Izmene i dopune metodologije i Uputstava PGŠ prema BMEL projektu

* RK 9 + 10: Promene u opisu i inventuri sastojine

Version6

Date: 05.11.2018

# Obeležavanje granice odseka

Predlog: Obeležavanje granica na terenu stalno se sprovodi na terenu kada se granice nemogu jasno prepoznati na terenu ( slične strukturne karakteristike i mešovotost sastojine ali različitih namena)

# Opis na nivou sastojine

## Gazdinski Tip

GK (gazdinske klase) su grupisane u GT (gazdinski tip). Gazdinski tipovi su stoga homogene grupe sastojina, kojima se može gazdovati prema sličnom programu gazdovanja odnosno prema konkretnim smernicama za gazdovanje za svaki gazdinski tip. Program gazdovanja je opisan u Smernicama za gazdovanje.

U tabeli ispod dat je spisak gazdinskih tipova za pilot GJ Istočna Boranja. Ona je popunjena samo sa onim GT, koji čine najveću površinu GJ 2505 "Istočna Boranja" i GJ “Radjenovci Novi”. U narednom periodu potrebno je završiti konačan spisak GT-ova kroz dodatni ili novi projekat.

| Sifre | Gazdinski Tip | Management Types |
| --- | --- | --- |
| 1110 | Visoke mešovite šume OML | High mixed forests of other soft broadleaved species (OSB) |
| 1120 | Izdanačke mešovite šume OML | Coppice mixed forests of other soft broadleaved species (OSB) |
| 1121 | Izdanačke mešovite šume OML - Visoke mešovite šume OML | Coppice mixed forest of OSB - to High mixed forests of OSB |
| 1210 | Veštački podignute plantaže vrba i topola | Willow and Poplar plantations |
| 2310 | Visoke mešovite šume poljskog jasena | High mixed forests of fraxinus angustifolia |
| 2410 | Visoke mešovite šume lužnjaka | High mixed forests of Quercus robur |
| 2510 | Visoke mešovite šume kitnjaka, sladuna i cera | High mixed forests of Quercus petraea, frainetto & cerris |
| 2620 | Izdanačke mešovite šume hrastova | Coppice mixed forests of Quercus petraea, frainetto & cerris |
| 2621 | Izdanačke mešovite šume hrastova- Visoke šume hrastova i ostalih lišćara | Coppice mixed forests of Quercus species - to high mixed forests of oaks |
| 2721 | Izdanačke mešovite šume lipa - Visoke šume lipe i ostalih lišćara | Coppice mixed forests of Tilia - to high forest of Tilia |
| 2810 | Visoke mešovite šume OTL | High mixed forests of other hard broadleaved species (OHB) |
| 2820 | Izdanačke mešovite šume OTL | Coppice mixed forests of OHB |
| 2821 | Izdanačke mešovite šume OTL - Visoke mešovite šume OTL | Coppice mixed forests of OHB - High mixed forests of OHB |
| 2920 | Izdanačke mešovite šume bagrema | Coppice mixed forests of Robinia  |
| 21010 | Visoke mešovite šume javora i jasena | High mixed forests of Acer pseudop. and Frax. nigra  |
| 21110 | Visoke mešovite šume bukve | High mixed forests of Beech (F. moesiaca) |
| 21120 | Izdanačke mešovite šume bukve | Coppice mixed forests of Beech  |
| 21121 | Izdanačke mešovite šume bukve - Visoke šume bukve i ostalih lišćara i četinara | Coppice mixed forests of Beech - to high forest of Beech |
| 31210 | Visoke mešovite šume borova  | High mixed forests of Pinus species |
| 31211 | Visoke mešovite šume borova-Visoke šume lišćara i četinara | High mixed forests of Pinus -to high forests of conifers & broadleaves |
| 31510 | Visoke mešovite šume smrče | High mixed forests of Picea abies |
| 31511 | Visoke mešovite šume smrče - Visoke šume četinara i liščara | High mixed forests of Picea species - to high forests of Picea & broadleaves |
| 31610 | Visoke mešovite šume ostalih četinara | High mixed forests of other conifers (Douglas, Larix) |
| 41310 | Visoke šume bukve i jele | High mixed forests of Fir & Beech |
| 41410 | Visoke šume bukve , jele i smrče | High mixed forests of Fir, Spruce & Beech |
| 51730 | Šibljaci / Šikare / Zbunasta vegetacija | Shrubs & bush vegetation  |
| 51731 | Šibljaci / Šikare / Zbunasta vegetacija - za rekonstrukciju | Shrubs & bush vegetation - for reconstruction |

# Atributi na primernoj površini

## Uzgojna Grupa/Faza –na nivou kruga

Svaki GT ili svaka GK može se podeliti na uzgojne grupe. Grupe su opisane dimenzijama drveća (D-prečnik, H-visina) i glavnim tipovima gazdinskih tretmana koje se primenjuju u svakoj uzgojnoj grupi.

| ID/ ŠIFRA | Uzgojna Grupa1 | Treatment Phases |
| --- | --- | --- |
| 1 | Podmladak, visina i prečnik dominantnih stabala [H: 0-3] m; DBH < 5 cm] | Regeneration [H: 0-3] m; DBH < 5 cm] |
| 2 | Rani mladik, visina i prečnik dominantnih stabala [H: 3-12 m; DBH 3 – 20 cm]  | Rani sapling [H: 3-12 (15) m; DBH 3 – 20 cm] |
| 3 | Kasni mladik, visina i prečnik dominantnih stabala2 [H: 12-17 m; DBH 15 – 25 cm] | Young pole [H: 12-17 m; DBH 15 – 25 cm] |
| 4 | Srednjedobna sastojina, visina i prečnik dominantnih stabala[H: 17-25; DBH 20 – 35 cm] | Old pole [H: 17-25; DBH 20 – 35 cm] |
| 5 | Dozrevajuća (odrasla) sastojina, visina i prečnik dominantnih stabala [H > 25 m; DBH 35-60] | Maturing[H > 25 m; DBH > 35-60] |
| 6 |  Zrela sastojina u fazi obnavljanja, visina i prečnik dominantnih stabala[H > 30 m, DBH cm >= 60 u zavisnosti od ciljnog prečnika] | Regeneration [H > 30 m, DBH >= 60  |
| 7 | Prebirna sastojina, grupimično prebirna sastojina | Uneven aged selection or group selection  |

1 Granične vrednosti prečnika su orjentacione vrednosti za uslove dobrog i prosečnog rasta produktivnih **bukovih šuma** i treba ih uskladiti sa nižim vrednostima na lošijim staništima. Vrednosti za druge gazdinske tipove date su u uputstvima za svaki gazdinski tip

2 Vrednosti dominatnih stabala u sastojini (dominantna stabla u dominatnom sloju)

Smernice gazdovanja sadrže opis svih tipičnih uzgojnih mera koje treba primeniti u svakoj fazi uzgoja kvalitativno i kvantitativno (npr. Selektivna proreda,.izbor PSB (potencijalnih stabala budućnosti) i uklanjanje 3-4 konkurenta u 10 godina; ili na primer kresanje grana kod četinarskih sastojina na PSB do 6-8m visine).

# Atributi na nivou stabla

## Visina stabla

Visina stabla defineše se kao vertikalni razmak od njegove osnove do vrha. Merenje visine će se **vršiti na svim stalnim (permanentnim) primernim površinama i ostalim detaljnim krugovima** tako što će se meriti visine svih stabala koje imaju prsni prečnik (DBH)>10cm. Drveće sa izlomljenom krošnjom, drveće u ležećem polozaju ili ono koje je veoma nagnuto neće se meriti.

## Početak krošnje/ dužina debla

Meri se na svim stablima na kojim se mere visine. Početak krošnje je visina merena u **dm**, na kojoj se nalaze veće i starije grane koje formiraju krunu ili na kojoj se stablo račva. Definicija je ilustrovana na slici ispod. Kod četinara visina krune predstavlja visinu na kojoj se nalaze najmanje 3 zelene grane.

|  |
| --- |
| Messhöhe_Kron |

*Slika 1: Početak krošnje*

## Stepen sušenja

U kolonu Stepen sušenja upisuje se pripadnost svakog stabla na krugu određenom stepenu sušenja po sledećim kodovima:

|  |  |  |
| --- | --- | --- |
| SIFRA | IME\_SIF | IME\_ENG |
| 0 | Zdravo stablo bez pojave sušenja | Vital living tree |
| 1 | Polusuvo stablo | Dying - partly dead |
| 2 | Suvo stablo | Dead tree |

## Socijalni status/Kraftova klasifikacija

Kod za klasifikaciju socijalnog statusa upotrebom „Karftovog klasifikaconog sistema“ prikazan je ispod. Ocena se vrši na **svakom stablu na svim primernim krugovima**

Socijalni status stabla je odnos njegove visine prema okolnim stablima. Informacija o socijalnom statusu je korisna za interpretaciju (zdravstvenog stanja) kondicije krošnje i podatke o prirastu pojedinačnih stabala. Naprimer dominantna stabla mogu biti osetljivija na stres od kodominantnih. Procena socijalnog statusa, u pojedinim slučajevima, može biti veoma teška. Potištena stabla ne treba izjednačavanti sa suvim, u raznodobnim sastojinama ona predstavljaju buduću generaciju stabala. Klasifikacija na strmim padinama predstavlja problem jer i relativno niska stabala dobijaju sunčevu svetlost. U ovim slučajevima klasifikacija treba da bude bazirana na relativnoj visini drveća.

**1= predominantna i dominantna (KRAFT 1 i 2** uključujući i stabla na osami) stabla čija je krošnja iznad nivoa opšteg nivoa kruna, jako razvijena krošnja.

**2= kodominantna-** (**KRAFT 3**) stabla čije krošnje se nalaze u istom spratu (nivou) ili nešto nižem, stabla sa dobro razvijenom krošnjom

**3**= **potištena uključujući i suva stabla** (**KRAFT 4 i 5**)– stabla sa krošnjim koja je ispod nivoa sklopa, ne prima direktnu svetlost odozgo, krošnja je više ili manje zakržljala i ograničena sa svih strana ili razvijena kao zastava.



Slika 2 Ilustacija socijalno statusnih klasa po Kraftu

Primedba: za stabla sa slomljenim vrhom nema klasifikacije po Kraftu

## Tehnička klasa

Tehnička klasa ocenjuje se na svakom stablu svih primernih krugova. Osnovni cilj ovog podatka je ocena kvaliteta stabla i potencijalne sortimentne strukture stabala u sastojini i na nivou GJ.

|  |  |  |
| --- | --- | --- |
| SIFRA | IME\_SIF | IME\_ENG |
| 1 | Stablo dobrog kvaliteta  | Good quality |
| 2 | Stablo srednje dobrog kvaliteta | Medium quality |
| 3 | Stablo lošeg kvaliteta | Low quality  |

* **1= Stablo sa** pravilno razvijenom krunom bez oštećenja i preloma sa **deblom bez oštećenja i pravim** do 25 % od ukupne visine (Potencijalno stablo budućnosti ako je u dominantnom položaju-stablo lepog opšteg izgleda)
* **2= Stablo sa** pravilno razvijenom krunom bez oštećenja i preloma **sa deblom sa manjim oštećenjem oštećenja i malo kriva** do 25 % od ukupne visine (Prosečni kvalitet stabla)
* **3**= **Stablo sa deblom sa vidljivim oštećenjima i/ili kriva** (Stablo lošeg kvaliteta)

### Probna doznaka

U okviru pilot projekta meri se na svakoj primernog površini **(do kraja juna test, a nakon toga konačna odluka na kojim krugovima će se ocenjivati),** sva stable su klasifikovana prema potrebi da budu negovana ili posečena u narednih 10 godina. Uzorak predstavlja osnov za definisanje inteziteta i količina drvne mase za seče u sastojinu.

Klasifikacija treba da bude izvršena kao poslednja aktivnost na svakoj primernoj površini (nakon definisanja tehničke i socijalne klase stabala).

|  |  |  |  |
| --- | --- | --- | --- |
| SIFRA | RedBr | SKR\_IME | IME\_SIF |
| 0 | Bez statusa | 0 | No status |
| 10 | Potencijalno Stablo Budućnosti | PSb | Potential future tree |
| 21 | Konkurent stablima budućnosti | Konk | Competitor |
| 30 | Indiferentno, bez uticaja stablo | Ind | Indifferent |
| 41 | Hitno za seču, vrlo lošeg kvaliteta | Za seču | Urgent cut - Very bad quality |
| 51 | Zrelo, seča obnavljanja | Zrelo | Mature - Regeneration cut |

# Primerne površine za praćenje rasta i prirasta

One se uspostavljaju tokom inventure koristeći mrežu detaljnih primernih površina na način kako je opisano u prethodnim poglavljima i postojećoj metodologiji prikupljanja podataka.

Ove primerne površine su uvek postavljene kao:

* Primerne površine u obliku kruga sa konstantnim prečnikom (kako je definisano za sastojinsku inventuru)
* Primerne površine u obliku koncentričnih krugova (ako je definisano za sastojinsku inventuru)
* Primerne površine pravougaonog oblika (ako je definisano za sastojinsku inventuru)

Broj primernih površina

* Broj primernih površina na kojima se vrši obzervacija iznosi 50% detaljnih primernih površina. U slučaju da broj primernih površina nije ceo, broj primernih površina na kojima se vrši obzervacija se zaokružuje.
* Primer: 7 detaljnih primernih površina/2 = 3,5
=> Broj površina na kojima se vrši obzervacija = 4

## Obeležavanje primernih površina na terenu

* Za razliku od stalnih primernih površina, za sastojinsku inventuru primerne površine su označene kao najefikasniji način za redovno ponovno merenje tokom naredne PGŠ inventure.
* Centralna tačka je trajno obeležena metalnom šipkom utisnutom duboko u zemlju (vrh metalne šipke treba da bude u ravni sa površinom zemlje). Kao takav, on ostaje kao trajno obeležje (referentna tačka) mreže klastera na celom području Republike Srbije. Ostale tri uzorka primerne površine označene su drvenim kočićima u centru.
* Ako nije moguće utisnuti drveni kočić u zemlju zbog stena i sl, označavanje centra primerne površine može biti prebačeno na najbližu moguću lokaciju (maksimalno udaljenu 9.99 m). Ako centar primerne površine pada na nepokretne stene ili podlogu, centar primerne površine tada treba označiti crvenom bojom. Ako je obeležavanje centra primerne površine pomereno dalje od stvarnog centra, udaljenost i azimut od pravog centra do aluminijumskog kočića treba evidentirati na obrascu.

|  |
| --- |
| Označavanje bojom kako bi se označio pravac centra primerne površine |

Slika 3: Označavanje stalnih primernih površina

* Oznaka se obeležava bojom i grebačem na najbližim stablima koji okružuju centar kruga i treba da ukažu na pravac ka centru primerne površine. Oznake na stablima i panjevima treba postaviti odmah iznad tla.
* Lokacija primerne površine se meri visoko preciznim GPS uredjajem koji se koristi za sastojinsku inventuru. Pozicija primerne površine se meri minimum 30 sekundi. Treba koristiti naknadnu obradu GPS podataka.

## Atributi za lociranje stabla na krugu

### Azimut do stabla

Azimut od centra primerne površine do svakog stabla treba da se meri na svim stalnim primernim površinama

Ovo merenje je očitavanje na komapsu od centra primerne površine do centra stabla na prsnoj visini

Validne vrednosti: 0 do 360.

### Udaljenost do stabla

Udaljenost do svakog stabla treba da se meri na svim stablima koja se mere.

Udaljenost centra primerne površine do centra stabla na prsnoj visini treba vertex ili Vertexom III i udaljenost zabeležiti u metrima (m). Primer distanca do stabla 7,4 m

Distanca

Centar kruga

Azimut

## Metod premera prečnika



* Identifikovanje graničnih stabala na krugu vrši se visinomerom hipsometer Vertex. Proveru graničnih stabala treba izvršiti samo za stabla graničnih prečnika.
* Prečnik treba meriti prečnikom ili mernom trakom u milimetrima. Premer stabala treba uvek započeti od severa i kretati se u smeru kazaljke na satu.
* Prečnicu prilikom merenja treba držati upravno u odnosu na stablo, a krak prečnice uvek treba da bude usmerena ka (ili daleko od) centra primerne površine. Mesto gde prečnica dodiruje stablo na visini od 1,3 m označava se oznakom (X) koristeći grebač. Iznad prečnika od 80 cm se koristi merna traka. Mesto premera se takođe označava na stablu.
* Ako stablo ima nepravilnosti na prsnoj visini, što utiče na premer prečnika, mesto premera bi trebalo pomeriti na najkraće moguće rastojanje nagore ili nadole, da bi se izbegla ova nepravilnost. Različita visina - koja odstupa od DBH - se beleži.
* U slučaju račvanja ispod prsne visine, svako stablo treba meriti posebno. Račve iznad 1.3 m DBH treba meriti kao posebna stabla.

## Merenje prečnika na prsnoj visini

Ako se na prsnoj visini od 1.3 m nemože meriti, tj zbog nepravilnosti stabla, visina na kojoj se meri stablo uneće se u metrima (m). Primer prsna visina na kojoj se meri stablo je 1,4 m

Za detalje vidi isliku ispod

|  |
| --- |
| abw |

Slika 4: Merenje prečnika na prsnoj visini

**ENGLISH VERSION**

Changes and additions in the methodology and manuals of the FMP according to BMEL project

Version6

Date: 05.11.2018

WS 9 + 10: Changes in the sample inventory and stand description

# Marking stand boundaries

Proposal: Marking field boundaries are constantly being implemented on the ground, when the boundaries cannot be clearly identified on the ground(similar structural characteristics and mixture but for different purposes).

# Attributes on stand level

## Management types

“Management classes (MC)” and “Forest Units (Sastojinske jedinice)” are grouped in Management types (MT). **Management types are homogeneous stand groups, which you can manage according to similar management or according to specific guidelines for the management of each management type**. Management programs for the MTs are described in Management guidelines.

The table below provides a list of management types for pilot MU Istočna Boranja. It is filled only with those MT, which represent the main area of MU2505 "Istočna Boranja"and MU "Radjenovci Novi”. In the coming period it is necessary to complete the final list of MTs through additional or new project.

| Sifre | Gazdinski Tip | Management Types |
| --- | --- | --- |
| 1110 | Visoke mešovite šume OML | High mixed forests of other soft broadleaved species (OSB) |
| 1120 | Izdanačke mešovite šume OML | Coppice mixed forests of other soft broadleaved species (OSB) |
| 1121 | Izdanačke mešovite šume OML - Visoke mešovite šume OML | Coppice mixed forest of OSB - to High mixed forests of OSB |
| 1210 | Veštački podignute plantaže vrba i topola | Willow and Poplar plantations |
| 2310 | Visoke mešovite šume poljskog jasena | High mixed forests of fraxinus angustifolia |
| 2410 | Visoke mešovite šume lužnjaka | High mixed forests of Quercus robur |
| 2510 | Visoke mešovite šume kitnjaka, sladuna i cera | High mixed forests of Quercus petraea, frainetto & cerris |
| 2620 | Izdanačke mešovite šume hrastova | Coppice mixed forests of Quercus petraea, frainetto & cerris |
| 2621 | Izdanačke mešovite šume hrastova- Visoke šume hrastova i ostalih lišćara | Coppice mixed forests of Quercus species - to high mixed forests of oaks |
| 2721 | Izdanačke mešovite šume lipa - Visoke šume lipe i ostalih lišćara | Coppice mixed forests of Tilia - to high forest of Tilia |
| 2810 | Visoke mešovite šume OTL | High mixed forests of other hard broadleaved species (OHB) |
| 2820 | Izdanačke mešovite šume OTL | Coppice mixed forests of OHB |
| 2821 | Izdanačke mešovite šume OTL - Visoke mešovite šume OTL | Coppice mixed forests of OHB - High mixed forests of OHB |
| 2920 | Izdanačke mešovite šume bagrema | Coppice mixed forests of Robinia  |
| 21010 | Visoke mešovite šume javora i jasena | High mixed forests of Acer pseudop. and Frax. nigra  |
| 21110 | Visoke mešovite šume bukve | High mixed forests of Beech (F. moesiaca) |
| 21120 | Izdanačke mešovite šume bukve | Coppice mixed forests of Beech  |
| 21121 | Izdanačke mešovite šume bukve - Visoke šume bukve i ostalih lišćara i četinara | Coppice mixed forests of Beech - to high forest of Beech |
| 31210 | Visoke mešovite šume borova  | High mixed forests of Pinus species |
| 31211 | Visoke mešovite šume borova-Visoke šume lišćara i četinara | High mixed forests of Pinus -to high forests of conifers & broadleaves |
| 31510 | Visoke mešovite šume smrče | High mixed forests of Picea abies |
| 31511 | Visoke mešovite šume smrče - Visoke šume četinara i liščara | High mixed forests of Picea species - to high forests of Picea & broadleaves |
| 31610 | Visoke mešovite šume ostalih četinara | High mixed forests of other conifers (Douglas, Larix) |
| 41310 | Visoke šume bukve i jele | High mixed forests of Fir & Beech |
| 41410 | Visoke šume bukve , jele i smrče | High mixed forests of Fir, Spruce & Beech |
| 51730 | Šibljaci / Šikare / Zbunasta vegetacija | Shrubs & bush vegetation  |
| 51731 | Šibljaci / Šikare / Zbunasta vegetacija - za rekonstrukciju | Shrubs & bush vegetation - for reconstruction |

# Plot level attributes

## Treatment Phase

Every MT can be split into treatment groups. Groups are described with three dimensions(D-diameter, H-height) and main types of forest management treatments which are applied in each breeding group.

| **ID /CODE** | **Treatment Group1** | **Treatment Phases** |
| --- | --- | --- |
| 1 | Sapling, height and diameter of the dominant trees[H: 0-3 m; DBH <5 cm] | Sapling [H: 0-3 m; DBH <5 cm]  |
| 2 | Thicket, height and diameter of the dominant trees[H: 3-12 m; DBH 3-20 cm] | Thicket [H: 3-12 (15) m; DBH 3-20 cm]  |
| 3 | Young pole, height and diameter of the dominant trees2[H: 12-17 m; DBH 15-25 cm] | Young Pole [H: 12-17 m; DBH 15-25 cm]  |
| 4 | Middle-aged stand, height and diameter of the dominant trees[H: 17-25;DBH 20-35 cm] | Old Pole [H: 17-25; DBH 20-35 cm]  |
| 5 | Maturing(adult) stand, height and diameter of the dominant trees[H> 25 m; DBH 35-60] | Maturing [H> 25 m; DBH 35-60]  |
| 6 | Mature stand in regeneration phase, height and diameter of the dominant trees  [H> 30 m, cm DBH> = 60 depending on target diameter] | Mature - Regeneration [H> 30 m, DBH> = 60 depending on target diameter]  |
| 7 | Selection, group selection and other uneven-aged stands with multi layered vertical structure | Selection stands, group selection stands and other uneven aged stands with multi-layered vertical structure.  |

1The limit values are approximate diameter values for the requirements of good and productive average growth **beech forests** and should be brought into line with lower values on poor sites. The values for the other type of forest management are given in the instructions for each type of management

2The values of the dominant trees in stand(dominant trees in the dominant layer)

The guidelines include a description of the management of all typical silvicultural measures to be applied at each stage of growing qualitatively and quantitatively (eg. Selective thinning,. selection PFT(potential future trees)and removing 3-4competitors in 10 years, or, for example, cutting branches in coniferous stands in the PFT to 6-8mheight).

# Tree level attributes

## Tree height

Tree height is defined as the vertical distance from its base to the top. Height measurement will be carried out on all permanent suitable surfaces and other detailed circles So what will be measured by the height of all trees having her pectoral diameter (DBH)> 10 cm. Trees with a broken crown, trees in the prone position or one that is very sloped will not be measured.

## Crown base / length of the trunk

Measuered by all trees where heights are measured. The crown base is the height measured in **dm**, where big and old branches to form the green crown are positioned at the stem or a forking of the stem starts. The definition is illustrated below. For Conifers the height of the crown means the height of a whirl of at least 3 green branches.

|  |
| --- |
| Messhöhe_Kron |

Figure 1: Crown base

## Degree of drying

In the column Degree of drying is entered the belonging of each tree on a circle to a particular degree of drying, using the following codes:

|  |  |  |
| --- | --- | --- |
| SIFRA | IME\_SIF | IME\_ENG |
| 0 | Zdravo stablo bez pojave sušenja | Vital living tree |
| 1 | Polusuvo stablo | Dying - partly dead |
| 2 | Suvo stablo | Dead tree |
|  |  |  |

## Social status /Kraft Classification

Code for classification of social status by using "Kraft’s classification system” is shown below. The assessment is done on **every tree in all sampling circles**

Social status of the tree is the ratio of its height to the surrounding trees. Information about the social status is useful for the interpretation (health status) of the crown condition and data on increment of individual trees. For example, the dominant trees can be more sensitive to stress than co dominant term. Assessment of social status, in some cases, can be very difficult. Suppressed trees should not be equated with dry, in uneven-aged stands they are the future generation of trees. Classification on steep slopes is problematic because the relatively low trees receive sunlight. In these cases, classification should be based on the relative height of the trees.

**1 = very dominant and dominant (KRAFT 1 and 2**including a secluded tree) tree whose crown is above the level of the general level of the crown, very developed crown.

**2 =codominant - (KRAFT 3)**tree canopy which are located in the same floor (level),or slightly lower, the trees with well-developed crown

**3**=**suppressed including dead trees(KRAFT 4 and 5)**- a tree with a canopy, which is below the level set, does not receive direct light from above, crown more or less stunted and confined on all sides, or developed as a flag.



Figure 2: Illustration of the social class status according to Kraft

Note: For stable with a broken tip there is no classification by Kraft

## Technical classes

Technical classes estimated on each tree of all appropriate circles. The main objective of this information, the assessment of quality trees and the potential assortment structure trees in a stand at the level of MU

**1 =tree with a** properly developed crown without damage and fracture and timber **without damages** and **right** 25% of the total height (Potential future tree if it is in a dominant position-well general appearance tree)

**2 =tree with a** properly developed crown without damages and fractures **with minor damage and little curved** to 25% of the total height (average quality of the tree)

**3**=**A tree with a trunk with visible damage and / or curved** (Tree of poor quality)

## Virtual tree marking

Within the pilot project it is measured on each sampling area **(test by the end of June, after which the final decision on which plot will be evaluated),**all the trees were classified according to the need to be nurtured and harvested the next 10years.The sample is the basis for defining the intensity and amount of timber to be cut in a stand.

Classification should be carried out as the last activity on each exemplary surface (after defining technical and social class trees).

|  |  |  |  |
| --- | --- | --- | --- |
| SIFRA | Red Br | SKR\_IME | IME\_SIF |
| 0 | Bez statusa | 0 | No status |
| 10 | Potencijalno Stablo Budućnosti | PSb | Potential future tree |
| 21 | Konkurent stablima budućnosti | Konk | Competitor |
| 30 | Indiferentno, bez uticaja stablo | Ind | Indifferent |
| 41 | Hitno za seču, vrlo lošeg kvaliteta | Za seču | Urgent cut - Very bad quality |
| 51 | Zrelo, seča obnavljanja | Zrelo | Mature - Regeneration cut |

# observation plots for monitoring of growth and increment

They are established during the detailed inventory using a network of suitable surface in the manner described in the previous sections and existing methodology of data collection.

These sampling areas are still set as:

* Sampling areas in the form of a circle with a constant diameter (as defined for Stand Inventory)
* Sampling areas in the form of concentric circles (if defined for Stand Inventory)
* Sampling areas in the rectangle form (if defined for Stand Inventory)

Number of sampling areas

* Number of sampling areas on which the observation is carried out is 50% of the detailed sampling areas. In case the number of sampling areas is not the whole, the number of sampling areas on which to perform observation is rounded.
* Example: 7 detailed sampling areas / 2 = 3.5
=> The number of areas which performs observation = 4

## Special marking of the observation plots in the field

* Observation plots can be regularly re-measured of during each FMP inventory.
* The central point is permanently marked with a metal stick imprinted deep into the ground (top metal rod should be below the surface of the ground).As such, it remains as a permanent feature (reference point) Cluster network in the whole territory of the Republic of Serbia. The other three samples suitable surface marked with wooden stakes in the center.
* If you cannot fix the metal stick in the ground because of rocks, etc., marking of the center can be moved to a suitable location nearest (a maximum of 9.99 m away).If center of the sampling area falls on the immovable item or surface (rock), the center of the plot should then be marked in red. If the center mark (metal stick) had to be moved from the real center, distance and azimuth from the real center to the metal stick must be recorded on the form.

|  |
| --- |
|   Color marking in order to indicate the direction to the center of the suitable surface |

Figure 3: Marking Permanent sampling area

* Assign marks the color and ice scraper on the nearest trees that surround the center of the circle and should indicate the direction to the center suitable surface. Markings on trees and stumps should be placed just above the ground.
* Location sampling area is measured highly accurate GPS device that is used to Stand Inventory. Position a suitable surface is measured at least 30 seconds. You must use the post-processing GPS data.

## Attributes for locating trees on the observation plot

### Azimuth to tree

Azimuth from the center of the sampling area to each tree should be measured at all permanent sampling areas

This measurement is read on compass from the center of the sampling area to the center of the tree at breast height

Valid values: 0 to from is 360.

### Distance to tree

Distance from each tree should be measured on all trees that are measured.

For distance from center of the sampling area to the center of the tree at breast height, vertex or Vertex III and record the distance in meters (m).For example, the distance from the tree 7.4 m



## Diameter measurement methods

* Identification of the boundary trees is done by Vertex instrument distance measurement. Boundary trees checking should be done only for tree with boundary diameters.
* Above a diameter of 80 cm using measuring tape. Diameter spot is also marked on the tree.
* Diameter needs to be measured with the diameter or the **measuring tape in millimeters**. Survey should always start from the north and move in a clockwise direction. When measuring diameters with a caliper (down to the millimeter) the caliper should be kept perpendicular to the tree, a leg brace should always be directed towards (or away from) the center of the plot. The point where the caliper touches the tree at a height of 1.3 m shall be marked (X) using a scraper (Beech) or pruning saw (oaks, conifers).
* If the tree has irregularities at breast height, which affects the diameter survey, the diameter spot should move to the shortest possible distance up or down in order to avoid this irregularity. The different levels - which deviates from DBH - is recorded.
* In case the fork under the breast height each tree should be measured separately. Forks above 1.3 m the DBH should measure as a separate tree.

## Measurements of the diameter at breast height

If at breast height of 1.3 m can not be measured, because of tree irregularity, height on which the tree is measured shall be entered in meters (m).Example breast height to which the tree is measured 1.4m

For details see below

|  |
| --- |
| abw |

Figure 4:Measure the diameter at breast height

# ANNEX

## Annex 1: List of Management Types

## Annex 2: Images of trial marking trees will be added