Evaluation and Reformulation of the Planning of Risk Assessment and Monitoring for Natural Protection (In Icelandic). [Link](#).

⁵⁰ Pronto et al., 2023, Research for REGI Committee Forest Fires of Summer 2022, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels.

part of its multi-hazard approach. As part of the system, there may be opportunities to consider expanding the existing fire prevention associations which include fire professionals, response parties, and insurance companies (Eldarnabandalagið, Brunatæknifélagið) with relevant landowners and other wildfire stakeholders to facilitate joint decision-making (see examples from other countries on fire protection associations [FPAs] in [Box 2](#)). Externally, there may be opportu-

nities to strengthen engagement with the UCPM training, grants, as well as through the UCPM civil protection pool. For example, a lava cooling module could be the entrance point, with gradual expansion of capacities in wildfires. There are also opportunities to strengthen research (see the Chapter on risk assessment).

Box 2. An example of FPAs from South Africa

Source: [Cape Peninsula Fire Protection Association \(CPFFA\)](#).

FPAs are voluntary organizations formed by landowners or other stakeholders in wildfire risk areas to prevent, predict, manage, and assist with the extinguishing of wildfires, often with a legal mandate to promote/protect such activities provided certain criteria are defined and followed. FPAs are cooperative structures established between local authorities, the state, and private landowners (and their lessees) in areas of high wildfire risk. The purpose is to make all wildfire stakeholders and landowners (and occupiers of land) take greater responsibility for integrated wildfire management to prevent and control wildfires on and around their properties. FPAs help their members fulfill their responsibilities by providing advice and guidance about how to reduce the risk of wildfires. FPAs are therefore seen as being a supportive and cost-effective way of doing this.

Box 3. Iceland's experience of using lava cooling equipment

Source: [Hraunkæling við Svartsengi | Almannafróðingurinn](#).

Iceland has unique experience with lava cooling (spraying) equipment, which is a new and important resource for the country. This equipment can also be used for suppression of wildfires in the future. Since ordinary firefighting equipment was not adequate for lava cooling, authorities invested in special equipment managed by the DCPEM. In the autumn of 2023, preparations were made to use lava cooling to protect important infrastructure from volcanic eruptions in Reykjanes, complementing the protective dams constructed as the main physical protection. Various stakeholders, including EU experts, were involved in this initiative. The equipment was successfully used in 2024, and the DCPEM continues to develop this initiative with experts. The lava cooling equipment supported protective dams, for example, due to a possible overflow, as experienced in June 2024, and worked on preventive measures to cool and strengthen the lava closest to the defenses, as done in November 2024. During the eruption in mid-December 2024, an estimated 26,000 liters of water were sprayed every minute on the lava to cool it down. Part of the lava edge was cooled to strengthen the lava closest to the defenses that were still under construction. Since there are considerable water resources in the area, the maximum distance to a resource was about 800 meters. The collaboration between the authorities, institutions, and companies has been effective, particularly between the contractors and fire brigades. Due to the capacity of the lava cooling equipment i.e. pumps, hoses etc. and the training of the teams it can be a helpful addition to other wildfire fighting equipment and staff.

Conclusion

Iceland has a unique opportunity to update its wildfire risk management governance before key elements of the risk (exposure and vulnerabilities) escalate. Iceland already has a strong governance system for civil protection and emergency management. Key structures and general civil protection capacities are in place, and processes are driven through consultations and inclusion of all parties. In line with the growing recognition among stakeholders of this risk, wildfires need to be fully recognized by the system to enable adjustments and developments that will lead to effective prevention, preparedness, and response measures. A start can be made by integrating wildfire hazards into the relevant legislation (including civil protection, fire protection, land use planning, and early warning), while the long-term objective should be to unite the stakeholders around a national strategy on IWFRM. A clear articulation of what Iceland is protecting with an IWFRM is needed to align the key stakeholders around sound and achievable objectives.

Table 2. Wildfire governance - roadmap recommendations

<p>IMMEDIATE/SHORT TERM</p> <p>Agree on a common vision and a roadmap (action plan), confirm lead and contributing entities for implementing agreed priorities, as well as funding.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Update laws with known gaps (for example, Act no. 70/2008 on the Meteorological Office of Iceland, Act no. 40/2015 on management of fires and respective regulation; Act no. 75/2000 on fire protection) and approve amendment to Act no. 82/2008 for greater clarity on national risk assessments.</p>	<p>MEDIUM TO LONG TERM</p> <p>Identify further reforms to update and explicitly integrate and/or consider IWFRM (for example, the Planning Act no. 123/2010). Conduct an overarching legal review and work toward updating more complex law(s) and regulations.</p>
<p>IMMEDIATE/SHORT TERM</p> <p>Update HCA guidance/standards in coordination with relevant stakeholders.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Strengthen/adjust existing networks to be able to function as national (and regional and local) FPAs and promote a cross-cutting and all-of-society approach.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Review opportunities related to the UCPM resource pool (establishing of modules), access to grants, and rescEU funding.</p>
<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Strengthen the policy/research interface on wildfire risk management between different stakeholders—authorities, academia, private sector, and broader interested public.</p>	<p>MEDIUM TO LONG TERM</p> <p>Continue strengthening/adjusting existing networks to function as national (and regional and local) FPAs.</p>	<p>MEDIUM TO LONG TERM</p> <p>Regularly review the national wildfire risk management roadmap and update it based on progress and needs.</p>

WILDFIRE RISK ASSESSMENT

WILDFIRE RISK ASSESSMENT considers processes at the national and subnational levels to understand wildfire risk and its elements, as well as to communicate and share risk information and data. Aspects considered include identification, analysis, and evaluation stages. It reviews how assessment results are communicated to stakeholders and the public, as well as broader capacities in line with the legislative framework and processes.⁵¹

WILDFIRE RISK

The National Risk Assessment (2011) identifies the most common threats as volcanic eruptions, earthquakes, extreme weather events, snowstorms, snow avalanches, landslides, floods, glacial outburst floods, tsunamis, glacial retreat, drift ice, and geothermal events. While wildfires are referenced, they are not yet covered by any comprehensive risk assessment. The National Climate Action Plan (2020) underscores the growing danger of wildfire linked to extended periods of drought, combined with rising global temperatures. Historically, the country's landscape and cool, wet climate, combined with more intensive land use (grazing), made large-scale wildfires rare. However, with global warming, the conditions that prevent wildfires—such as consistent precipitation and moist vegetation—are becoming less reliable, putting Iceland at higher risk. This fire-weather-related increase of risk is exacerbated by a declining number of farmers and sheep and an overall changing land use, combined with afforestation efforts, leading to more available wildfire fuel.

Wildfires can be triggered from various sources, including human activities like discarded cigarettes, and natural events like volcanic eruptions and the associated lava flow, or lightning strikes. The latter are expected to become increasingly prevalent with climate change, which is a driver of more intense storms. Over the past 50 years, the incidence of wildfires ignited by lightning has grown globally by 2 to 5 percent annually.⁵² This phenomenon creates a feedback loop worsening the situation, where wildfires not only destroy vegetation but also release vast amounts of greenhouse gases, such as carbon dioxide and methane, further fueling climate change and in turn increasing the likelihood of future fires. Such a vicious circle is particularly

alarming given the accelerating pace of climate change, which extends wildfire seasons and increases their intensity. A new compounding issue is the threat of abiotic disturbances to forested areas. The threat of bark beetle which have devastated forests in other parts of Europe has arrived in Iceland. This is an indication of both (changing) conducive climate conditions and a risk of cascading disturbances to Iceland's limited forests and the flora and fauna that depend on this ecosystem.

In recent years, the country has witnessed an increase in wildfires, including vegetation, bush, peat, moss, and forest fires. According to the NSII, at least 26 wildfires that occurred on the island between 2006 and 2021 burned slightly more than 7,450 ha of land. Per records of the HCA, fire brigades went into action 516 times in the years 2018-2022 because of wildfires.⁵³ Two of the most significant fires are the following. In 2006, in the Mýrar region (in West Iceland), a wildfire occurred where approximately 6,700 ha of wetland—previously dried out by cold, dry winds and a lack of precipitation for several days—was consumed by flames. This fire, the largest ever recorded in Iceland, took four days to be extinguished and forced several farmers to evacuate to protect their livestock. More recently, in 2021, a wildfire in the Heiðmörk conservation and recreation area near Reykjavík, critical for the capital's water supply, consumed 56.5 ha of land. Moreover, it prompted the authorities to issue the country's first-ever 'danger alert' for wildfires. Once again, this event underlined the role of climate change and dry weather conditions in the rapid and widespread progression of the fire.

Iceland is currently experiencing an increase in vegetation growth. This is characterized by afforestation efforts, accompanied by the introduction of non-native, often flammable plant species, as well as a significant reduction in the sheep popula-

⁴⁹ Wildfire risk assessments are a prerequisite for a better understanding of the risk, a better identification of the current status, and better defining of gaps and deriving actions to overcome the identified gaps.

⁵² NASA. 2017. Lightning Sparking More Boreal Forest Fires. Feature. [Link](#).

⁵³ See: HMS. Stóraukin hættu á gróðureldum á Íslandi (Significantly increased risk of wildfires in Iceland). [Link](#).

tion and therefore in sheep grazing. These factors all contribute to a higher fuel load, particularly in recreational areas where trees are planted for shelter. Moreover, the increasing development of campsites and wood cottages in the countryside for holiday and leisure activities, especially in vacation areas established decades ago, further increases the risks associated with wildfires, as these structures are a potential source of ignition and vulnerable due to the lack of proper planning norms.

The necessary protective measures for such properties, such as damp or thinly vegetated buffer zones, are insufficiently implemented. Although the current Icelandic law requires sufficient water resources and access for firefighting, as well as escape routes and defensible space when building and area planning permits are issued, there is no continuous legal obligation for property or landowners to maintain these spaces over time. The Fire Service has the responsibility to inspect properties/structures and lots with regard to fire hazards, but

there is no specific body that performs inspection of wildfire prone areas, such as recreation home areas or forest areas. The Fire Service, the municipal agency responsible for inspecting standards conformity for new properties/structures and lots, may submit comment regarding non-compliance (adequate access, water, sewer, etc.), but when it comes to wildfire risk, they ultimately do not have any legal enforcement capacity to reject development when wildfire risk/vulnerability is not mitigated. This largely has to do with the lack of wildfire being a classified hazard within relevant legal frameworks, hence compliance to mitigate wildfire risk cannot be compelled, only commented on. Furthermore, no law covers previously built-up areas, so reconstruction of access roads and water resources remains unresolved. These gaps in legislation highlight the need for more effective management of the WUI, including awareness-raising campaigns for home and landowners, potentially with the relevant support of associations, volunteers, and other groups.



Figure 6 - Top
Largest moss fire recorded in Iceland (250 ha), following an eruption at Litli-Hrútur, 2023

Source: World Bank Team.

Figure 7 - Bottom
Wooden cottages in Hallormsstaðaskógur national forest, east of Iceland

Source: World Bank Team.

KEY STAKEHOLDERS

Related to IWFRM, based on stakeholder mapping, the following organizations hold specific mandates/roles and are relevant to understanding and communicating wildfire risk:

- **The Ministry of Justice**, through the **DCPEM**, supervises the preparation of risk assessments conducted at the local level in consultation with the CPCs.
- **The Ministry of Infrastructure**, through the **municipalities**, conducts local risk assessments (Act no. 82/2008 art. 15 on Civil Protection) and uses risk information in spatial planning and permitting. Associations like the recreation homeowners also play a role. **The Ministry of Social Affairs and Housing** through the **HCA** sets standards for fire services, fire prevention, and management of the database “Brunagátt” on past fire events, including wildfires and local fire service capacities. **Municipal fire brigades** have a Fire Prevention Plan, reviewed every five years (Act no.75/2000 on Fire Prevention), which includes a risk assessment of fire hazards within their service area, including buildings and vegetated areas. They have access to the HCA “Brunagátt” database.
- **The Ministry of Environment, Energy, and Climate** is planning a national climate risk assessment and developing a risk atlas. **Land and Forest**, and relevant **associations**, conduct analyses and mapping of vegetation and landowners, that is, farmers and forests. The **NSII** keeps a registry of major wildfires and produces maps (including geological maps), conducts various research, and collects and makes available data, including data on habitat types.
- **Others, such as Landsnet (Ministry of Environment, Energy, and Climate) and electrical utilities (Ministry of EEC), and associations (different ministries)**, conduct their own analyses and mapping of vegetation and national parks.

REVIEW AND RECOMMENDATIONS

What Works Well

- **Data:** Several institutions have already collected or are collecting different types of data relevant to understanding and monitoring wildfire risk. The IMO holds a significant archive of weather data records for Iceland which could be cross-referenced with known wildfire outbreaks to better understand the relationship between weather conditions and wildfire risk. The IMO will also have information, through national-scale climate projections, on the changes in wildfire risk to be expected over the coming decades. Despite limitations in the legal framework noted in the previous chapter, the IMO has supported or conducted some analysis in collaboration with the University of Iceland. One or more suitable researchers should be resourced to carry out a full analysis of the IMO data in the context of wildfire risk. The NSII has already collected various data, including from past events, and plans to better analyze plant vegetation types (with satellite imagery). The HCA maintains a countrywide database ‘Brunagátt’ on all fire incidents, including past fire events, fire brigade response capacities (education, experience, equipment) for fires in buildings. The database is being updated to include other actions of the fire brigades such as wildfire response, open air fires, and other statutory tasks. Land and Forest maintains a database on forestry areas countrywide, but with no reference to wildfires. The Faculty for Environmental Studies at the University of Iceland is initiating data collection for mapping and fire modeling. The Ministry of Environment is preparing a Climate Atlas to highlight the main risks associated with the changing climate.
- **National and local risk analyses/assessments:** Wildfires are referenced in the NRA (2011)⁵⁴ led by the DCPEM, National Security Report (2022), the website of the Department of Civil Protection, and the Climate Action Plan (2020).⁵⁵ The Icelandic Government Report on Natural Hazards, a project led by the Ministry of Environment, Energy, and Climate (April 2023), also recognizes wildfires.⁵⁶ The project to update the NRA was launched in 2022, and it is expected that follow-

⁵⁴ Government of Iceland 2011.

⁵⁵ The Climate Action Plan includes actions for afforestation and revegetation. See Government of Iceland. 2020. Climate Action Plan. [Link](#).

⁵⁶ Government of Iceland 2023.

ing the passing of the renewed Civil Protection Act that will be proposed in the Parliament in 2025, the implementation of the project will speed up. The Ministry of Environment, Energy, and Climate is planning to conduct (from 2024/2025 onward) a climate risk assessment, which is expected to include wildfire risk. At the municipal level, understanding of risk varies significantly based on local experience. Municipalities that have previously experienced wildfires or manage areas with high concentrations of recreation homes recognize the importance of wildfire risks.

- **Risk awareness and communication:** There is inter-institutional communication on wildfire risk that typically peaks during the spring months, with HCA working group members, since 2018, participating in radio and television interviews and utilizing social media platforms to raise public awareness about wildfire risks, as well as giving talks in meetings of diverse associations. Since 2015, the IMO has been hosting daily coordination calls at 14:00 hours through an open Teams meeting, bringing together key response stakeholders, including Civil Protection, police, fire brigades, rescue forces, and media weather reporters. This platform serves as an effective operational risk communication channel, with regional stakeholders joining based on their information needs. While no formal protocol exists for fire danger communications, strong interagency collaboration ensures that increased Fire Danger Index (FDI) values are shared among stakeholders. Different associations, fire brigades, and fire prevention associations also use their social media channels to disseminate wildfire risk when relevant, that is, during dry spells in winter, summer, and spring.

Challenges

- **Data and system(s):** While some data exist, they are fragmented across multiple organizations and are not easily accessible for decision-makers. There is no risk information platform or system that consolidates and visualizes information. There is currently no wildfire database that spatial planners can use in the same way that a landslide registry exists. Funds and resources are not currently available to consolidate and build robust risk information datasets, analytics, and platforms/systems.
- **National and local risk assessments:** While wildfires are included in the 2011 national risk assessment, they are not considered a major risk, and there are still only limited risk analytics read-

ily available. There is no up-to-date quantitative wildfire risk assessment or risk analytics to inform spatial planning and response/contingency planning systematically. There is also no developed wildfire risk assessment methodology for Iceland, which links to the legislative situation of wildfires not being classified as a specific natural hazard. It is unclear which institution would undertake a full wildfire risk assessment as part of its mandate and funding. Per consultations, there are limited capacities at the national and local levels to conduct wildfire analytics. Additionally, there is a need to consider climate change projections and scenarios, which is not currently done with respect to wildfires. Funds and resources are currently not allocated to risk analytics (scenarios for high-risk areas, quantitative and qualitative assessments, and so on). For example, the IMO does not have the staff resources to devote to carrying out a full analysis of its own meteorological data in relation to wildfires.

- **Risk awareness and communication:** Current risk assessment activities primarily manifest through sporadic public communications from key stakeholders. The HCA, IMO, Forest Owners Association, and Land and Forest conduct periodic risk monitoring and issue public alerts based on actual fire weather conditions. An official FDI within the IMO early warning system is lacking. The IMO can give generalized information and advice concerning wildfire risk but at present cannot issue formal warnings as wildfires are not included within the official definition of its role in monitoring and warning against natural hazards.

Opportunities

- **Data, analysis, and information system:** There is a clear need to collect and consolidate existing data as well as access other available data to improve the overall understanding of the scale of wildfire risk. A detailed compilation of past wildfire events has not been evaluated against certain indicators such as corresponding weather conditions (though historical weather data exist). This would be an important first step in better understanding and predicting future conditions conducive to large wildfire occurrence / spread. Also, although the IMO does not monitor fire risks on a daily basis (Fire Weather Index [FWI] or FDI), it conducts limited experimental monitoring and evaluation of moisture levels, providing potentially additional valuable data for assessing wildfire risk. In the medium to long term, the goal should be to set up a comprehensive wildfire information system. There are openly accessible initiatives of the EU which may provide some

level of information, as well as private sector solutions that could be explored.⁵⁷ As an immediate opportunity, researchers could be resourced (within Iceland and beyond) to carry out a full analysis of data concerning elements of wildfire risk across the various institutions, including the IMO, INII, Land and Forest, and so on. Through collaborative efforts among stakeholders, building on this foundation could lead to the development of a comprehensive wildfire risk assessment system for the entire country as a medium- to long-term strategic goal. Related to this, exchange with other countries and peer-to-peer learning could also be helpful. For example, collaborating with the Irish and Scottish Fire Early Warning experts could provide added value. The experience of adapting the Canadian FWI system to Ireland/Scotland could be valuable to define the limitations of the Canadian FWI and define well-working indices, that is, the Fine Fuel Moisture Code (FFMC) with better accuracy for North-Atlantic conditions. The Netherlands is also investing heavily in related initiatives.

- **Risk assessments and scenarios:** While data are being collected and improved, there are opportunities to immediately improve the understanding of wildfire risk for known high-risk areas (or areas of critical interest) by conducting scenario analysis and tabletop exercises. In parallel, a methodology and eventually a full risk assessment should be developed and integrated into an updated national risk assessment. The next update of the NRA and the upcoming climate risk assessment are important opportunities to integrate information on wildfire risks, including climate change impacts/scenarios relevant for this risk. Existing wildfire risk assessments at the EU level could be relevant in terms of methodologies currently used.⁵⁸ Existing risk assessment tools for communities and WUI areas can be adapted to Iceland, namely tools like the 'Scorecard'.⁵⁹ An example of an FDI is in [Box 4](#).
- **Wildfire science:** Linked to the above, there is a need and a unique opportunity to provide for improved wildfire research and science. A discipline on wildfire ecology and management to study risks and fire effects at an academic level could make important contributions to IWFRM in Iceland. This initiative would naturally lead to the establishment of Icelandic 'Wildfire Science', creat-

ing a new discipline focused on fire ecology and management within Iceland's unique ecosystem. More broadly, research champions/networks and collaborations should be encouraged to consider a range of wildfire research topics, such as remote sensing, mapping, fuel maps, spread model validation, ground truthing, and validation between fire, volcano, hot springs, fire severity, and burned area mapping. Research should be closely linked to wildfire risk management practices and the relevant authorities—such as IMO, HCA, Land and Forest, or fire brigades. Iceland's robust research and development (R&D) sector capabilities make the development of a context-specific risk assessment methodology, or the adaptation of an existing framework, feasible. Such development would ensure a thorough understanding of fire effects and strengthen the country's ability to manage wildfire risk effectively.

- **Risk assessment in Icelandic forests:** Land and Forest is working on a project in connection with Forest Stewardship Council FSC. FSC deals with the proactive and reactive elements to wildfires / natural disturbances through varied IGI requirements (International Generic Indicators (IGI): The IGI (FSC-STD-60-004) are a set of indicators developed by the FSC to operationalize the Principles and Criteria at the national level. They provide a common starting point for the development or revision of National Forest Stewardship Standards) e.g, monitoring, FMP (forest management plans), contingency plans, risk assessments, H&S (health and security) documentation, etc. Land and Forest will be applying the ISO 31010 methodology to assess risk in forests in relation to Operation Note 40⁶⁰ by the Forestry Commission in England. The aim is to adapt the information to Haukadalsskógur and write a guidance for reducing wildfire hazard in Icelandic forests.
- **Risk awareness and communication:** The IMO could establish a standardized early warning system through an FDI with relatively modest investment. Furthermore, following the SFDRR's principle of 'understanding the risk', collaboration between R&D institutions, the Met Service, and Remote Sensing Fire Information Systems could result in the development of a comprehensive Wildfire Information System for Iceland. This presents a unique opportunity to collect and analyze data

⁵⁷ For example, OroraTech is a private wildfire information system which serves the EU and Copernicus.

⁵⁸ Oom et al. 2022.

⁵⁹ Arise-Us. 2023. Wildfire Resilience Scorecard. [Link](#).

⁶⁰ Assessment of potential wildfire risk resulting from planned deforestation to open habitat: operations note 40 - [GOV.UK](#).

from the very beginning of an emerging fire regime, something rarely possible in other contexts. (The chapter on prevention and preparedness also mentions wildfire awareness activities, including the FireSmart Program.) Furthermore, there is available good practices in risk awareness and communication which could be reviewed and elements adapted for Iceland's context.⁶¹

CONCLUSION

While the current level of understanding of wildfire risk is still relatively limited, several preconditions exist to strengthen this important aspect of IWFRM. Despite various limitations related to data, the legislative framework (see the previous chapter), and resources, several stakeholders have begun taking initial steps toward understanding and communicating wildfire risks. Initial data and analysis could be consolidated and leveraged for analytics and eventually for the development of a full wildfire

risk assessment and an integrated wildfire risk information system. However, to fully leverage this potential, the establishment of an enabling environment with clear mandates and dedicated operational resources is essential. Existing efforts require additional support in terms of personnel, resources, and dedicated time to reach their full potential. This transformation would allow Iceland to proactively address its emerging wildfire challenges while building on existing institutional strengths. The path forward requires starting with small, achievable steps that produce tangible outcomes, such as focusing on high-risk areas like recreation home communities and consolidating already available information.

Box 4. Example of an FDI

Source: Markos Gouvas, Nikolas Iliopoulos, A. Papadopoulos, and Dasiou Zisoula. 2022. The South African Lowveld Fire Danger Index (LFDI) and Its Applicability in Greece. [Link](#).

An opportunity to explore could be conducting a simple analysis of factors influencing fire behavior (wind, slope, exposition, fuel) and then combining it with exposure and vulnerability of values at risk. Local FDI can be calculated with simple tools like the guide of the Lowveld Fire Danger Index (LFDI).

The collage contains several key elements:

- Sign:** A yellow sign with black text that reads "DON'T START FIRES YOU CAN'T STOP. BE FIREWISE." with a red fire icon.
- FDI Alignment Chart:** A graph showing the relationship between DRYBURN °C (y-axis, 0-35) and RELATIVE HUMIDITY % (x-axis, 0-100). It includes instructions for measuring wind speed and direction.
- National Fire Danger Rating System Chart:** A table with five columns representing danger ratings: Indiguitant (Blue), Low (Green), Moderate (Yellow), High (Orange), and Extreme (Red). Each column lists specific fire prevention measures, relationships with disaster management, fire behavior characteristics, and fire suppression difficulties.

⁶¹ Plana, E., Serra, M., Nebot, S., Smeenk, A., Macri, P., Vendrell, J., Pronto, L., Canaletta, G., Gomes, J., Alfonso, L. 2024. Wildfire risk awareness and communication: Analysis of good practices. Union Civil Protection Knowledge Network. [Link](#).

Table 3. Understanding wildfire risk - roadmap recommendations

<p>IMMEDIATE/SHORT TERM</p> <p>Collect and consolidate existing fragmented wildfire data (including fire history-coupled meteorological data) to create an initial 'understanding of the problem' and a baseline for further efforts; engage universities, key institutions, and external experience in doing so.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Conduct scenarios and hold tabletop exercises prioritizing known high-risk areas/ recreation home communities.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>(Preparedness) Implement an FDI system under the IMO.</p>
<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Develop an Iceland-specific wildfire risk assessment methodology or adapt existing frameworks</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Develop a concept for a comprehensive wildfire risk information platform/system, in coordination with relevant stakeholders, including local research institutions.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Increase the technical capacity of local institutions, for example, create research programs focused on fire ecology and management or develop wildfire science as a distinct academic discipline in Iceland.</p>
<p>MEDIUM TO LONG TERM</p> <p>Conduct a comprehensive nationwide wildfire risk assessment, in consultation with relevant stakeholders, linked to data collection and a comprehensive wildfire information system, and ensure integration of key information in the national risk assessment/ climate risk assessment.</p>	<p>MEDIUM TO LONG TERM</p> <p>Develop a wildfire information system through collaboration between research institutions, the IMO, and using various sources of available information, including remote sensing fire information systems, and establish Icelandic 'wildfire science' (that is, excellence on wildfire topics) focusing on fire ecology and management and invest in building capacity for studying local fire effects and behavior in Iceland's unique ecosystem.</p>	<p>MEDIUM TO LONG TERM</p> <p>Regularly update wildfire risk assessments, drawing on new data, and integrate them into new national risk assessments/climate assessments.</p>

WILDFIRE RISK MANAGEMENT planning examines planning roles and processes for wildfire risk management at the national and subnational levels. It analyzes stakeholder roles and engagement, methods for identifying and prioritizing risk management measures, M&E systems, and alignment with related planning frameworks (policy coherence) in line with the overall framework.

IWFRM planning refers to an evidence-based approach drawing on risk information and coordinated stakeholder engagement, which can identify and prioritize specific actions and investments across the whole IWFRM cycle. IWFRM planning should be compatible with relevant processes and IWFRM capacity development should be integrated across the national and subnational levels. The prioritized/planned actions and investments should also be monitored and evaluated. Key benefits of IWFRM planning include (a) mitigating identified wildfire risks and hazards to improve the overall resilience of landscapes and populations against wildfires and (b) identifying the measures needed to close the gaps between the current standards expressed in fire protection plans and the identified risks. Wildfire risk management planning leads to increased preparedness and improved response in case of wildfire events.

PLANNING FRAMEWORK

Related to broad planning frameworks, Iceland, along with other UN member states, has adopted the 17 Sustainable Development Goals (SDGs), as well as the SFDRR. Statistics Iceland keeps track of the results.⁶² The National Development Plan on Sustainable Development,⁶³ adopted in June 2024, and the National Land Development Plan 2024–2038,⁶⁴ approved in 2024, refer to the SDGs. The National Land Development Plan Part B.6 emphasizes the necessity of preventive measures for the safety of the public against natural hazards, especially due to increased volcanic hazards and climate change. It mentions preventive measures to be taken in planning suburban recreation homes and forestry areas regarding fire prevention (para 2 and 4). The planning shall refer to the latest information on natural

hazards, paragraph 5. It also refers to planning regulation (Act no. 90/2013) rules regarding the safety requirements and restrictions on land use due to natural hazards and the continual change due to settlement patterns and land use, tourism, and the knowledge of the influence of climate change on natural hazards and their frequency. Iceland has in place a Climate Action Plan enacted in 2020.⁶⁵

Spatial planning: The Ministry of Social Affairs and Housing oversees the spatial planning system in Iceland and develops the National Planning Strategy.⁶⁶ Svæðisskipulag is a regional plan for two or more municipalities on common interests and regional priorities. Aðalskipulag is a municipal plan that covers all of a municipality's land, setting out the local government's policy and decisions regarding the future use of land and the layout of the settlement. The policy set out in each municipal plan is further elaborated in deiliskipulag which is a local plan forming a coherent unit, such as a neighborhood, part of a neighborhood, street, or cluster of houses. It sets out provisions on building permits, the design of buildings, and the landscaping of the environment. The fifteen-year National Planning Strategy (see above) provides guidelines for the planning authorities at the municipal level. For instance, there is a regional plan for the capital region, municipal plans for all the seven municipalities in the area and then there are local plans that can vary greatly in scope and content. Among the roles of the National Planning Agency (Skipulagsstofnun) is to review and validate regional and municipal plans. The agency also reviews local plans, but it is the local authorities that are responsible for validating them. For different plans the municipalities request consultation from relevant public bodies, among those, the fire departments in each area. The Ministry of Environment, Energy, and Climate formulates and enforces the Ice-

⁶² Statistics Iceland. Iceland Data for the Sustainable Development Goals. [Link](#).

⁶³ Government of Iceland. 2024. Stefna Íslands um sjálfbæra þróun til 2030 (Iceland's strategy for sustainable development until 2030). [Link](#).

⁶⁴ Althingi. 2024. Tillaga til þingsályktunar um landsskipulagsstefnu fyrir árin 2024–2038 ásamt fimm ára aðgerðaáætlun fyrir árin 2024–2028 (Proposal for a parliamentary resolution on the National Planning Strategy for the years 2024–2038, together with a five-year action plan for the years 2024–2028). [Link](#).

⁶⁵ Government of Iceland. 2020. Climate Action Plan (EN). [Link](#).

⁶⁶ Described in [Link](#).

landic government policy for environmental affairs.

Response planning: According to the law on Civil Protection no. 82/2008, the National Commissioner of the Icelandic Police participates in preparing and writing response plans for the state and the municipalities, as well as supervising revisions and coordinating the plans created by the respective parties. The National Commissioner also oversees the creation of private parties' disaster response plans. The DCPEM acts on behalf of the National Commissioner as a plan coordinator. The decision on the creation of response plans follows a risk assessment done by the respective authorities in cooperation with the DCPEM. More information on emergency preparedness planning is included in the relevant chapters of this report.

KEY STAKEHOLDERS

Related to IWFRM, based on stakeholder mapping, the following organizations hold specific mandates/roles and are relevant to wildfire risk management planning:

- **The Ministry of Infrastructure** and its subordinate authorities/agencies, including municipalities, and fire brigades.
- **The Ministry of Social Affairs and Housing**, including the subordinate HCA and planning agencies.
- **The Ministry of Environment, Energy, and Climate** and its subordinate authorities/agencies, including the Environmental and Energy Agency, Land and Forest, Forest Owners Association as well as utilities, including Landsnet.
- **The Ministry of Justice** through the NCIP and the DCPEM.
- **The Ministry of Culture, Innovation and Higher Education** through departments of Planning and Design, Environmental and Forest Sciences, and Agricultural Sciences at the Agricultural University of Iceland.

⁶⁷ Brunabot. Latest News. [Link](#).

⁶⁸ Brunabot. 2023. Aðildarsveitarfélög EBÍ 2023 og hlutdeild í Sameignarsjóði EBÍ (Member Municipalities of EBI 2023 and Share in EBI's Common Fund). [Link](#).

⁶⁹ Government of Iceland 2020; [Link](#).

REVIEW AND RECOMMENDATIONS

What Works Well

- **Risk information and planning:** New development and spatial plans must consider evacuation routes and access to water in line with relevant regulations and HCA guidelines (see [Annex 1](#)). The Land and Forest agency has a database of forestry areas in Iceland showing the density of natural birch forests and cultivated forests countrywide. As part of its mandate, the HCA maintains a database 'Brunagátt' which includes collected and analyzed data on fire brigades' response capacities for fires in buildings. This gives an overview of the age and status of the fire equipment, staffing levels, and training followed by the personnel, which supports long-term planning for the development of the fire service itself. There are plans for 2025 to extend the database to wildfire response capacity and other activities of the fire brigades. The HCA also leads a working group on wildfires, as mentioned before. The Recreation Homeowners Association, the Association of Fire Chiefs, and the Forest Owners Association, with their respective activities, are advocating for a more organized approach to wildfire planning.
- **Financial resources:** The Brunabót was initially established in the 1950s to insure residential properties outside of Reykjavík against fire; in 1994, it was changed to a Holding Company Brunabótafélag Íslands.⁶⁷ The company's compensation funds have been invested, among other things, in the development of fire protection and water supply projects. Yearly, Brunabót distributes grants to the municipalities for different projects.⁶⁸
- **CCA:** Policies on CCA are guided by the Climate Action Plan from 2020.⁶⁹ The Ministry of Environment, Energy and Climate is preparing a new Climate Action Plan, which is expected to include wildfire risk.

Challenges

- **Risk information and spatial planning:** Currently, the planning system emphasizes volcanic activity, fissures, earthquakes, avalanches, and landslides; wildfires are seen as a low priority and

an issue in only three or four municipalities. There is no overarching IWFRM action plan (see the chapter on governance) with priorities identified across the IWFRM elements or specific areas, in line with risks identified and current capacities. The lack of a database for wildfires (similar to the avalanche database) or consolidated wildfire risk information (a full wildfire risk assessment or high-risk maps and so on) prevents spatial planners in municipalities, as well as the HCA and planning agencies, from consistently checking for wildfire risk in the plans. Municipalities and fire brigades also lack such information for preparedness and response planning. For example, the analysis of recent wildfires, patterns, trends, fire weather, and scenario playing would all be required to feed a wildfire risk assessment and planning capacity. Currently, no agency takes leadership for coordination on IWFRM planning. It is also noted that while new buildings/developments must have access to water, the level of water provision (comparative scale) may currently not be well-described in the regulation and therefore potentially unreliable in the event of a fire.

- **Planning resources:** The HCA working group has not been formally active in recent years, does not regularly report to the highest levels, and does not publish reports on a regular basis. Still the group's projects have made some progress through the work of individual members and their institutions, i.e., fire brigade equipment, IMO research. Fire Chiefs and fire services/brigades are key players in risk management planning, but many are part-time and do not have the capacity or resources to focus on wildfire risk planning for prevention and preparedness. Fire services/brigades are funded through municipalities and must compete for resources with schools and other essential public services. Municipalities too are lacking funding. Although there is Brunabót, its activities seem limited with respect to wildfires. Without a specific/formally acknowledged role within the governance framework with respect to wildfire, the Forest Owners Association, forestry associations, and associations that manage large outdoor areas, such as labor organizations with recreation home areas, face challenges in effectively planning for wildfire risks, necessitating the development of a more structured approach that includes preventive measures and coordinated response actions.
- **CCA:** Currently, wildfire risk is not integrated into climate change adaptation/mitigation planning in a systematic way – e.g., that it would be automatically considered as for other climate-related hazards.

Opportunities

- **Risk information and spatial planning:** Building on improving understanding of risks, the focus should be on enabling risk information/systems to be accessible and usable by national and local authorities so that they can integrate them as part of spatial/development planning and/or quality review processes. Risk data/information/systems need to be accompanied by relevant training to ensure the use and application of system-relevant information and capacities. An overarching IWFRM action plan should also build on the risk information and identify priorities (for example, for the next five years) across the IWFRM elements and/or specific areas, in line with risks identified and current capacities.
- **Planning resources:** Based on risk data, analytics, scenarios, and/or risk assessments, ensure the allocation of human, financial, and other resources at the appropriate levels (such as fire chief brigades' staffing, municipalities' budget, or HCA). The HCA working group on wildfires could be activated and formalized with specific responsibilities, including planning. An adjusted purpose and use of the <https://brunabot.is/> for IWFRM activities could also help investments, especially at the municipal level. Further financial incentives can be developed, considering good practices from other countries, to promote better planning. The Faculties of Planning and Design, Environmental and Forest Sciences, and Agricultural Sciences at the Agricultural University of Iceland could introduce wildfire topics into their education, which could help raise the awareness of wildfire risk among the planning community and bring long-term benefits in reducing the incidence and impact of wildfires in Iceland, as well as introducing the topic specifically to municipality planners already in office. The university would need a fire-allocated budget and resources to fully service the gaps in fire knowledge in Iceland. The roles of other stakeholders in terms of 'collecting fire-related knowledge'—such as the Forest Owners Association—could be better clarified to facilitate their improved contribution to the planning phase.
- **CCA:** In the short term, in the absence of a fully developed IWFRM strategy or plan, integrating wildfire considerations into CCA planning could provide an immediate framework for action. The upcoming CCA Plan provides opportunities to integrate wildfire risk into CCA planning and investments, so that actions can be taken up by relevant stakeholders.

CONCLUSIONS

IWFRM planning in Iceland can be significantly improved through systematic integration of risk information and identification of relevant priorities and activities across the spectrum of stakeholders. This requires leveraging existing initiatives while addressing current resource/capacity limitations and strengthening coordination among the stakeholders.

Table 4. Wildfire risk management planning - roadmap recommendations

<p>IMMEDIATE/SHORT TERM</p> <p>Review the existing budget line (https://brunabot.is/) or the Avalanche Programme to identify opportunities to use either or both for improved planning and investments in IWFRM, or identify other dedicated resources for wildfire planning.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>(Governance) Ensure wildfire risk information is available to be included in spatial planning, provide training/ learning on available information through higher education i.e., the Agricultural University.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Integrate wildfire considerations into existing CCA planning frameworks, such as national/local action plans, etc.</p>
<p>IMMEDIATE/SHORT TERM</p> <p>(Governance) Develop a roadmap (e.g., for the next 3-5 years), with funds dedicated to implementation and M&E.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>(Governance) Strengthen and build on existing (planning) coordination mechanisms between stakeholders, e.g., the HCA working group on wildfires.</p>	<p>MEDIUM TO LONG TERM</p> <p>Research and develop WUI regulations and guidance</p>
<p>MEDIUM TO LONG TERM</p> <p>Continue updating access and accessibility of risk information for decision-making, to improve wildfire risk management planning.</p>	<p>MEDIUM TO LONG TERM</p> <p>Continue to ensure sufficient resources for wildfire risk planning activities and information dissemination across the different stakeholders and coordination mechanisms.</p>	

WILDFIRE PREVENTION CONCERNS preventive measures designed to reduce wildfire risks and mitigate the negative consequences for people, the environment, property, and cultural heritage. It analyzes the framework for implementing preventive measures, including landscape management practices, fire use regulations, guidelines and enforcement, innovation and knowledge services, and risk communication strategies, in line with the overarching framework and capacities.

PREVENTION IN IWFRM

Prevention, which encompasses a range of activities geared to reducing risk and mitigating the negative impacts of disasters, is critical for a proactive approach. Related to the landscape, it does not mean that prevention of wildfires will eliminate all fires in the landscape. It focuses on minimizing the negative effects of unwanted fires, increasing fire management efficiency, and firefighter and community safety. Prevention also extends to the built environment, particularly the WUI, and, in the context of Iceland, also to tourism/recreation housing areas. Given the cross-cutting nature of prevention and the fact that a range of stakeholders across different administrative levels/sectors (public/private) contribute, it can be challenging to plan, implement, and track changes.

Landscape management, particularly vegetation control, stands as the cornerstone of fire prevention for mitigating uncontrolled wildfires. Under suitable weather conditions, vegetation becomes potential wildfire fuel, with its fire behavior determined by specific characteristics including quantity, type, structure, continuity, and moisture content. Iceland's historical landscape was naturally managed by approximately 2 million grazing sheep.⁷⁰ The significant reduction in sheep farming over the years has led to an increase in unmanaged vegetation, creating potential fuel for fires. This shift coincides with other significant changes: expanding birch bushland, increased afforestation efforts, and the growth of WUI areas where recreation homes are surrounded by combustible vegetation. When combined with climate change-induced weather extremes, particularly dry spells, these factors create conditions increasingly conducive to fire spread. While human intervention cannot significantly influence weather patterns or topography, vegetation management remains a critical tool for fire prevention, managing risk, and reducing vulnerability.

Related to the built environment, zoning laws and the planning system are key elements in the prevention and mitigation of wildfire risk. As noted in the previous chapter on planning, Iceland has comprehensive spatial planning in place. There is a system of spatial planning that determines whether a new building will be allowed and a separate system of building regulations to oversee the proper construction and use of materials. The latter is supported by building inspectors and has been in operation since 1998. All new building regulations are compliant with Eurocodes. Given the exposure to different hazards (including strong winds and extreme winter events), buildings have usually been built above the mandated standards (that is, to be able to sustain heavy snow loads and so on).

As an example of an existing prevention program related to a natural hazard, the avalanche and landslide (ofanflóð) program has been available since 1997 with Act no. 49/1997 on protective measures against avalanches and landslides. It is available for funding protective measures against these hazards following the proposal of the respective committee. With respect to volcano outbreaks/lava flows in the Reykjanes Peninsula, a special Act no. 84/2023 on the protection of critical infrastructure in Reykjanes was established for funding and implementation of actions. The act makes the National Commissioner of Police responsible for implementing actions, including the construction of defense walls to divert lava flows from roads and other key infrastructure.

⁷⁰ The Statistics Iceland gives about half a million and getting less in recent years. In 2023 it was only 355,000.

KEY STAKEHOLDERS

Related to IWFRM, based on stakeholder mapping, the following organizations hold specific mandates/roles and are relevant to wildfire prevention.

- **Ministry of Environment, Energy and Climate Change; the Environmental Agency** oversees land management practices and can issue instructions (such as for national parks); **Land and Forests** (Skógræktin / Land og skogur), **NSII**.
- **Ministry of Infrastructure** through the **Municipalities and the Icelandic Road and Coastal Administration (IRCA)**.
- **Ministry of Social Affairs and Housing** through the **HCA and planning agencies**.
- **Ministry of Industries** through tourism and agriculture.
- **Ministry of Justice** through the **DCPEM and ICE-SAR**. ICE-SAR, for example, conducts public awareness campaigns on safety and security for both locals and tourists.
- **Property owners:** Compliance with regulations around (structural) fire safety is the responsibility of the property owners.
- **Research stakeholders, associations, and civil groups** (farming, forestry, nature conservation, tourism, Recreation Homeowners Association, and so on), **and broader society**.

REVIEW AND RECOMMENDATIONS

What Works Well

- **Guidance/materials:** Several stakeholders have been sharing information on wildfire prevention. The Icelandic Forest Service (now Land and Forest) has issued some guidance on forestry with respect to wildfires.⁷¹ This includes guidelines for access roads, fire breaks, multi-species afforestation, and water extraction points. The HCA has issued guidance on wildfire response and preparedness and manages the website www.gro-

dureldar.is which provides a wide range of information about wildfires, prevention, and response.⁷² The Ministry of Environment's CCA Plan acknowledges fire as a climate-driven risk and outlines preventive measures. The Forest Owners Association produces information material regarding afforestation, publishing regularly twice a year.

- **Awareness:** The Association of Recreation Homeowners has been quite active over the past seven years in addressing the topic of wildfire protection of their members' properties through their annual meetings and publications.⁷³ These publications regularly include the guidance developed by the association with instructions on what needs to be done to prevent and respond to a fire. Groups like ICE-SAR also conduct public awareness campaigns, using various communication tools like the 'Safe Travel'⁷⁴ application for tourists and foreigners (developed with the Icelandic Tourist Board) and other tools to reach the local population. The Icelandic Touring Association also raises awareness among local and foreign tourists. The Southland College (see also the chapter on governance) provides courses on wildfire awareness, prevention, and response for the public and for organizations in cooperation with members of the HCA working group.
- **Projects/investments:** As noted in the chapter on planning, spatial plans for new development consider wildfire risk aspects, such as evacuation routes and access to water. Several pilot activities conducted at local levels consider wildfire risk (supported by the Ministry of Environment, Energy and Climate Change). The Environment Agency, and the Land and Forest Authority, have begun implementing NBS for climate adaptation. The Icelandic Touring Association, for example, coordinates with the respective Forest services—they cut the trees and clear land, relying on guidance from the forest services.

Challenges

- **Framework:** While prevention elements exist within various regulations, the formal legislative framework governing prevention activities could be strengthened. For example, there is little mention of wildfire in the current forest regulation.

⁷¹ FRÆÐSLUEFNI UM SKÓGRÆKT (Educational Materials on Forestry). [Link](#).

⁷² Grodulerdar. "Mikil hættu er á gróðureldum á Íslandi" (There is a high risk of wildfires in Iceland). [Link](#).

⁷³ The association issues a booklet every year with simple recommendations regarding preparedness and response.

⁷⁴ Safetravel is a website, app, and notification board run by the ICE-SAR. Giving out regular warnings to travelers on natural hazards and road conditions. Subscription to an e-mail alert is possible.

The Act no. 33/2019 on Forests and Forestry, in Art. 4, mentions fire prevention and safety regarding the contents of the national plan for land reclamation and forestry; the same clause is included in Act no. 155/2018 on Land reclamation. However, there is no mention of wildfires or fire prevention in the regulation on forestry. Fire prevention responsibility lies with landowners and managers rather than response agencies, given the nature of forest fire management. However, the current frameworks lack clear specifications about fire prevention measures, including the essential details of why, how, what, and where prevention activities should occur. This gap is also evidenced by the absence of well-defined prevention protocols in both governance and legal frameworks. Without clear legislative mandates, ownership and coordination of fire prevention activities remain undefined among stakeholders. This lack of formal designation also means no dedicated budget exists to support the implementation of prevention initiatives. While there are several initiatives, these are not necessarily coordinated or conducted as part of an overarching strategy or plan under a framework of similar principles and/or working toward the same overarching goals. There is no specific prioritization among activities conducted. At the property owners' level, compliance with regulations on fire safety is the responsibility of property owners, but gaps in compliance are common. A gap in the framework is also related to WUI, as noted in other parts of this report.

- Landscape management and the built environment:** The absence of wildfires in the natural hazard classification has also impeded the development of coordinated landscape management measures. While NBS exist for various purposes, none specifically target fire risk reduction. This gap extends to innovation and knowledge development in fire prevention. Regarding the use of fire as a tool for risk reduction/prevention, while there is a regulation on fire management and protection against wildfires, Act no. 325/2016 regulating the use of fire for farmers to light grass fires (*sinubrenna*), it is not much used in practice (permits are not granted on a regular basis). There are also no training programs or guidelines for land managers who would like to use managed fire on their lands. Related to the built environment, while new buildings are built in line with modern codes/spatial plans, and even older buildings are expected to have been built beyond the code of their construction, older buildings may have considerable vulnerability to wildfires, especially those that were constructed for leisure activities (recreation homes) but are now being

used year-round by their owners or for tourism. A special challenge is the updating of wildfire prevention for older forestry and recreation home areas with respect to access and escape routes, vegetation management, and water resources. Since the fulfillment of new regulations is not mandatory for those older-established areas, a multisectoral approach with the participation of all stakeholders is necessary.

- Awareness and research:** Public awareness of wildfire risk more broadly and prevention opportunities more specifically remains limited, despite various efforts noted above, particularly among those unfamiliar with Iceland's changing climate and rural environment. This knowledge gap reflects the historical absence of significant wildfire threats, creating challenges for implementing comprehensive prevention strategies. As noted in the chapter on governance and understanding risk, there are gaps in research related to prevention. For example, wildfire risk is not covered in the curriculum of the Agricultural University of Iceland. While there are compulsory topics in the curriculum on Preparedness for Emergencies, this does not yet include wildfire risk.

Opportunities

- Framework:** There is an opportunity to strengthen systematic/programmatic investment in wildfire prevention across different sectors/stakeholders, which can be linked by having a dedicated IWFRM strategy and action plan (see the chapters on governance and planning), as well as dedicated funding mechanisms. There are gaps to be filled in related guidelines for forest farmers, forest owners as well as WUI areas (see examples in [Box 6](#)). It is also important to not criminalize the planned use of managed fire but to engage with that traditional knowledge as one tool in the toolbox to learn 'living with fire'. Leadership, guidance, and capacity building for good practice for fire use can be a task for the recommended FPAs (see [Box 2](#)). Responsibilities need to be understood at the various levels—local level (forest), county/municipality or forest enterprise level (organization), and national level (enabling environment). Analysis of the hazards (e.g., most flammable vegetation types) as well as values at risk with their exposure and vulnerability, combined with the enabling policy and governance framework, addressed on those levels and relevant decision-making powers, would better support smaller steps in implementing prevention

measures.⁷⁵ Meanwhile, integration of wildfire prevention activities into the CCA Plan would also help provide a solid framework and mandate for action. More systematic collaboration among stakeholders could further foster scaling-up of preventive actions.

- **Investments and activities:** Some funding mechanisms could be adjusted (for example, incentivizing farmers to engage in preventive measures) or new ones created (like the avalanche program). The successful avalanche program could potentially serve as an immediate model for implementing fire prevention strategies. There are also opportunities to build on/scale up existing pilot wildfire prevention activities conducted at the local levels. Connected to this should be support for research as noted above with potential focus areas listed in [Box 5](#). For updating wildfire prevention in older areas, a pilot initiative could be started by the respective municipalities to summon the stakeholders of defined areas and discuss improvements. Since some of the improvements may prove costly, financing could possibly be met by contributions from a common wildfire fund. Additionally, relevant funding opportunities offered through the EU should be explored, particularly those supporting country-to-country exchanges (e.g., collaborating with other Nordic countries).
- **Innovative approaches:** Innovative approaches could be further fostered and piloted and/or scaled up to improve both landscape management and wildfire prevention/risk reduction, including focusing on NBS to manage fuel (load, type, density, structure, and so on): re-wetting, close-to-nature forestry, and regenerative agriculture/farming (restoration of wetland, slow water flow, increase water storage capacity), under the leadership of the Ministry of the Environment, in coordination with others, including universities/researchers. There is room for improvement and upscaling to plan for targeted grazing regimes,⁷⁶ continuous cover forestry,⁷⁷ and agroforestry⁷⁸ schemes to break up fuel continuity and modify fuel load, types, and structure as well as fuel characteristics like moisture content. Experience and innovative ideas like from the Forest Farmers Association should be explored, such

as the idea to increase tree planting efforts up to the 400m ASL mark to increase the potential of groundwater and nutrient retention and to combat water run-off and eventually better support agricultural and silvopastoral activities. Furthermore, this kind of “clean slate” forestry is an opportunity to plan carefully against future fire risk (e.g., planting larch, especially in more gravelly areas, to buffer pine /spruce plantations). Detailed planning and implementation of fire-related NBS could be a task for the recommended expanded FPAs. While not primarily focused on fire prevention, initiatives like wetland restoration through re-wetting measures provide ancillary benefits for fire prevention by increasing soil and fuel moisture content. Modern forestry guidelines incorporate fire prevention considerations, including mixed-species approaches, more general use of broadleaf species, and provisions for access, water sources, and firebreaks. Pilot activities could include a prescribed/controlled program pilot to reestablish a culture of working with managed fire where it is reasonable, restoring land, reducing fuel, and training with live fire.

- **Risk awareness and communication:** In the immediate/short term, there is an opportunity to develop a comprehensive risk awareness and communication strategy with different planned activities, target groups, and funding sources, to guide the implementation of various initiatives including, for example, (a) a general wildfire awareness campaign; (b) adaptation, for example, of the FireSmart Canada campaign for Iceland, leveraging and consolidating existing initiatives that exist in Iceland; (c) development of controlled burning programs for training and fuel management; and (d) creation of fire-specific and multifunctional NBS. The website www.groddureldar.is offers a wide range of information about wildfire risk, prevention, and response, which could be further developed; similarly, communications materials already developed, or outreach conducted by various stakeholders could be enhanced. Promotion and support for public information, such as the courses for the public and associations offered by the Southland College and others, are also important. These opportunities emphasize both immediate actions and long-term strategic development, leveraging existing

⁷⁵ Plana Bach, Eduard, Marta Serra Davos, et al. 2021. Climate Change Impacts on Natural Hazards Risk Management and Civil Protection of Wildfires, Floods, Storms, Avalanches, Rockfalls and Landslides. [Link](#).

⁷⁶ Ramatsdefoc. “What characteristics must pastures have to qualify for prescribed silvopasture certification?” [Link](#).

⁷⁷ Rautio, Pasi, et al. (eds). 2025. Continuous Cover Forestry in Boreal Nordic Countries. [Link](#).

⁷⁸ EFI. 2020. Agroforestry as a sustainable land use option to reduce wildfires risk in European Mediterranean areas.

[Link](#).

institutional capabilities while building new competencies in wildfire prevention. In parallel, wildfires could be included in the Preparedness for Emergencies curriculum, as well as in the curriculum of universities. Building Inspectors hold a forum twice per year—this may provide an opportunity to consider wildfire risk in the context of building codes. National Parks could also conduct wildfire awareness campaigns, following guidance by the Environment and Energy Agency.

CONCLUSION

Stakeholders demonstrate a strong awareness and interest in wildfire prevention, possessing both technical capabilities and access to international good practices. While the potential exists to develop comprehensive prevention methodologies, implementation requires an enabling environment with clear mandates and dedicated resources to fully leverage existing capabilities and expertise. Human-caused ignitions represent the primary source of wildfires in Iceland, excluding those caused by lava. While complete prevention of human-caused fires is unrealistic, reducing ignitions remains crucial. A greater focus on vegetation control and awareness can help reduce wildfire risk in Iceland's evolving landscape.

Wildfire prevention is multifaceted, cross-sectoral, and multidisciplinary. Various and often diverse stakeholders have to subscribe to a commonly agreed vision and mission to align their respective prevention approaches to create synergies and avoid conflicts or duplication. In addition, localized prevention needs to be embedded in a wider context considering regional aspects, and support for smaller landowners is needed in terms of guidance and resources. A practical approach of aligning the various stakeholders and activities, streamlining efforts, and ensuring respect for the wider context, aligning prevention with preparedness and response as well as recovery, is the use of FPAs, as noted above and in the chapter on governance, composed of various stakeholders within a region, including landowners.

Box 5. Examples for research linked to wildfire prevention

R&D opportunities are substantial, supported by high stakeholder awareness and interest. Priority areas include the following:

- Development of NBS, for instance,
 - Re-wetting of historically drained landscapes to increase moisture content in soil and vegetation;
 - Adoption and adaptation of Pro Silva Europa⁷⁹ principles for close-to-nature forestry, to increase forest resilience; and
 - Targeted grazing programs to protect high value areas through fuel load reduction.
- Prescribed burning protocols for fuel reduction.
- Use of Pro Silva Europa principles for new afforestation and forest stand management for increased resilience.
- Creation of a comprehensive wildfire information system incorporating:
 - FWI and early warning
 - Early detection and fire monitoring systems
 - Risk assessment frameworks
 - Weather, vegetation, and terrain analysis
 - Burn area mapping and spread modeling
 - Statistical pattern analysis.

⁷⁹ Pro Silva. [Link](#).

Box 6. Examples of good examples of building code regulations

Portugal has building codes and standards to strengthen building assets in wildfire-prone areas. This includes the requirement of non-flammable building materials for new and existing buildings and the creation of defensive measures such as fire barriers and building maintenance.⁸⁰ There is also a specific requirement for rural settlements within 50 meters of forested lands to have buffer zones around built assets. Existing buildings in exposed WUI areas must be integrated into fuel management programs and new construction should be constrained to areas with less fire risk. However, despite existing regulations, enforcement is hindered by the socioeconomic context and land ownership structures in the country.⁸¹

Greece provides minimum standards for retrofitting housing and other built assets and these are mandatory for properties located within 300 meters of forested areas, woodlands, and grasslands as well as for properties in urban and suburban green areas.⁸² Notably for the WUI, Greece has required structural protection measures and establishes a mandatory three-tier fire protection zone around houses and regulates the use of different types of vegetation around properties as well as prohibits the storage of flammable materials in the vicinity of the property (Figure 8).

California Department of Forestry and Fire Prevention: provides the following information on defensible areas⁸³: Zone 0 ember Resistant Zone: 0-5 ft from the house, intense fuel reduction. gravel, pavement, clear weeds, grass, debris, minimize combustibile items, no fire wood (basically no vegetation); Zone 1 Lean, Clean and Green: 5-30 ft; clear dead plants, weeds, grass, no wood piles, prune flammable plants; and Zone 2 Reduce Fuel Zone: 30-100 ft, trim grass, space out shrubs and trees, wood piles at least 10ft clear from surroundings, also tanks 10 ft away;

⁸⁰ OECD. 2023. Taming Wildfires in the Context of Climate Change: The Case of Portugal. [Link](#).

⁸¹ Canadas, M. J., M. Leal, F. Soares, A. Novais, P. F. Ribeiro, L. Schmidt, A. Delicado, F. Moreira, R. Bergonse, S. Oliveira, and P. M. Madeira. 2023. "Wildfire Mitigation and Adaptation: Two Locally Independent Actions Supported by Different Policy Domains." Land Use Policy 124: 106444. [Link](#).

⁸² OECD. 2024. Taming Wildfires in the Context of Climate Change: The Case of Greece. [Link](#).

⁸³ California Department of Forestry and Fire Prevention. Defensible Space. Website. [Link](#).

Figure 8
Three-tier buffer zone requirements around residential properties

Source: Adapted from Hellenic Republic. 2019. Regulation 55904/2019. Cited in OECD 2024.

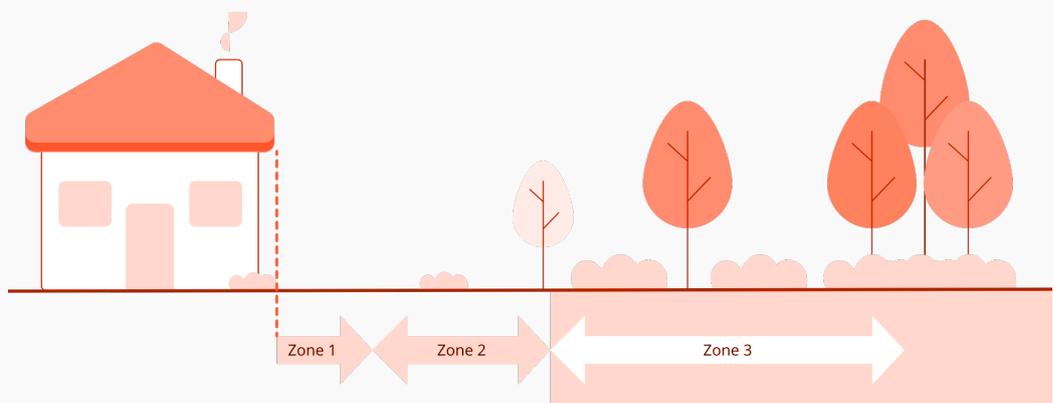


Table 5. Wildfire risk management prevention - roadmap recommendations

<p>IMMEDIATE/SHORT TERM</p> <p>(Governance) Improve clarity on institutional responsibilities on prevention (including risk awareness & communication) and coordination mechanisms.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>(Planning) Review existing funds / programs, such as the avalanche program or farmer programs, to identify opportunities for scaling up support for wildfire prevention</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Adapt landscape management, land use planning, and CCA actions to reflect wildfire risk information and management tools, such as firebreaks, clearing, wetland recreations, re-wetting of agricultural drained landscapes, NBS and other innovative approaches such as grazing regimes to reduce fuel load, prescribed burning, WUI topics like evacuation routes, water access, etc.</p>
<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Pilot and scale up preventive measures through a range of activities led by different entities, including bottom-up approaches, and focusing on various areas, including of older forest and recreation home areas.</p>	<p>MEDIUM TO LONG TERM</p> <p>Adopt a strategic/planned approach to wildfire prevention with a coordinated range of activities and dedicated funds.</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Research nature-based and innovative solutions, for example, pilot projects on 'FireSmart' prevention measures with associations (e.g., the Recreation Homeowners Association) and research stakeholders, promoting research in these areas.</p>
<p>IMMEDIATE/SHORT TERM</p> <p>Develop an overarching awareness and communications strategy/plan</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>In line with the overarching strategy, pursue activities for target groups with the help of different stakeholders and tools. Activities may include a wildfire awareness communication campaign, FireSmart Communities program, awareness courses for the public and associations as well as checklists for forest owners with regard to wildfire prevention.</p>	<p>MEDIUM TO LONG TERM</p> <p>Review and share lessons learned on prevention among responsible and affected stakeholders.</p>

WILDFIRE PREPAREDNESS

WILDFIRE PREPAREDNESS EXAMINES preparedness measures for establishing readiness and response capabilities for wildfire events. It analyzes processes for identifying and implementing preparedness actions, including contingency planning, early warning systems, training and exercises, international exchanges, and response capacities and capacity development. It is noted that some information related to response training is covered in the next chapter.

PREPAREDNESS FRAMEWORK

Related to response planning, under the Civil Protection Act no. 82/2008 and Regulation no. 323/2010 on Preparedness Plans, every ministry and its subordinate agencies are required to develop response plans (based on risk assessments) detailing the organization of measures during emergencies. Similarly, municipalities and their administrative bodies must prepare response plans based on the risk assessments within their respective jurisdictions. Response planning is divided into two types: general and specific. The general response plan outlines the response to any hazard or disaster in Iceland, regardless of location or probability, and is based on standardized disaster response protocols. In contrast, specific response plans provide detailed measures for highly probable events, such as volcanic eruptions, major earthquakes, or influenza pandemics. These plans are reviewed as often as deemed necessary and in accordance with the Civil Protection Act. As noted in the previous chapter on prevention, various activities are also conducted on preparedness, led by various stakeholders.

Related to early warning systems, as noted in the chapter on governance, Iceland uses the common European emergency number 112 as the sole point of contact for all emergency situations, including accidents, fires, crimes, searches, rescues, and natural disasters occurring on land, at sea, or in the air. This service operates 24/7, year-round, and as of 2019, it includes access to a location-based SMS alert system which enables rapid, large-scale delivery of alerts directly to individuals' mobile phones. The IMO also plays a crucial role in early warning through early detection and warning of possible or imminent hydrometeorological and geological hazards. The 112 service operates an alert database and has access to database maps including information on all registered properties country-wide.

Related to training and exercises, in accordance with Regulation no. 1246/2022 on the Fire Fighting Academy, the HCA operates a school designed for firefighters, fire chiefs, and fire inspectors. In addition to the school, training continues at the individual fire station level, depending on the local threats and the available equipment. In 2023, Iceland's Firefighting, ICE-SAR, and Ambulance Schools formalized a cooperative agreement to enhance emergency responder training and education. This collaboration addresses the frequent need for effective interagency coordination during emergencies, emphasizing the importance of clear roles and organizational understanding for successful outcomes. The partnership aims to strengthen interagency relations and improve Iceland's overall emergency response system. The Association of Firefighters and Paramedics is also a stakeholder involved in training design and implementation. With respect to external training, Iceland has participated in the UCPM since 2014. Iceland benefits from participation in the training program, civil protection exercises, exchange of experts (EoE), and other forms of knowledge management cooperation. At the same time, Iceland can contribute to the voluntary pool of response capacities and the European Union Civil Protection Mechanism's Emergency Response Capacity (i.e., rescEU).⁸⁴

KEY STAKEHOLDERS

Related to IWFRM, based on stakeholder mapping, the following organizations hold specific mandates/roles and are relevant to wildfire preparedness:

- **The Ministry of Justice through**
 - **DCPEM and Police.** The **DCPEM** coordinates and supports the local CPC and police chief in planning and response in terms of setting the requirements for the content of the response

⁸⁴ European Commission. RescEU. [Link](#).

plans on national and local levels. These processes are supported with capacity-building activities, training, and exercises to ensure the effective operational use of the response plans. The **Icelandic Police** are the first line of defense and response to emergencies, including wildfires. The DCPEM temporarily manages and stores the lava cooling equipment (see **Box 3**) and provides overview of the trained lava cooling teams.

- **The ICG** supports preparedness for joint operations on site during major wildfires to support firefighting efforts.
- **ICE-SAR** maintains a high level of preparedness for joint operations on-site during major wildfires to support firefighting efforts.
- **Neyðarlína** manages the emergency number 112.
- **Red Cross** supports major wildfire response operations as per their mandate and capacities, such as setting up sheltering and humanitarian assistance centers.
- **The Ministry of Infrastructure through the Municipalities.** Municipalities, through their respective fire services (firefighters and paramedics), have a relevant role in the first line of defense and response to wildfires. They also coordinate evacuations and sheltering the affected population during major wildfires in cooperation with the Red Cross. CPCs are authorized by law to prepare and implement response plans.
- **The Ministry of Social Affairs and Housing – through the HCA, the National planning agency and municipal planning departments.** The HCA sets the standards in terms of equipment (both personal protective and collective) used by the fire brigades/service to respond to wildfires, standard operating procedures (SOPs), and training.
- **The Ministry of Environment, Energy, and Climate** is responsible for setting overarching rules/governance and supporting operations through the IMO and other agencies. The **IMO** is responsible for early warning systems and wildfire predic-

tion/spread models. **Land and Forest** is responsible for forest fire management planning, including planning for recovery after major wildfires. The **Environmental and Energy Agency** through possible funding from the Climate and Energy fund as well as air quality measurements.

- **The Ministry of Health** through responsibility for stocking medication and respiratory protection.⁸⁵
- **Research groups, associations** (including forest farmers as noted in earlier parts of the report), volunteers, civil society groups and broader society.

REVIEW AND RECOMMENDATIONS

What Works Well

- **Response plans:** Wildfire response plans for two areas exist: Skorradalur since 2017 and North-east Iceland since 2022. The plans provide a structured approach to organizing and managing the response. Their primary goals are to ensure coordinated actions to mitigate accidents, damage to vegetation and property, and to deliver prompt assistance to affected individuals due to wildfires. These plans are open to the public on the DCPEM website; they are written for responders, used by the DCPEM and other response parties in emergencies; they do not include information on public response. More information is provided in **Box 7**. The HCA is developing a textbook for firefighters on wildfire response plans based on a Swedish textbook adapted to Iceland, which is expected to be published in 2025.⁸⁶ Recently, the DCPEM has developed a Host Nation Response Plan that includes provision for international assistance during wildfire events. The Ministry of Health ensures that about two months' supply of inhalers, asthma medication, and similar items (as might be needed to treat smoke inhalation) is maintained in Iceland. A stock of FP2 and FP3 masks is held in the country. Preparedness and response systems for smoke inhalation and exposure to other airborne pollutants are in place.
- **Early warning:** The IMO provides daily and long-term weather forecasts; monitors volcanic activ-

⁸⁵ The Ministry of Health is responsible for national medicine stocks (maintained by the Medicines Agency and suppliers with a two-month supply) and for respiratory protection (FFP2/3 masks), while other emergency equipment is managed through the Chief Epidemiologist's stockpiles.

⁸⁶ This is in addition to HCA workgroup guidance to wildfire response and preparedness. [Link](#). It was funded by Burnabot (EBI), see [Link](#).

ity, earthquakes, avalanches, and weather-related hazards; issues timely alerts to mitigate risks; and has a contingency plan for wildfires. The IMO alert system includes drought, and there are plans to include wildfire risk within the color-coded system employed for weather warnings.

- Contingency and evacuation planning:** Every school is required to have a school preparedness plan, focusing on fire hazards and natural hazards prevalent in the given areas. Landsnet, the TSO, has a wildfire contingency plan (emergency response plan), which is regularly reviewed and updated, as well as procedures for removing vegetation in the vicinity of power lines that can cause a risk of wildfire. Tour operators must have safety plans, organized through the quality and environment management system Vakinn⁸⁷ that include four elements: risk assessment, SOPs, response plans, and accident reporting. A few recreation homes and camping areas have developed evacuation plans. Furthermore, the Association of Recreation Homeowners has promoted the emergency registration of the property number of recreation homes, information integrated into the 112-emergency telephone system: dialing 112 and providing the home number pinpoints the location requiring intervention. A few recreation home area owners have supplied evacuation plans and guidance on prevention and response to wildfires in their areas leading to some recreation homeowners purchasing tools like fire swatters and other recommended preventive equipment.
- Training and equipment:** ICE-SAR is also active in this area, recognizing the emerging wildfire threat. Based on its experience with providing support to the firefighters during wildfires, it has decided to initiate a process leading toward adjusting and augmenting their PPE. Furthermore, in cooperation with its counterpart in Estonia, recently some rescuers participated in a training program for wildfire response. Further details on response capacities are provided in the next chapter on response.

Challenges

- Gaps in response planning:** While there is solid general expertise in disaster response planning, there are gaps in planning for response to wildfires, which could affect implementation. The wildfire context in Iceland must consider urbanization and land use planning in parallel with afforestation and reforestation practices. While wildfire risk was not considered when many communities were established, there are areas, namely older recreation home and forestry areas (see also the chapter on prevention), with poor preventive practices (no fire lines, uncontrolled vegetation close to the houses, no alternative routes for emergency access and evacuation, no straightforward access to water, and so on). The significant increase in mass tourism in Iceland also creates challenges for local response entities, which are limited in terms of both staff and equipment. The WUI is currently not systematically considered—this can be of concern in areas where homes and other structures are built in close proximity to undeveloped, natural areas, such as forest, grassland, or shrubland, which creates a high risk of wildfires spreading from the wildlands into populated areas. Iceland has a low capacity to treat serious burn patients (two beds); it has cooperative agreements with the Nordic countries to assist as necessary, but it is possible those could be under pressure as well and may have limited additional capacities, as well as significant travel time and logistics to transport critical patients internationally. The low capacity for treatment of burns in Iceland could be quickly overwhelmed by even a modest wildfire that affected just one inhabited dwelling. While tour operators have safety plans, wildfires have not yet been included in the risk assessments, based on the audits conducted by the Icelandic Tourist Board. The fire brigades/services have limited capacity (manpower, training, and equipment) since the focus has been on structural (building) fires.
- Registration:** A potential major gap in preparedness results from the system of property and residency registration in Iceland. While citizens are required to register all properties, their residence is only registered at their permanent home (principal residence) but not in their recreation home areas. According to Act no. 80/2018 on residence and address, it is not allowed to register permanent residency, in a recreation home area as these are not planned for permanent residency

⁸⁷ Vakinn. [Link](#).

and the municipalities cannot provide essential services for these areas. Yet, more people are residing in such housing with the move to working from home, meaning authorities may not have an accurate overview of the actual occupancy status of recreation homes during an emergency. There are no special planning considerations concerning renting out a property on Airbnb or similar short-term rental platforms with respect to wildfire risk management.

- **Response framework and coordination:** While protocols and SOPs exist for cooperation and coordination with aerial support, other cooperation, such as that with ICE-SAR, does not yet have a formal protocol in place to guide ICE-SAR/FRS coordination in front-line operations. There may be potentially missing protocols relating to ad hoc volunteers in large wildfire situations and to police response with respect to wildfires. There is also limited coordination in non-emergency times between Land and Forest (former National Forest Service) and fire services/brigades.
- **Early warning:** Officially, the Met Office Alert system does not include warnings of wildfire risk.⁸⁸ As noted in the chapter on governance, a key obstacle seen from the perspective of the IMO is the lack of any formal recognition of wildfires in the legislation as part of its monitoring for natural hazards and issuing warnings. This omission, as well as the consequent lack of funding, poses a challenge to supporting substantial and long-term research and to activities such as weather-fire precursor analysis or FDI calculation.
- **Training and exercises/coordination:** Regarding the training and exercises of fire services/brigades, a review of the 2024/2025 HCA school program revealed no specific results in terms of content relevant to wildfires. Recent examples of wildfire training for fire services/brigades are more ad hoc, project driven by enthusiasts. As noted in the chapter on prevention, there are also gaps in broader public awareness, which translate into gaps in personal- and community-level preparedness.

Opportunities

- **Response planning:** Response plans, especially in high-risk areas (forested recreation areas, camping grounds, or popular/dense recreation home areas), should consider wildfire risk. High risk areas (e.g., WUI areas) should account for the number of people in these areas at different times. Emergency escape routes, possible fire containment lines / fire breaks, available basic response equipment, and primary and secondary protection objectives (extending also beyond the prioritization of life and property to assess natural / protected areas, etc.). WUI guidelines could be developed by the relevant authority (for example, HCA Fire Protection Department or Ministry of Environment, Energy and Climate Change). A type of secondary register could be kept (for example by municipalities) to record or estimate the number of people who are actually present in an area (or temporary residence, for public safety purpose or tourism registration for short-term stays), as opposed to registered residents. Also, wildfire risk could be included in the Safety Plans of Recreation Home Area Operators (often trade unions or private parties) and Associations (operating under Act no. 75/2008 on Recreation area housing and rental of plots for recreation homes), together with touring agents/operators that operate in areas susceptible to wildfire risk. The plans should emphasize preparedness, annual updates, basic training for property owners (e.g. emergency evacuation procedures etc.), or exercises in high risk areas, etc. While Iceland's context is unique, valuable lessons can be drawn from other regions/countries, and Icelandic examples of preparedness for other hazards can also be highlighted. The process of developing and testing (desktop or exercise) such plans should include engagement of different stakeholders. The Skorradalur and the Northeast Iceland civil protection wildfire response plans could serve as a potential model for exercises for responders.
- **Response planning and coordination** could be strengthened by developing wildfire-specific response protocols (for example, police, ICE-SAR/firefighters on front lines, volunteers in large events), under the coordination of the DCPem, potentially with a liaison officer who is versed in such protocols. Drills and coordination could be

⁸⁸ Currently, the IMO can only forecast or warn about the risk conditions for wildfires (dry vegetation, strong winds, possible lightning, and so on). The IMO cannot forecast the actual occurrence of wildfires in advance. In this respect the warnings are distinct from (for example) warnings of an approaching storm, which the IMO can monitor using weather satellites, observations, and weather forecast models, and which can be forecast with great temporal and spatial precision.

conducted in line with the preparedness and response plans.

- **Training and expertise:** Training programs for firefighters and other responders need standardization and wildfire-specific content. The exchange of wildfire experts should be promoted and systematized by establishing a wildfire EoE program with other experienced countries and regions such as the United States, Canada, Scandinavia (especially Arctic parts), Scotland, Portugal, Poland, and so on. The newly established Pan-European Forest Risk Facility can serve as a hub for the EoE program. Following a rapid capacity assessment, a comprehensive capacity-building program on IWFRM response, with priority rollout in at-risk areas, could be developed by the relevant authorities (DCPEM, HCA, fire chiefs, and so on).
- **Equipment and trained teams:** Since there are few means for all local fire brigades to own equipment and train groups for fighting wildfires, the HCA wildfire working group on equipment and prevention has been discussing the need and extent for common equipment and teams for wildfire response with the DCPEM. Equipment and teams that can be located centrally in four different areas in the country covering the main wildfire danger areas. The equipment and the teams should be easily transported to incident areas by road or air if needed. A proposal has been made for equipment and locations have been made including the possibility of making use of the lava

cooling equipment and teams. The negotiations are to be continued in 2025. There does not seem to be a direct correlation between the number of wildfire incidents responded to by the local fire brigades and their local municipalities funding for wildfire equipment. Even so, the fire brigades of the municipal area SHS and of the Southland Brunavarnir Árnessýsla, showing by far the largest number of wildfire response incidents, have been acquiring extra funding for wildfire response equipment from their municipalities. It could offer an opportunity to use wildfire statistics as well as results of area risk assessments for wildfire risk as support for adequate funding for new equipment and training.

- **Detection, warning, and emergency system:** Fire detection and monitoring could be improved, with several publicly accessible options or off-the-shelf trusted options available (significant capability advancements in the private sector are available for different services, at various scales, pricing schemes, and customizations levels). The IMO's early warning/alert system capabilities and the E-112 emergency system require wildfire-specific indicators. Allowing full recognition of the hazard through legislation (Act no. 70/2008) will support funding for the development by the IMO of specific early warning products such as an FDI. The IMO has both the knowledge and capacity (but not, as yet, the resources) to expand its activities in the area of wildfires.⁸⁹

⁸⁹ Technically, there are two options which would need to be considered by relevant institutions, namely whether E-112 alerts should be disseminated on the basis of 'wildfire risk' (as determined through an FDI provided by the IMO) or actual wildfire occurrence (following a reported wildfire). In the first case, the issuance by the IMO of an FDI above some specified level (such as likely or severe) would trigger an E-112 alert. In the latter case, the E-112 alert would only be triggered by the validated report of a wildfire (which could be an on-the-ground report or based on satellite wildfire detection). Basing the E-112 message on the IMO's FDI would allow people to take precautions (that is, avoid open fires in nature, for example) and thus reduce the risk of actual wildfire occurrence. Basing the E-112 message on actual detection might require users to take more drastic actions, up to and including evacuation.

Box 7. Key elements of the Skorradalur and East Iceland wildfire response plans

1. Activation protocols: Defined authority to activate or de-activate the plan based on threat levels (uncertainty, alert, and emergency).
2. Geographical considerations: The area is divided into zones based on identified risks, with specific strategies for evacuation and resource deployment.
3. Resource management: Designated roles for emergency services like firefighting, law enforcement, and health services to coordinate their efforts.
4. **Infrastructure and accessibility:** Challenges like narrow roads and limited water access points are acknowledged, with solutions outlined.
5. Collaboration: Various stakeholders, including local authorities, forestry agencies, and volunteers, work under a unified command structure to manage incidents effectively.

CONCLUSION

Preparedness planning has a solid base in Iceland, which can be leveraged to integrate wildfire risk.

The example of the Skorradalur and the Northeast Iceland wildfire response plans and relevant international practice, consideration of the Iceland-specific risk factors (for example, landscape practice, recreation home and forested areas, tourism patterns), and additional efforts such as specific guidance on WUI and improved training opportunities, could significantly improve wildfire preparedness. Related to an early warning system, legal recognition of wildfires as a natural hazard, and relevant funding, could help significantly broaden the IMO's activities on wildfire risk monitoring and alerting. Simultaneously, stakeholder coordination and broader prevention and preparedness activities (as noted in the chapter on prevention) should be strengthened.

Table 6. Wildfire risk management preparedness - roadmap recommendations

<p>IMMEDIATE/SHORT TERM</p> <p>(Governance, Risk Communication) Update the legal framework for wildfire hazards to be monitored by the IMO (a formal definition of wildfires as a natural hazard), establish an FDI/ Fire Danger Rating System (FDRS) in the IMO warning system with adequate funding. Improve the video surveillance system for early detection of wildfires in critical areas or more remote, but high-risk areas (factoring in also historical fire data).⁹⁰</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Support municipalities with wildfire risk analysis to develop response plans and to test them. In parallel, support and encourage campers, farmers, forestry, recreation area and recreation home area operators, associations, other stakeholders, and communities / individuals to improve their own preparedness.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>(Response) Introduce wildfire response topics in the training curriculum for the fire and rescue staff, drawing on available national and international resources and relevant experience. Roll out/provide training based on the HMS wildfire textbook for firefighters</p>
<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>(Response) Improve all-society preparedness (awareness, training) – improve public health preparedness (ICU units, protocols for burn treatment), preparedness across associations (bottom up), as well as self-preparedness/self-protection of different stakeholders and groups (e.g., farmers, recreation homeowners).</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>(Response) Initiate an EoE program on the topic of wildfire preparedness and response and benefit from the networks already created at European level.</p>	<p>MEDIUM TO LONG TERM</p> <p>(Governance, Risk Communication) Continue improving accuracy and timeliness of wildfire alerting and services provided.</p>
<p>IMMEDIATE/SHORT TERM</p> <p>(Response) Initiate a training program for wildfire response and conduct regular drills for areas at risk to help improve their response plans.</p>	<p>MEDIUM TO LONG TERM</p> <p>(Response) Continue to advance training and wildfire expertise among responders, in particular based on AARs and gathered experience to identify improvement opportunities.</p>	

⁹⁰ Early/ultra-early fire detection systems can also be gas or sound sensor-based (i.e., not video surveillance based).

WILDFIRE RESPONSE

WILDFIRE RESPONSE CONSIDERS activities during wildfire events, focusing on needs assessment, impact evaluation, response operations, business continuity, and response coordination processes across agencies and jurisdictional levels.

KEY STAKEHOLDERS

Related to IWFRM, based on stakeholder mapping, the following organizations hold specific mandates/roles and are relevant to wildfire response:

- **The Ministry of Infrastructure:** through the municipalities' **FRS**. Response to a wildfire incident is, like for other incidents, mandated and covered by the Act on Fire Protection, no. 75/2000, the Act on Fire Management and Prevention of Wildfires no. 40/2015, and related regulations such as Act no. 747/2018 on fire services activities. Wildfire is, however, not specifically mentioned in the Fire Protection Act no. 75/2000 and hence it is treated like any other incident, but it is specifically noted in the Fire Management Act no.40/2015. Traditionally, the FRS has focused on structural fires, affecting buildings and infrastructure, rather than wildfires.
- **The Ministry of Environment, Energy and Climate Change** through the IMO, which operates under this Ministry, provides wind and weather predictions as required to support wildfire response operations.
- **The Ministry of Justice, through the DCPEM** which steers and coordinates all relevant parties involved in emergency management. It is also responsible for temporarily managing and storing the lava cooling equipment and providing an overview of the trained lava cooling teams.
- In a firefighting operation, especially for larger incidents or complex wildfire situations or on difficult terrain, the FRS can be supported by other agencies and stakeholders, such as the aerial support provided by ICG **helicopters**, **police**, and **volunteers** like those active with **ICE-SAR**. **ICE-SAR** members may support logistics, provide transportation with specialized equipment, assist in setting up scenes for helicopters, and engage in fire suppression under

exceptional circumstances. They operate under fire chief leadership during wildfire incidents.

- **Private sector** (campsite operators, recreation home and area operators and associations, road tunnel operators, industrial site operators, providers of additional vehicles, machinery or aircraft, and so on) also play a role and may have individual continuity plans and incident reporting protocols in place.
- **Associations, e.g. of forest farmers, research groups, volunteers and civil society groups, private sector.**

REVIEW AND RECOMMENDATIONS

What Works Well

- **Coordination:** Despite the absence of formal protocols (see the chapter on preparedness), operational response and cooperation at local/regional levels work well because most actors in Iceland know each other personally and are accustomed to working and cooperating in other fields. The level of cooperation and willingness among farmers and the general population to work together is high, especially in times of need. For regular 'standard' wildfires, the current response approach has been effective. Rescue and containment operations appear to be functioning well. Additionally, the daily calls/meetings (more frequent as needed) between the IMO and relevant response agencies/stakeholders ensure responders have access to high-quality weather information and are a successful model.
- **Capacities (resources, equipment, funds):** The wildfire-affected FRS in Iceland have been adapting their resources for wildfire response by partially adapting training, equipment, tools, and vehicles as needed. The FRS has, for example, a stock of wildfire hand tools, light portable pumps, forestry hose, as well as hands-on improvised so-

lutions like transporting water in intermediate bulk containers (IBCs) by helicopter for suppression operations in remote areas. The FRS has been using standard and readily available IBC, light portable pumps, and forestry hose in combination with hand tools, which has worked well in several wildfire situations. The FRS have been testing wildfire PPE and clothing in Icelandic weather conditions. Some brigades have also purchased new vehicles, allowing easier access to difficult terrain (Figure 9). More recently, the DCPem has bought lava cooling equipment, pumps, hoses, fittings, generators, and other equipment that can also serve to support wildfire response. The ICG has three Super Puma H225 helicopters (and a crew of six for each), which can be used in case of a wildfire.⁹¹ ICE-SAR has identified wildfires as a growing concern and is actively preparing for this risk in terms of acquiring training/testing equipment; for example, ICE-SAR has been testing level 1 PPE for wildfire response (in collaboration with CORTEX Engineering Ltd, producer of special equipment⁹²). The website www.grotureldar.is provides information for the public, farmers, and recreation homeowners/associations/area managers on wildfire response and basic equipment such as hoses, fire swatters, pickaxes, and shovels (retailers annually update their stock of this equipment). A textbook for firefighters on wildfire response (based on a Swedish

publication and translated into Icelandic) is being issued by the HCA in 2025.

Challenges

- **Response capacities:** Responding to more complex wildfires has been a challenge for the FRS, with large differences between fire services/brigades' capacities in terms of available equipment, numbers of firefighters, and training of personnel. Aggressive and fast initial attack on wildfires have often been hindered by remote locations and challenging terrain. Due to this, critical time can be lost in the initial attack phase. The structural FRS (that is, an FRS that primarily responds to urban fire situations like house fires, car accidents, and so on) responds to wildfires in the landscape based on existing SOPs and experience, primarily related to structural firefighting. Unlike a road traffic collision or a burning house, a wildfire is not static; it moves through the landscape, with its behavior, intensity, and rate of spread constantly changing as the factors influencing fire behavior—such as weather, topography, and fuel—fluctuate. Activating the coast guard helicopters can be slow and dependent on availability; and there has been no specific training for aerial firefighting operations. In summary, there are gaps in 'minimum' as well as more technical/specialized capabilities. The absence of adequate PPE for wildfire operations is a safety and security concern, as well as a liability question e.g., in case of firefighter collapse due to heatstroke in non-suitable PPE. Common wildfire PPE has been tested under Icelandic weather conditions and has not proven suitable due to the cold and windy climate. Finding appropriate PPE is therefore a challenge and may require direct cooperation with

⁹¹ Typically, two out of the three helicopters are available for operations because of maintenance requirements and crew availability. Operations are limited to 2–2.5 hours because of fuel considerations. A fuel tanker is needed to support inland operations by providing fuel to helicopters near the hazard site.

⁹² Cortex Engineering. [Link](#).



Figure 9
Response vehicle at a fire station in Iceland, October 2024

Source: World Bank team.

market providers to develop customized options fit-for-purpose under Icelandic conditions.

- **Operational information:** The weather-related information provided by the IMO is useful but incomplete in relation to wildfire response. Iceland does not have a fully operational wildfire information system (early warning, weather, risk analysis, fire detection and monitoring, fire spread models, post-fire assessment, statistics).
- **Mutual aid and cooperation agreements:** As wildfire is a cross-cutting issue involving a multitude of stakeholders at various stages, detailed, legally sound mutual aid and cooperation agreements between all relevant actors need to be in place before a wildfire. Alerting procedures, liaison officers, procurement procedures and supply/replenishment protocols, logistics etc. Including the inclusion of private sector and volunteer services needs to be established from a legal, liability, and insurance perspective. This is crucial for streamlining mutual assistance during a wildfire and ensuring / guaranteeing pre-agreed-upon reimbursement and resource replenishment protocols for the agencies, organizations and volunteers involved. This is especially important for longer-duration and more complex incidents which may likely involve non-traditional emergency response actors.

Opportunities

- **Coordination: It is recommended that DCPEM oversees the** formalization of cooperation and coordination protocols, to ensure a safe and secure operational environment, reducing potential friction due to the unclear definition of roles and providing the best possible synergies and added value. There may be opportunities to also develop SOPs specific to wildfire response. In more complex situations—fires in remote areas, in difficult terrain, and larger incidents threatening life and property—the streamlined cooperation of all potential supporting agencies and stakeholders is crucial; here it is essential to establish beforehand such mutual aid and cooperation agreements. Modular upscaling of incident management, unified command, logistics, financial control, and liability (legal, insurance, etc.) are critical elements. Wildfire response that is focused on vehicles and water alone is not fit for purpose. The inclusion of farming equipment,

mining equipment, aircraft, volunteers, specialized organizations, and private capacities needs thorough planning and common training, and a legal basis (cooperation agreement, refurbishment/renumerations plan, etc.). Bigger, more difficult fires bring the need for cooperation of all stakeholders, each in his/her own and best capacity to achieve the common goal. This work could be coordinated by the DCPEM.

- **Training and specialized expertise:** In line with recommendations in the previous chapter, Iceland would benefit from developing a basic wildfire management capacity-building/training program, based on international wildfire standards / good practice, coordinated by the HCA, (standards such as that of the National Wildfire Coordinating Group [US] or the National Wildfire Training Standard [Germany]⁹³) and relevant experience (for example, Scandinavia/other countries). Based on a rapid capacity assessment, such training could be rolled out first in priority/high-risk areas and then extended more broadly. More technical expertise also needs to be developed, such as fire behavior expertise—that is, understanding both observed and expected fire behavior, along with its influencing factors, as the primary tool for supporting decisions and formulating specific wildfire tactics and strategies. A specialized wildfire team could be established with tactical support (such as wildfire tactical advisers [TacAd]/helicopter tactical attack [HeliTack] crew) to help mitigate unavoidable time delays in the initial attack (lead fire service). For example, under severe FWI conditions, having a HeliTack crew available can help minimize response time. Equipped with a Bambi bucket, the HeliTack crew can provide immediate aerial support for a rapid and aggressive initial attack with simultaneous deployment of ground resources, provided that the helicopter(s) and HeliTack Crew are on immediate stand-by on high FDI days. This could be coordinated by the HCA.
- **Capacities:** As noted above, there is a need to strengthen ground and aerial firefighting capacities through operational capabilities (minimum and specialized), including specific training for coast guard pilots. ICG's minimum wildfire needs include three sling hooks (currently only two), three Bambi buckets (currently two), three doors (currently one), mirrors, burn treatment equipment, and training. Following a rapid needs as-

⁹³ For example, Waldbrand Klima Resilienz ([Link.](#)) offers training modules to transition from structural firefighting to wildland firefighting. They are widely used as the German standard and rolled out now to other countries.

assessment, a minimal set of equipment could be made available to at-risk fire brigades, while overall capacities of the system would be strengthened over time and monitored for continuous improvement. There is also an opportunity to improve aerial firefighting capabilities by providing fire behavior and firefighting tactics training for pilots. Considering future fire conditions, Iceland could review the need of investing in the purchase or lease of e.g., BELL 412 or a Black Hawk helicopter(s) as a multipurpose tool to increase effectiveness and speed of initial attack in Iceland (the rugged terrain does not allow for fast aggressive initial attack with current ground-based means). Minimal/specialized equipment should be tracked and continuously replaced, updated, and modernized.

- Self-preparedness, public, and private sector response preparedness and involvement:** With respect to the public, there are opportunities to encourage the public in recreation areas, recreation home areas, as well as their area organizations to train for wildfire response and to acquire the basic tools listed on the website www.gro-dureldar.is. This may be done through public campaigns in the media and on social media, as well as addressing the organizations directly, for example, through the fire services, the HCA working group, Land and Forest, courses at the Southland High School and others. With respect to the private sector, there are opportunities to improve business continuity planning for companies. Finally, there should be a comprehensive (and continuous) stocktaking of non-traditional response resources. For instance, representatives of the Forest Farmers Association stressed the motivation and availability for forest farmers (and other farmers) to augment response resources with their own heavy equipment, local knowledge and quick reaction times.

CONCLUSIONS

Response operations in Iceland demonstrate a high level of professionalism and collaboration. However, despite the best efforts of various actors to improve their response capabilities, Icelandic fire services/brigades, first responders like search and rescue teams, and planning authorities are not yet prepared to handle the increasing frequency and intensity of wildfires. Current wildfire control capacities can cope with the average fire situation. The FRS is being stretched and facing its limits in larger, more complex wildfire situations in remote difficult terrain or in more complex WUI situations, such as in recreation home areas. However, as the mandated lead in wildfire suppression, the FRS is highly motivated and already adapting to the new and emerging challenges. There is significant potential for improvement and greater efficiency, as well as enhanced firefighter safety, through the implementation of a nationwide training program, specialized training in tactics and strategy for wildfire teams, and improved aerial support. As noted in the previous chapter, an international wildfire exchange of expert's program can be an effective investment in capacity building, fast-forwarding of experience, building competence and self-confidence, and networking. Finally, mutual aid /cooperation agreements to capitalize on the capacity/offerings of other relevant agencies, the private sector, and volunteer groups, associations and /or individuals should be explored to ensure that not only "all tools in the toolbox" are available/utilized, but that they are supported through the relevant legal/administrative procedures and agreements.

Table 7. Wildfire risk management response - roadmap recommendations

<p>IMMEDIATE/SHORT TERM</p> <p>(Preparedness) Use HCA’s “Brunagátt” database (with updated wildfire needs) to register capacities and strategically fill gaps. Consider expanding ‘capacities’ to include other stakeholders (farmers, ICE-SAR, private).</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>(Preparedness) Improve PPE, as well as basic and specialized equipment for firefighters engaged in wildfire response operations and provide relevant training, potentially drawing on experience of the lava cooling team.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>(Governance) Review the use of the Brunabot fund, with the aim of supporting the fire services in their wildfire-related activities.</p>
<p>IMMEDIATE/SHORT TERM</p> <p>Develop a basic wildfire management capacity-building/training program, based on good practice and standards, including HCA school for firefighters, and other/EU training opportunities.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Develop specialized wildfire team(s), including TacAd and a HeliTack crew</p>	<p>IMMEDIATE/SHORT TERM</p> <p>(Preparedness) Establish an EoE program on the topic of wildfire preparedness and response and benefit from the formal/informal networks already existing at the European level.</p>
<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>(Governance) Formalize cooperation protocols between FRS and supporting agencies (like police, rescue, coast guard, ICE SAR as well as non-traditional response actors like e.g., farmers) and develop SOPs specific to wildfire response across all supporting agencies, coordinated by the DCPEM.</p>	<p>MEDIUM TO LONG TERM</p> <p>(Preparedness) Consider establishment of a Ground Forest Firefighting Module or other UCPM response capacity to fast-track operational experience / learning and facilitate knowledge exchange and internal capacity development.</p>	<p>MEDIUM TO LONG TERM</p> <p>Continue to track and continuously replace, update, and modernize equipment, and update training needs. Consider expanding the use of drone technology; acquisition/leasing/adjusting the use and operation of aerial means for firefighting as a multipurpose tool to increase effectiveness and speed of initial attack. Explore the procurement of additional advanced means of wildfire management decision-support tools (hardware, software, services, etc.)</p>
<p>MEDIUM TO LONG TERM</p> <p>Continue to improve the video surveillance system for early detection of wildfires for better operational information. Consider augmenting video surveillance systems with gas or audio-based sensors in priority areas for ultra-early detection.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>(Preparedness) Continue promoting public awareness programs and education on WF risk and prevention.</p>	

WILDFIRE RECOVERY AND LESSONS LEARNED: This chapter examines recovery and review processes following major wildfire events. It analyzes the implementation of recovery and restoration plans, build-back-better/restoration initiatives, and lessons-learned procedures to identify best practices and improve risk management measures for enhanced resilience, in line with the overarching framework.

RECOVERY AND LESSONS LEARNED IN IWFRM

Recovery and reconstruction planning, along with post-fire recovery analysis, form an important part of IWFRM. The process of post-fire analysis generates important lessons learned and can lead to improved preparedness as well as more resilient landscapes. In natural landscapes, restoration and replanting are frequently carried out far too quickly, with an attitude of 'going back to normal as soon as possible'. At the same time, in rural/urban areas, in the WUI, post-disaster recovery can be a complex process requiring infrastructure reconstruction, rehabilitation as well as social and psychological support.

Post-fire management has different aspects. Assessing and evaluating each wildfire provides insight and knowledge for future fires. Well-developed restoration and recovery measures can determine future fire risk and flammability levels. A thorough understanding of fire severity, fire effects, local site conditions, and pre-fire ecosystem traits is the prerequisite for effective restoration and recovery for a more resilient landscape in the future. Post-fire assessment, planning of recovery, and designing future resilient landscapes are often the most neglected parts of integrated wildfire management, yet they provide a starting point for a 'build-back-better' future.

Particularly in the WUI context and after significant wildfire events, post-disaster recovery planning needs to be linked to broader post-disaster recovery frameworks. Post-disaster frameworks and guidelines should describe the institutional, implementation, funding, M&E, and reporting processes and arrangements. Included should be post-disaster financing instruments and disbursement arrangements, as well as other support for the population.

KEY STAKEHOLDERS

Related to IWFRM, based on stakeholder mapping, the following stakeholders are relevant for recovery and lessons learned:

- **The Ministry of Justice** through the **DCPEM**, which coordinates and develops general recovery frameworks or guidelines.
- **The Ministry of Environment, Energy and Climate Change**, through **Land and Forest, NSII**, through recovery/restoration research and activities.
- **The Ministry of Infrastructure** through **municipalities** and their respective recovery/restoration activities. Fire services/brigades through activities such as impact assessments.
- **The Ministry of Social Affairs and Structure** through HCA and planning agencies.
- **Universities, associations (different ministries)**, including the Association of Forestry Farmers, the Association of forest owners, Forestry associations, the Association of Recreation Homeowners, and so on.
- **Research groups, civil society groups, volunteers, broader public.**

REVIEW AND RECOMMENDATIONS

What Works

- **Recovery:** The DCPEM is developing a general (multi-hazard) recovery framework and guidelines. This is linked to several recent major emergency events (volcano outbreaks) which required significant recovery efforts and funding. Some burned forest areas have been replanted, often informed by afforestation guidelines that now include some fire prevention information. In the

case of grassland fires, restoration of the landscape usually takes place naturally.

- **Learning:** The fire services/brigades, the NSII, and other stakeholders (for example, Land and Forest or Forestry Association of Reykjavík) are collecting information and lessons learned about past wildfire events. For example, the NSII keeps a register of major wildfires (from 2006) and follows up on area recovery by research and review of burned areas some years after the fires. The information from such research could be an important input into land use planning and recovery of land since the soil is generally susceptible to erosion due to its composition. The Fire brigades are registering wildfire incidents in the HCA Database 'Brunagátt'.
- **Post-disaster funding:** Currently, recovery efforts (smaller) are funded by municipalities/relevant asset owners/per mandate. Emergency funds for major events are available on an ad hoc basis, upon request to the Ministry of Finance. Lack of research funding for manpower limits the possibilities of the NSII on post-fire research, but research equipment is present.

Challenges

- **Recovery:** There are currently no specific recovery/restoration plans for post-wildfire situations other than restoration of forested areas in the case of Heiðmörk. Often grassland returns naturally within weeks and months as in the case of Mýrareldar, but moss on old lava fields cannot be restored actively and takes decades to restore naturally.
- **Learning:** While lessons learned have been captured by various organizations, there does not seem to be a systematic or regular exchange of the information captured across the different institutions, and not all information may be consolidated. While there are some studies, there is no systematic research focus on this topic.
- **Funding:** There is limited information available on the funding provided following previous wildfires. The NCI currently does not cover wildfire and has not conducted any (financial) risk assessment related to wildfires. Farmers can, in principle, obtain wildfire insurance from private insurance companies, but forest owners cannot obtain insurance for their forestry areas.

Opportunities

- **Recovery planning:** There are opportunities to ensure that the upcoming recovery framework/guidelines on post-disaster recovery include considerations for wildfire recovery/restoration. It would be particularly important to establish recovery guidelines for key high-risk areas (or areas of special significance), with relevant institutional and coordination arrangements, funding sources, etc. For specific high-risk areas, considerations such as financial, social, and psychological support arrangements may also be needed. Having such specific recovery guidelines in place helps facilitate rapid recovery and reconstruction efforts. The development of such guidelines should be carried out in consultation with the various IWFRM stakeholders to ensure that all essential elements are captured. Establishing such guidelines would best be coordinated at ministerial level with cross ministry engagement, since many stakeholders at different administrative levels and from different sectors are involved. Outreach to other countries may help harness relevant examples and knowledge. Another opportunity is in sharing data from databases of the different stakeholders, including Land and Forest, NSII, HCA, National Planning Agency, and other stakeholders to establish an overall database on WUI, vegetation, and wildfires. This would again need institutional and coordination arrangements, funding sources, and so on.
- **Learning:** There is an opportunity to consolidate information and begin systematic documentation of fire effects and severity and gradually develop and implement burned area mapping and assessment protocols to assess fire severity and fire effects, thus aiming to provide decision support for recovery. This could be done in coordination with, or under the leadership of, research entities. Understanding fire effects on different ecosystems and terrains is also important to inform future response actions (i.e., whether to take an aggressive response strategy or if an active monitoring and management /let-burn strategy is more appropriate).
- **AARs:** In parallel, there is an opportunity to introduce wildfire AARs after every wildfire incident to develop a lessons-learned repository. AARs will have different areas of focus for each stakeholder, that is, landowners have different 'evaluation needs' to those of the response agencies. The reviews for responders should focus on (a) what was planned, (b) what actually happened, (c) what can be learned about why it happened,

(d) what went well, what did not go well, as well as (e) what should be changed for next time, including what will be done now (immediately after).⁹⁴ Should any injuries and or ‘close-calls’ have occurred on an incident, these should be evaluated separately and in-depth. Some counties have separate near-miss and accident reporting databases (including anonymous reporting options) and separate investigations that are undertaken to ensure maximum learning, future accident avoidance, and to inform any needed changes to policies or SOPs. An example is the SAFECOM system for reporting aviation-related safety concerns or incidents used by the U.S. Department of Interior and U.S. Forest Service.⁹⁵ The evaluation and review of unsafe or potentially unsafe should also apply to civil society (e.g., an AAR for an evacuation or public messaging during an emergency: based on what happened, are the current protocols and communications plans/strategies achieving the desired results? Was the evacuation safe and orderly? etc.). A range of stakeholders should be involved in the process, and the lessons learned could e.g., be registered in the “Brunagátt” database, as well as databases of the NSII and others. An example of a post-fire management guideline for forestry is the Guide for Post Fire Restoration of Forests in the state of

Brandenburg, Germany.⁹⁶ Several good practice recommendations on post-fire assessment and post-fire management is summarized in [Box 8](#).

- **Funding:** There is an opportunity for the legislator to review the existing funding and disbursement (financial flows) arrangements post-disaster. This could be done across all disasters, including wildfire. This could help to better understand gaps and potential opportunities. Information flowing from the improved understanding of wildfire risk (or other hazards/climate change) can then be linked and flow into more complex financial risk analysis, including macro-fiscal modeling of impacts, and how these risks can be managed through different instruments or sources of financing, including state/municipal reserves and risk transfer (insurance). The NCI has information on insured properties, which could also be combined with other information (such as the value of commercially used forests, farms, etc.) to evaluate risk and potential damage. This could potentially start with select areas in the south and east of Iceland.

⁹⁴ USDA Forest Service. [Link](#).

⁹⁵ SAFECOM. [Link](#).

⁹⁶ Land Brandenburg. Empfehlungen zum Umgang mit Waldbrandflächen (Recommendations for Dealing with Forest Fire Areas) [Link](#).

CONCLUSION

There are several opportunities related to wildfire recovery and lessons learned. Thorough assessment of fire severity and fire effects, comparison of pre- to post-fire conditions, and analysis of fire weather and soil conditions, such as moisture, at the time of a fire can provide good guidance on restoration measures. Allowing more time to observe natural regeneration, supplementing this where needed, and embedding all restoration activities in NBS can support long-term landscape resilience. At the same time there are opportunities to foster post-disaster recovery planning, particularly for high-risk areas. The following list of activities and engagement can provide initial starting points.

Box 8. Recommendations related to post-fire management

Post-fire assessment, planning of recovery, and designing future resilient landscapes are often the most neglected parts of integrated wildfire management, yet they provide a starting point for a 'build-back-better' future. The stakeholders to be engaged in understanding, assessing, and evaluating in the post-fire process are diverse. FRS should focus on AARs to provide a lessons-learned repository; separately, accidents/injuries or near-misses should be investigated, recorded, and assessed against a potential need to change policy and/or operational SOPs to continually evolve responder and public safety. Land and forest owners should study the fire effects on soil and site conditions for thorough planning of recovery measures. R&D can evaluate fire behavior, seasonality, frequency with return intervals, fire history, spread patterns, fire spread, and intensity macro- and micro-indicators, which can also inform future response actions/strategies. Municipalities should focus on possible changes in land use planning, the ministries on respective updates of the legal environment, and the DCPEM on updating current or writing new wildfire response plans and adjustments to operational SOPs. Together, the collectively gathered data and information of all stakeholders forms the basis for sound and logical decision-making and safe, effective and efficient responses.

A one-size-fits-all solution for recovery and restoration of burned areas does not exist. Fires burn with varying intensities, spread rates, and severities, and consequently, the effects need to be individually assessed and evaluated to define suitable approaches for recovery. Depending on such an assessment, a combination of measures can be considered, from a no-intervention approach to full-scale replanting (keeping in mind a changing climate). In almost all cases, the site-specific measures will combine a variety of approaches. In general, it is recommended to allow a time span of 5 years to monitor the natural regeneration and recovery processes. If then assisted recovery is needed, planting, seeding, and so on can be implemented. Especially the sanitary felling and clearing of dead wood, if not well assessed and planned, can have negative consequences in terms of creating a more resilient future. Combining different approaches in different spatial zones allows for the best possible mix of treatments.

Table 8. Wildfire risk recovery and lessons learned - roadmap recommendations

<p>MEDIUM TO LONG & SHORT TERM</p> <p>(Governance) Integrate wildfire risk into planned post-disaster recovery framework/guidelines.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Develop initial recovery planning frameworks for high-risk areas/areas of specific significance, most likely coordinated at a ministerial level.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Introduce AARs following wildfire incidents to create a lessons-learned repository:</p> <ul style="list-style-type: none"> •What was supposed to happen? •What actually happened? What went well / what did not go well? •What should be changed for next time, and what will be done now? •“What if” scenario building
<p>MEDIUM TO LONG & SHORT TERM</p> <p>Implement a system for reporting and investigating injuries/accidents and near-misses to ensure maximum learning outcomes, avoid future accidents and to inform any needed changes to policies or SOPs to continually enhance responder and public safety.</p>	<p>IMMEDIATE/SHORT TERM</p> <p>Consolidate information and start systematic documentation of fire effects and severity in a unified manner.</p>	<p>MEDIUM TO LONG & SHORT TERM</p> <p>Develop and implement burned area mapping (share in a general database accessible to stakeholders) and assessment protocols to assess fire severity and fire effects to provide decision support for recovery.</p>
<p>IMMEDIATE/SHORT TERM</p> <p>Develop specialized guidelines for different landscape, types/bioregions (forestry, grassland, lava fields), WUI, and specific high-risk areas (like campsites)</p>	<p>MEIDUM TO LONG TERM</p> <p>Test developed recovery guidelines and continuously improve them based on lessons learned for future events.</p>	<p>MEDIUM TO LONG & IMMEDIATE/SHORT TERM</p> <p>Create a lessons-learned repository from AARs, connect to “Brunagátt”, NSII database and others respectively.</p>
<p>IMMEDIATE/SHORT TERM</p> <p>Review funds/disbursement flows related to previous wildfire events.</p>	<p>MEIDUM TO LONG TERM</p> <p>Continue to build academic capacity in fire ecology and fire management to inform post-disaster recovery planning and activities and inform/improve future response actions and strategies (i.e. aggressive or more passive fire suppression strategy, based on ecosystem needs/dynamics, etc.).</p>	<p>MEIDUM TO LONG TERM</p> <p>Implement actions based on post-disaster funding review (such as adjusting levels of reserves for specific municipalities/defining potential funding flows or sources of financing).</p>

SUMMARY OF TECHNICAL RECOMMENDATIONS

THIS CHAPTER SUMMARIZES key technical recommendations across the structured diagnostic conducted.

GOVERNANCE

- **Strategic framework:** A roadmap with a vision and key priorities in the immediate/short-term and medium-long term (more ambitious) can guide further actions. Responsibilities and funds for implementation should be confirmed, as well as monitoring, evaluation, and arrangements for sharing results and lessons learned. The roadmap should reflect a cross-sectoral and inclusive approach and consider the engagement of a range of stakeholders, including bottom-up efforts of associations, academia, civil groups, and volunteers. These groups should also contribute to coordination and can support the uptake of IWFRM principles across relevant sectors and levels. The roadmap should consider general policy recommendations for improved IWFRM in other countries to learn from others' experiences and challenges.⁹⁷
- **Legislation:** The legal framework needs updating to formally recognize wildfires as a specifically identified natural hazard with clear institutional mandates and roles. Several legislative pieces need updating, including Act no. 70/2008 on the Meteorological Office of Iceland, Act no. 82/2008 on Civil Protection,⁹⁸ Act no. 75/2000 on Fire Prevention, and potentially other legislation, considering also the likely impacts of climate change (for example, the Planning Act, 2010). In parallel, more ambitious reforms should be identified (e.g. related to existing camp areas, etc.) for the medium-long-term.
- **Coordination:** Internally and externally, coordination on strategic planning, analysis and communication, and prevention, should be enhanced in order to leverage and scale up actions and in-

vestments. For preparedness and response, the existing national emergency response and coordination structures provide a solid foundation that can be improved to integrate wildfire risk as part of its multi-hazard approach. There may also be opportunities to link existing entities at different levels (including HCA, DCPem, etc.), local fire-fighting services, the Associations of Fire Fighters and Paramedics, and the countrywide association Brunatæknifélag Íslands⁹⁹ to act as FPAs to foster a more cross-cutting and all-society approach. Externally, there are opportunities to strengthen cooperation with the UCPM, training opportunities, access to resources, grants, and expertise.

RISK MANAGEMENT PLANNING

- **Planning resources and capacities:** Linked to Governance and Risk Analysis as noted above, there are opportunities to improve wildfire risk management planning, including ensuring the allocation of human, financial, and other resources at the corresponding levels (such as Fire Chief Brigades staffing/municipalities budget) in line with wildfire risk information. Risk data/ information/ systems need to be accompanied by relevant training to ensure necessary capacities. Greater use of the existing fire prevention fund/ association (<https://brunabot.is/>) could also help stimulate improved wildfire risk planning and risk management.
- **CCA** Wildfire risk considerations should be included in CCA planning and investments, including the upcoming CCA Plan, so that actions can be taken up by relevant stakeholders.

⁹⁷ European Parliament. 2022. Research for REGI Committee – Forest Fires of Summer 2022 Lessons to Draw from the Cohesion Policy Response. .

⁹⁸ Expected to be introduced in parliament in autumn 2025

⁹⁹ BTI Island ([Link](https://brunabot.is/)) is a countrywide association (part of the Institution of Fire Engineers) that promotes fire protection by holding meetings on different fire protection issues including wildfires. Members are public and professionals interested in fire protection issues.

UNDERSTANDING OF RISK, RISK ANALYSIS, AND ASSESSMENTS

- **Data, analysis, and information system:** Collecting and consolidating existing data, while accessing other available data can help to improve the overall understanding of the scale of wildfire risk. In the medium- to long-term, Iceland should set up a comprehensive wildfire information management system, which can provide information to different stakeholders (government structures, academia, private sector, broader public) in line with their mandates/ areas of interest.¹⁰⁰ For example, the European Forest Fire Information System (EFFIS) can serve as an entry-level example for a wildfire information system, although it is limited to early warning, detection, and burned area measurement. Greece, for instance, is in the process of establishing a full-scale wildfire information system (OroraTech) starting in 2025.
- **Risk mapping, scenarios, assessment:** In the immediate term, a priority could be rapid risk mapping and developing scenarios for known fire-prone areas while also developing a methodology and eventually a full wildfire risk assessment for the medium-/long-term. The forthcoming update of the NRA and Iceland's first country climate risk assessment offer important opportunities to integrate wildfire risks and consider different climate change scenarios.
- **R&D:** A priority – relevant for several areas - could be to promote wildfire science, research, and development, including by establishing a discipline on fire ecology and management, as well as research champions/networks and collaborations, enabling them with sufficient resources and connecting them with external funding/research opportunities.

PREVENTION

- **Landscape management:** Landscape management practice, policies, and investments should be adapted to integrate wildfire risk, as well as available/innovative approaches. Relevant IWFRM approaches may include, for example, NBS to manage wildfire fuel (load, type, density, and structure), re-wetting, close-to-nature forestry, and regenerative agriculture/farming (restore wetlands, slow water flow, increase water storage capacity), preventive actions as part of WUI management (e.g. focusing on areas where the natural landscape overlaps with settlements/industrial zones, ensuring escape routes and water access); and piloting a controlled burn program to reestablish a culture of working with fire where feasible, restoring land, reducing fuel, and training with live fire. Especially civil society groups and associations like the Forest Farmers Association should be engaged in this thematic area. Relevant research should also be supported.
- **Scale up of preventive investments:** There is an opportunity to strengthen systematic/ programmatic investment in wildfire prevention across relevant sectors and stakeholders. Some funding mechanisms could be adjusted (for example, incentivizing farmers, foresters and other landowners/land users to engage in prevention) or new ones created (for example, similar to the avalanche program). There are also opportunities to build on or scale up existing (pilot) wildfire prevention activities conducted at the municipal levels and other bottom-up approaches led by associations and others. Wildfire prevention should also be part of climate action efforts.
- **Risk awareness:** It is critical for wildfire risk to be well communicated. In the immediate/short-term, there is a need to develop a comprehensive risk awareness and communication strategy with different planned activities, target groups, and funding sources to guide the implementation of various activities, such as public awareness campaigns or a FireSmart Iceland campaign, using various outreach tools, or education activities provided by the Agricultural University for forest owners. The reach of the existing website www.grodureldar.is could be increased. Wildfire risk awareness communication initiatives can be

aligned with available good practice.¹⁰¹ There is a range of new AI-guided software and hardware solutions and services that can greatly enhance risk mapping, assessing, etc.

PREPAREDNESS

- **Detection, early warning, and emergency system:** Fire detection and monitoring could be improved with several technological options available. The IMO's early warning/alert system capabilities and the E-112 emergency system require wildfire-specific indicators.
- **Training:** Basic and more specialized training programs for firefighters and other responders should be provided for wildfire risk (the HCA-developed textbook for wildfire response could be a starting point) and rolled out first in priority areas and then country-wide. Further improvements to the training program could reflect a rapid needs assessment and be part of a comprehensive capacity-building program on IWFRM. Provide specific training for helicopter pilots. The exchange of wildfire experts (especially in international fora) should be promoted and systematized.
- **Preparedness planning:** Emergency plans should be developed for all areas with identified wildfire risk (for example, the Northeast civil protection response plan from 2022 and the 2017 Skorradalur municipality's wildfire response plan could serve as examples). Plans are especially needed in identified WUI areas, camping grounds, and recreation home areas. The preparation process should involve engaging and coordinating with different stakeholders. Plans should be tested (desktop/drills, awareness campaigns, etc.). There is also a need for response plans from associations and other parties that operate inside at-risk areas, such as associations covering recreation home areas, forestry associations, and land and forest owners. To anticipate the trend of increased permanent/prolonged residency in recreation homes, strategies should be considered to ensure authorities have an accurate overview of the occupancy status of secondary homes in the event of an emergency.

- **Response planning** could be strengthened by developing wildfire-specific response protocols and cooperative agreements (for example, police, ICE-SAR/firefighters on the front lines, associations and volunteers in large events) and considerations such as fire control lines, priorities of protected natural/physical environments, and the development of WUI guidelines.¹⁰² There could also be greater coordination between Land and Forest and Fire Brigades outside of emergencies as part of preparedness and response planning, as well as with the NSII and academic institutions, such as the Agriculture University.

RESPONSE

- **Human resources:** Ensure staffing for firefighting services with relevant basic and specialized wildfire response skills. Build a specialized wildfire team (the example of the lava cooling team could serve as a model), with tactical support, such as TacAd or a HeliTack crew, particularly for more remote or inaccessible areas. Solicit local knowledge, where appropriate.
- **Equipment:** Following a rapid needs assessment, a minimal set of wildfire response equipment should be made available to at-risk fire brigades and eventually augmented by more specialized equipment and operational capacities including additional ground and aerial firefighting assets. The overall capacities of the system should be strengthened over time (for example, including specific pre-positioning and transportation plans) and monitored for continuous improvement (the HCA-led "Brunagátt" database related to wildfire risk capacities can help prioritize investment and capacity needs). Conduct stocktaking of non-traditional response resources (e.g. heavy equipment from farmers/ foresters) and establish agreements on liability, insurance, refurbishment etc.

¹⁰⁰ Annex 3 offers an overview of elements that constitute a wildfire information management system.

¹⁰¹ Plana, E., Serra, M., Nebot, S., Smeenk, A., Macri, P., Vendrell, J., Pronto, L., Canaleta, G., Gomes, J., Alfonso, L. (2024). Wildfire risk awareness and communication: Analysis of good practices. Union Civil Protection Knowledge Network. [Link](#).

¹⁰² See examples in the chapter on preparedness.

RECOVERY AND LESSONS LEARNED

- **Recovery planning:** Develop a recovery framework with guidelines for 'building back better' and recovery plans for key at-risk areas / areas of particular importance, including institutional arrangements, roles, and funding sources. Develop restoration plans for areas of particular significance that may be at risk. Develop an understanding of areas / ecosystems where fire occurrence begins to eventually better determine where certain fires can be actively managed or monitored as opposed to aggressively suppressed.
- **Learning:** Introduce wildfire AARs to develop a lessons-learned repository. Separately, accidents/injuries or near-misses should be investigated, recorded, and assessed against a potential need to change policy and/or operational SOPs to continually evolve responder and public safety.
- **Funding:** Review existing funding arrangements post-disaster as well as wildfire risk information to understand better the potential financial impacts of wildfires, and the potential solutions.

ANNEX 1: ADDITIONAL INFORMATION

THE ANNEX PROVIDES a summary of key legislation related to civil protection (Box 9), forestry (Box 10), and planning and building regulation (Box 11).

Box 9. Key legislation related to civil protection in Iceland

CIVIL PROTECTION

- ..Civil Protection Act, no. 82/2008.
 - Regulation no. 323/2010 on the content and design of response plans.
 - Regulation no. 100/2009 on the organization of the coordination and command centre.
 - Regulation no. 45/2009 on the working practices of the Public Safety and Security Council.
 - Regulation no. 650/2009 on the Civil Protection Act's Alert Levels.
 - Regulation no. 107/1969 on appointing the auxiliary team.
- ..Police Act, no. 90/1996
 - Regulation no. 335/2005 on the communication center and the national police commissioner.
- ..Act on weather services, no. 142/2004.
 - Act on the Meteorological Office of Iceland, no. 70/2008.
 - Act on Protection against Avalanches and Landslides, no. 49/1997.
 - Regulation no 636/2009 on risk assessment of avalanches in ski areas.
- ..Act on health services, no. 97/1990.
- ..Act on Emergency Alert-112, no. 25/1995.
- ..Communicable Diseases Act, no. 19/1997.
- ..Regulation no. 411/1973 on the National Health Service.
- ..Medical Act, no. 52/1988.
- ..Act on the Red Cross, no. 115/2014.
- ..Act on Iceland's natural disaster insurance, no. 55/1992.
 - Regulation no. 642/2017 on Emergency Insurance of Iceland.
- ..Act on radiation protection, no. 44/2002.
- ..Act on Fire Protection, no. 75/2000.

- Regulation no. 747/2018 on fire brigade operations.
- Regulation no. 325/2016 on the handling of fire and wildfire prevention.
- ..Act on lifeguards, no. 43/2003.
 - Regulation no. 289/2002 on search and rescue on land and the cooperation between police and rescue teams.
- ..Act on the Coast Guard of Iceland, no. 52/2006.
- ..Air Travel Act, no. 60/1998.
- ..Act on protection against pollution of seas and beaches, no. 33/2004.
 - Regulation no. 1010/2012 on response to acute marine pollution.
- ..Act on uniform emergency telephone number, no. 40/2008.
- ..Act on navigation and watch stations, no. 41/2003.
- ..Act on ship coasting and drifting, no. 42/1926.
- ..Defense Act, no. 34/2008.
- ..Regulation no. 1246/2022 on the Fire Fighting Academy.
- ..Act on the Protection of critical infrastructure in Reykjanes Act no. 84/2023.
- ..Regulation on fire extinguishers nr. 1068/2011. 2021.
- ..Regulation on smoke diving nr. 1088/2013. 2013.
- ..Regulation on firefighters' protective equipment nr. 914/2009. 2021.

Box 10. Key legislation relevant to forestry

FORESTRY

- ..Act on forests and forestry, no. 33/2019.
- ..Act on Regional Afforestation Programs on Icelandic farms, no. 95/2006.
 - Regulation no. 285/2015 on regional forestry projects.
- ..Act on agricultural land, no. 81/2004.
- ..Act on fire management and prevention against wildfires, no. 40/2015.
- ..Act on Land Reclamation, no. 155/2018.
- ..Planning act, no. 123/2010.
- ..Act on timber and timber products, no. 95/2016.
- ..Nature Conservation Act, no. 60/2013.
- ..Act on environmental responsibility, no. 55/2012.
- Forestry in Iceland: Policy for the 21st century is a strategic document for the sector published in 2013. The strategy emphasizes: Building up a forest resource; Forest utilization, value and innovation; Society, access and health; Environmental quality and biodiversity; Climate change.

Box 11. Key legislation relevant to planning and building regulation

PLANNING AND LAND USE

- White Paper on Planning. Hvítbók um skipulagsmál 2023, website: [Hvitbok-um-skipulagsmal.pdf](#)
 - Planning includes adaption to climate change to strengthen the resilience of the respective community long term.
 - Consider different types of natural hazards i.e., wild-fires. Please see „gróðure“ in chapter 7.2a on rural and populated areas and 7.2f on rural areas.
- Land use planning 2024-2038. Landsskipulagsstefna.
- Act on spatial planning no. 123/2010. Skipulagslög.
 - IV. kafli. Gerð og framkvæmd skipulagsáætlana, 12. gr. Skipulagsskylda
 - 8. mgr. Landgræðslu- og skógræktaráætlanir skulu vera í samræmi við gildandi skipulagsáætlanir.
- Regulation no. 90/2013 on spatial planning. Skipulagsreglugerð. Forestry in municipal planning. Skógrækt í skipulagsáætlunum sveitarfélaga.

BUILDING REGULATION

- Building regulation no.112/2012. Byggingareglugerð.
- Regulation no.772/2012 on implementation permits. Reglugerð um framkvæmdaleyfi.

HCA

- A summary of all law and regulations regarding HCA; [Lög og reglugerðir | Hús-næðis- og mannvirkjastofnun](#):
 - Fire protection and fire brigades: Brunavarnir and Slökkvilið (different regulations see Bibliography).
 - Electricity: Rafmagnsöryggi (see below).
 - Buildings and construction: Byggingar (see above).
- Guidelines from the HCA:
 - Fire Safety Plans of Municipalities, content and structure. Brunavarnaáætlanir. 60735014-8d21-4719-8c82-fab05ca364f9_6042-leidbeiningar-um-efni-og-gerd-brunavarnaraatlana-11.pdf
 - Fire safety in recreation home areas. Brunavarnir í frístundabyggðum.
- Fire safety for campsites and trailer parks. Brunavarnir á tjald- og hjólhýsasvæðum. Building regulation no 112/2012.

ELECTRICAL UTILITIES

- Act on the Safety of Electrical utilities, and Electrical Equipment no.146/1996. Lög um öryggi raforkuvirkja, neysluveitna og raffanga. Regulation no.678/1996 on electrical installations. Reglugerð um raforkuvirki.
- Electrical energy act no. 65/2003. Raforkulög.

ANNEX 2: GENERIC OUTLINE OF AN IWFRM STRATEGY/ APPROACH

THIS ANNEX PROVIDES information useful for developing a future IWFRM strategy or roadmap. The suggestions below draw on international examples and would have to be adapted to the Icelandic legal framework

WHY: Vision, Strategic Goal and Objectives: Living with Fire

HOW: Governance, Legislation, Policy, Frame, Budget

WHAT: Measures and tools

The generic outline for an IWFRM approach incorporates seven critical elements:

1. Leadership
2. Consistent policy
3. Investment in prevention, damage mitigation, and preparedness
4. Fire management and firefighting capability/capacity/competence
5. Planning and regulation
6. Economic policy
7. Promotion of excellence

ELABORATING ON THE KEY ELEMENTS/ GENERAL PRINCIPLES

All these elements are important. No element by itself will do the job; no element can be ignored. The system will only work as a holistic, interlocking, and coordinated approach. Having a strategy and plan of action based on evidence, innovation, planning, and clear accountability for monitoring results and measures is critical to professionalizing the approach to wildfire risk management.

1. Leadership: To be effective, the Iceland IWFRM approach requires ownership by clear-headed leaders who will assume responsibility. Their job will be to devise policy, assign priorities, fight for budget allocations, build capacity, oversee outcomes, and ensure system feedback and correction. Effective leaders will maintain focus and effort during good times, and they will keep their heads when things go bad. They will insist on proactive rather than responsive wildfire management. This is

the ultimate requirement: there can be no progress without ownership by a strong leader promoting sound policy and sensible action.

2. Consistent policy: Effective IWFRM management cannot be achieved if there are opposing policies, conflicts between different arms of government, and no sense of priority. In every government agency and subnational/regional authority, it must be accepted that prevention of high-intensity or high-severity wildfires is a priority, and this objective overrides all others, in the interests of saving lives and livelihoods. Policies for the protection of unique landscape values, biodiversity, water catchments, landscapes, waterways, air quality, farms, and so on are important, but if they are allowed to constrain effective IWFRM, they will be self-defeating. A critical requirement is that relevant authorities and stakeholders must be able and willing to override inappropriate policies adopted at lower levels (if needed), particularly if they are preventing landowners or mandated stakeholders from taking wildfire prevention/mitigation actions on their own properties. For example, an amendment to the energy law was made in Iceland to allow the TSO to clear vegetation despite landowners' protests.

3. Prevention, mitigation of wildfire damage, preparedness. Effective prevention requires significant investment in damage mitigation and in preparing communities and landscapes in the expectation of fire. The objective is to reduce the fire intensity, severity, and power of a future wildfire and to increase community resilience—doing these things at a time of our own choosing, well before a fire starts. For example, reducing wildfire fuels through a well-planned series of strategies, including science-based prescribed burning, grazing, NBS, close-to-nature forestry, and sustainable farming and agriculture programs, all with the aim of decreasing the percentage of bushland treated annually (percentage to be defined or prioritized based on risk assessment), is the fundamental underpinning of the entire system. It is the only measure that humans can take to shift the balance of power away from a fire and toward the firefighters.

4. Firefighting capability. Meeting the needs of wildfire response requires proper maintenance of an efficient fire early and ultra-early detec-

tion capability, rapid response from well-trained and adequately equipped firefighters, managed collaboration between the various land management and fire response bodies as well as civil protection agencies, and the capacity to call on experienced, trained incident teams to command firefighting operations and to fight fires on the ground.

5. Planning Wildfire-resilient communities.

Rural and semirural communities must be hardened so that they can better withstand an incoming wildfire and recover from it with less disruption. An example of an IWFRM assessment, planning, and mitigation process is FireSmart Canada, which could be adapted to Icelandic conditions and context. An important point is how to manage 'legacy housing/settlements', for example, vacation recreation homes and forestry areas at the rural/urban interface where sensible wildfire planning measures and constraints were not imposed years ago. For these processes to work, local governments must be prepared to take hard decisions, resist pressure groups opposed to responsible wildfire management, and enforce wildfire legislation.

6. Economic and financial decision-making.

IWFRM has to leverage opportunities for reaping multiple socioeconomic and environmental benefits. The Ministry of Finance plays an important role in decision-making about wildfire policies and management. The aim will be to see that taxpayers' money is spent where it will bring the highest benefits, that is, in the prevention of wildfire disasters rather than dealing with them after the event. Cost-benefit analyses will be used continuously to inform decision-making about alternative approaches and technologies and to provide feedback.

7. Promoting excellence.

The final essential element of an effective wildfire management system is fostering constant improvement through investment in recruitment, mentoring, training, education, and research. The aim must be to achieve the capability for implementing the fire program on the ground with professional competence, confidence, and practical know-how. Young people need to be involved in wildfire research and operations, absorbing appropriate culture and gaining experience and an understanding of wildfire science. Research is needed that seeks ways to increase the safety, effectiveness, and efficiency of firefighters and to reduce the intensity and severity of wildfires to keep them burning within the threshold of control (less damaging, easier, and safer to control) and to establish the discipline of fire ecology in Iceland ahead of frequent fire occurrences. Learning the concept of 'living with fire' is crucial. Promoting excellence must be a deliberate policy, targeting

staff in government agencies and local government, members of fire brigades, landowners, and school-teachers.

THE ESSENCE OF AN EFFECTIVE IWFRM APPROACH:

Wildfires will still occur, but if an intelligent, integrated system is applied, driven by firm leadership and professional governance, the potential damage and losses caused by high-severity wildfires will be minimized.

IMPLEMENTATION OF GENERIC OUTLINE:

For the system to work, it requires a champion. Someone must be in charge—not for actually running the system but to make sure it runs smoothly. The champion should work with politicians and bureaucrats but will be independent, reporting to the relevant government bodies, authorities, and agencies.

FURTHER READING

- <https://www.fao.org/forestry-fao/firemanagement/101248/fr/>
- <https://openknowledge.fao.org/items/ea8c5e83-d95b-4efd-9c26-70588fd9f7d7>
- <https://www.wildfire2023.pt/conference/framework>
- https://research-and-innovation.ec.europa.eu/knowledge-publications-tools-and-data/publications/all-publications/forest-fires-sparking-fires-smart-policies-eu_en
- <https://op.europa.eu/en/publication-detail/-/publication/4e6cc1f1-8b8a-11eb-b85c-01aa75ed71a1>
- <https://publications.jrc.ec.europa.eu/repository/handle/JRC130136>
- <https://research4committees.blog/2023/12/05/publication-forest-fires-of-summer-2022-lessons-to-draw-from-the-cohesion-policy-response/>

ANNEX 3. CONSULTATIONS CONDUCTED

Institution, company, and ministry (English)	Institution, company, and ministry (Icelandic)
Icelandic Red Cross	Rauði krossinn á Íslandi
Icelandic Coast guard	Landhelgisgæslan
SL/ICE-SAR	Slysavarnafélagið Landsbjörg
Icelandic Association of Local Authorities	Samband sveitarfélaga
Association of fire chiefs in Iceland	Félag slökkviliðsstjóra
National Association of Firefighters and paramedics	Félag slökkviliðs- og sjúkraflutningamanna
Icelandic Meteorological Office	Veðurstofa Íslands
Ministry of the Environment, Energy, and Climate	Umhverfis-, orku- og loftslagsráðuneytið
Natural catastrophe insurance of Iceland	Náttúruhamfaratrygging Íslands
Ministry of Education and Children	Mennta- og barnamálaráðuneytið
Ministry of Finance	Fjármála og efnahagsráðuneytið
Ministry of Infrastructure	Innviðaráðuneytið
Ministry of Health	Heilbrigðisráðuneytið
Ministry of Justice	Dómsmálaráðuneytið
Directorate of Health	Heilbrigðisráðuneyti/Landlæknir (Heilbrigðisráðuneytið)
Housing and Construction Authority HCA	HCA - Húsnæðis og mannvirkjastofnun
Icelandic Forest Service, Land and Forest	Land og skógur: Skógræktin
Icelandic Land reclamation, Land and Forest	Land og skógur: Landgræðslan
Civil Protection Coordination Center	SST - Samhæfingarstöð almannavarna
The Icelandic Forestry Association	Skógræktarfélag Íslands
The Forest Owners Association (Forest Farmers / Farmers association)	Félag skógareigenda (Skógarbændur / Bændasamtökin)
Agricultural University of Iceland	Landbúnaðarháskólinn
Icelandic Tourist Board	Ferðamálastofa
Icelandic Road Administration	Vegagerðin
Landsnet/TSO of the Electric Power System (and the PSEMF)	Landsnet/Raforkuflutningskerfið (& NSR Neyðarsamstarf raforkukerfisins)
Iceland Touring Association	Ferðafélag Íslands
National Association of Recreation Homeowners	Landssamband sumarhúsaeigenda
University of Iceland	Háskóli Íslands/Univercity of Iceland
Icelandic Natural History Institute	Náttúrufræðistofnun Íslands
National Planning Agency	Skipulagsstofnun
Association of Icelandic Municipalities	Samband íslenskra sveitarfélaga
Icelandic Regional Development Institute	Byggðastofnun

ANNEX 4. BIBLIOGRAPHY

CITED SOURCES

- Agricultural University of Iceland. Nature and Forest (in Icelandic). [Link](#).
- Almannavarnir (Civil Defense). [Link](#).
- Almannavarnir (Civil Defense). Gróðureldaáætlanir (Civil Defense Plans). [Link](#).
- Almannavarnir (Civil Defense). Vísindaráð almannavarna (Scientific Council of Civil Defense). [Link](#).
- Almannavarnir (Civil Defense). 2011. Áhættuskoðun almannavarna 2011 (Civil Protection Risk Assessment 2011) [Link](#).
- Althingi. 2024. Tillaga til þingsályktunar um landsskipulagsstefnu fyrir árin 2024–2038 ásamt fimm ára aðgerðaáætlun fyrir árin 2024–2028 (Proposal for a parliamentary resolution on the National Planning Strategy for the years 2024–2038, together with a five-year action plan for the years 2024–2028). [Link](#).
- Althingi. 2025. Forsetaúrskurður um skiptingu stjórnarmálefna milli ráðuneyta í Stjórnarráði Íslands (Presidential Decree on the Division of Government Affairs between ministries in the Government of Iceland).
- Arise-Us. 2023. Wildfire Resilience Scorecard. [Link](#).
- Brunabot. 2023. Aðildarsveitarfélög EBÍ 2023 og hlutdeild í Sameignarsjóði EBÍ (Member Municipalities of EBI 2023 and Share in EBI's Common Fund). [Link](#).
- BTI. Um BTI (About BTI). [Link](#).
- Canadas, M. J., M. Leal, F. Soares, A. Novais, P. F. Ribeiro, L. Schmidt, A. Delicado, F. Moreira, R. Bergonse, S. Oliveira, and P. M. Madeira. 2023. "Wildfire Mitigation and Adaptation: Two Locally Independent Actions Supported by Different Policy Domains." Land Use Policy 124: 106444. [Link](#).
- Cortex Engineering. [Link](#).
- EFI. 2020. Agroforestry as a sustainable land use option to reduce wildfires risk in European Mediterranean areas. [Link](#).
- European Commission. RescEU. [Link](#).
- European Commission. 2023. Wildfires. [Link](#).
- European Parliament. 2022. Research for REGI Committee – Forest Fires of Summer 2022 Lessons to Draw from the Cohesion Policy Response. [Link](#).
- European Union. 2023. Wildfire Peer Review Assessment Framework. [Link](#).
- Food and Agriculture Organization (FAO). 2024. Integrated Fire Management Voluntary Guidelines – Principles and strategic actions. Second edition. Forestry Working Paper, No. 41. Rome. [Link](#).
- Grodulerdar. "Mikil hættu er á gróðureldum á Íslandi" (There is a high risk of wildfires in Iceland). [Link](#).
- Government of Iceland. 2011. National Risk Assessment, Iceland (summary in EN) [Link](#).
- Government of Iceland. 2020. Climate Action Plan (EN). [Link](#).
- Government of Iceland. 2023. Natural Hazard. Status Assessment and Challenges Regarding the Evaluation and Reformulation of the Planning of Risk Assessment and Monitoring for Natural Protection (In Icelandic). [Link](#).
- Government of Iceland. 2024. Stefna Íslands um sjálfbæra þróun til 2030 (Iceland's strategy for sustainable development until 2030). [Link](#).
- HCA Working Group on Wildfires. 2018. Committee's Report on Wildfires (in Icelandic) [Link](#). The website www.grodueldar.is provides a range of information about wildfires, prevention, and response.
- HCA Working Group on Wildfire Prevention and Response 2019. Gróðureldagreinagerð: Vinna unnin á árunum 2018–2019 [WILDFIRES Prevention and Response Report: Work done in 2018–2019].
- HMS. Stóraukin hættu á gróðureldum á Íslandi (Significantly increased risk of wildfires in Iceland). [Link](#).
- Huidobro, G., L. Giessen, and S. L. Burns. 2024. "And It Burns, Burns, Burns, the Ring-of-Fire: Reviewing and Harmonizing Terminology on Wildfire Management and Policy." Environmental Science & Policy 157: 103776.
- IMO (Icelandic Meteorological Office). 2018. Climate Report 2018: The Third Report on Impacts of Climate Change in Iceland. [Link](#).
- Island.is. Land and Forest Iceland Common Strategy. [Link](#).

Land Brandenburg. Empfehlungen zum Umgang mit Waldbrandflächen (Recommendations for Dealing with Forest Fire Areas) [Link](#).

Markos Gouvas, Nikolas Iliopoulos, A. Papadopoulos, and Dasiou Zisoula. 2022. The South African Lowveld Fire Danger Index (LFDI) and Its Applicability in Greece. [Link](#).

NASA. 2017. Lightning Sparking More Boreal Forest Fires. Feature. [Link](#).

OECD (Organisation for Economic Co-operation and Development). 2023. Taming Wildfires in the Context of Climate Change: The Case of Portugal. [Link](#).

OECD. 2024. Taming Wildfires in the Context of Climate Change: The Case of Greece. [Link](#).

Oom, D., D. de Rigo, H. Pfeiffer, A. Branco, D. Ferrari, R. Grecchi, T. Artés-Vivancos, et al. 2022. Pan-European Wildfire Risk Assessment. EUR 31160 EN. Luxembourg: Publications Office of the European Union. doi:10.2760/9429. JRC130136.

Plana, E., Serra, M., Nebot, S., Smeenk, A., Macri, P., Vendrell, J., Pronto, L., Canaleta, G., Gomes, J., Alfonso, L. 2024. Wildfire risk awareness and communication: Analysis of good practices. Union Civil Protection Knowledge Network. [Link](#).

Price, O. 2019. "Bushfires." In *Encyclopedia of Wildfires and Wildland-Urban Interface (WUI) Fires*, edited by S. Manzello. Cham: Springer. [Link](#).

Pronto et al., 2023, Research for REGI Committee – Forest Fires of Summer 2022, European Parliament, Policy Department for Structural and Cohesion Policies, Brussels. [Link](#).

Pro Silva. [Link](#).

Ramatsdefoc. "What characteristics must pastures have to qualify for prescribed silvopasture certification?" [Link](#).

Rautio, Pasi, Johanna Routa, Saija Huuskonen, Emma Holmström, Jonas Cedergren, Christian Kuehne (eds). 2025. Continuous Cover Forestry in Boreal Nordic Countries. [Link](#).

SAFECOM. [Link](#).

Silva, J. S., ed. 2010. *Towards Integrated Fire Management: Outcomes of the European Project Fire Paradox*. Joensuu, Finland: European Forest Institute.

Tedim, F., G. Xanthopoulos, and V. Leone. 2015. "Forest Fires in Europe: Facts and Challenges." In *Wildfire Hazards, Risks and Disasters*, 77–99. Elsevier.

USDA Forest Service. [Link](#).

Wild Europe. 2013. *A Working Definition of European Wilderness and Wild Areas*. [Link](#).

World Bank and European Commission. 2021. *Investment in Disaster Risk Management in Europe Makes Economic Sense*. [Link](#).

World Bank. 2021. *Economics for Disaster Prevention and Preparedness: Investing in Disaster Risk Management in Europe Makes Economic Sense*, Background Report. [Link](#).

CONSULTED SOURCES

Alþingi. 2023. Stjórnartillaga: Tillaga til þingsályktunar um landsskipulagsstefnu fyrir árin 2024–2038 ásamt fimm ára aðgerðaáætlun fyrir árin 2024–2028 [Proposal for a parliamentary resolution on national spatial planning policy for 2024–2038 with a five-year action plan for 2024–2038]. Þingskjal 621–535.

Alþingi. 2024. Lög um almannavarnir, Nr. 82/2008 [Civil Protection Act, no. 82/2008]. Lagasafn (útgáfa 154b) – Íslensk lög. X2008082.dvi

Alþingi. 2024. Lög um brunavarnir, Nr. 75/2000 [Fire Safety Act, no. 75/2000]. Lagasafn (útgáfa 154b) – Íslensk lög. X2000075.dvi

Alþingi. 2024. Lög um meðferð elds og varnir gegn gróðureldum, Nr. 40/2015 [Act on the Handling of Fire and Wildfire Prevention, no. 40/2015]. Lagasafn (útgáfa 154b) – Íslensk lög. X2015040.dvi

Alþingi. 2024. Lög um öryggi raforkuvirkja, neysluveitna og raffanga, Nr. 146/1996 [Act on the Safety of Electrical Installations, Consumer Utilities, and Electrical Equipment, no. 146/1996]. Lagasafn (útgáfa 154b) – Íslensk lög. X1996146.dvi

Alþingi. 2024. Lög um skóga og skógrækt, Nr. 33/2019 [Forestry Act, no. 33/2019]. Lagasafn (útgáfa 154b) – Íslensk lög. X2019033.dvi

Alþingi. 2024. Lög um Veðurstofu Íslands, Nr. 70/2008 [Act on the Icelandic Meteorological Office, no. 70/2008]. Lagasafn (útgáfa 154b) – Íslensk lög. X2008070.dvi

- Alþingi. 2024. Skipulagslög, Nr. 123/2010 [Planning Act, no. 123/2010]. Lagasafn (útgáfa 154b) – Íslensk lög. X2010123.dvi
- Alþingi. 2024. Stjórnsýslulög, nr. 37/1993 [Administrative Procedures Act, no. 37/1993]. Lagasafn (útgáfa 154b) – Íslensk lög. 37/1993: Stjórnsýslulög | Lög | Alþingi
- Alþingi. 2024. Upplýsingalög, Nr. 140/2012 [Information Act, no. 140/2012]. Lagasafn (útgáfa 154b) – Íslensk lög. X2012140.dvi
- Department of Civil Protection and Emergency Management, National Commission of the Police. n.d. Handbók um stuðning við gestgjafabjóð: Íslensk almannavarnir [Host Nation Support Handbook: Icelandic Civil Protection]. PPI.
- Ekanger, I., J. O. Brunvatne, H. Busk, A. Alriksson, S. Larsson, H. Kállsmyr, B. B. Jónsson, et al. 2019. Det nordiska skogsbruket: utmaningar i en framtid präglad av mer extremväder [Nordic forestry: Challenges in a future characterized by more extreme weather]. Nordic Council of Ministers.
- FAO Knowledge Repository. n.d. [Link](#).
- FAO. n.d. Gestion des feux [Fire management]. faoRights. [Link](#).
- European Commission. 2018. Forest Fires: Sparking firesmart policies in the EU. n.d. Rannsóknir og nýsköpun [Research and Innovation]. [Link](#).
- Forsætisráðuneytið. 2022. Skýrsla starfshóps um neyðarbirgðir [Report of the working group on emergency supplies]. August 2022. Forsætisráðuneytið. [Link](#).
- International Wildland Fire Conference. 2023. Framework. n.d. [Link](#).
- Þorvaldsson, S. 2020. Fræðsluefni um skógrækt [Educational material on forestry]. In Arnlín Óladóttir, Hallur Björgvinsson, Hraundís Guðmundsdóttir, Jón Þór Birgisson, Sæmundur Kr. Þorvaldsson og Valgerður Jónsdóttir, eds., Fræðsluefni Um Skógrækt (3rd ed.). Skógræktin. [Link](#).
- Reglugerð nr. 678/2009 um raforkuvirki [Regulation on electrical installations]. Reglugerð um raforkuvirki.
- Húsnæðis- og mannvirkjastofnun. 2020. Brunavarnir á tjald- og hjólhýsasvæðum [Fire safety for campsites and trailer parks]. (Reglugerð nr. 6.017). [Link](#).
- Húsnæðis- og mannvirkjastofnun. 2020. Leiðbeiningar um efni og gerð brunavarnaráætlana [Guidelines on the content and structure of fire safety plans]. (Reglugerð nr. 6.042, Útgáfa 1.1).
- Húsnæðis- og mannvirkjastofnun. 2022. Leiðbeiningar um brunavarnir í frístundabyggðum [Fire safety for recreation homes areas]. (Útgáfa 1.0). [Link](#).
- Innviðaráðuneytið. 2023. Hvítbók um skipulagsmál: Drög að landsskipulagsstefnu til 15 ára og aðgerðaáætlun til fimm ára [White paper on planning: Draft national planning policy for 15 years and action plan for five years]. Stjórnarráð Íslands. [Link](#).
- Jacome, F. O. D., R. D. De, H. Pfeiffer, A. Branco, D. Ferrari, R. Grecchi, V. T. Artes, T. Durrant, R. Boca, P. Maianti, G. Liberta', and J. San-Miguel-Ayanz. 2022. Mat á eldhættu í Evrópu [Pan-European wildfire risk assessment]. JRC Publications Repository. <https://doi.org/10.2760/9429>
- Alþingi. 2023. Lög um lögheimili og aðsetur nr.80/2018 [Act on Residence and Address Act no. 80/2018] Lagasafn(útgáfa 155) - Íslensk lög. X2018080.dvi
- Alþingi. 2023. Lög unr. 111/2021 um umhverfismat framkvæmda og áætlana. [Environmental Impact Assessment Act.] Lagasafn (útgáfa 155) - Íslensk lög. X2021111.dvi
- Alþingi. 2023. Löggjafarþing 2023–2024. 2023. Þingskjal 621 — 535. mál. Stjórnartillaga. Tillaga til þingsályktunar [Parliamentary document 621 — 535. Proposal for a parliamentary resolution].
- Publications Office of the European Union. 2021. Land-based wildfire prevention: principles and experiences on managing landscapes, forests and woodlands for safety and resilience in Europe. Publications Office of the EU. [Link](#).
- Reglugerð nr. 1068/2011. 2021. Reglugerð um slökkvitæki [Regulation on fire extinguishers]. Útgáfa í gildi frá 1. des. 2021. [Link](#).
- Reglugerð nr. 1088/2013. 2013. Reglugerð um reykköfun [Regulation on smoke diving]. Útgáfa í gildi frá 5. des. 2013. [Link](#).
- Reglugerð nr. 112/2012. 2024. Byggingarreglugerð [Building Regulation]. [Link](#).
- Reglugerð nr. 1246/2022. 2022. Reglugerð um Brunamálaáskólann [Regulation on the Fire Fighting Academy]. Útgáfa í gildi frá 17. nóv. 2022. [Link](#).

Reglugerð nr. 1381/2021. 2022. Reglugerð um umhverfismat framkvæmda og áætlana [Regulation on environmental assessment of projects and plans]. [Link](#).

Reglugerð nr. 285/2015. 2022. Reglugerð um landshlutaverkefni í skógrækt [Regulation on regional forestry projects]. [Link](#).

Reglugerð nr. 325/2016. 2019. Reglugerð um meðferð elds og varnir gegn gróðureldum [Regulation on the handling of fire and wildfire prevention]. Útgáfa í gildi frá 31. des. 2019. [Link](#).

Reglugerð nr. 650/2009. 2009. Reglugerð um flokkun almannavarnastiga [Regulation on classification of civil protection levels]. Útgáfa í gildi frá 23. júlí 2009. [Link](#).

Reglugerð nr. 660/2015. 2019–2021. Reglugerð um mat á umhverfisáhrifum [Regulation on environmental impact assessment]. [Link](#).

Reglugerð nr. 723/2017. 2021. Reglugerð um eldvarnir og eldvarnareftirlit [Regulation on fire safety and fire safety inspections]. Útgáfa í gildi frá 1. des. 2021. [Link](#).

Reglugerð nr. 747/2018. 2021. Reglugerð um starfsemi slökkviliða [Regulation on fire brigade operations]. Útgáfa í gildi frá 18. nóv. 2021. [Link](#).

Reglugerð nr. 772/2012. 2022. Reglugerð um framkvæmdaleyfi [Regulation on implementation permits]. [Link](#).

Reglugerð nr. 774/2010. 2015. Reglugerð um héraðsvegi [Regulation on rural roads]. Útgáfa í gildi frá 19. nóv. 2015. [Link](#).

Reglugerð nr. 90/2013. 2016. Skipulagsreglugerð [Spatial Planning regulation]. Útgáfa í gildi frá 3. nóv. 2016. [Link](#).

Reglugerð nr. 914/2009. 2021. Reglugerð um hlífðarbúnað slökkviliðsmanna [Regulation on fire-fighters' protective equipment]. Útgáfa í gildi frá 1. des. 2021. [Link](#).

Ríkislögreglustjórinn, Almannavarnanefnd í umdæmi Lögreglustjórans á Norðurlandi eystra. 2022. Viðbragðsáætlun vegna gróðurelda í umdæmi lögreglustjórans á Norðurlandi eystra [Response plan for wildfires in the jurisdiction of the police commissioner in Northeast Iceland]. Útgáfa 1.0. Maí 2022.

Ríkislögreglustjórinn, Lögreglustjórinn á Vesturlandi, Almannavarnanefnd Borgarfjarðar og Dala, Slökkvilið Borgarfjarðar. 2017. Viðbragðsáætlun vegna gróðurelda í Skorradal [Response plan for wildfires in Skorradalur]. Útgáfa 1.0. Október 2017.

Skógræktin & Skipulagsstofnun. 2023. Skógrækt í skipulagsáætlunum sveitarfélaga [Forestry in municipal planning, 4th edition]. Egilsstaðir & Reykjavík: Skógræktin and Skipulagsstofnun. [Link](#).

Stjórnarráð Íslands. 2023. Náttúruvá. Stöðumat og áskoranir varðandi mat og endurmótun á tilhögun hættumats og vöktunar vegna náttúruvár [Natural hazards. Status and challenges regarding the assessment and reorganization of hazard assessment and monitoring due to natural hazards]. Reykjavík, apríl 2023. [Link](#).



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