

Forest Rescue Point System

Subjects: [Agricultural Engineering](#) | [Others](#)

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Forest work is dangerous. In particular, manual or motor manual work still exists in large parts of both the professional sector and in the management of small private forests. For example, Germany has a large number of forest owners, estimated at approx. 2,000,000. Accidents that happen in the forest often involve severe injuries. In 2020, 4834 (2019: 5257) accidents during forestry work were reported in Germany. 1533 (2019: 1680) people were so seriously injured that they were unable to work for more than three days. 26 (2019: 36) people lost their lives while working in the forest. The system of fixed rescue points has been established in some areas of Germany for a long time. For example, a system of fixed rescue meeting points was established in the Bavarian state forest as early as the 1990s. In addition to establishing a clear meeting point for the rescue service, providing the fastest route to a landline telephone also played a major role at that time. With the current predominant use of smartphones, the role of the rescue meeting points has changed.

[forest rescue system](#)

[forest accident](#)

1. Occupational Accidents

Forest work is dangerous. In particular, manual or motor manual work still exists in large parts of both the professional sector and in the management of small private forests. For example, Germany has a large number of forest owners, estimated at approx. 2,000,000. Accidents that happen in the forest often involve severe injuries. In 2020, 4834 (2019: 5257) accidents during forestry work were reported in Germany. 1533 (2019: 1680) people were so seriously injured that they were unable to work for more than three days. 26 (2019: 36) people lost their lives while working in the forest ^[1]. Furthermore, if people are working in the forest, providing a description of the accident site is difficult, and the path by which the rescue service can reach the injured person is often unclear. An example of this is the passability of forest roads. Thus, it should be ensured that the forest roads leading to the accident site can be used by rescue vehicles (all year round), are suitable for these vehicles, and have no obstacles ^{[2][3][4][5]}.

Additionally, occupational safety laws and accident prevention regulations require precautions such as access to emergency medical care, rescue facilities, regular training, provision of first aid materials, adherence to safe work procedures ^{[6][7]}. Therefore, having a comprehensive and working rescue concept is essential.

Especially in the case of calamities (e.g., storm damage, drought, bark beetle), which have increased in recent years, an increased risk of accidents for forest workers is to be expected ^[8], and the accident rate can be double that encountered during normal forestry operations ^[9].

Under German law, occupational accidents must be reported if they result in incapacity to work for more than three days or in death [10]. The accident statistics of employed forestry workers in the state forestry enterprises, state forestry administrations, and federal forestry are compiled and prepared as part of accident statistics [11]. **Figure 1** shows a selection of these data, where only reportable accidents are counted.

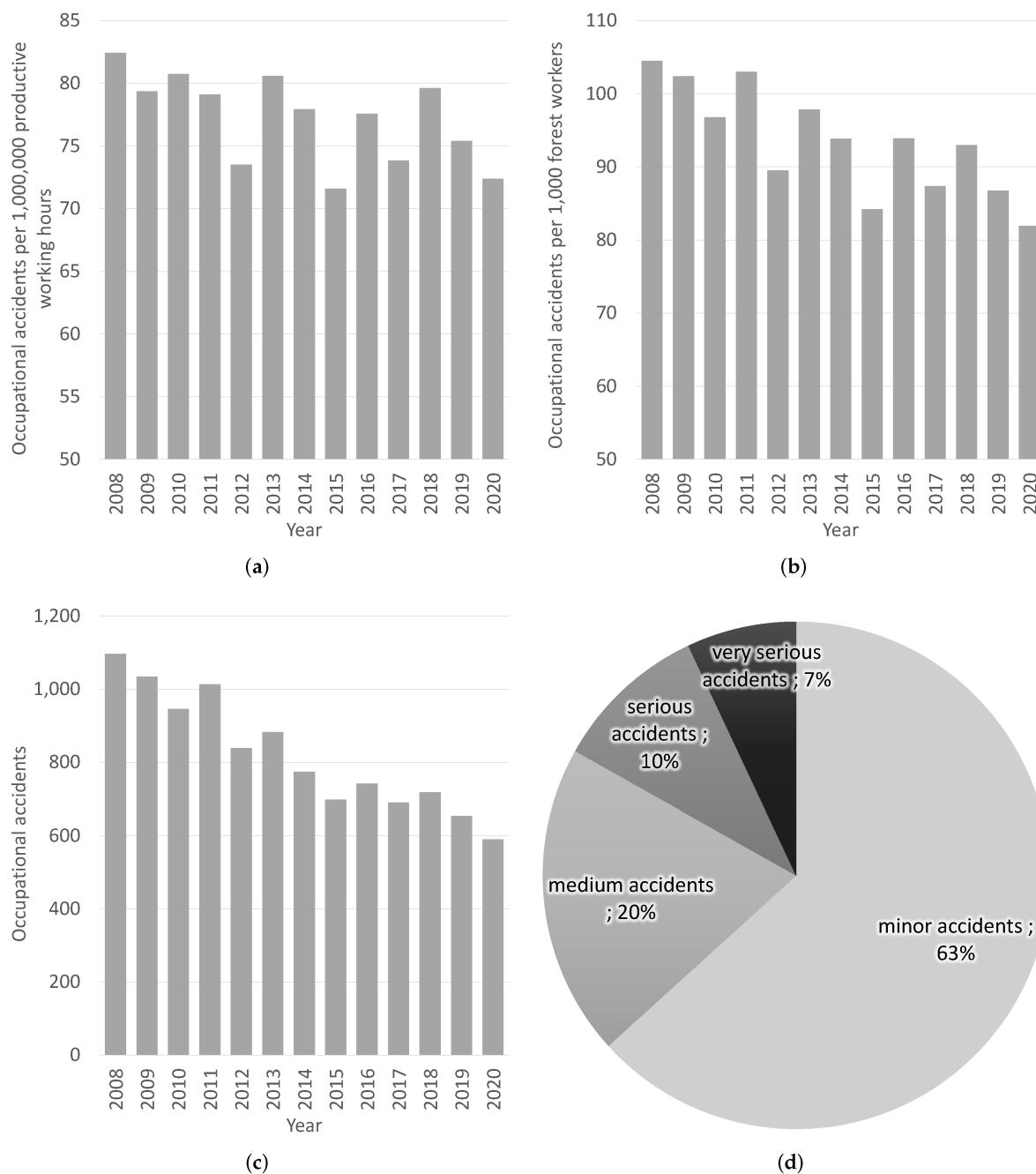


Figure 1. Forest occupational accidents in German state forests from 2008 to 2020: (a) occupational accidents per 1,000,000 productive working hours; (b) occupational accidents per 1,000 forest workers; (c) occupational accidents; and (d) severity of accidents at work in days of lost service: minor accidents (4–20 days lost), medium accidents (21–45 days lost), severe accidents (46–90 days lost) and very severe accidents (more than 90 days lost; data source: [11]).

The accident severity statistics (**Figure 1d**) are characterised by days of lost service and categorised and presented as minor accidents (4–20 days lost), medium accidents (21–45 days lost), severe accidents (46–90 days lost) and very severe accidents (more than 90 days lost).

The occupational accident statistics are illustrated as absolute number (**Figure 1c**), occupational accidents per 1,000,000 productive working hours (**Figure 1a**), as well as occupational accidents per 1000 forest workers (**Figure 1d**).

From the accident statistics of employed forestry workers, a development trend can be derived from these statistics and decisions for accident prevention can be derived to evaluate implemented occupational health and safety measures. For example, the relative number of accidents, measured in accidents per million hours worked, shows a slight decreasing trend [1]. This is also reported from other countries such as Austria, New Zealand, and Slovakia [12][13][14]. However, there are still many accidents, and rapid first aid and, thus, a rapid response system is essential.

The presented statistics are limited to the defined reportable accidents in the state forests. This does not include non-reportable accidents or those associated with private forestry contractors and private forest owners, which are difficult to record. It can be deduced from this that there are also many unreported cases in the recording of occupational forest accidents. In addition, there are many forest visitors, such as mountain bikers, who can also have accidents in the forest and are reliant on a well-functioning rescue system in the forest [2].

Therefore, a comprehensive and functional rescue concept is essential. This is especially important for professional forestry work.

2. Forest Rescue Concepts

There is a considerable risk of injury during forestry work. It is therefore advisable to work at least in pairs or even in threes, and not only when harvesting timber. Receiving effective and rapid first aid in forest areas is rather unlikely when working alone.

The standardised rescue concept for three-person work is as follows: If an accident occurs, the first priority is to secure the accident site and care for the injured person. Then, an emergency call is made. When making the emergency call, the nearest accessible rescue meeting point is mentioned. Afterwards, one person goes to this rescue meeting point to wait for the rescue service and then to guide the rescue service to the injured person using the fastest possible route. The second person continues to take care of the injured person.

A severe problem with the two-person working group is the lack of a third person who can take over the guide function. If the emergency is in an area without cell phone reception, the first responder is forced to leave the injured person alone for a short time in order to make the emergency call [3][15][16].

Emergency calls are received by integrated control centres, which use state-of-the-art IT systems to coordinate all the assistance provided by rescue services, fire brigades, and the Federal Agency for Technical Relief and delegate the emergency call to the responsible agencies. The positions of the rescue points and other information are available to the integrated control centres in a quality-assured manner and are appropriately forwarded.

Today, the rescue of injured forest workers, in contrast to the rescue of recreational people, is a relatively rare occurrence, especially in tourist areas. Studies of fire department reports of an 8000 ha forest area in a region of Baden-Württemberg over ten years have revealed 104 recreational accidents in the forest compared to 8 accidents of forest workers. In the federal state of Baden-Württemberg, the guidelines are that the response time for emergency medical reasons should be a maximum of 15 min. According to the rescue plan, these times should be reached for 95% of the operations [17][18]. This applies to all operations, including forestry. However, it was also shown that in 75% of operations, the arrival time was 18:42 min (median 13:21 min), which is higher than the maximum of 15 min rescue time to be respected for 95% [4][19].

3. Forest Rescue Point System

The system of fixed rescue points has been established in some areas of Germany for a long time. For example, a system of fixed rescue meeting points was established in the Bavarian state forest as early as the 1990s. In addition to establishing a clear meeting point for the rescue service, providing the fastest route to a landline telephone also played a major role at that time. With the current predominant use of smartphones, the role of the rescue meeting points has changed. However, this system was purely internal and therefore the locations and details of rescue points were not made available to the public. For outsiders (e.g., outdoor sportsmen, recreationists, hunters), the points in the internal system were unknown and could not be used [20][21].

The aforementioned rescue points form a system of meeting points in or near the forest and are intended to serve as clear orientation points. Additionally, they should provide the possibility for rescue services and the party requesting this service to meet at these points in the event of an emergency. Such points are simply meeting points with well defined and known coordinates and pieces of information. First aid equipment is not available.

The rescue points in use meet various requirements and are usually quality-tested. Currently, 63,718 such official rescue points are available as part of this centrally coordinated system in Germany [5][22].

Most of the rescue points are marked with a sign in the field. The numbering and presentation may vary between federal states, as many have different historical origins and vary in federal regulations and competencies. **Figure 2** shows examples for the signage of the rescue points for different federal states. Maintenance of the signposting of rescue points in the terrain is not ensured everywhere.



Figure 2. Examples of the signage for rescue points in the different federal states: Baden-Württemberg (**left**), Bavaria (**middle**), and Saxony-Anhalt (**right**).

Due to the federal structures and different types of forest ownership, rescue points are implemented very differently throughout Germany. There is no direct legal basis or public mandate for forest rescue points in Germany and, thus, no uniform regulation—each forest owner is responsible for this themselves. The coexistence of different solutions and the lack of agreements on points close to the border complicate the handling both for the rescue control centres and for the users [5].

Historically, the rescue points have been developed and implemented differently in the various regions and federal states of Germany. In 2013, most of the German federal states representatives met and agreed on a standard or similar approach to selecting, installing, and managing the rescue points to achieve harmonisation and quality assurance throughout Germany. One of the results was a guideline for the creation and quality assurance of the used forest rescue points [5].

The central office of the KWF (Kuratorium für Waldarbeit und Forsttechnik e. V.—Board of Trustees for Forest Work and Forest Engineering) coordinates the development and harmonisation of the rescue points, regularly collects the information from the various institutes of the federal states, and then makes this available in summarised form.

It was determined that the permanent rescue points to be created should meet defined requirements. It is recommended that they be distinctive places close to or in the forest. Regarding the spatial location of rescue points, the following main guidelines are given:

- Rescue points must be accessible by rescue vehicles all year round, even in bad weather. Therefore, the rescue points should be located predominantly on public roads (state, county, and municipal roads), preferably at forest entrances/approaches and hiker parking areas.

- If a designation in the forest is necessary, prominent points such as trail junctions, hiking cabins, or similar should be chosen on forest trails that are accessible all year round (NavLog way class 1 to 3).
- Rescue points must be located in a way that is safe for traffic (not in curves, no danger to flowing traffic).
- Mobile phone network reception should be available at the rescue point, if possible.
- The involvement of local emergency services (rescue service, fire department, mountain rescue service) is recommended for the final location decision.

These standards should be fulfilled as far as possible for the used points. Another requirement was that these rescue points should be on a public road or a NavLog road. If these locations are on public roads, they have to be traffic-safe. NavLog is the German permanent truck logistics road dataset of the forest [23][24]. Therefore, this road has to be accessible all year round for vehicles without four-wheel drive [25].

The rescue points are freely available as marked points in the forest, such as in maps or IT applications [5][26]. It was, and still is, common practice to display rescue points offline on analogue printed maps both at work orders, in work trucks, at rescue dispatch centres, and on emergency service vehicles. The concept of rescue points is based on permanent points. The information on these points is not deleted again in the rescue control centres, even in changes, as old cards with old numbers could be in circulation.

Experiments and evaluation of rescue data have shown that the use of dedicated orientation points, such as rescue meeting points, and sufficiently high-quality maps and navigation bases, such as NavLog, in the forest increases the ability to find people who have had accidents and reduces the rescue time [3][4][27].

4. Foreign Rescue Point Systems

Other countries have also adopted a system of permanent rescue points, although in a version that is usually not as strongly coordinated or pronounced. In addition, these are often initiated or operated by non-forestry institutions, such as water rescue organisations or tourist associations [28][29].

In Austria, in the province of Vorarlberg, every cycle route sign has a unique location number and also fulfils a dual function in also serving as rescue meeting point [28].

In Denmark, official rescue points that are operated by the lifeguards are available at all bathing sites and ensure that emergency services can identify exactly where to send the rescue team in an emergency. The rescue points are signs with the emergency numbers that are installed by the individual municipalities [29].

The Czech Republic has been building a system of permanent rescue points since 2008 under the leadership of the General Directorate of Fire and Rescue Services of the Czech Republic. Around 2500 (status October 2016) rescue points are available [30][31][32].

In addition, many countries have temporary rescue points that are used during forestry operations in the forest and are specified in the contract documents.

5. Rescue Point Numbers and Density

The German permanent rescue point system is not static; it can be adapted if necessary. When creating, thinning out, or condensing the rescue points, the question usually arises as to how many rescue points are sufficient and how high should the density of rescue points be. The number and arrangement of rescue points is essentially dependent on the extent of the forest and relief structure as well as the quality of the forest road system.

At present, the number or density of rescue points has not been specified. A rough guideline is provided by the rule that it should be possible to reach one rescue point from another within 10 min. Another possible guideline is that 3–5 rescue points should be established per 1000 hectares in large closed forest complexes or 6–8 rescue points per 1000 hectares in small isolated forest areas [5][20].

This leads to the question of whether there are enough rescue points and are they well distributed.

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