

# EVALUATION AND CONTROL OF NATURE VALUES IN THE ADAZI VILLAGE MILITARY TRAINING AREA

## **MANUAL**

**FOR THE USAGE OF ARMED FORCES PERSONNEL**

can be used for the assessment of certain described nature values also in other military polygons



# ABSTRACT

The Latvian Fund for Nature is working in the vicinity of Adazi village since 1999 and is investigating nature values, and has taken part in founding the protected landscape area “Adazi”. The protected landscape area “Adazi” (6131 ha) is a part of the largest (7784 ha), nowadays active military polygon in the Baltic States. Military activities here started already in 1934. The NATURA2000 site, the protected landscape area was founded in 2004, to conserve the largest areas of heather fields in the Baltic States and wide areas of herbaceous grey dunes covered by grey hair-grass *Corynephorus canescens* developed and maintained due to regular military activities. In this area, also *Molinia caerulea* meadows and mesotrophic lakes as well as a remarkable number of protected plant and animal species exist. One restricted nature area – “Lieluikas and Mazuikas lakes” (192 ha), founded in 1999 – is included in the protected landscape area. There are areas sensitive to any disturbances, which interchange with wide, open plain areas dependent of disturbances maintained by military activities that conserve these areas in a favourable state. The military training area Adazi and its vicinity is a significant international Important Bird Area (IBA), too.

The manual is prepared within the activities of the LIFE-Nature project “Restoration of Biological Diversity in Military Training Area and NATURA2000 site “Adazi”” (2007-2009) administrated by the Ministry of Defence of Latvia. The professionals of the Latvian Fund for Nature have carried out several essential activities within the frame of an extend project including:

- development of nature management plan;
- education of military personnel on natural values including development of education programme and approbation; during the project more than 1000 military staff where trained;
- development of monitoring programme and manual for military personnel to evaluate and control species and habitat state;
- preparation of information stand on natural values for military personnel located at the project site;
- consultation of the project administration group about several issues to realize scientifically based management of species and habitats.

Military ecology is a rather new branch in professional conservation of nature. Therefore, work in the military training area Adazi was a big professional challenge. A full habitat mapping and habitat assessment of the landscape area was performed. It needs to be stressed that just several protected sites in Latvia have a detailed actual habitat map for the whole area.



For the first time in Latvia and Europe, a monitoring programme, method and manual for the assessment of species and habitats by the military personnel was developed during 2008-2009. Simple but reliable indicators are included in the monitoring programme to evaluate the conservation state of certain species and habitats. As a result of special education, the monitoring applied by the military personnel which use a monitoring manual, maps with marked routes to be monitored as well as questionnaires are carried out. As the Adazi protected landscape area is part of the active military training area, changes in nature can occur rapidly. The aim of the monitoring is quickly to follow the impacts of military activities and their effects on nature.

Since 2010, monitoring is successfully carried out by the National Armed Forces of Latvia. An analysis of the preliminary results show that obtained data is relevant and usable for proper statistics and nature conservation purposes. A scientific monitoring of nature management activities and *NATURA2000* species and habitat monitoring are carried out simultaneously.

The manual is adapted for the usage outside the *NATURA2000* site and military training area Adazi and translated into English to share a proved, scientifically based experience and method to inspire colleagues outside Latvia. The provided questionnaires can be adapted also to other habitats on military training areas across Europe.

Location of military training area and *NATURA2000* site Adazi in Latvia and in region



# Dear soldier, you are welcome!

This manual will help you perform monitoring of certain values in nature – species and habitats in a military training area including its protected parts. What is monitoring and why is it needed? Monitoring means to make regular observations according to which it is possible to judge about changes in nature. The observations are necessary while the military training area contains different rare species and habitats to be conserved besides wide areas used for training purposes. As this area is managed by the National Armed Forces, you, as any other responsible owner, should take care of all values in this area. A longterm management of the military training area – using the area primarily for military trainings and simultaneous proper management of natural values – is feasible if using monitoring which constantly and quickly follows the impacts of military activities and their effects on nature.

## **Knowledge necessary to carry out monitoring**

All necessary basic information to perform monitoring is available in this manual. Before carrying out the monitoring, it is advisable to organize a two-day training course including theoretical lectures and field trainings. The performer of monitoring should remember that all observations should be done precisely and responsibly. The implementation of the task is usually made by working in pairs where as a leader the most experienced soldier is chosen.

## **Inventory necessary to carry out monitoring:**

- map with marked areas to be assessed;
- plane table – pad to make notes;
- writing materials;
- questionnaire – form to fill and register observations;
- monitoring manual;
- binoculars.

## **Additional inventory, advisable:**

- GPS device;
- digital camera.



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## Terms used in manual

**Monitoring** – regular observations of changes in the area performed in certain places according to a particular method.

**Habitat or biotope** – a homogenous terrestrial or water area which is suitable for a certain species complex. For example, a habitat is a forest, meadow, river, heather etc. One habitat can be a living space for various species.

**Species habitat or living space** – a place where species live, reside or has been observed regularly. Species living space is a habitat or part of habitat or several habitats together.

**Protected in Latvia** – a habitat or species that are rare in Latvia and thus protected by the national legislation.

**Protected in European Union** – a habitat or species that are rare in the European Union and thus protected.

**Priority protected in European Union** – a protection of species or habitat which is prior in the European Union.

# Objects to observe

In the case of the military training area Adazi nine various habitats and three living spaces of protected species are planned to be observed by this monitoring. An overview of species, habitats and observation methods are arranged in Table 1. The observation methods are described in details further. However, for other military training areas, additional or other habitats could be relevant and questionnaires have to be modified.

Table 1

Species and habitats to observe		
No	object	method
<b>HABITATS</b>		
<b>habitats sensitive to any disturbances</b>		
1.	eutrophic and oligotrophic (Lieluika and Mazuika) lakes	observation of lakes according to the questionnaire
2.	flowing waters and their banks, beaver	observation of flowing waters and their banks according to the questionnaire; audit of beaver dams and registration of new ones, mapping and filling in the questionnaire
3.	wet and damp forests	local observation of habitats according to the questionnaire
4.	mires	local observation of habitats according to the questionnaire
<b>habitats dependent on regular disturbances</b>		
5.	heather	local observation of habitats according to the questionnaire
6.	sand plains	local observation of habitats according to the questionnaire
7.	biggest dunes, dune ridges and masses	local observation of habitats according to the questionnaire
8.	meadows	local observation of habitats according to the questionnaire
9.	several old dry pine forests	observation of separate areas of forests according to the questionnaire
<b>SPECIES</b>		
10.	natterjack toad	evaluation of habitat
11.	black grouse	audit of wintering spots
12.	beaver	audit of beaver dams and registration of new ones, mapping and filling in the questionnaire



# Frequency and methods of species and habitat observations, general information

The optimal frequency of observations is three observations per year. The observation of habitats should be made during the vegetation season (from May to the end of September). Some observations exceptionally are allowed to perform outside the vegetation season in a snow free period. Observations of the black grouse have to be done in winter but beavers can be observed all over the year in snow free periods.

The routes of habitat observations vary in length, width and direction according to the habitat.

Lakes have to be walked round along their banks when observing them within the distance of direct sight (15-25 m wide bank zone belt), but, the flowing waters control should be performed along the stream in a 10 m wide zone.

The dunes have to be crossed via ridge or the highest line, when observing the top and slopes of the dune.

Other habitats have to be observed by crossing them according to numbered routes marked on maps. Thresholds and terminal points of the routes are easily found and identified by objects in the field such as passes, bridges or ditches.

Observations in forest habitats are to make in the width of approximately 5 m, in heather fields, sand plains and mires in the width of approximately 10 m on either side from the marked route.

Species are observed in the same way, according to the marked routes or the observation is performed from the species living space.

In one observation one or several routes can be checked, the overall time is dependent on the length and difficulty of the routes.

Maps with observation routes should be included in the supplement of the observation questionnaire.



# Habitats sensitive to any disturbances

Habitats sensitive to any disturbances develop and exist without human influence because human impact is not positive in this case.

The following habitats are sensitive to any disturbances in the military training area Adazi:

- eutrophic and oligotrophic lakes (Lieluika and Mazuika lakes);
- flowing waters (Puska and Melnupe rivers) and their bank zone belts;
- wet and damp forests.

## Habitat observation methods

**Eutrophic and oligotrophic lakes (Lieluika and Mazuika lakes).** Lakes have to be walked round along their banks and register visible indicators in the bank zone. The presence and amount of bushes as well as the level of overgrown areas with reed have to be checked along the bank-line of the oligotrophic lake like Mazuika. The parameters to be checked are described in detail in a habitat description. Two questionnaires, one for each lake, have to be filled in.

**Flowing waters (Puska and Melnupe rivers) and their banks.** Water streams have to be controlled along one bank in at least a 2.5-3 km long section, previously marked in a map, to register observations in a 10 m wide waterside belt. Tracks, inundated areas, beaver houses and dams along the banks of rivers must be registered and mapped. A separate questionnaire has to be filled in for each section of flowing waters. The first observation has to be performed in spring (April or May) the following two observations should be performed in summer and early autumn (July and August).

**Wet and damp forests.** The forests have to be crossed according to the marked line-route in a map. Observations are performed when crossing the forest and registered in the questionnaire. The parameters to be observed are described in detail in a habitat description. The first observation has to be performed in May, and the following two observations in July and August.

The recordings of habitats by photography in the course of observations are advisable if a digital camera is available. It helps compare changes of the habitat during a longer period of time. The places where the photos are taken have to be mapped and numbers of the photos registered in the questionnaire.



# Eutrophic and oligotrophic lakes

## (Lieluika and Mazuika lakes)

Both lakes are located in the western part of the military training area Adazi. Lake Mazuika (Figure 2) is oligotrophic – poor in nutrients – and is a protected habitat in Latvia and the European Union. Lake Lieluika (Figure 3) is eutrophic – richer in nutrients due to the inflow of waters from the Rampa mire. Lieluika lake is a protected habitat in the European Union. Several protected plant species occur in the lakes and along their banks.

The water level of lake Mazuika is rather fluctuating; it changes seasonally as well as yearly. A wide sandy flood belt is developed due to regular water level rising and dropping (Figure 2) where rare and protected species occur. Water is very clear with a high transparency.



Figure 2. Flood plain belt of lake Mazuika

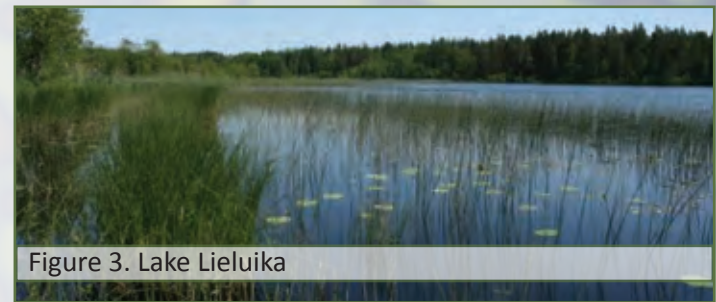


Figure 3. Lake Lieluika

People are keen on taking a rest near lake Mazuika because the flood belt of the lake looks similar to a coastal beach environment, in spite of formal prohibition to swim there. An unauthorized recreation causes pollution (Figure 4) and refinement of the lake with nutrients (*eutrophication*) which in its turn leads to disappearing of sensitive protected plant species and faster overgrowing of the banks with reeds (Figure 5). Tourists are trampling along the flood plain belt of the lake and make bonfires, too. The same problems can also exist for lakes in other military training areas.



Figure 4. Lake Mazuika waterside is overvisited and polluted



Figure 5. Section of lake Mazuika bank is overgrown with reeds

The observation method of the two lakes is given on page 6 and the questionnaires are given in supplements 1 and 2. It takes approximately 3-4 hours to control one lake.



# Flowing waters

## (Puska and Melnupe rivers) and their banks

Several flowing waters can occur in a military training area. For the military training area Adazi, the Puska and Melnupe rivers are the most important ones there. The headwaters of the Puska river were been drained many years ago, while the lower reaches form a serpentine landscape with a marked and variable width of the flood plain (Figure 6). The headwaters of the Melnupe river were drained too, but a lower part has been kept untouched (Figure 7).

A characteristic feature of the untransformed sections of rivers is meandering, which makes any river significantly longer and broadens its flood plain as well as influences the habitats along its banks. Old and valuable forests with high biological diversity develop along these rivers. Beaver dams occur on both rivers (Figure 6). Trees are gnawed and felled by beavers along their banks (Figure 8).



Figure 6. Lower reaches of Puska river



Figure 7. Lower reaches of Melnupe river



Figure 8. Trees gnawed and felled by beaver in lower reaches of Puska river

The observation method of flowing waters is given on page 6 and the questionnaire is given in supplement 3. It takes approximately 4-5 hours to observe and control one section of flowing waters.



# Wet and damp forests

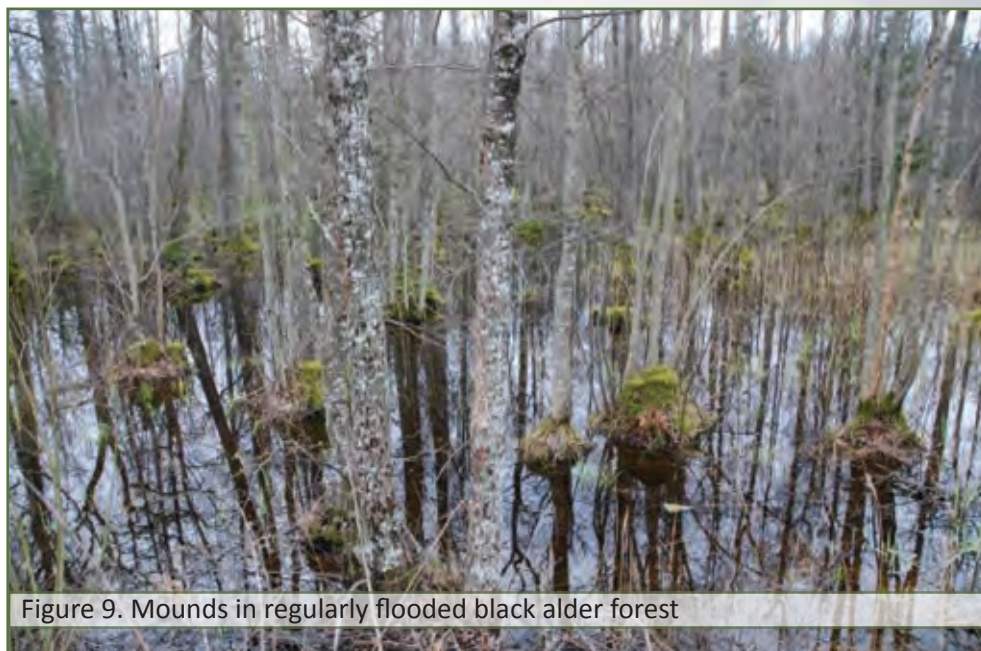


Figure 9. Mounds in regularly flooded black alder forest

Wet and damp forests can occur in military training areas in declines of reliefs along flowing waters and other areas with high ground water level and a low relative altitude above the sea level, as it is the case in Adazi.

Regular water level fluctuations, which sometimes express themselves as floods are common in damp forests. Trees under such conditions are trying to “climb up” above the water level, thus, around roots of trees mounds covered by mosses are common (Figure 9).

As most of these forests consist of deciduous trees when the leaves appear and canopies join, a permanent shadow develops. A large amount of moss and a lichen deck on the stems of trees indicate a very high humidity of air (Figure 10).

Dead standing trees are characteristic of wet and damp forests with no assistance of human activities (Figure 11). This dead wood forms feeding ground for various larvae of insects. Many woodpecker species feed on them. This is a reason why in dead trees nine times out of ten it is possible to find hollows made by woodpeckers.

Some trees in such forests fall flat or are broken down by wind. When fallen down, they develop decayed trees of various sizes which decompose slowly (Figure 12).

The soil in wet forests is humid and therefore very soft almost all the time. That is why signs of tracks in such forests can keep a very long time. It is allowed only to walk there with great care.





Figure 10. Stem of tree covered by moss in wet forest

The observation method of wet and damp forests is given on page 6 and the questionnaire in supplement 4. It takes approximately 1-5 hours to observe and control one route of wet and damp forests



Figure 11. Dead standing tree with hollows made by woodpecker



Figure 12. High diameter decayed tree



# Habitats dependent on disturbances

A longterm maintenance of the habitats and connected species dependent on regular disturbances, to imitate the processes in nature when separate trees are fallen down by storms, fire etc., controlled burning, loosening of the upper layer of soil, an eliminating vegetation in small patches, diminishing the number of trees and bushes, as well as cutting down trees is needed. Military activities in a polygon imitate disturbances to help keep certain habitats open and prevent overgrowing, and transformation towards other types of habitats. The following habitats are dependent on disturbances in the Adazi military training area:

- dry and wet heather fields;
- sand plains;
- dunes;
- meadows;
- mire – edge of the Rampa mire;
- dry pine forests.

## Habitat observation methods

**Heather fields.** A habitat has to be crossed according one, previously mapped route, in the width of approximately 10 m on either side from the marked route. When filling the questionnaire in, the level of overgrowing with bushes and trees of heather field as well as other parameters has to be checked.

**Sand plains.** The control of sand plains is performed similar to the heather field control. In this case, too, the habitat is crossed according one, previously mapped route and overall conditions of areas as well as other observations are registered in the questionnaire.

**Dunes and dune masses.** Dunes are recognized in the field due to their more or less elevated state above surroundings. The dunes have to be crossed via ridge or the highest line, when observing. In this case, the route is not a straight line but a curve. The observations are performed within the whole width of the dune.

**Meadows.** Several meadows (small in size) occur in the polygon, two of them have to be observed by walking around the perimeter at first. Afterwards, the meadow has to be crossed according a mapped route. The observations are performed in the width of approximately 10 m on either side from the marked route and registered in the questionnaire.

**Mire.** The mire has to be crossed according to a previously mapped line that allows to be stepped off to avoid marsh pools. Overgrowing with bushes and trees as well as other observations has to be registered in the questionnaire. The observations are performed in the width of approximately 10 m on either side from the marked route.

The recordings of habitats by photography in the course of observations are advisable if a digital camera is available. It helps compare changes of the habitat during a longer period of time. The places where the photos are taken have to be mapped and numbers of the photos registered in the questionnaire.

**Dry pine forests.** The forests are observed in the width of approximately 5 m on either side from the marked route and according to the questionnaire.

# Heather fields

Dry heather field is a protected habitat in Latvia and in the European Union. Heather field in Latvia is a rare habitat. The largest areas occur in the Adazi military training area where they cover more than 1800 ha. The heather fields at Adazi have developed and are maintained due to regular military activities – fires, tracking, digging and exploding – which is also true for other heather fields in Europe. The heather fields in the polygon Adazi are diverse depending on soil, humidity and management.



Figure 13. Mosaic of heather field with lichens – visible as light patches

Heather fields as their name shows are predominated by heather *Calluna vulgaris* (Figure 13), although these are not only plants. Larger or smaller patches with various lichens are common among heather fields. They are a good indicator of a favourable state of heather fields because in future heather grows older or overgrows, and instead of lichens, other plants spread out. Regularly managed heather field has a rather small number of trees and bushes and mainly they occur in small groups while the other area is open.





Figure 14. Overgrowing heather field



Figure 15. Overgrown heather field

If heather fields are not managed for some time, they slowly overgrow with pines and birches (Figures 14 and 15). The most suitable management of heather fields is regular burning. After burning has been done, heather regenerates rapidly (Figure 16).

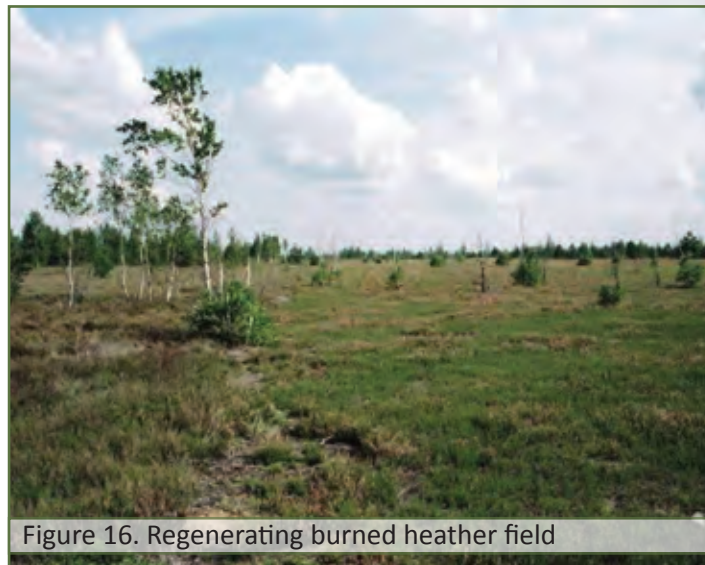


Figure 16. Regenerating burned heather field



Figure 17. Disturbance made by military activities in heather field

It is not only fire that helps maintain heather fields. They are also influenced positively by tracking, exploding and other military activities, as a result of which small open soil surface patches have been exposed (Figure 17).

The observation method of heather fields is given on page 11 and the questionnaire in supplement 5. It takes approximately 2-3 hours to observe and control one route of heather field.



# Sand plains

Sand plains within the area of the polygon Adazi have developed in places where regular military activities take place – there are lots of activities like driving, walking, digging, shooting and blowing up. Based on the military activities and soil conditions sand plains also exist in other military areas. Sand is permanently visible in sand plains, compared to heather fields. Vegetation is very scared, and it consists mainly of mosses and separate grasses (Figures 18 and 19).



Figure 18. Typical sand plain in Adazi military training area

Similar to heather fields, sand plains are slowly overgrowing if it is not managed properly or military activities do not take place in them, or the intensity of activities is too low (Figure 20). On the other hand, if a sand plain has been overused, that is, very intensive driving takes place, very large open sandy areas without vegetation develop which causes erosion of soil and blowing off sand by wind (Figure 21).



Figure 19. Development of vegetation on sand



Figure 20. Overgrowing of sand plain



Figure 21. Overused sand plain

The observation method of sand plains is given on page 11 and the questionnaire in supplement 6. It takes approximately 2-3 hours to observe and control one route of sand plain.



# Dunes and dune masses

Separate dunes and dune masses occur – like sometimes in other military areas – in several places of the Adazi polygon where local elevations of the relief have developed. Parts of these dunes correspond to the highly protected habitat in Latvia and the European Union. One rare grass in Latvia can be found in vegetation – grey hair-grass *Corynephorus canescens*, which grows only on moving sands (Figure 22).

Moderate military activities play the main part to maintain dunes. These activities facilitate a periodical elimination of vegetation that takes place partly or fully (Figures 23 and 24) preserving simultaneously the form and relief of the dune.



Figure 22. Grey hair-grass *Corynephorus canescens* in sandy plain of Adazi polygon



Figure 23. Dunes maintained by military activities



Figure 24. Moderate disturbances facilitate regeneration of dune vegetation and prevent overgrowing of dune



Figure 25. Significantly impaired dune in Adazi polygon

If dunes are not managed actively but natural development takes place, they are slowly overgrowing with trees and bushes, and are transformed into a dry pine forest. On the other hand, when managing dunes, it is important to preserve the relief, not permitting significant modifications, which eliminate the form and landscape of a dune and facilitate blowing off sand by wind (Figure 25).

The observation method of a dune is given on page 11 and the questionnaire in supplement 7. It takes approximately 2-2.5 hours to observe and control one route of a dune.



# Meadows

Meadows can occur on military training areas in various sizes. In the Adazi military polygon meadows occur as small and isolated patches in the former homesteads. These are dry fallow meadows. On the other hand, sandy meadows have developed on the slopes of dunes and in plains intensively used for military activities. In most cases the polygon meadows are not permanently and properly maintained – by mowing and grazing. For that reason, they overgrow with trees and bushes (Figure 26). In the result of overgrowing the number of plant species decreases.



Figure 26. Patch of overgrowing meadow in Adazi polygon

The observation method of a meadow is given on page 11 and the questionnaire in supplement 8. It takes approximately one hour to observe and control one meadow.



# Mires

The mires, that are not influenced by human activities, are characterized by watery pools and tussocks covered with cranberries interchanged with hollows. *Sphagnum* moss is common there (Figure 31). Plants in a mire are growing slowly. If the vegetation has been eliminated, it regenerates only within a period of several years. In the case of the military polygon Adazi, the edge of the Rampa mire, Dzerve mire and other smaller mires are located in the polygon.



Figure 31. *Sphagnum* moss in mire



Figure 32. Overgrowing mire

The Rampa mire as well as the Dzerve mire was drained intensively many years ago and thus significantly lowering the water level in them. As a result, *Sphagnum* mosses were substituted by heather fields in large areas. Later these areas overgrew with birch, aspen and pine (Figure 32). At present, the conditions of the mires are improved but to restore mire landscape, bushes and trees have to be cut down.

The observation method of mire is given on page 11 and the questionnaire in supplement 10. It takes approximately 3 hours to observe and control one route of mire.



# Dry pine forests

Dry pine forests are widely spread in the Adazi polygon. The major part of the forest stand has developed on dry, poor soils because of elevations of the relief but newer stands have developed because of overgrowing heather fields and sand plains. Part of the forest stands is a priority in the European Union and thus an especially protected habitat – a boreal forest.

These forests are mostly old pine stands (Figure 27) where pines are biologically old and the trunks of the pines are commonly hollowed or branchy.



Figure 27. Pine stand in Adazi polygon



A large part of the vegetation is formed by various lichens (Figure 28). If disturbances do not occur in this type of forest, such as fires, mechanical disturbances of the upper layer of soil etc., lichens gradually disappear from the lower cover of vegetation. Mosses as well as heather and other tiny bushes such as cowberries and bearberries appear instead developing a dense lower layer of vegetation, which prevents spreading the pine offspring (Figure 29).



Figure 28. Lichens in lower layer of vegetation



Figure 29. Lower layer of vegetation densely covered with heather and mosses in dry pine forest

In dry pine forests undisturbed or partly disturbed by forestry, standing dead trees with hollows made by woodpeckers can be found. In addition, decayed trees of various sizes (Figure 30) occur which are of great importance for several insect species.



Figure 30. Decayed tree in dry pine forest

The observation method of a dry pine forest is given on page 11 and the questionnaire in supplement 9. It takes approximately 2-3 hours to observe and control one route of a dry pine forest.



# Species

Within the activities of monitoring, an observation and control of habitats and residential places is useful as these can be good indicators for the changes of the natural value of a military training area. For the military training area of Adazi three protected species are chosen: natterjack toad *Bufo calamita*, black grouse *Tetrao tetrix* and beaver *Castor fiber*. However, for the monitoring of other military training areas the choice of other species can be worthwhile.

## Monitoring methods of chosen species

**Natterjack toad.** The conditions of a species are supervised from mid April to the end of August observing areas of the registered habitats and potentially suitable places. The most reliable way to identify and denote the presence of a species is an observation of individuals in the chosen area. A characteristic feature by which it is easy to denote a natterjack toad is by a yellow stripe on its back. When observing the chosen area, it should be taken in consideration whether potentially suitable places for spawning areas such as shallow pools with sloping banks can be located in the vicinity. The chosen area has to be crossed according to the previously mapped route. All observations including the number of spotted individuals have to be written down in a questionnaire.

**Black grouse.** The presence of the black grouse has to be checked in areas where they have been registered before and where they stay for breeding in winter. These areas are heather fields and the edge of the Rampa mire in the Adazi military polygon. During the observation time the observer drives along the previously mapped roads, and trying on both sides of the road to register all the visible black grouse who are sitting on the branches of trees and feeding on buds. The registered number of birds in each flock and geographic coordinates has to be written down in the observation questionnaire.

**Beaver.** The beaver is not a rare species in Latvia but it is particularly protected in the European Union. The flooded areas made by beavers function as a habitat for other comparatively rare species. For that reason, when analysing changes in the number and the intensity of their activities it is possible to judge about the condition of these rare and protected species. The beaver has to be observed in his most inhabited areas, such as the largest drained ditches and in cases when the observations of flowing waters (Puska and Melnupe rivers) are performed. The condition of a species can be denoted practically during the whole snowless period. The species is observed according to the signs of its residence and activities, such as beaver houses and dams as well as to the gnawed trees and dens.

The recordings of habitats by photography in the course of species observations are advisable if a digital camera is available. The places where the photos are taken have to be mapped and numbers of these photos registered in the questionnaire.



# Natterjack toad

The natterjack toad *Bufo calamita* is the smallest toad in Latvia and can be distinguished from other toads by a yellow stripe on its back (Figure 33). An adult individual of this species can reach 6-8 cm in length and feed mostly on insects, spiders and worms. The natterjack toad is a protected species in Latvia and the European Union, and its habitats in Latvia have been strongly endangered recently.



Figure 33. Natterjack toad *Bufo calamita*



Figure 34. Pools suitable for spawning of natterjack toad in wet heather field in Adazi polygon

The species is rare because it requires specific conditions for its spawning grounds. The spawn usually takes place in shallow open sunny waters, which are not too deep – approximately from 5-10 cm till 50 cm – and have gently sloping watersides. In the Adazi polygon the natterjack toad uses for spawning partridge holes, different shallow pools and tracks made by military transport during its activities (Figure 34).

The regulations for the habitat observation of species are given on page 20 and the questionnaire of natterjack toad in supplement 11. It takes approximately 3-4 hours to observe and control one route.

# Black grouse

The black grouse *Tetrao tetrix* is a protected bird species in Latvia and the European Union. In the Adazi military polygon the black grouse occurs in heather fields and the Rampa mire. The black grouse is a permanent resident; it means that individuals stay permanently in a definite area. In spring, black grouses (Figure 35) gather in their mating-places which are usually longterm and permanent. The observation of the black grouse, not to disturb them, in the period of mating is prohibited!



Figure 35. Male (left) and female (right) black grouse *Tetrao tetrix*

In their residential areas in winter the droppings of the black grouse can be found (Figure 36). In winter the black grouse can be observed sitting on the branches of trees where in small groups they are feeding on buds. In this period the easiest way, how to denote them is by their typical outline (Figures 37 and 38), and it is possible to count up individual birds.





Figure 36. Droppings of black grouse



Figure 37. Group of black grouse in trees



Figure 38. Black grouse in trees

The method for the habitat observation of species is given on page 20 and the questionnaire of black grouse in supplement 12. It takes approximately one hour to observe and control one route if driving by car.



# Beaver



Figure 39. Beaver *Castor fiber*

The beaver *Castor fiber* (Figure 39) is not a protected animal species in Latvia but it is rare and protected elsewhere in the European Union. The beaver is significant because in inundated areas made by beavers the dried trees serve as habitats and feeding grounds for some rare species, such as various woodpecker species. This animal plays an important part in the regulation of water level and development of wetlands.



Figure 40. Beaver dam on Puska river



Figure 41. Beaver house

In the Adazi military polygon the beavers' occurrence is connected with drainage ditches as well as flowing waters, Puska and Melnupe rivers (see a description on page 8). There the residence of the beaver can be denoted according to its dam (Figure 40), gnawed and felled trees (Figure 8, see a description on page 8), as well as a beaver house which resembles a big, dense heap of branches (Figure 41).

The method for the habitat observation of species is given on page 20 and the questionnaire of beaver in supplement 13. It takes approximately 2-3 hours to observe and control one route.



# Explanations of habitat and species observation

Here is shown one observation questionnaire of a habitat with explanations how to fill it in. As an example, the questionnaire for the assessment of dry pine forests was used. Beside this figure, comments are given on each field of the questionnaire.

1 Name and surname of observer; \_\_\_\_\_ Observation date; \_\_\_\_\_

2 Number of observation route (from map) \_\_\_\_\_

3 Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

4 1) Are mounds observed around roots of trees?  
No Yes Many of them? No Yes

2) Are trees covered by mosses or lichens observed?  
No Yes How many such trees are visible on the route? 1 - 5 6 - 10 >10

3) Are standing, dead - wood observed?  
No Yes How many such trees are visible on the route? 1 - 2 >2

4) Are hollows made by woodpeckers in standing, dead - wood occur (circular hollows or dints conned)?  
No Yes

5) Are big (more than 10 cm in diameter), fallen down trees visible in foreseeable section of route?  
No Yes How many of them? 1 2-3 4 and more

6) Are tracks made by mechanical transport visible?  
No Yes Old signs of tracks (before some years) Fresh signs of tracks (this year)

Place for notes NB! Your observations and notes can be very important!

5

1 in a field of the questionnaire the performers of monitoring write down their names, surnames and the date of observation

2 observing a habitat or a species according to a mapped route, the performer of monitoring registers the number of the route written on the map

3 in a field of the questionnaire the performer registers the numbers of photos taken in a definite place

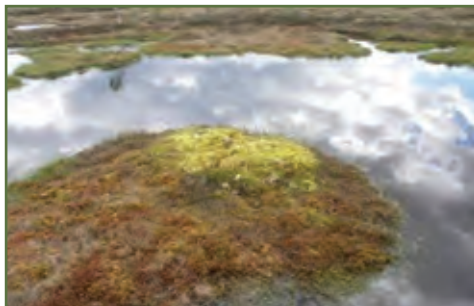
4 in a field of the questionnaire questions are included, the answer to which in most cases is "yes" or "no"; sometimes after the answer an additional question is given, for example, "How many?" to which also the variants are given (Have to be underlined or rounded!)

5 this field of the questionnaire is meant for notes and comments; the performers of monitoring can note everything that seems most important to them when considering the chosen material; as well as to make notes and calculations in the period of monitoring

# Supplement

## Observation questionnaires of habitats and species

1. Observation questionnaire of eutrophic lakes
2. Observation questionnaire of oligotrophic lakes
3. Observation questionnaire of flowing waters
4. Observation questionnaire of wet and damp forests
5. Observation questionnaire of heather fields
6. Observation questionnaire of sand plains
7. Observation questionnaire of dunes
8. Observation questionnaire of meadows
9. Observation questionnaire of dry pine forests
10. Observation questionnaire of mires
11. Observation questionnaire of natterjack toad
12. Observation questionnaire of black grouse
13. Observation questionnaire of beaver





# Observation questionnaire of eutrophic lakes (Lake Lieluika)

Supplement 1

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Are tracks made by cars or pathways made by walking visible along bank of lake?

No	Yes	How many?	in 1 place	in 2 – 3 places	in >3 places
----	-----	-----------	------------	-----------------	--------------

2) Are observed resting – places / bonfires?

No	Yes	How many?	1 place	2 – 3 places	>3 places
----	-----	-----------	---------	--------------	-----------

3) Is visible household waste in surrounding of lake?

No	Yes	How many?	Some waste	Heaps of waste
----	-----	-----------	------------	----------------

Place for notes

NB! Your observations and notes can be very important!

# Observation questionnaire of oligotrophic lakes (Lake Mazuika)

Supplement 2

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Are tracks made by cars or pathways made by walking visible along bank of lake?

No      Yes      How many?      in 1 place      in 2 – 3 places      in >3 places

2) Are resting – places / bonfires observed?

No      Yes      How many?      1 place      2 – 3 places      >3 places

3) Is household waste visible in surroundings of lake?

No      Yes      How many?      Some waste      Heaps of waste

4) How far (meters) from bank of lake through water bed of lake is visible?

1 – 2m      3 – 4m      5 – 6m      >6m from bank

5) Are bushes growing in belt between bank of lake and forest?

No      Yes      How many of them?      Several bushes      Groups of bushes

6) Are reeds growing along bank of lake?

No      Yes      How many of them?      Very small amount, several plants      Inhomogenous area

Place for notes

NB! Your observations and notes can be very important!



# Observation questionnaire of flowing waters

Supplement 3

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Name of observed flowing water: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Are beaver dams on river?

No	Yes	How many?	1	2 – 3	4 – 5	6 and more
----	-----	-----------	---	-------	-------	------------

2) Are trees gnawed by beaver occur along banks of river?

No	Yes	How many?	Few (several)	3 – 10	10 – 20	>20
----	-----	-----------	---------------	--------	---------	-----

3) Are marks of gnawing fresh (Made this year)?

No	Yes	How many of them?	Several (1 – 3)	On most of gnawed trees
----	-----	-------------------	-----------------	-------------------------

4) Banks of river are:

– entirely shadowed	– partly shadowed	– completely open
---------------------	-------------------	-------------------

5) Are tracks made by mechanical transport visible on banks of river?

No	Yes	How many?	in 1 place	in 2 – 3 places	in >3 places
----	-----	-----------	------------	-----------------	--------------

Place for notes

NB! Your observations and notes can be very important!

# Observation questionnaire of wet and damp forests

Supplement 4

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Are mounds observed around roots of trees?

No	Yes	Many of them?	No	Yes
----	-----	---------------	----	-----

2) Are trees covered by mosses or lichens observed?

No	Yes	How many such trees are visible on the route?	1 – 5	6 – 10	>10
----	-----	---	-------	--------	-----

3) Are standing, dead – wood observed?

No	Yes	How many such trees are visible on the route?	1 – 2	>2
----	-----	---	-------	----

4) Are hollows made by woodpeckers in standing. dead – wood occur (circular hollows or dints conned)?

No	Yes
----	-----

5) Are big (more than 10 cm in diameter), fallen down trees visible in foreseeable section of route?

No	Yes	How many of them?	1	2 – 3	4 and more
----	-----	-------------------	---	-------	------------

6) Are tracks made by mechanical transport visible?

No	Yes	Old signs of tracks (before some years)	Fresh signs of tracks (this year)
----	-----	---	-----------------------------------

Place for notes

NB! Your observations and notes can be very important!



# Observation questionnaire of heather fields

Supplement 5

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Are trees and bushes visible in foreseeable section of route in heather field?

No Yes How many of them? some, several clumps many

2) If there are trees and bushes in heather field, what is average height of them?

till 1m 1 – 3m 4 – 8m >8m

3) Do patches of lichens on ground among heather occur in foreseeable section of route?

No Yes

4) Has been heather field burned?

No Yes When? This year More than one year ago

5) Do patches with open sand occur in heather field?

No Yes How large are these patches in foreseeable section of route? 1m<sup>2</sup> 2m<sup>2</sup>–10m<sup>2</sup> >10m<sup>2</sup>

6) Are tracks made by mechanical transport visible?

No Yes How many of these signs? \_\_\_\_\_

7) Are other signs made by military activities visible?

No Yes Holes of explosions, shell-holes (old, new) Positions made (old, new) \_\_\_\_\_

8) Are household or military waste visible (shells of projectiles etc.)?

No Yes Household Military Other? \_\_\_\_\_

Place for notes

NB! Your observations and notes can be very important!

# Observation questionnaire of sand plains

Supplement 6

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Do large areas of bare sand without vegetation occur in foreseeable section of route?

No    Yes    How large are these areas?    till 50m<sup>2</sup>    50m<sup>2</sup> – 100m<sup>2</sup>    >100m<sup>2</sup>

2) Are tracks made by mechanical transport visible?

No    Yes    Driven 1-2 times over one place    Driven many times over the same place

3) Are other signs made by military activities visible?

No    Yes    Holes of explosions, shell-holes (old, new)    Positions made (old, new) \_\_\_\_\_

4) Are household or military waste visible (shells of projectiles etc.)?

No    Yes    Household    Military    Other? \_\_\_\_\_

Place for notes

NB! Your observations and notes can be very important!



# Observation questionnaire of dunes

Supplement 7

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Do large homogenous patches with bare sand without vegetation occur on top of dune or/and slopes?

No      Yes      How large are these patches?      till 50m<sup>2</sup>      50m<sup>2</sup> – 100m<sup>2</sup>      >100m<sup>2</sup>

2) Are tracks made by mechanical transport visible?

No      Yes      Driven 1-2 times over one place      Driven many times over the same place

3) Is relief of dune changed (deep tracks are driven, shell-holes etc.)?

No      Yes

4) Are household or military waste visible (shells of projectiles etc.)? \_\_\_\_\_

No      Yes      Household      Military      Other?

5) Is dune fragmented by blow-outs (for example, roads)?

Yes      No

Place for notes

NB! Your observations and notes can be very important!

# Observation questionnaire of meadows

Supplement 8

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Is meadow moved?

No      Yes      When?      This year      One year or more years ago

2) Are bushes overgrowing meadow from sides towards its centre?

No      Yes      Just some      Many

3) Are tracks driven in meadow by mechanical transport?

No      Yes, but tracks are not deep      Yes, tracks are deep

4) Are signs of other activities, which have changed micro-relief, visible?

No      Yes, signs of explosions      Yes, positions are made      Other: \_\_\_\_\_

5) Is meadow burned?

No      Yes      Newly (This year)      Long ago (Before one or more years)

6) Are household or military waste visible (shells of projectiles etc.)?

No      Yes, household waste (some, heaps)      Yes, military waste (some, heaps)

Place for notes

NB! Your observations and notes can be very important!



# Observation questionnaire of dry pine forests

Supplement 9

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Are gross (>40 cm in diameter), hollowed trees visible in foreseeable section of route?

No	Yes	How many of them?	1	2 – 3	>3
----	-----	-------------------	---	-------	----

2) Are patches, covered by lichens, visible on ground?

No	Yes
----	-----

3) Are standing, dead-wood visible in foreseeable section of route?

No	Yes	How many of them?	1	2 – 3	4 and more
----	-----	-------------------	---	-------	------------

4) Are hollows made by woodpeckers in standing dead-wood occur (circular hollows or dints conned)?

No	Yes
----	-----

5) Are big (more than 5 cm in diameter), fallen down trees visible in foreseeable section of route?

No	Yes	How many of them?	1	2 – 3	4 and more
----	-----	-------------------	---	-------	------------

6) Is it visible that forest has been cut (stems are visible)?

No	Yes	One year or more ago	This year
----	-----	----------------------	-----------

7) Is it visible that forest has been burned?

No	Yes	One year or more ago	This year
----	-----	----------------------	-----------

8) Are household waste occurs?

No	Yes	Some waste	Heaps of waste
----	-----	------------	----------------

9) Are “shot” trees visible (trees with signs of shooting, cracked trees)?

No	Yes	1 – 3	4 – 8	>8
----	-----	-------	-------	----

Place for notes

NB! Your observations and notes can be very important!

# Observation questionnaire of mires

Supplement 10

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Has mire overgrown by bushes in foreseeable section of route?

No      Yes      How many?      Few (several bushes)      Many (groups of bushes, homogenous scrubs)

2) Do trees occur in foreseeable section of route in mire?

No      Yes      How many?      Few (1 – 3)      Many (4 and more)

3) Do heathers occur in foreseeable section of route in mire?

No      Yes      How many?      Few (several clumps)      Many (big groups or homogenous patches)

4) Do Sphagnum mosses occur in mire?

No      Yes

Place for notes

NB! Your observations and notes can be very important!



# Observation questionnaire of natterjack toad

Supplement 11

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Is natter-jack toad registered during this observation?

No	Yes	How many?	1	2 – 3	4 and more
----	-----	-----------	---	-------	------------

2) Do shallow pools with sloping banks occur in observed area?

No	Yes	How many of them?	1	2 – 3	4 – 6	7 – 10	>10
----	-----	-------------------	---	-------	-------	--------	-----

3) Are pools filled with water?

Yes, pools are filled with water	No, pools are dry
----------------------------------	-------------------

4) If pools are filled with water, are black ropes (filaments) spawns visible?

Yes	No
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Place for notes

NB! Your observations and notes can be very important!

# Observation questionnaire of black grouse

Supplement 12

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) When driving along roads in area, are black grouse sitting on deciduous trees visible?

No

Yes (Please, fill in the table!)

Observation	Number of individuals in one group	Place of observation (coordinates or detailed description observation place)
1		
2		
3		
4		
5		
6		

2) Are droppings of black grouse visible in area?

No

Yes

In how many spots?

1

2 – 3

>3 places

Place for notes

NB! Your observations and notes can be very important!



# Observation questionnaire of beaver

Supplement 13

Name and surname of observer: \_\_\_\_\_

Observation date: \_\_\_\_\_

Number of observation route (from map) \_\_\_\_\_

Numbers of photos taken (do not forget to map the place of the object!) \_\_\_\_\_

1) Are beaver dams on ditches?

No	Yes	How many in all route?	1	2 – 3	>3 _____ (precise number)
----	-----	------------------------	---	-------	---------------------------

2) Are pathways made by beavers occur along banks of ditch?

No	Yes	How many?	1	2 – 3	4 and more
----	-----	-----------	---	-------	------------

3) Do trees gnawed (fallen) by beaver occur along banks of ditches?

No	Yes, freshly gnawed (fallen) trees	Yes, before some time gnawed (fallen) trees
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4) Do beaver “houses” occur along ditches or its surroundings?

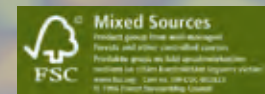
No	Yes	How many “houses”?	1	2 – 3	more
----	-----	--------------------	---	-------	------

Place for notes

NB! Your observations and notes can be very important!



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