Excursion guide

Working-plan area Borová Lada 1st July, 2021

Transformation of young coniferous stands through variable density thinning

Stand transformation – active restoration management of forest ecosystems in the ŠUMAVA National Park (ŠNP)

Jan Kozel

Stand transformations lead to the gradual restoration of natural forest ecosystems, which is a long-term goal of all national parks. In ŠNP, stand transformations are carried out in areas with active restoration management (zones close-to-nature and concentrated management). The interventions influence the tree species composition, alter the stand structure, disrupt the "forests of age classes" model and also the management of even-aged stands.

These interventions are based on, for example:

- Selection principles;
- The elements of the conversion from forests managed under systems involving coupes to those unmanaged;
- Nature-friendly forest management;
- The knowledge of variable density thinning (VDT).

Through these approaches, the biological diversity and ecological stability of forest ecosystems increases. Originally, a forest managed under systems involving coupes is transformed into a forest with a richer structure thus creating conditions for long-term protection of ŠNP. This goal is the gradual improvement of the state of forest ecosystems and the gradual restoration of natural ecosystems, including the ensuring of an undisturbed course of natural processes in their natural dynamics.

The goals of stand transformation

1. To spatially differentiate forest stands;
2. To support natural ecological functions and biological diversity of the forest through targeted influence of the stand microclimate;
3. To create favourable conditions for continuous natural regeneration and its spontaneous selection;
4. To bring the tree species composition closer to the natural;

5. To limit the risk of extensive damage due to different interventions in the upper stand layers.
6. To gradually restore the natural ecosystems and ensure the uninterrupted flow of natural processes.

Sub-division of ŠNP according to management

Depending on the kind of management, the ecosystems on the territory of ŠNP can be divided into specific areas, which tie on to the existing zoning in force.

Table 1: The surface areas of the zones in 2021

ŠNP zone	Natural	Close-to-natural	Concentrated management	Cultivated landscape	Total
Surface area (ha)	16,536	15,545	16,805	10	48,896
Percentage (%)	33.82	31.79	34.37	0.02	100

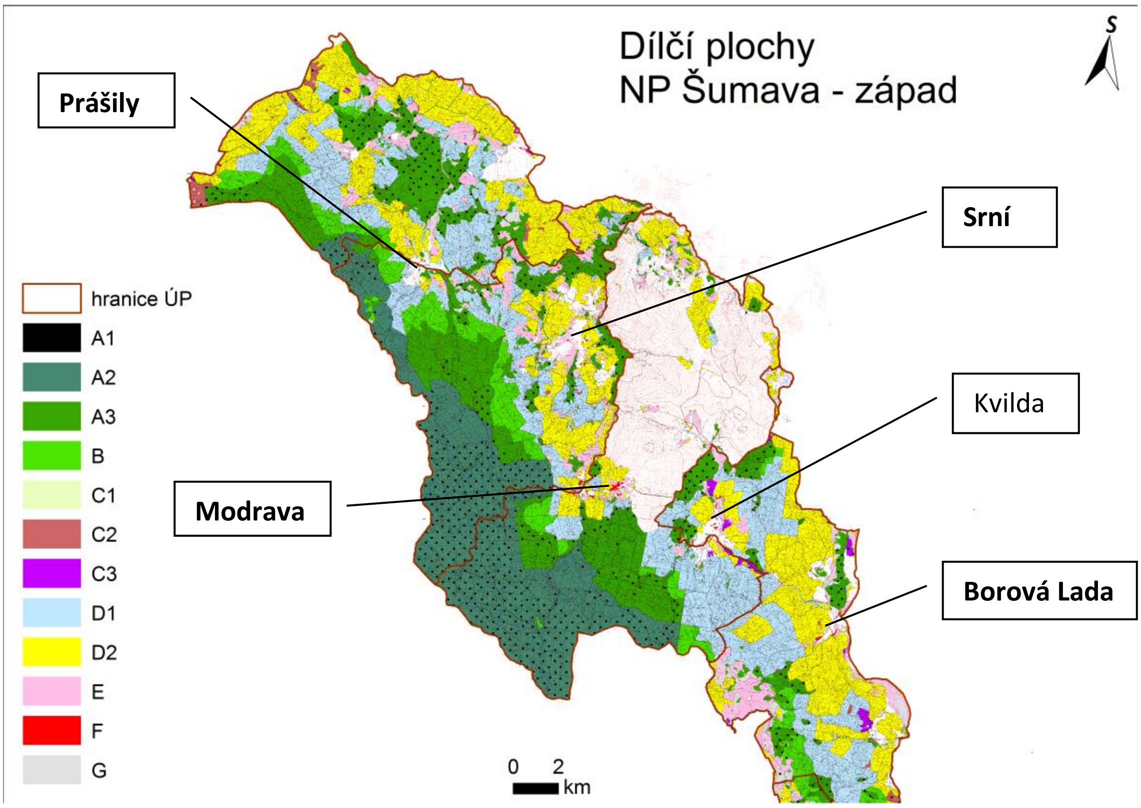


Figure 1, 2: Specific areas west and south – A2,3 undisturbed natural processes (A2 no hunting); B no salvage felling; C 2,3 conditioned salvage felling; D1 no artificial regeneration, D2 complete active restoration management; E-G other; Names in bold indicate territorial workstations of ŠNP Administration.

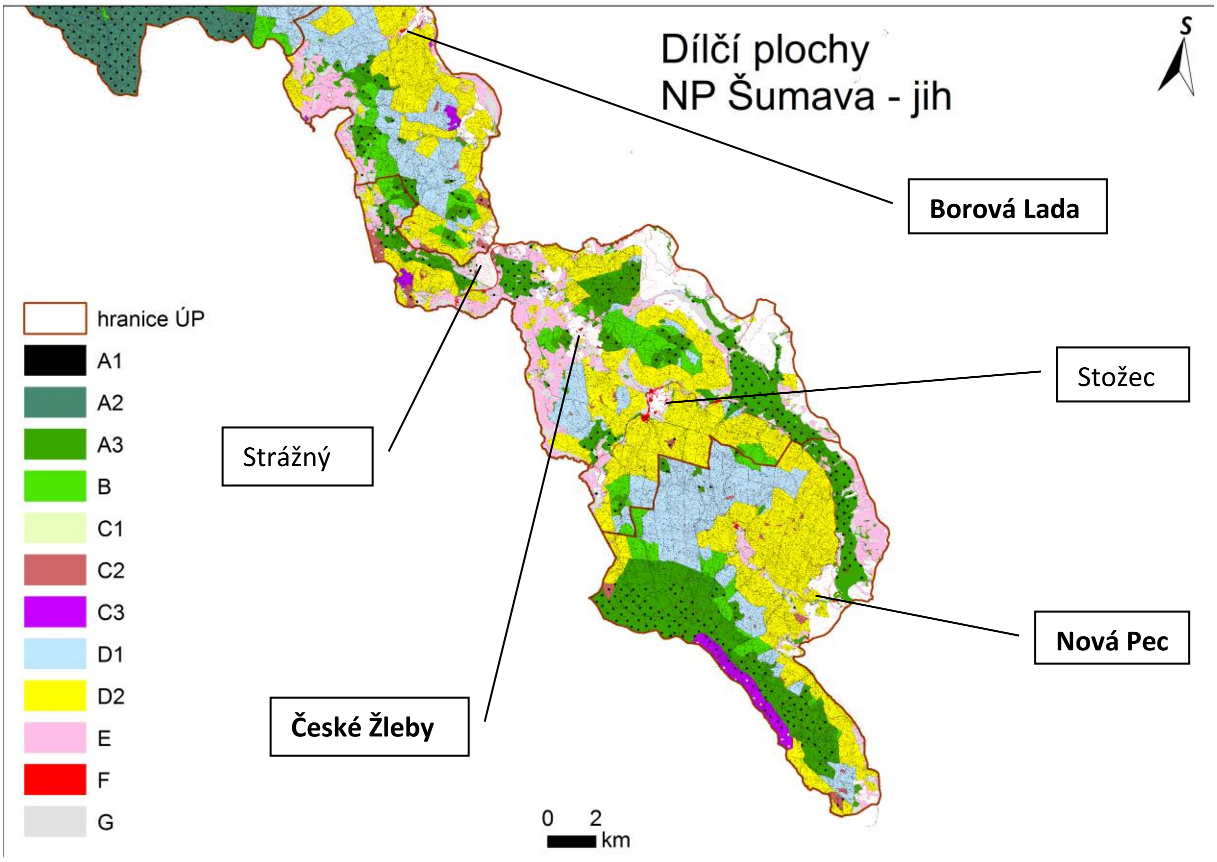


Table 2: The surface areas of the specific areas in ŠNP in 2021

		Restricted active restoration management		Active restoration management			
	Undisturbed natural processes	No salvage felling	Conditioned salvage felling	No artificial regeneration	Complete active restoration	Other	Total
Specific area	A	B	C	D1	D2	E-F	A-F
Surface area (ha)	17,545	3,485	924	10,782	16,079	81	48,897
Percentage (%)	35.9	7.1	1.9	22.1	32.9	0.2	100

Reasons for transformation

Homogeneous forest stands

Forest stands in ŠNP intended for active restoration management are undergoing transformation. This concerns stands whose tree species composition and spatial structure often differ from potential stand types of the pertinent site, they are ecologically unstable and classified as distant and transitional. Many of these forest stands were influenced by man through his activity, including management under systems involving coupes. The consequences today, of this influence, are in the form of even-aged all-spruce stands. A number of them had come about within a short period as a result of artificial or combined regeneration on clear-cut areas because the previous stands had been damaged by wind (or secondary biotic factors), often even before these forests were declared ŠNP.

Support of biological diversity and prevention of disturbance

Especially young, homogeneous and spatially unstructured stands may present a risk of extensive disturbance in future if there is no intervention. Without the appropriate silvicultural treatment, there can arise dense stands with highly competitive crown and root storeys, where the risk of ecological and static instability of the stands (made up of individuals with disproportionate crowns, insufficiently developed root systems and unfavourable slenderness ratio) is high. Simultaneously, extensive, mainly spatially unstructured spruce stands, could reduce the diversity of forest ecosystems and limit the occurrence of species protected by ŠNP.

Transformation as a means of active restoration management

The transformation of forest stands, with the application of the selection principles, ecological forestry and variable density thinning, is the means via which it is possible to improve the condition of forest stands and support natural biological diversity. An important part of active restoration management is the transition from forests managed under systems involving coupes to those unmanaged. With regard to the high percentage of salvaged felling, these interventions are employed in the transformation of stands. Disturbances by wind and insects contribute to the preservation of natural structural elements of the ecosystem (biological heritage of the ecosystem), thanks to which windthrow structures, together with parts of biomass (stubs, fractures, wood intended for decomposition) are preserved, natural regeneration, standing trees and low-level plants are spared. Part of this transformation is the regulation of the numbers of and the appropriate care for deer.

Transformation tools

1. **Working plans (WP) based on operational inventory** – The silvicultural system is a selection system, the WP are drawn up according to the methodology for forests with a richer structure. The basic planning units are the forest development type (FDT) and stand type (ST).

2. **Return period** – The optimal period of return (with an effective transformation) is 6 years (i.e. half the validity of the WP in ŠNP).

3. **Treatment blocks** – A forest with active restoration management is divided into blocks for planning and monitoring, maintaining return periods of 6 years with equal silvicultural treatment for the entire forest.

4. **Subdivision of forest stands** – Subdivision of extensive young spruce stands can reduce the risk of windbreaks and windfalls by inserting reinforcing forest belts.

5. **Reduction in the number of trees** – Uneven reduction on the number of tress initiates the growth of long and well-built crowns, it improves the slenderness ratio (to below 0.9) and stabilizes the stands.

6. **Positive selection** – This supports healthy, stable trees that create the skeleton of the stands and interspersed species, which are native to that site, including pioneer species (target trees). Sterile dead standing trees and den trees are left in the stands.

7. **Special-purpose selection** – In order to carry out species conversion, support heterogeneous spatial structure and biological diversity of forest stands, individual-to-group selection is performed, for example:
   a. **Structural special-purpose selection** – Target trees are supported by uneven positive selection in the upper stand layer and the intermediate and suppressed layers are left. After this intervention, the dispersion of the thicknesses of the trees increases, which gives rise to the successive differentiation of stands.
   b. **Special-purpose selection with varying intensity** – Intervention with a broad range of intensities creates a heterogeneous mosaic of stands, which simulates a structure of a heterogeneous forest with trees of all ages. These are tools aimed at increasing the stability of the stands, the variety of the species, and the biological values of younger stands which have been uniform and had been artificially established.

8. **Natural regeneration** – This is the most suitable means of species conversion and the preservation (and improvement) of genetic diversity of forest stands.

9. **Reduction in the number of deer** – Effective and efficient hunting of deer is a necessary part of stand transformation.

10. **Leaving trees to die** – Original species, besides spruce, are left to die. Dead standing trees and den trees are not removed from the stands because their presence increases the diversity.

Stop No. 1 – Demonstration plot PRO SILVA BOHEMICA and VDT

Zone: concentrated care

FDT: stony, poor, acid beech-spruce stand

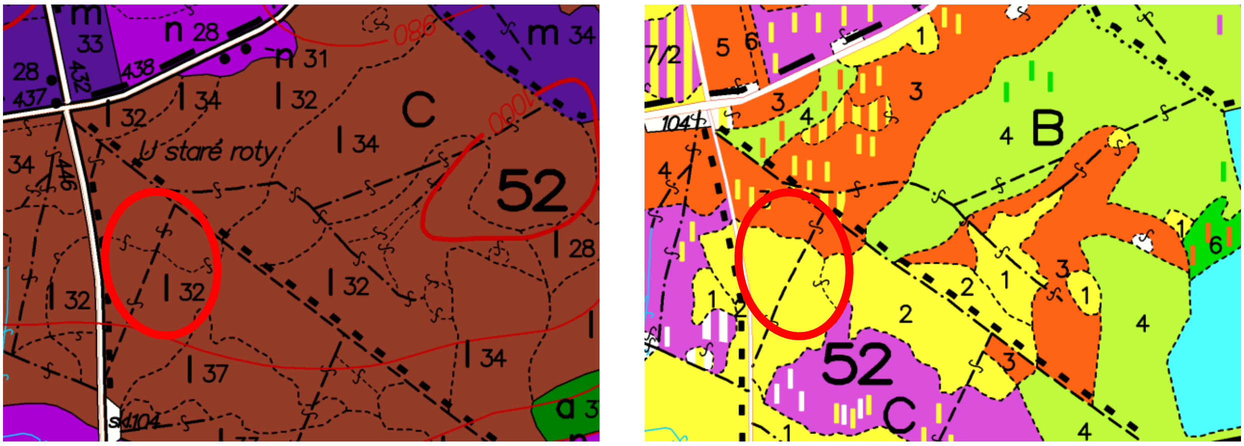
ST: distant from target type

Segment of ST: young stand with directed intervention (with timber)

Data of 52Dl32 stand from working plan of Borová Lada (2010, 1st January – 2021, 31st December)

Forest type	Altitude (m n.m.)	Area (ha)	Age (years)	Tree composition (%)
7K6	980	8.1	28	Spruce 94
$d_{1,3}$ (cm)	H (m)	Volume ($m^3.ha^{-1}$)	Stocking	Thinning ($m^3.ha^{-1}$)
10	10	98	9	19

A comparison of the stand maps: FDT (left) and even-aged classes (right)



Transformation of an extensive young, mainly coniferous stand with the use of VDT (winter 2015).

In accordance with VDT, we created gaps inside the stands with the aim of determining their optimal size and numbers, and also verified the technological solution, economic aspects and the operational application of specific-purpose selection with varying intensity.

We supported the spatial and thickness differentiation of the stand, including their subdivision into work-plots.

We reduced the number of trees through individual-to-group positive selection, felled the intermediate-layer trees, leaving the suppressed layer trees.

The target trees were the broadleaved species (natural) and healthy spruce trees with favourable slenderness ratios and well-developed crowns.

We supported the stability of individual trees and the entire stand, e.g. improved the value of the slenderness ratio and increased the percentage of trees with well-developed crowns.

In the spring of 2016, we established sample plots for the quantification of basic dendrometric parameters and the determination of the influence of the special-purpose selection with VDT.

In the winter of 2020, we carried out a repeated intervention with the same aim. This intervention was limited only to the sample plots. At the same time, we repeated measurements and evaluated the interventions on these sample plots.

Parameters of interventions

Time of intervention	Technology*	Volume of felling (m^3)	Intensity ($m^3.ha^{-1}$)	Costs skidway ($Kč.m^{-3}$)	Yield ($Kč.m^{-3}$)	Balance ($Kč.m^{-3}$)
Winter 2015	HVT+LCS	595.1	73.5	730	1,329	599
Winter 2020	HVT+ LCS	94.21	47.1	607	1,244	673

**HVT- harvester; LCS – lite clam skidder;*

Time of intervention	Assortment	Saw wood	Groundwood pulp	Wood-fibre	Pole	Mean volume
Winter 2015	Volume (m^3)	165.84	218.88	210.38	-	0.06
	Ratio (%)	28	37	35	-	
Winter 2020	Volume (m^3)	67.67	17.16	3.52	5.6	0.23
	Ratio (%)	72	18	4	6	

Measurement results in the sample plots in the years 2015 and 2020

Intensity of intervention 2015	Basal area ($m^2.ha^{-1}$)	Stand density ($tree.ha^{-1}$)	Volume ($m^3.ha^{-1}$)		**Intensity of intervention 2020**	Basal area ($m^2.ha^{-1}$)	Stand density ($tree.ha^{-1}$)	Volume ($m^3.ha^{-1}$)
After felling	20.53	869	122.71		After felling	17.41	578	116.42
Felling	-	985	-		Felling	7.68	262	49.8
Before felling	-	1,854	-		Before felling	25.09	841	166.22
(%)	-	53	-		(%)	31	31	30

Calculation of increments	Basal area ($m^2.ha^{-1}$)	Volume ($m^3.ha^{-1}$)
2015	20.53	122.71
After felling 2020	17.41	116.42
Felling	7.68	49.8
Current increment during 2015-2020	10.80	56.09
Current increment annual ($m^3.ha^{-1}.year^{-1}$)	2.16	11.22

Result: An evidently horizontally differentiated, well-accessible stand with thickness heterogeneity and uneven canopy. After intervention and quantification via sample plots, we derived the optimal size of the gaps inside the stands (0.1 ha) and their density and the number of trees thicker than 7 cm (approx. 1 tree per 0.01 ha). The resultant structure creates the conditions for favourable development of the stand. This microclimatic mosaic provides the biotopes that the overlapping and homogenous stands require. Monitoring of the development aids in the determining of the optimal parameters of this type of stand and FDT and offers feedback for continued silvicultural treatment.

Stop No. 4 – The demonstration plot transformation of stands in ŠNP

Zone: close-to-nature

FDT: stony, poor, acid beech-spruce stand

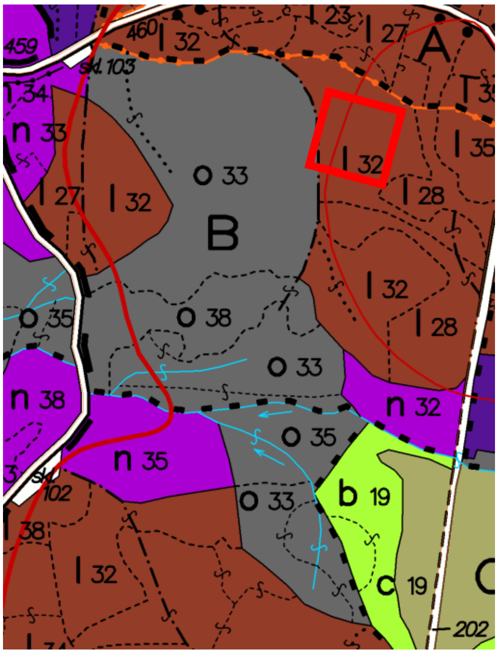
ST: distant from target type

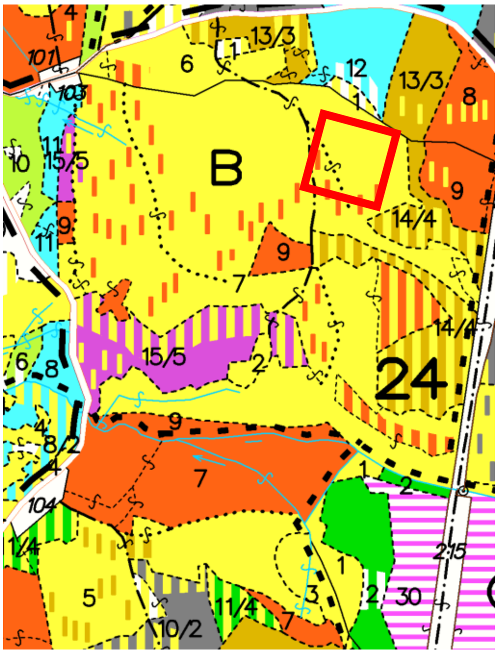
Segment of ST: young stand with timber in which was performed streamlining intervention

Data of **24Bl32** stand from working plan of Borová Lada (2010, 1st January – 2021, 31st December)

Forest type	Altitude (m n.m.)	Area (ha)	Age	Tree composition (%)
7K6	1040	4,45	28	Spruce 99 Beech 1
$d_{1,3}$ (cm)	H (m)	Volume ($m^3.ha^{-1}$)	Stocking	Thinning ($m^3.ha^{-1}$)
9	9	92	10	26

A comparison of the stand maps: FDT (left) and even-aged classes (right)





The transformation of a young stand that resulted from salvage felling in the 1980s, without silvicultural treatment and now finds itself in the stage of juvenile thinning.

The aim of the intervention (autumn 2014) was to subdivide it, make it technologically accessible and clear, to unevenly reduce the number of trees and to stabilize it with the outlook of applying special-purpose selection in future.

In the reduction process, we applied positive selection of co-dominant trees that was conducted on healthy spruce and interspersed broadleaved species and, furthermore, did not affect the suppressed trees.

The condition of the stand and the parameters of the intervention were quantified on a 1-hectare demonstration area established in the autumn of 2017, which is a part of a 17.55 ha demonstration forest (subcompartment 24B) that had been transformed in ŠNP.

In the winter of 2020, we carried out a repeated intervention (after 6 years), focused on the differentiation of the structure (structural special-purpose selection) and re-measured the sample area.

Parameters of interventions

Time of intervention	Technology*	Volume of felling (m^3)	Intensity ($m^3.ha^{-1}$)	Costs skidway ($Kč.m^{-3}$)	Yield ($Kč.m^{-3}$)	Balance ($Kč.m^{-3}$)
the autumn 2014	HVT+LCS	306.02	69.0	739	901	162
the autumn 2020	HVT+ LCS	50.74	25.4	776	1,025	249

**HVT- harvester; LCS – lite clam skidder;*

Time of intervention	Assortment	Saw wood	Groundwood pulp	Wood-fibre	Mean volume
the autumn 2014	Volume (m^3)	0	128.63	177.39	0.03
	Ratio (%)	0	42	58	
the autumn 2020	Volume (m^3)	23.09	21.65	6.0	0.23
	Ratio (%)	45	43	12	

Measurement results in the sample plots in the years 2015 and 2020

Intensity of intervention 2014*	Volume ($m^3.ha^{-1}$)	Stand density ($tree.ha^{-1}$)	Basal area ($m^2.ha^{-1}$)		**Intensity of intervention 2020**	Volume ($m^3.ha^{-1}$)	Stand density ($tree.ha^{-1}$)	Basal area ($m^2.ha^{-1}$)
Before felling	141.87	2,603	31.17		Before felling	134.97	1,107	25.74
Felling	69.08	1,459	15.77		Felling	39.33	382	7.75
After felling	105.67	1,136	20.92		After felling	97.1	742	18.28
(%)	49	56	51		(%)	29	35	30

**reconstruction according to measurements in the years 2017 and 2020*

Calculation of increments	Basal area ($m^2.ha^{-1}$)	Volume ($m^3.ha^{-1}$)
2017	20.92	105.69
After felling 2020	18.28	97.1
Salvage felling (2017-2020)	0.43	2.17
Planned felling 2020	7.75	39.33
Current increment during 2017-2020	5.54	32.91
Current increment annual ($m^3.ha^{-1}.year^{-1}$)	1.85	10.97

Result: Our results indicate that this is a well-accessible, thickness-differentiated stand, with favourable values of the slenderness ratio and a variable density. The condition of the stand offers favourable prerequisites for using structural special-purpose selection and other controlled treatment of the stand microclimate. Repeated measurement of the demonstration plot recorded the development of the stand. The obtained data will serve, among other things, the verification of the target growing stock of the appropriate FDT.

An aerial photo showing the intervention with VDT in the demonstration plot (Stop No. 3)


0
50
m
0.19 ha
0.45 ha
0.15 ha
0.12 ha
0.57 ha

Excursion guide under the FORRISK project meeting

Municipal Forest Volary ltd.

For the project
FORRISK ATCZ251 Cross-border forest risk management

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History

Since 1925, city Volary owned forest enterprise. Before, it was owned by old citizens of Volary, until 1810 by family of Schwarzenberg, Eggenberg and before them by Rudolf II, who bought it from the last Rosumberg Petr Vok.
Municipal enterprise was nationalized in 1951.
The three fourth of historical enterprise located out of National park Šumava were returned back in June 1991.
Forests located at National park were returned back to Volary in August 2000.
The city Volary establish its own company to manage owned forest in1991 – Municipal Forest Volary (as a private limited company from1999).

Long-term goals

Municipal Forests Volary have its own target goals:

- sustainable yield from owned enterprise
- maintenance and even improvement of health status of forest stands.

The way how to reach such goals MF Volary see in realization of **transformation of age-class forest to selection one.**
Resources to make easy that way are in:

- stabilized team of high-quality staff,
- operation with a high-tech and its early recovery,
- maintaining and improving of immovable as well as movable property.

Other activities
Beekeeping
Utilization of solar radiation.

Basic information about Forest Enterprise

- **Area of managed forest is 3333 ha.**
- **Forests are located from 620 to 1152 m a.s.l.**
- Annua average air temperature below 5 °C.
- **Annual amount of precipitation reach ca 800 mm.**
- **Growing season duration ranging due to forest vegetation zones from 110 to 130 days.**
- **More than half of forest stands is influenced by water (periodically or permanently, peaty soils..).**
- The dominant representative tree species are Norway spruce (72 %), Scotch pine (8 %), European beech (7 %), White fire (4 %), Dwarf pine (4 %), Birch (2 %). Tree species below 2 % in representation are: larch, alder, sycamore, rowan, elm, ash, banks pine, Douglas fir, white pine.

More than one half of forest stand area is affected by water (gley, waterlogged, peat lands etc.) Middle-age forest stands established in years 1980 – 1990 are damaged by bark stripping from more than 70 %.

Actual forest management plan is valid for: 2015 - 2024.
Maximal harvest: 346 926 m^3.
Minimal size of tending interventions in young forest stands (till 40 years): 653.51 ha.

From1992, several calamity events occurred in MF Volary.
Wind calamities:
- in1995, disturbed and processed 12 thousand m^3 of wood,
- in 2003, 14 thousand m^3,
- in 2007 (Kyril), 45 thousand m^3,
- in 2013, 24 thousand m^3, from these 6 thousand m^3 stay unprocessed at 1. zone of National park Šumava.

Bark beetle calamity lasting from 2015 as a result of direct neighbourhood with intervention free zones of National park Šumava reached the volume of 40 thousand m^3 together from 2015 to 2020.

Frost calamity in 2014 - 3 thousand m^3 at elevation around 900 m a.s.l.

Necessary steps for forest transformation to „Dauerwald“ – permanently creative forest

- Forest personal must take the transformation idea as yourself.
- Harvest technology must reflect specific site conditions.
- Game population must be reduced to the ecological and management tolerable level.

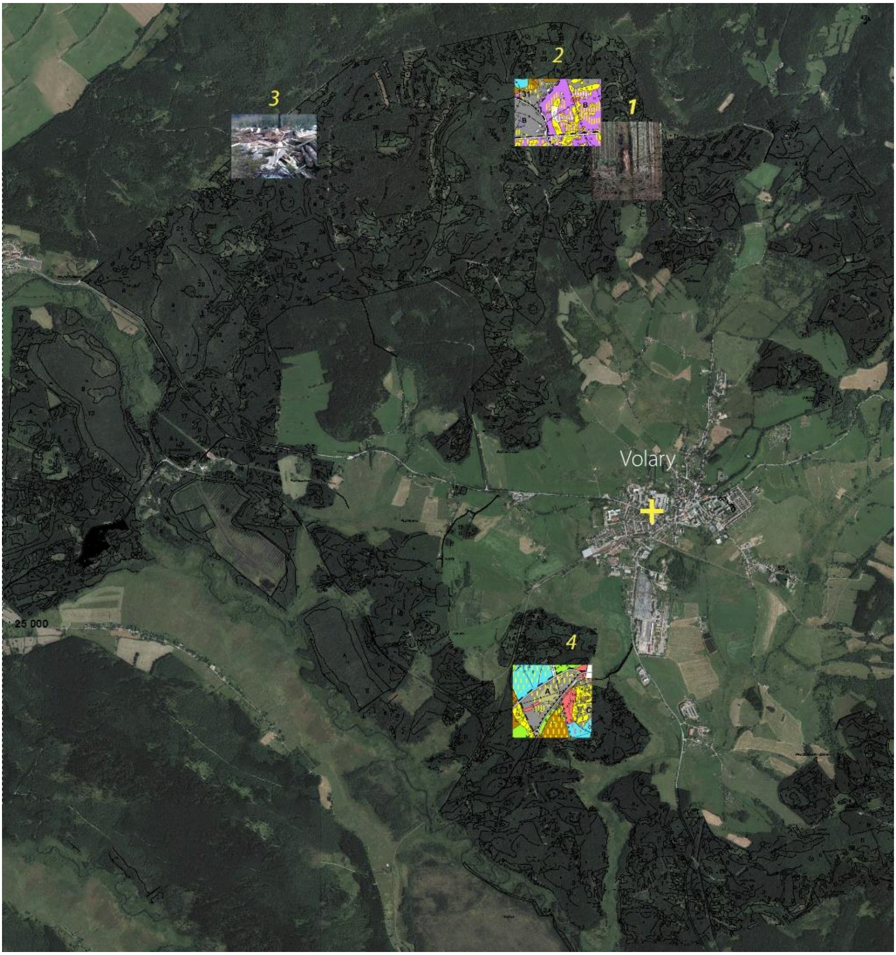
Tools

- Making of permanent net of extraction tracks
- Long-term evidence and feedback of realised forest interventions.
- Diminishing of damages made by game with a use of hunting and forest protection.

Feedback

- In total 740 of inventory points are located within forests to monitor wood increment, wood stock and health status of forest.
- Four experimental plots, with size of 1 ha of each for detail inventory of forest development after harvest intervention etc., are established at different sites.
- Whole forest land area is affected by nature protection interests, which are limiting forest management by different ways.

ORIENTATION MAP OF INDIVIDUAL POINTEE IN THE FIELD



1. Pointee – damages by game, hunting
2. Pointee – forest stands in tending process since 1992 - 2014 via small-sized shelterwood system with a high representation of fir in regeneration, permanent net of extraction tracks helps to realization of selection cut and calamities processing.

3. Pointee – calamity are 14 years after Kyrill storm.
4. Pointee – forest group 6A11 – tending of forest stand by periodic application of scattered selection method in the transition phase to selection forest structure

1st POINTEE_ Game and Hunting

Hunting is a service for silviculture, not the subject of business

An appropriate form of game management is not based on defined absolute number of game for hunting district, but on the effects of game population on the environment.

From the economic point of view game damages are tolerable when forest owner is not limited in fulfilling its own management intent.

For sustainable profit production from forest, carry on professional and consequent hunting is necessary:

- elimination of privileges, the same permit for all,
- stop of feeding,
- good hunting infrastructure,
- continuous education, training in shooting cinema,
- modern guns and equipment,
- support of hunting dogs, especially tracker dogs (compensations for dogs).

What is tolerable damage?

Approximately 20 % of damaged trees from planting to plantation establishment is a tolerable damage by game browsing. The minimal proportion of ameliorative tree species must be meet.

Tolerable amount of damage by bark stripping and bark browsing cannot overcome 1 % of damaged trees during the last growing period, whereas the total amount of damage cannot overcome 10 % of trees after the last thinning intervention until the stand age of 40. The proportion of undamaged ameliorative tree species must be preserved.

Damages evaluation by bark stripping is pursued in current year at forest stands of 40 years in age. It is evaluated as a simple ratio between damaged and healthy trees at plots with the size of 10 x 10 m.

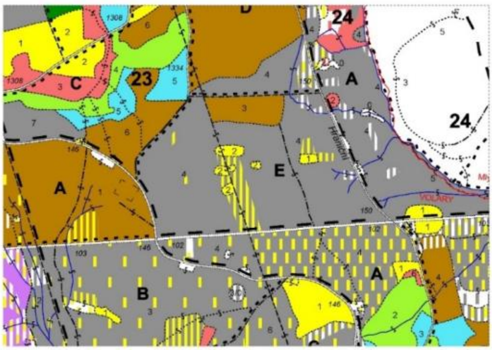
Three plots per 1 ha of stand area are established, five plots in stands over area of 1 ha, these plots are marked by colour in plot corners.

2nd POINTEE – forest stands in tending process since 1992 - 2014 via small-sized shelterwood system with a high representation of fir in regeneration, permanent net of extraction tracks helps to realization of selection cut and calamities processing.

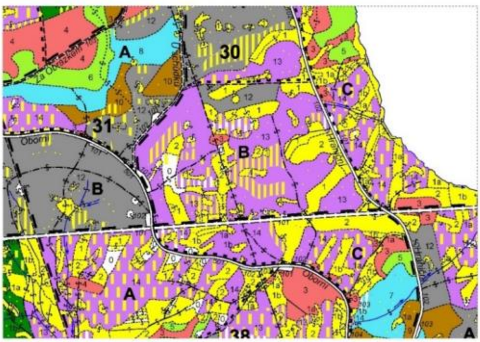
Management unit 571 – glei sites of high elevation areas, target tree species composition Norway spruce 70 %, White fir 20 %, European beech 10 %

Set of forest types: 6S – fresh spruce-beechwood, natural tree species composition spruce 3, beech 4, fir 3; 6V - wet spruce-beechwood, natural composition fir 4, spruce 3, beech 3, sycamore, ash; 6D - enriched spruce-beechwood, natural composition beech 5, fir 3, spruce 2, sycamore; 6A – sycamore-spruce-beechwood, natural composition beech 5, fir 3, spruce 1, sycamore 1; and 6K – acid spruce-beechwood, natural composition spruce 4, beech 4, fir 2

Status in 1.1.1995



Status in 1.1.2015



130 years, height 37, bonity 34				
30B13	m³/ha		Felling	
	Wood stock	Increment	Type	m³/ha
1995 (20.54 ha)	670			
1995 - 2004			N	57
1995 - 2004			O	67
In total 1995 - 2004		**18**	118	**124**
2005 (19.54 ha)	732			
2005 - 2014			N	44
2005 - 2014			O	95
In total 2005 - 2014		**10.2**	105	**139**
2015 (14.74 ha)	729			
2015 - 2020			N	85
2015 - 2020			O	18
In total 2015 - 2020				**103**

133 years, height 35, bonity 32				
38C14	m³/ha		Felling	
	Wood stock	Increment	Type	m³/ha
1995 (10.66 ha)	522			
1995 - 2004			N	59
1995 - 2004			O	150
In total 1995 - 2004		**24.2**	151	**209**
2005 (7.72 ha)	613			
2005 - 2014			N	101
2005 - 2014			O	154
In total 2005 - 2014		**25.5**	170	**255**
2015 (5.17 ha)	698			
2015 - 2020			N	
2015 - 2020			O	
In total 2015 - 2020				

Permanent net of extraction tracks simplify selection cuttting and processing of calamities.

The net of extraction track sis always created for the whole catchment area not only for concrete forest group.
In forest stands appropriate for felling realization by harvesters, the distance between track sis 20 m; in stands inappropriate for harvesters this distance could be higher, but technology cannot go into the field between them.
Tracks are marked by oil colour, marking inclination shows the direction of extraction, the track width is 4 m.
During cable towing, wood skidding in whole length is not allowed.

3rd POINTEE_Calamity plot 14 years after Kyrill.

Management unit 781 – transformed to forest stand with no clear cut management, spruce management system,
Target tree species composition: spruce 5-7, fir 2, beech 1, ash, birch, rowan

Group of forest types 6D - enriched spruce beechwood, natural composition: beech 5, fir 3, spruce 2, sycamore;

6V - wet spruce beechwood, natural composition: fir 4, spruce 3, beech 3, sycamore, ash

136 years, height 38, bonity 34						
26B14	Felling			Forest regeneration		
	type	m^3	ha	type	species	ha
2007	wind	3690	4.20			
2008	wind	94				
	Bark beetle	131	0.13			
2009	Bark beetle	21				
In total		3936	4.33			
2007				regeneration (70 %)	spruce	1.94
					beech	0.90
					fir	0.20
2009				planting (30 %)	spruce	1.11
					elm	0.18
In total						4.33

4th POINTEE_ Forest stand group 6A11 – felling by selection method in the phase of transformation to selection forest with irregular scattering salvage cutting

Management unit 781 – for transformation to selection forest, spruce management system, target tree species composition: spruce 5-7, fir 2, beech 1, ash, birch, rowan

Group of forest types 6P – acid spruce firwood, natural composition: beech 1, fir 5, spruce 4 (pine).

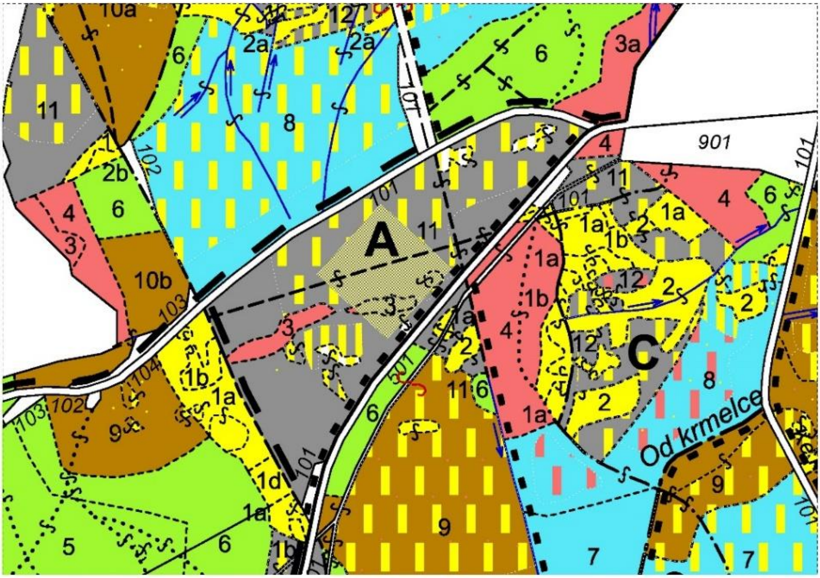
Area – mostly at uplands, corrugated plateaus and soft slopes, terraces, pure bedrocks with loam overlay.

Soil – alternately waterlogged, balanced soil moisture, loamy soil, rarely stony (type g – submontane, partially peaty)

Threats – strong wind, extreme waterlogging, snow, frost, bush grass.

10 5 years, height 30, bonity 30				
6A11	m^3/ha		Felling	
	Wood stock	Increment	type	m^3/ha
2000 (5,67 ha)	311			
2000 - 2004			N	8
In total 2000 - 2004		**9.4**	8	**8**
2005 (5,83 ha)	397			
2005 - 2014			N	8
In total 2005 - 2014		**5.5**	8	**8**
2015 (5,78 ha)	444			
2015 - 2020			N	9
2015 - 2020			V	80
In total 2015 - 2020				**89**

Status in 1.1.2015 with a mapping of demonstration plot 201902A_Forest and Typological map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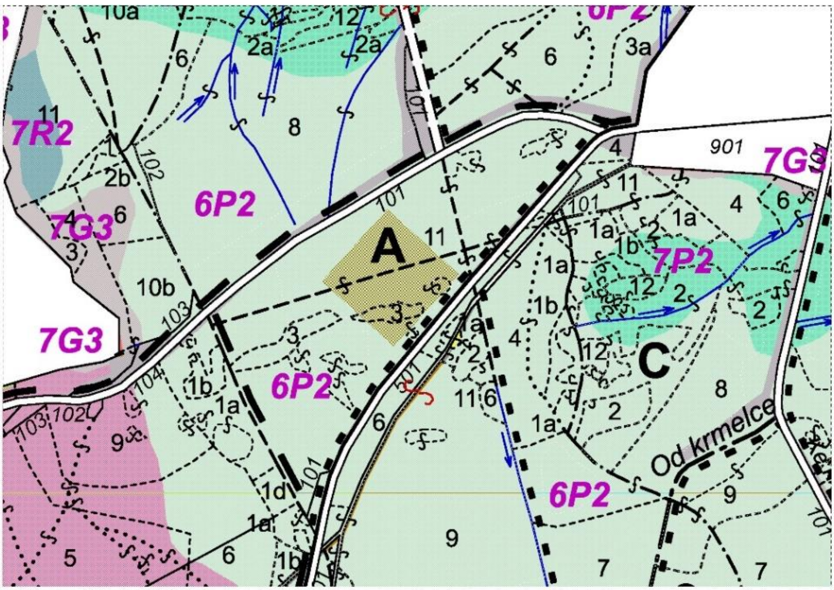
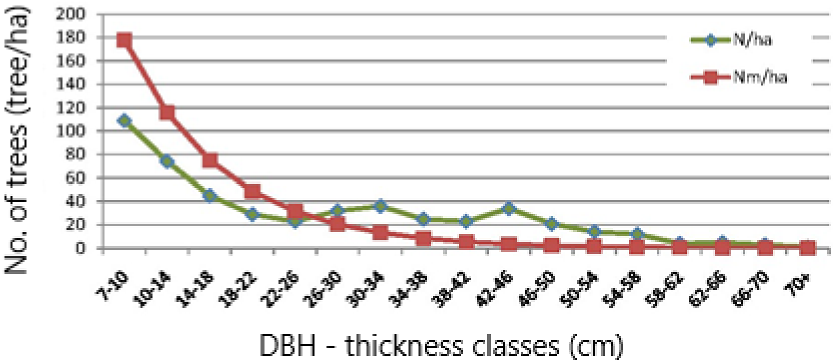
1b
1d
11
12
101
102
103
104


A
C
901
Od krmelce
7R2
7G3
6P2
7P2
10a
10b
3a
1a
1b
1d
11
12

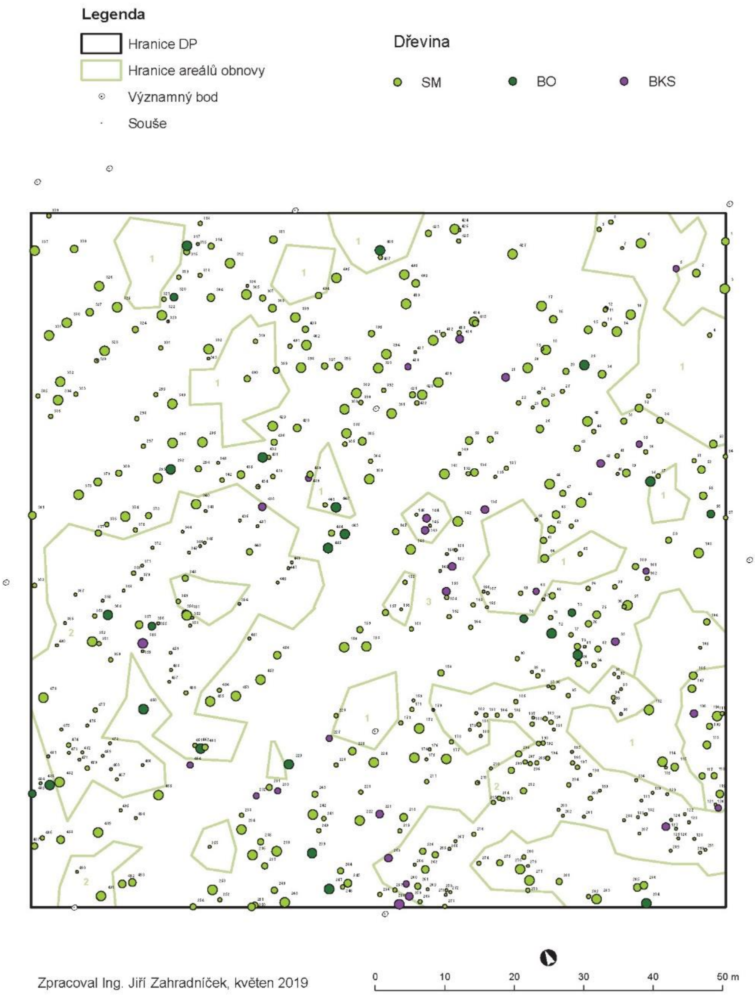
Liocourth function of ideal representation of tree frequency comparing to real situation at the demonstration forest plot 201902A.



Liocourth expressed ideal distribution of tree frequency in selection forest as a function of stem diameter at breast height (DBH). Tree number of trees decrease with increasing of stem thickness. According to Liocourth this trend is descendent with a coefficient varying between 1.3 and 1.5.

Demonstrační plocha nepasečného hospodaření 201902A - Městské lesy Volary, hájemství Vltava A

Stav k 5/2019



Zpracoval Ing. Jiří Zahradníček, květen 2019

Part of tree-table from demonstration plot 201902A

DP 201902A   Tabulka stromů   *Stav k 5/2019*   DP A

ID	DŘEV.	DBH (mm)	H (m)	Hg (m)	V s.k.(m3)	G 2 s.k. (m2)	V b.k. (m3)	SOUŠE	ZLOM	ROZDVOJENÍ	MECH.POŠK.	STÁŘÍ M.POŠK.	LOUPÁNÍ	VYZNAČEN
1	SM	305	28,4	26,2	0,79	0,07	0,72	NE	NE	NE	NE	NE	NE	NE
2	SM	315	27,2	26,7	0,85	0,08	0,77	NE	NE	NE	NE	NE	NE	NE
3	SM	565	34,4	35,5	3,41	0,25	3,10	NE	NE	NE	NE	NE	NE	NE
4	SM	103	8,2	9,9	0,03	0,01	0,03	NE	NE	NE	NE	NE	nad 1/8 obv	NE
5	BKS	300	26,1	29,0	0,86	0,07	0,78	NE	NE	NE	NE	NE	NE	NE
6	SM	516	32,2	34,2	2,77	0,21	2,52	NE	NE	NE	NE	NE	NE	NE
7	SM	80	6,4	6,1	0,01	0,01	0,01	NE	NE	NE	NE	NE	nad 1/8 obv	NE
8	SM	124	11,9	12,7	0,07	0,01	0,06	NE	NE	NE	NE	NE	NE	NE
9	SM	104	12,1	10,0	0,03	0,01	0,03	NE	NE	NE	NE	NE	NE	NE
10	SM	456		32,3	2,07	0,16	1,88	NE	NE	NE	NE	NE	NE	NE
11	SM	172	13,9	17,6	0,18	0,02	0,16	NE	NE	do 1.3 m	NE	NE	NE	NE
12	SM	171	18,7	17,5	0,17	0,02	0,15	NE	NE	do 1.3 m	NE	NE	NE	NE
13	SM	192		19,3	0,24	0,03	0,22	NE	NE	NE	NE	NE	NE	NE
14	SM	457		32,3	2,08	0,16	1,89	NE	NE	NE	NE	NE	NE	NE
15	SM	396		30,2	1,49	0,12	1,35	NE	NE	NE	NE	NE	NE	NE
16	SM	385		29,8	1,39	0,12	1,26	NE	NE	NE	NE	NE	NE	NE
17	SM	578	37,7	35,9	3,60	0,26	3,27	NE	NE	NE	NE	NE	NE	NE
18	SM	416		30,9	1,67	0,14	1,52	NE	NE	NE	NE	NE	NE	NE
19	SM	98		9,1	0,03	0,01	0,03	NE	ohnutý	NE	NE	NE	NE	NE
20	SM	406	31,4	30,6	1,58	0,13	1,44	NE	NE	NE	NE	NE	NE	NE
21	BKS	338	34,5	33,4	1,19	0,09	1,08	NE	NE	NE	NE	NE	NE	NE
22	SM	187	18,3	18,9	0,22	0,03	0,20	NE	NE	NE	NE	NE	NE	NE
23	SM	70	5,6	4,1	0,01	0,00	0,01	NE	NE	NE	NE	NE	NE	NE
24	SM	98	9,6	9,1	0,03	0,01	0,03	NE	NE	NE	NE	NE	NE	NE
25	SM	337	32,8	27,7	1,01	0,09	0,92	NE	NE	NE	NE	NE	NE	NE
26	SM	356	33,7	28,6	1,15	0,10	1,05	NE	NE	NE	NE	NE	NE	NE
27	SM	134	11,3	13,9	0,08	0,01	0,07	NE	NE	NE	NE	NE	nad 1/8 obv	NE
28	SM	290		25,5	0,70	0,07	0,64	NE	NE	NE	NE	NE	NE	NE
29	BO	425		29,7	1,69	0,14	1,54	NE	NE	NE	NE	NE	NE	NE
30	SM	396		30,2	1,49	0,12	1,35	NE	NE	NE	NE	NE	NE	NE
31	SM	118	8,4	11,9	0,06	0,01	0,05	NE	NE	NE	NE	NE	NE	NE
32	SM	383		29,7	1,37	0,12	1,25	NE	NE	NE	NE	NE	NE	NE
33	SM	217	19,6	21,1	0,33	0,04	0,30	NE	NE	NE	NE	NE	NE	NE
34	SM	290	25,7	25,5	0,70	0,07	0,64	NE	NE	NE	NE	NE	NE	NE
35	BKS	260	25,1	22,5	0,47	0,05	0,43	NE	NE	NE	NE	NE	NE	NE
36	SM	161		16,6	0,15	0,02	0,14	čerstvá	NE	NE	nad 1/8 obv.	staré	NE	NE
37	SM	144	13,1	14,9	0,11	0,02	0,10	NE	NE	NE	NE	NE	NE	NE
38	BO	555	32,9	28,6	2,80	0,24	2,55	NE	NE	NE	NE	NE	NE	NE
39	SM	327		27,3	0,94	0,08	0,85	NE	NE	NE	NE	NE	do 1/8 obv.	NE
40	SM	75		5,1	0,01	0,00	0,01	NE	NE	NE	NE	NE	NE	NE
41	SM	107	8,2	10,5	0,04	0,01	0,04	NE	NE	NE	NE	NE	NE	NE
42	BKS	320		33,1	1,05	0,08	0,95	NE	NE	NE	NE	NE	NE	NE
43	SM	280		25,0	0,64	0,06	0,58	NE	NE	NE	NE	NE	NE	NE
44	SM	137	12,2	14,2	0,09	0,01	0,08	NE	NE	NE	NE	NE	NE	NE
45	SM	430	33,9	31,4	1,81	0,15	1,65	NE	NE	NE	NE	NE	NE	NE
46	SM	465	35,3	32,6	2,17	0,17	1,97	NE	NE	NE	NE	NE	NE	NE
47	SM	267		24,2	0,57	0,06	0,52	NE	NE	NE	NE	NE	NE	NE
48	SM	440	34,0	31,8	1,91	0,15	1,74	NE	NE	NE	NE	NE	NE	NE
49	SM	125		12,8	0,07	0,01	0,06	NE	NE	NE	NE	NE	NE	NE
50	SM	230		22,0	0,39	0,04	0,35	NE	NE	NE	NE	NE	NE	NE
51	SM	113		11,3	0,05	0,01	0,05	NE	NE	NE	NE	NE	NE	NE
52	SM	357	30,6	28,6	1,16	0,10	1,05	NE	NE	NE	NE	NE	NE	NE
53	SM	313	30,6	26,6	0,84	0,08	0,76	NE	NE	NE	NE	NE	NE	NE
54	SM	135		14,0	0,09	0,01	0,08	NE	NE	NE	NE	NE	NE	NE
55	SM	350		28,3	1,10	0,10	1,00	NE	NE	NE	NE	NE	do 1/8 obv.	NE
56	BO	359		30,1	1,21	0,10	1,10	NE	NE	NE	NE	NE	NE	NE
57	SM	174		17,8	0,18	0,02	0,16	NE	NE	NE	do 1/8 obv.	staré	NE	NE
58	SM	255		23,5	0,50	0,05	0,45	NE	NE	NE	NE	NE	do 1/8 obv.	NE
59	SM	308	29,8	26,4	0,81	0,07	0,74	NE	NE	NE	NE	NE	NE	NE
60	SM	94	10,3	8,5	0,02	0,01	0,02	NE	NE	NE	NE	NE	nad 1/8 obv	NE
61	SM	220		21,3	0,34	0,04	0,31	NE	NE	NE	NE	NE	do 1/8 obv.	NE
62	SM	368		29,1	1,25	0,11	1,14	NE	NE	NE	NE	NE	NE	NE
63	SM	397		30,2	1,49	0,12	1,35	NE	NE	NE	NE	NE	NE	NE
64	SM	400		30,3	1,52	0,13	1,38	NE	NE	NE	NE	NE	NE	NE
65	SM	106		10,3	0,04	0,01	0,04	NE	NE	NE	NE	NE	nad 1/8 obv	NE
66	SM	281		25,0	0,64	0,06	0,58	NE	NE	NE	NE	NE	NE	NE
67	SM	100		9,4	0,03	0,01	0,03	NE	NE	NE	NE	NE	NE	NE
68	BKS	300		30,8	0,86	0,07	0,78	NE	NE	NE	NE	NE	NE	NE
69	SM	170	12,7	17,4	0,17	0,02	0,15	NE	NE	NE	NE	NE	NE	NE
70	BO	350		28,4	1,09	0,10	0,99	NE	NE	NE	NE	NE	NE	NE
71	SM	138		14,3	0,09	0,01	0,08	NE	NE	NE	NE	NE	do 1/8 obv.	NE
72	BO	448		28,9	1,83	0,16	1,66	NE	NE	NE	NE	NE	NE	NE
73	BO	335		25,0	0,88	0,09	0,80	NE	NE	NE	NE	NE	NE	NE
74	SM	124		12,7	0,07	0,01	0,06	NE	NE	NE	NE	NE	do 1/8 obv.	NE
75	SM	345		28,1	1,07	0,09	0,97	NE	NE	NE	NE	NE	NE	NE
76	SM	201		20,0	0,27	0,03	0,25	NE	NE	NE	NE	NE	NE	NE
77	SM	128		13,2	0,07	0,01	0,06	NE	vrcholový	NE	NE	NE	do 1/8 obv.	NE
78	SM	263		24,0	0,55	0,05	0,50	NE	NE	NE	NE	NE	NE	NE
79	BO	420	32,1	29,8	1,66	0,14	1,51	NE	NE	NE	NE	NE	NE	NE
80	SM	290		25,5	0,70	0,07	0,64	NE	NE	NE	NE	NE	NE	NE
81	SM	75	8,9	5,1	0,01	0,00	0,01	NE	NE	NE	NE	NE	NE	NE
82	SM	290		25,5	0,70	0,07	0,64	NE	náhrad.vr.	NE	NE	NE	NE	NE
83	BKS	325		31,2	1,03	0,08	0,94	NE	NE	NE	NE	NE	NE	NE
84	SM	160	10,6	16,5	0,14	0,02	0,13	NE	NE	NE	NE	NE	NE	NE
85	SM	142		14,7	0,10	0,02	0,09	NE	NE	NE	NE	NE	NE	NE
86	SM	160	13,2	16,5	0,14	0,02	0,13	NE	NE	NE	NE	NE	nad 1/8 obv	NE