AGENTURA OCHRANY PŘÍRODY A KRAJINY ČESKÉ REPUBLIKY

Česká zemědělská univerzita v Praze
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ČZU ČESKÁ ZEMĚDĚLSKÁ UNIVERZITA V PRAZE

NATURE AND LANDSCAPE MANAGEMENT STANDARDS

SPECIAL MEASURES FOR SPECIES PROTECTION	**INSTALLING AND OPERATING MOBILE SEASONAL BARRIERS ALONG ROADS TO PROTECT AMPHIBIANS**	**SPPK E 02 001:2020**
SERIES E		

Zřizování a provoz mobilních zábran pro obojživelníky podél komunikací

Errichtung und Betrieb von mobilen Barrieren für Amphibien entlang von Verkehrswegen

The standard contains principles for use of mobile barriers for protection of migrating amphibians against entry into areas where they are at risk, typically roads and construction sites.

References:

Act no. 114/1992 Coll. on Nature and Landscape Protection, as amended

Act no. 246/1992 Coll. on Protection of Animals Against Cruelty, as amended.

Act no. 361/2000 Coll. on Road Traffic and on amendment of certain acts (Road Traffic Act), as amended

Act no. 89/2012 Coll., the Civil Code, as amended

Ministry of the Environment Decree no. 395/1992 Coll., executing some provisions of Czech National Council Act no. 114/1992 Coll. on Nature and Landscape Protection, as amended

Zavadil V., Sádlo J., Vojar J. (2011): Biotopy našich obojživelníků a jejich management. Metodika AOPK ČR, 178 pp.

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Documentation for the standard development is available in the NCA CR library.

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1. Standard purpose and contents

1.1 Standard definition

The standard " Installing and Operating Mobile Seasonal Barriers along Roads to Protect Amphibians" defines principles for use of these barriers for protection of migrating amphibians against entry into areas where they are at risk, typically roads and construction sites.

1.2 Definition and purpose of mobile barriers

Mobile barriers (temporary barriers) are technical devices made of various materials installed temporarily particularly along roads or around construction sites in order to prevent entry of amphibians and other organisms in those areas. Mobile barriers may be guiding (guide moving animals to safe areas) or capturing, built in combination with livetraps. In this case, the traps are checked periodically and captured animals are transported to designated areas. Inhibiting barriers are used exceptionally, i.e., without capturing vessels and guiding effect, used purely to bar entry of animals into an area.

1.3 Standard content

The standard defines basic types of mobile barriers and instructions for their correct installation and inspection so as to maximize effectiveness of protection of target organisms (typically amphibians, as well as potential invertebrates, reptiles and small mammals). It deals in particular with appropriate location of barriers, time for their installation, technical parameters and materials used, as well as methods of barrier installation, inspection and dismantling. It also describes critical factors of effective application of the measure, i.e., in what cases and under what circumstances building barriers makes or does not make sense. Last but not least, it mentions the legal context of installation of temporary barriers.

2. Legal framework

2.1 Act no. 114/1992 Coll.

Act no. 114/1992 Coll. on Nature and Landscape Protection, as amended (NLPA) defines, among other things, general and special protection of species, including amphibians. If mobile barriers are used in combination with livetraps, (not only) amphibians are caught in the traps and relocated to designated areas during subsequent inspections. Since all amphibians present in the territory of the CR except the common frog belong among specially protected species (SPS), for qhich Section 50 of the NLPA forbids any harmful intervention in natural development, e.g., catching, keeping in captivity, disturbing, collecting or relocating their developmental stages, their transfer requires an exemption from the ban pursuant to Section 56 of the NLPA. If the transfer is made based on a service provision agreement with the Nature Conservation Agency of the Czech Republic (NCA) in a territory under NCA administration, the agreement can transfer the NCA's exemption to the contractor.

2.2 Act no. 361/2000 Coll.

Act no. 361/2000 Coll. on Road Traffic and on amendment of certain acts (Road Traffic Act), as amended, defines, among other things, rights and obligations in connection with obstacles to road traffic. When installing mobile barriers, the devices must not endanger traffic safety and fluency on roads or preclude road maintenance. Workers inspecting barriers have to comply with road traffic safety rules so as not to endanger their own safety or that of others (including carrying reflexive elements).

2.3 Act no. 246/1992 Coll.

Act no. 246/1992 Coll. on Protection of Animals from Cruelty, as amended, defines animals (all vertebrates except humans) and forbids cruelty to animals. Activities regarded as cruelty in connection with the use of mobile barriers may include restricting animals' freedom of movement for other than medical reasons, if such restriction caused the animal to suffer or to die. In practice, such cruelty to animals has to be prevented, e.g., by periodic checking of traps and barriers, creating suitable conditions in traps (preventing animal damage and death) and gentle handling of individuals while transferring them (see chapter 7.2 for more detail).

2.4 Act no. 89/2012 Coll.

Act no. 89/2012 Coll., the Civil Code, as amended, defines, among other things, rights and obligations in connection with ownership. The owner is entitled to handle their property in any way the like within the limits of the legal system and exclude others from doing so. This means that when building mobile barriers on land other than one's own, one needs to respect protection of other people's ownership rights and request the owners' written consent to implementation of the measures in the preparatory phase.

3. Factors affecting application of mobile barriers

Many measures can be applied in connection with protection of migrating amphibians, ranging from simple collection of individuals on roads to use of mobile barriers to construction of permanent barriers in connection with culverts or other structures ensuring safe passage of amphibians. Implementation of mobile barriers is only effective under certain conditions; other solutions will be applicable in other cases. Of course, the construction and subsequent inspection of barriers must not endanger road traffic safety and fluency. The following factors are critical when deciding on use of mobile barriers:

- danger type,
- number of endangered/saved individuals,
- technical or administrative difficulty of the measure, risk of damage,
- financial demand of the measure,
- time demand of the measure and transfer staffing.

3.1 Danger type (temporary construction vs road traffic)

Mobile barriers can be used effectively in the case of temporary danger to animals during construction works (road or other construction). To protect amphibians against road traffic, the objective is construction of permanent barriers in co with culverts or bridges. Mobile barriers are advisably first used to identify sections where the amphibian migration is the strongest and their protection using these barriers is efficient.

3.2 Number of endangered/saved individuals

Mobile barriers can be used effectively in the case of endangerment of considerable numbers of individuals (in the order of many dozen or hundred and more; lower counts for severely or critically endangered species). Where single individuals are found, simply collecting them from the hazardous areas is usually a more efficient amphibian protection option. In the case of road construction or renovation, the species composition and estimated numbers of endangered individuals should be known from preceding surveys made as part of the project planning (e.g., during the EIA or other assessment process).

3.3 Technical or administrative difficulty of the measure, risk of damage

The technical requirements for installation of mobile barriers are sometimes so demanding that the installation itself is not advisable, e.g., in built-up areas. The alternative for problematic sections is to stop amphibians from entering the area where they cannot be protected, in combination with the building of an accessible substitute reproduction biotope. This is a professionally demanding solution, requiring specialist management.

3.4 Financial demand of the measure

Construction and, most importantly, inspection of mobile barriers without volunteer contribution are a very costly measure in the longer run, with costs exceeding the price of

permanent measures. Mobile barriers are not a permanent solution; they are installed in areas of periodic amphibian migration until a permanent barrier is built in combination with migration structures (typically culverts under the road).

3.5 Time demand of the measure and transfer staffing

In the case of capturing barriers, the traps have to be checked at least once a day, preferably in the morning, so that animals do not remain in the traps during the day (they usually fall in the traps in the evening and night). Integrity of the barriers should be checked periodically, at least once a week, ideally on each trap inspection. The inspection has to be provided throughout the barrier installation period, which is very time-demanding.

4. Mobile barrier classification

4.1 Mobile barrier classification by application

Mobile barriers can be used for protection of amphibians and other animals in the following cases:

- during execution of a construction project (road, linear excavations, etc.) to prevent entry of animals into the construction site area;
- as part of protection of amphibians from road traffic, unless such protection can be provided by a permanent measure.

4.2 Mobile barrier classification by function

Mobile barriers can be divided by function into:

- guiding,
- capturing,
- inhibiting.

4.2.1 Guiding mobile barriers

This type of barrier is used to guide the movement of amphibians, reptiles and other small animals outside the area where they are endangered by construction or road traffic, into various culverts, under bridges, etc. This is the most expedient type of temporary barrier solution, with much lower inspection costs (no trap checks). They are built on one or both sides of transport/linear construction projects, and along some or all of the construction site perimeter for other projects.

4.2.2 Capturing mobile barriers

They are similar in design to the above type, but complemented with vessels (traps) designed for capturing animals. As they move, they come across the barrier, which they cannot overcome, so they follow it until they fall into a vessel installed immediately by the barrier.

4.2.3 Inhibiting mobile barriers

Again, their design is similar to the above types, the difference being that there are no livetraps and movement of animals is not directed towards a culvert or other migration structure. The objective is solely to prevent animals entering into the barred area. Given their limited functionality in comparison with the above type, they are only employed exceptionally.

5. Basic description and materials used

5.1 Basic mobile barrier description

The minimum barrier height above ground is 40-50 cm; it is at least 50-70 cm in areas with agile frog presence. The bottom edge of the barrier is bent against the animal migration direction (10 cm wide) and covered with earth so that the animals (notably toad and spadefoot species) cannot burrow under it. The barrier is fastened to (wooden or metal) pegs driven deep enough into the ground. A border about 5 cm wide has to be formed at the top edge of the barrier by bending it against the animal migration direction; this border has to be fastened to the pegs at the top with staples or wire. This measure ensures functionality of barriers even for tailed amphibians, which overcome barriers without the bent borders very easily (regardless of the material used and barrier surface smoothness). The absence of a top border is only permissible in case no newts are demonstrably present on the site. Their absence has to be verified by first installing barriers with the top border.

5.2 Mobile barrier materials

A number of materials can be used for construction of temporary barriers. Below is an overview, including advantages, disadvantages and limitations.

5.2.1 Suitable materials

Woven fabric – reinforced sheet. This is highly suitable material with long life and easy to install. It is fastened to wooden pegs using staples. The bottom and top borders are easy to form The fabric can be used repeatedly, up to five times, if dismantled gently. If installed permanently (including winter), it can last for three to four years.

5.2.2 Partially suitable materials

Plastic strips (typically polythene). Insufficient resilience to weather is something of a problem, particularly for thinner polythene sheets. They come off the pegs and tear easily, so they cannot be used repeatedly. Moreover, transparent polythene is poorly visible for deer and boars, which can damage the barriers or get injured on them.

Maybach eco-friendly barrier, designed specifically for amphibians. The barrier material is suitable, but its fastening to the ground is problematic. The bent lower border is simply pressed down with metal anchors; this gives rise to loose spots in uneven areas, which permit animals to penetrate the barrier. The bottom pressure elements and metal anchoring posts are often lost or stolen.

5.3 Barrier fastening materials

The barrier is usually fastened with staples to wooden pegs hammered into the ground. Wooden pegs can be slit or cut lengthwise, and the barrier is placed between the two parts, which are then joined again. Square battens sized 3x3 to 5x5 cm and 80 cm long are the best (given a

barrier height of 50 cm); the barrier is stapled onto them. Metal brackets are an alternative to wooden pegs.

5.4 Livetrap materials

The capturing vessels are ideally plastic buckets with a capacity of 10-15 L, fitted with a lid that has a hole cut in the middle, through which the animals fall into the trap. A border made from the lid remains, at least 2 cm wide, prevents animals escaping from the trap. Thus, metal buckets are unsuitable, as are other vessels without a lid, particularly small ones, permitting amphibians easy escape. Another inadequate type is narrow cut plastic pipes, in which newts or smaller frogs are easily overlooked during inspection.

6. Mobile barrier installation

6.1 Mobile barrier installation dates

The choice of a suitable date of installation is difficult, but very important. Most commonly, barriers are built to protect amphibians migrating to reproduction sites and back. They can also be used for protection of individuals during other major migrations (e.g., to wintering sites). The dates for the same place may differ each year owing to weather. The main migration is frequently over in just a few days. Starting the installation only after first amphibians are found killed on the road is too late; both barriers and traps have to be installed well ahead of the amphibian migration, preferably already in late winter. With respect to the species, altitude and current weather situation, first amphibian migrations can be expected already in February (e.g., agile frogs in lowlands), and usually in the first half of March. Previous information about presence of (migrating) amphibians in the near surroundings from the NCA Nature Protection Find Database (NDOP) can be useful.

6.2 Mobile barrier installation time and location

6.2.1 Installed mobile barriers can be left on a site for variously long time with respect to different amphibian migration types, which differ in their timing in the course of the season and the age of migrating individuals. This dictates not only the time of installation of temporary barriers but also their location.

6.2.2 In the case of non-linear construction projects, barriers are installed along some or all of their perimeter; for linear structures or to protect amphibians against road traffic, they are placed on one or both sides of the road, depending on the migration type (see below). Installing one-sided or both-sided barriers also depends on the amount of available funds and staffing for inspection of barriers and traps, if any.

6.2.3 Spring installation to capture adults travelling to reproduction sites

6.2.3.1 This is the most important period, the so-called main migration, when adults migrate from wintering sites to reproduce in aquatic biotopes. This migration represents about 30% of all amphibian movement in a year. The migration timing depends on the species, altitude and current weather situation (see 6.1).

6.2.3.2 The migration duration is also species-specific; it may take only a few days (frequent with the common frog and the common toad) or several weeks (most other species), during which individuals of the same species may migrate to and from the reproduction site at the same time. The migration may be interrupted repeatedly by unfavourable weather (night-time temperature drops to or below zero, drought). Thus, the spring adult migration to reproduction sites may extent until early May.

6.2.3.3 One-sided barriers are used to capture exclusively the main migration. It is the cheapest, but least suitable solution, protecting only a part of the individuals. Besides, there is a risk that the one-sided barrier will prevent amphibians returning

from their migration and leaving the dangerous road area. The main migration and the return migration partly overlap. For these reasons, both-sided barrier installation is the only satisfactory solution (see below).

6.2.4 **Extended spring installation to capture individuals migrating back**

6.2.4.1 Since amphibians often take the same route back after reproduction and negotiate the same road section again, it is highly desirable to install mobile barriers on both sides of the road so as to capture individuals from the return migration as well. It is a more time-consuming and costly solution, but much more effective than one-sided barriers. If both-sided barrier installation is not possible before the start of the migration, it is essential to first built those that capture the main migration, towards the reproduction site. The other side of the barriers to capture the reverse migration can be built later.

6.2.4.2 The amphibian migration status can be estimated from the sex and age of migrating individuals. Males migrate first almost exclusively; females join them later, and the sex ratio equalizes over time until females prevail. Males are almost absent from the final stages, and immature individuals increase that migrate for reasons other than for reproduction. At suitable night-time temperatures (above +4°C) along with precipitation, if no individuals are registered at the barrier for three days in a row, the spring migration can be considered finished and the barrier can be dismantled.

6.2.5 **Installation until capture of metamorphosed individuals in summer**

6.2.5.1 After the spring migration of mostly adult individuals, freshly metamorphosed ones spread out in summer, frequently in huge quantities. This spread lasts for up to many weeks, depending on the species; differences within a species are possible with respect to altitude and weather situation.

6.2.5.2 Protection of metamorphosed individuals from roads is provided by both-sided barriers installed on the site until the juvenile migration is finished (June to August). Leaving the barriers on both sides makes sense although metamorphosed individuals are captured on one side only (the water side). The reason is that one-sided barriers always pose a risk for individuals that enter the road area from the other, unprotected side (see 6.2.1).

6.2.5.3 Protection for this movement is included mainly at large, particularly linear construction projects. The essential requirement is that barriers have a top border, because juveniles climb over a borderless barrier easily owing to their small size/low weight.

6.3 Mobile barrier installation methods

6.3.1 Mobile barriers are installed around construction sites and along existing roads. To protect amphibians against road traffic, barriers are installed preferably on the outer side of ditches so that they do not hinder traffic and road maintenance (mowing, snow removal, etc.). To provide stability, wooden pegs are hammered deep enough into the ground, so that they can hold the barrier in the wind and pressure waves from passing vehicles. For increased barrier strength, pegs can be installed on either side. Their anchoring depth depends on soil type and moisture, at least 30 cm in most cases. Spacing between pegs is 100-200 cm (shorter in more uneven terrain).

6.3.2 The barrier material is installed so that the bottom edge, about 10 cm wide, is laid on the original ground facing the animal migration direction and covered with surrounding earth or provided sand, forming a continuous layer without gaps (Fig. 1). The barrier has to touch the ground along the entire length. An exception is where the barrier crosses a watercourse. In such a case, a simple wooden bridge is built, which the sheet touches. Another option is to end the barrier at the watercourse and extend it along it with a backward looping bend (Fig. 4). The same arrangement is used on the other side of the watercourse.

6.3.3 The barrier is fastened to the pegs from the bottom up, preferably with staples (8-12 per peg) using a staple gun. The top edge of the barrier, about 5 cm wide, is bent against the animal migration direction (similar to the bottom edge) and then only fastened to the pegs with staples. This produces a border preventing tailed amphibians from overcoming the barrier.

6.3.4 If possible, installation of mobile barriers needs to avoid sharp angles, which may give amphibians an opportunity to overcome them. Where the barrier needs to end, make a backward looping bend. The loop returns amphibians to the barrier and prevents them leaving sideways (Fig. 4).

6.3.5 It is advisable to add a sign to the barrier explaining what the device is for and who is in charge of its inspection, including contact details. This is important in particular where barriers intersect footpaths.

6.4 Livetrap installation method

6.4.1 Livetraps are used with capturing mobile barriers. Vessels are dug right under the barrier, typically spaced 20-30 m apart. In the case of large numbers of animals, it is advisable to place traps more densely or add more later. Conversely, sections know to contain few individuals can have capturing traps spaced up to 50 m apart.

6.4.2 The bottom border of the barrier is adjusted (bent) near the vessel so that animals cannot use it to pass over the trap. The vessel opening has to be located partly under the barrier to avoid creating a loose spot between the trap and the barrier. Capturing vessels have to be sunken into the ground so that their top edge does not protrude over surrounding ground and amphibians thus do not circumvent them (Fig. 2). There must be no free space left around the sunken vessels, so that animals cannot fall in there instead of into

the vessels. The trap has a lid with its inside cut out. This produces an overhang preventing escape of amphibians, notably newts (Fig. 3).

6.4.3 The vessel has to have small holes in the bottom, no more than 2-3 mm in diameter, to help water escape. With larger holes, newts and metamorphosed frog individuals may escape through the bottom, hide or die in the area under the vessel; besides, shrews will bite through larger holes and enlarge them further. If traps are placed in highly waterlogged ground, water would enter the vessel via holes in the bottom. In such cases, do not make holes in the bottom. The vessel has to be weighted down, e.g., with stones to prevent groundwater lifting the vessel. Securing the vessel edge with a bent rebar driven into the ground is even better.

6.4.4 Do not put any substrate or stones in the vessel (with the above exception), as they complicate inspection (newts and frog juveniles in particular are easily overlooked in such vessels, or injured by handling the stones). Conversely, it is advisable to leave a moist sponge inside to prevent amphibians from drying, particularly if they remain in traps during the day. The peg nearest to the trap is marked with reflexive paint so that none of the capture vessels are left unchecked. It is very important to number the traps to allow accurate records on captured animals. It is very useful to locate the section with the greatest number of captured individuals. In the case of newly built roads, this helps identify the strongest migration point, where installation of a permanent measure is desirable.

7. Mobile barrier inspection

The method and frequency of temporary barrier inspection depends on their function.

7.1 Guiding and inhibiting barrier inspection

Guiding barriers are used to guide animals outside an area where they are threatened by road construction or traffic. They are used in combination with culverts, bridges, etc. (see 4.2.1). As with inhibiting barriers (4.2.3), they lack capturing vessels. Thus, inspection focuses mainly on functionality of barriers. Inspection is necessary at least once a week, but always following strong wind, rain or snow, which may damage barriers. Besides the barrier condition, it is necessary to check for any amphibians killed by the construction or road. It may indicate a damaged barrier or its inappropriate location.

7.2 Capture trap barrier inspection

7.2.1 Inspection method

7.2.1.1 In capturing barriers, the checks involve not only integrity of barriers, their fastening to pegs and correct earth covering (similar to the above types of barriers), but also the vessels used as traps for capturing migrating animals. Captured individuals are relocated to the destination immediately.

7.2.1.2 If the barrier is installed along one side of the road only, the check needs to pay attention to individuals returning from the reproduction site as well. These individuals have to be allowed to cross the barrier or carried over it.

7.2.1.3 Presence of amphibians killed on the construction site or road is also checked for.

7.2.2 Inspection frequency

Barriers and traps, if any, need to be checked at least once a day, preferably in the mornings, to make sure no amphibians stay in the traps too long (stress, injury, predators); the risk of dehydration is also higher during the day. During stronger migrations of many individuals, it is important to check traps more frequently, ideally in the mornings and evenings after dusk (mainly after rain at the start of the main migration).

7.2.3 Initial visual inspection of traps

Before emptying the capturing vessel, it is necessary to look inside it. It may contain a living or dead rodent or even an adder. Besides the inside of the trap, check the bottom of the lid edge too for newts.

7.2.4 Gentle handling of individuals

7.2.4.1 Captured individuals have to be handled carefully to prevent their injury. Gentle handling of individuals for the shortest possible amount of time is also necessary for stress reduction. Stress is energy-intensive and has a negative impact on

reproductive success and survival itself. The hands should be wet to prevent wiping the protective slime off the amphibian skin. Alternatively, gloves can be used for handling individuals (if using latex gloves, then only powder-free), which is of importance in prevention of spreading amphibian diseases (see 7.2.6). New disposable gloves shall be used on each site. If using thicker, rubber-coated gloves, always replace them between sites and then disinfect them.

7.2.4.2 Transfer of captured individuals over longer distances has to use suitably modified and sufficiently large lockable, but ventilated containers (e.g., larger animal crates or plastic crates with moist PU foam on the bottom). Containers with animals must not be left in the sun, where they would overheat. Amphibians can be transferred over short distances, in the order of hundreds of metres, crossed within a few minutes, in buckets. The vessels used as traps are inappropriate for this.

7.2.4.3 Some species are preferably not transferred together; e.g., fire-bellied toads can threaten other, more sensitive species (notably frogs in the genus *Pelophylax*) with their skin secretions. Adult frogs are transferred separately from juveniles and small newt species (notably the genus *Lissotriton*), which can also be eaten in the containers by larger newts in the genus *Triturus*. To minimise interspecies interactions, the best solution is to transfer different species separately.

7.2.4.4 If animals other than amphibians are found in the vessels, they have to be removed (including dead) just like leaves, bits of wood, etc.

7.2.5 **Clean and functional traps**

7.2.5.1 Capturing traps are maintained clean. If necessary, they are wiped clean with a sponge, washed in a disinfectant (such as F10, Virkon S at a concentration specified on the product packaging) after each trap to prevent spread of disease; see below.

7.2.5.2 The trap has to remain functional throughout the migration; checks its tight alignment with the barrier and position in respect of ground surface (surrounding earth must not be removed, the trap must not be pushed up by groundwater, etc.). If the bottom of a capturing trap has been nibbled through by rodents, replace it; otherwise, newts could crawl through the hole and die in the space underneath the vessel.

7.2.6 **Prevention of spread of infectious amphibian diseases**

7.2.6.1 They include ranavirus diseases and, most importantly, chytridiomycosis – a disease caused by chytrid fungi. It is manifested by open lesions on the skin, unnatural behaviour (e.g., absence of escape reaction or lethargy of individuals). If any individuals with lesions are found, each vessel with such individuals, including any other captured amphibians, is removed from the barrier immediately and replaced with a new one. Infection suspicion can only be confirmed/refuted

by an expert examination in a laboratory, which is why a regional NCA office has to be contacted immediately.

7.2.6.2 Although amphibian protection using mobile barriers is generally a useful protective measure, transfers have to stop if infection is confirmed, because it would spread much more efficiently via direct contact between individuals during transfer.

7.2.7 **Data recorded**

7.2.7.1 When using guiding and inhibiting barriers, all identified species and their numbers are recorded; identification of areas with the highest concentrations is important. The same applies for finds of killed amphibians.

7.2.7.2 When using capturing barriers, species and numbers of individuals, including their sex if possible, are recorded for each numbered trap on every day of inspection. In addition, it is advisable to record the time of each inspection. Information about current and preceding weather (precipitation, wind, air temperature) is useful. A maximum-minimum thermometer located near the barrier is expedient for this.

7.2.8 **Inspection interruption at low temperatures**

Amphibian migration is fundamentally influenced by weather, particularly precipitation and temperature. The air temperature in the evenings, about two hours after dark, is important. If it is below 2°C, amphibians will not migrate even if then increases during the night. If low temperatures continue for a longer time, capturing traps can be covered with a full lid temporarily and inspection can be interrupted. Leaving traps open without inspection is unacceptable, as other animals, such as small mammals, might fall into them.

8. Mobile barrier removal

8.1 Mobile barrier removal timing

For all amphibian migrations covered by mobile barriers (see 6.2), both barriers and traps are removed when the presence of amphibians becomes zero. Temperature and precipitation have to be taken into account. Drought and cold temperatures may only interrupt amphibian migration. If no amphibians are found even after rain and if the temperature in the evening before and on the following morning is at least 4°C, the migration is probably over. If this situation repeats for three consecutive days, remove the equipment.

8.2 Mobile barrier removal methods

A mobile barrier is unfastened from posts, the polythene or fabric is rolled up (polythene can be rolled up complete with clean and dry pegs) and taken to storage; damaged barriers are taken away for eco-friendly disposal. Wooden pegs are pulled up from the ground, earth is removed from them, and they are stored. Damaged or rotten pegs are disposed of. Capturing vessels are taken away for disinfection; damaged vessels (e.g., nibbled through by rodents) are disposed of safely. Holes left after capturing vessels have to be backfilled to prevent animals being trapped in them.

9. Final report

9.1 Final reporting duty

A final report has to be made after the work completion. It shall be submitted to the contracting authority by the date and in the format agreed in the contract. A copy of the final report should be sent in electronic form to the NCA CR (ndop@nature.cz), unless it is the contracting authority, by 30 October of the current year. Summary transfer data are entered into the NDOP, administered by the NCA.

9.2 Final report purpose

The final report serves assessment of measure efficiency, including decision-making whether permanent barriers should be set up instead of temporary ones and where. For long-term projects, trends in amphibian numbers can be assessed. Data on presence and numbers of amphibians acquired by capturing them using barriers and traps are very valuable. It is an extremely efficient monitoring method, which captures the absolute majority of individuals if done properly. Data from the final report are also used for updating the amphibian collision point layer (migration obstacle database) at www.mapy.nature.cz (Applied nature protection).

9.3 Final report requisites

Above all, the final report has to include data on species and numbers of transferred amphibians, including those killed (see 7.2.1) and any other identified species important in terms of conservation. This overview is made preferably in the form of a table; the rows can be for species and columns for days; more detailed breakdown by numbered capturing vessels is even better. If possible, we recommend distinguishing the individuals' age too (juvenile × subadult – typically two-year-old × adult). The **mandatory** requisites for a transfer report include:

- Identification /address, email, telephone) of the contracting authority and the person in charge of the project, and names of participating persons.
- Location (municipality or cadastral area), site identification (map, coordinates) and length of the barrier, dates of installation and removal, specification of sections with strongest amphibian migration (map, coordinates).
- Description of material for barriers and traps, method and frequency of their inspection.
- Assessment of the transfer, narrative summary and total numbers, comparison of data with previous years if possible, numbers of killed individuals, data on weather during the transfer, any endangering factors identified, and preferably suggestions for improving transfer and elimination of negative factors.

Additional **optional but useful** information includes:

- Data on site characteristics, prevalent biotope types in the surroundings, presence of watercourses, culverts, reproduction biotopes, etc.
- Weather on each day of inspection (precipitation, wind and, most importantly, temperatures, preferably daily maximums and minimums and evening temperatures).
- Map and graphic annexes.

Annex: Drawings

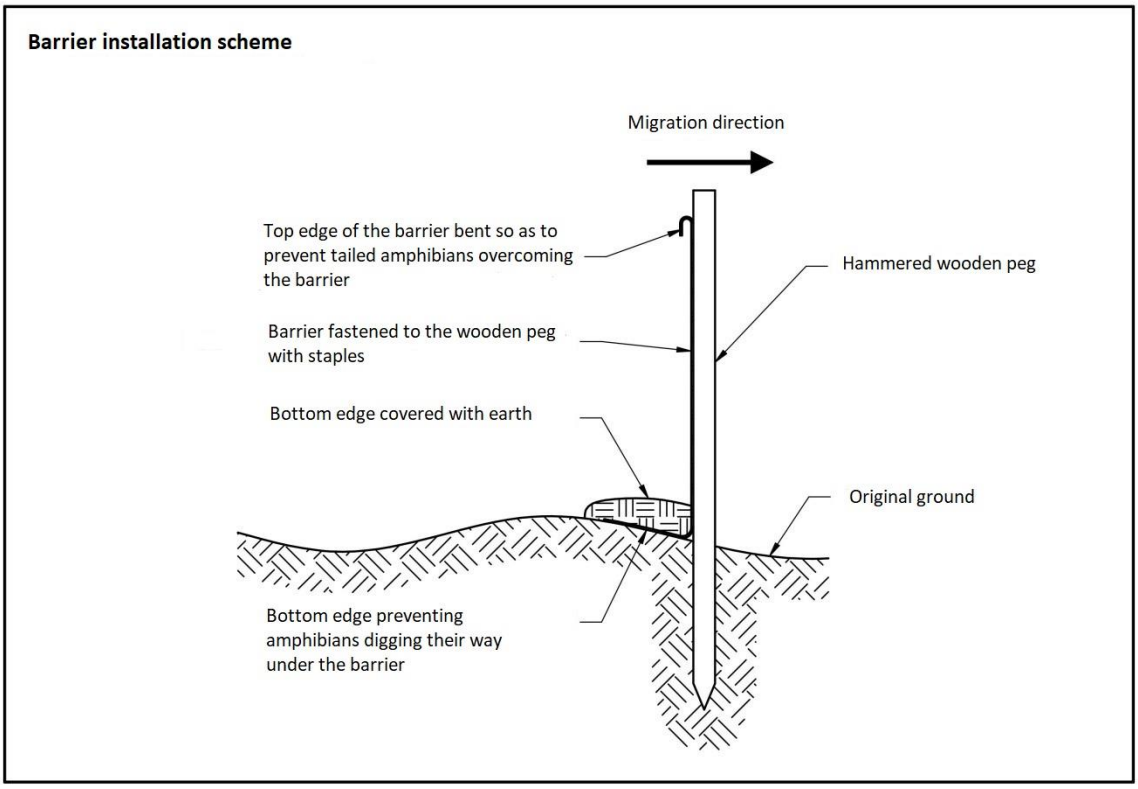

Fig. 1 Barrier installation scheme

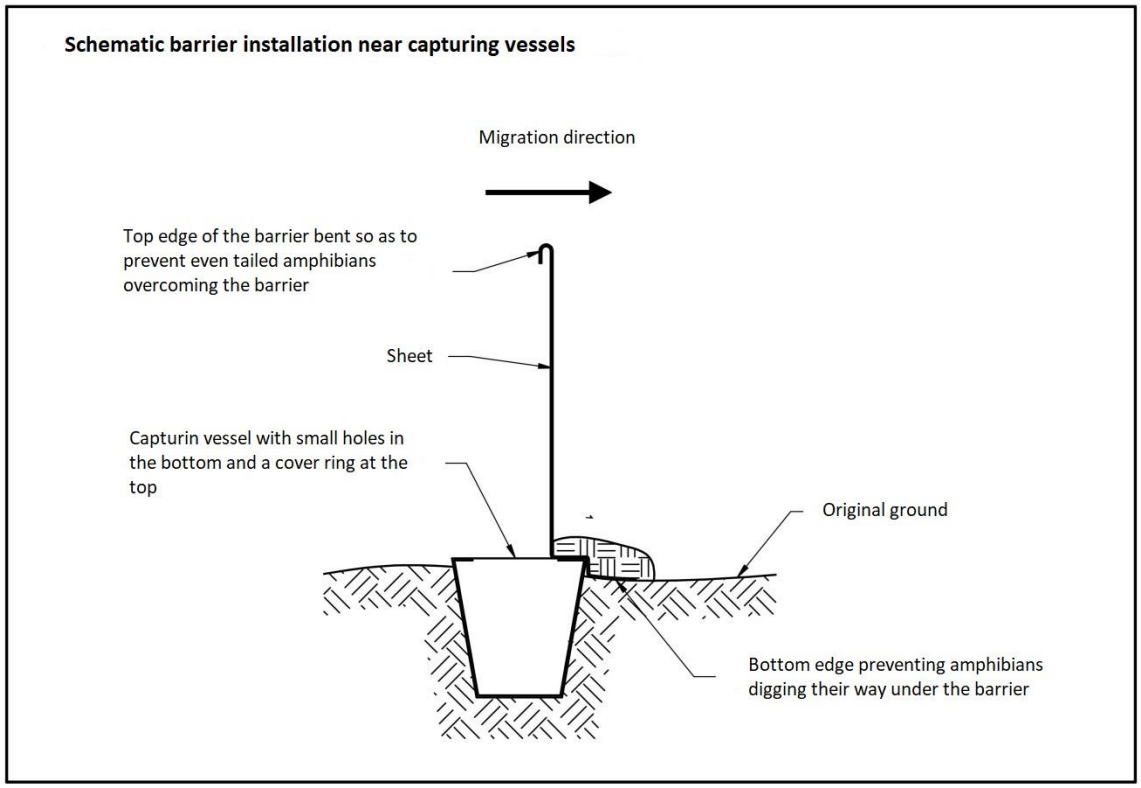

Fig. 2 Schematic barrier installation near capturing vessels

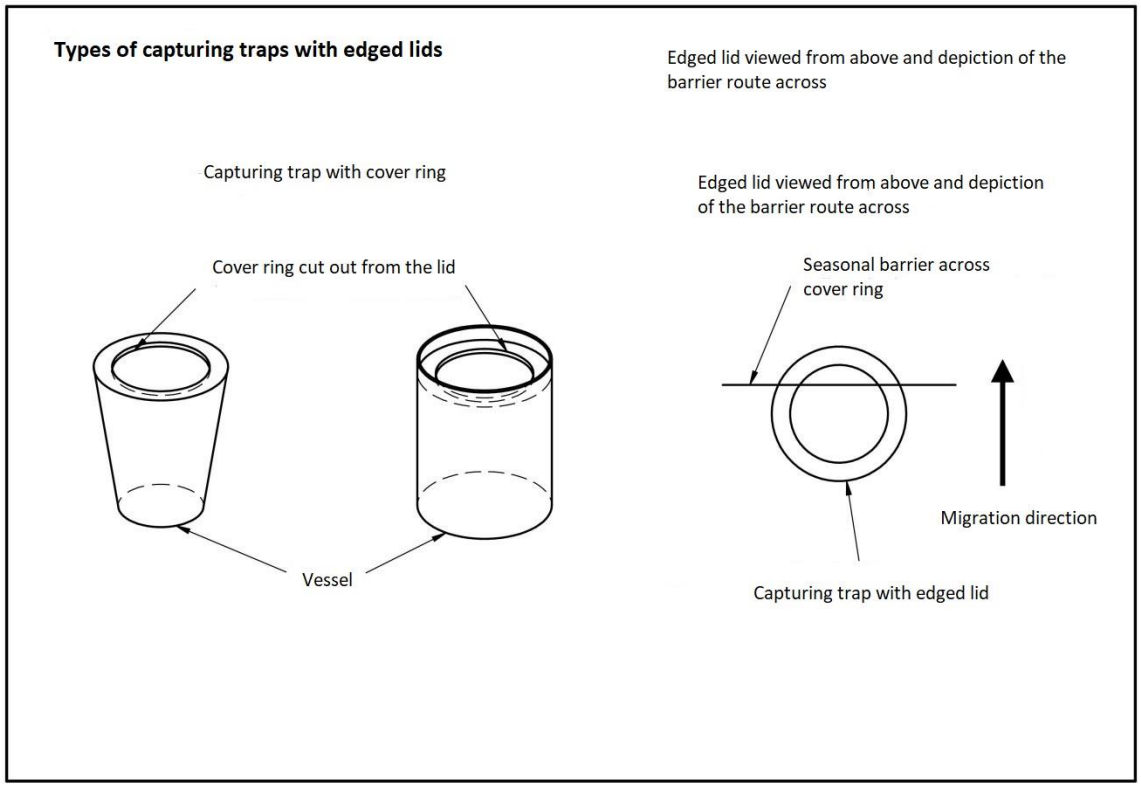

Fig. 3 Types of capturing traps with edged lids

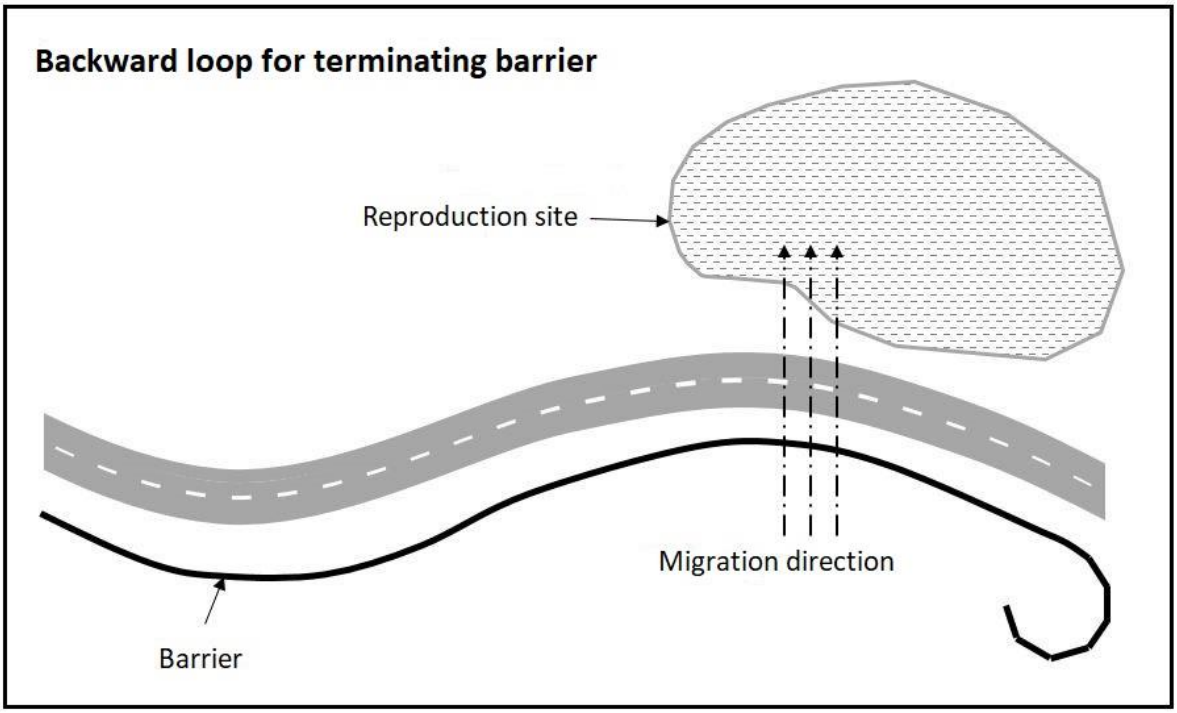

Fig. 4 Backward loop for terminating barrier

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