Landscape/planning level: Two different sized areas are used for implementation in Sub-boreal regions. Fishers in moist/wet subzones have a larger home range (50km^2) than fishers in dry subzones (25km^2). The respective home range sizes represent the area that should meet all the habitat requirements for a female fisher in each subzone type. *Minimum structural attributes* identify the characteristics of important habitat structures and patches used by fishers. *Primary stand attributes* are stand features identifiable in the VRI that describe stands which likely contain the important habitat features required by fishers. *Minimum targets* provide minimum estimates of the area of habitat and number of individual features an average female fisher is thought to require within their home range. *Strategies* provide ideas for implementing the targets to address fisher habitat needs. Finally, the table describes *why* these attributes are required for fishers. Note that multiple fisher life history components may be met by the same tree, patch, or stand.

BC FISHER HABITAT WORKING GROUP

Sub-Boreal Forests *(Dry SBS: SBSdw, SBSdh, SBSdk Moist or wet SBS: SBSwk, SBSmk, SBS mc, SBSmm, SBSmw)*

Fisher life history component	Structural attributes required	Primary stand attributes	Minimum targets	Strategies	Why?
Rearing or breeding habitat	Tree characteristics: • Black cottonwood (Act) ≥90 cm dbh, declining[1] with ≥60% tree and shrub cover immediately surrounding.	Moist/wet subzones: • Act leading, secondary, or tertiary species (or hybrid spruce (Sx) as only species). • Crown closure ≥30% • QMD ≥28.5 cm • Basal area ≥ 29.75 m²/ha • Stand age ≥125 years Dry subzones: • Act leading, secondary, or tertiary species (or hybrid spruce (Sx) as only species). • Crown closure ≥20% • QMD ≥28 cm. • Basal area ≥28 m²/ha. • Stand age ≥125 years.	Moist/wet subzones: • 247 ha of Primary stands needed per 50 km² (4.9% of home range). Dry subzones: • 129 ha of Primary stands needed per 25 km² (5.2% of home range). Other stands: • Potential den trees will also occur in other stand types where trees with the required structural attributes occur. Targets for those stands are addressed at the stand level.	• Mapping exercises can identify areas with suitable breeding habitat and ensure that sufficient area in Primary stands are retained in fisher home ranges at all times. • In general, harvested areas will not contain viable denning trees unless suitable trees are retained *and* forest cover is protected or develops sufficiently to provide security cover.	• Fishers require den cavities for birthing and raising their young. In the Sub-boreal forest, den cavities have only been found in larger diameter cottonwood trees containing heart-rot cavities. • Female fishers often use more than one den tree in a single year. Given this, fishers need multiple suitable trees for the present and will also require new den trees to develop in the future when existing trees fall. • Den trees also occur in stands that are not Primary as individual trees or small patches that are not mappable.
Resting habitat: ***rust broom sites***	Tree characteristics: • Sx ≥39 cm dbh with large rust brooms • Rust brooms should be >40cm diameter to provide a platform for fisher.	Moist/wet subzones: • Sx leading, secondary, or tertiary species. • Crown closure ≥30%. • QMD ≥22.7 cm. • Basal area ≥35 m²/ha. • Stand age ≥135 years; height ≥23.7 m. Dry subzones: • Sx leading, secondary, or tertiary species (or hybrid spruce as only species) • crown closure ≥25% • QMD ≥19.6 cm • basal area ≥32 m²/ha • stand age ≥72 years	Moist/wet subzones: • 945 ha of Primary stands needed per 50 km² (18.9% of home range). Dry subzones: • 544 ha of Primary stands needed per 25 km² (21.8% of home range) Other stands: Potential rest trees will also occur in other stand types with a spruce component. Targets for those stands are addressed at the stand level.	• Mapping exercises can identify areas with suitable resting habitat and ensure that sufficient area in Primary stands are retained in a 50 km^2 area at all times. • Resting habitat should be provided in a well dispersed arrangement where possible.	• Tree-based rest sites provide fishers with places to rest while providing protection from predators, thermal cover, and opportunities for prey detection. Rust brooms are used year round, but are used more often when temperatures are moderate (e.g. >-10˚ C).

[1] Declining: appearance code 2; tree live, but unhealthy; internal decay or growth deformities present; often dead leader (DTEIF 1990).

Sub-Boreal Forests – Landscape Level Management **Continued**

Fisher life history component	Structural attributes required	Primary stand attributes	Minimum targets	Strategies	Why?
Resting habitat: ***branch-limb sites***	Tree characteristics: • Cottonwood branches >12 cm diameter. • Will be captured by rearing habitat structural attributes (above).	• Will be captured by rearing habitat stand attributes (above).	• Will be achieved through rearing habitat targets (above).	• Branch-limb rest sites have similar attributes as breeding structures and stands, so it is likely that overlap with breeding habitat allows these components to be met with the strategies used for rearing habitat.	• Rest sites provide fishers with places to rest while providing protection from predators, thermal cover, and opportunities for prey detection. • Large branches provide fishers with relatively flat areas to rest.
Resting habitat: ***cavity sites***	Tree characteristics: • Act ≥77 cm dbh, ≥23m tall, surrounded by 70% tree and shrub cover • Trembling aspen (At) ≥59 cm dbh, ≥14 m tall, surrounded by 25% tree and shrub cover. • Fd ≥97 cm dbh, ≥29 m tall with advanced decay, surrounded by 55% tree and shrub cover.	*All subzones*: • At or Act as the leading, secondary species, or tertiary species. • Crown closure ≥25% • QMD ≥30 cm • Basal area ≥32 m²/ha • Stand height ≥35 m	Moist/wet subzones: • 8 ha of Primary stands needed in 50 km² (0.2% of home range) Dry subzones: • 15 ha of Primary stands needed in 25 km² (0.6% of home range). Other stands: • Potential rest trees will also occur in other stand types where trees with the required structural attributes occur. Targets for those stands are addressed at the stand level.	• Mapping exercises can identify areas with suitable cavity rest trees and ensure that sufficient area in Primary stands are retained in fisher home ranges at all times. • In general, harvested areas will not contain viable cavity trees unless suitable trees are retained *and* forest cover is protected or develops sufficiently to provide security cover.	• Rest sites in tree cavities provide fishers with safer and thermally superior rest sites than branches. • Cavity rest sites may also act as reproductive dens. However, females appear to require smaller entrance holes to denning cavities than to resting cavities, likely to provide greater protection for their kits.
Resting habitat: ***coarse woody debris sites***	CWD characteristics: • ≥35 cm diameter. • ≥7 m in length. • Decay class 2-3[2]. • Elevated 25-50 cm above ground. • Any tree species.	CWD rest stands: • QMD ≥22.7 cm. • Stand age ≥135 years; • Stand height ≥23.7 m.	Moist/wet subzones: • 1,379 ha of Primary stands needed in 50 km² (27.6% of home range) Dry subzones: • 371 ha of Primary stands needed in 25 km² (14.8% of home range).	• Mapping exercises can identify areas with suitable CWD resting habitat and ensure that sufficient area in Primary stands are retained in a 30 km² area at all times. • Future high-quality rest sites can also be created in harvested areas by reserving suitable logs and by creating piles of woody debris.	• The long, thin body of a fisher is thermally inefficient due to their high surface area to body weight ratio. Together, CWD and snow provide fishers with thermally efficient rest sites during winter. • Micro habitats that minimize heat loss are important for fishers, especially for areas with cold winter climates such as BC.
Foraging habitat: ***ruffed grouse***	Not applicable	Optimal ruffed grouse stands: • *Under development.*	Primary stands: • *Under development.*		• Ruffed grouse is an important prey species for fishers throughout BC.

[2] Decay class 2: intact log, hard to partly decaying, elevated but slightly sagging, bark intact or partly missing; Decay class 3: hard large pieces, partly decaying, sagging near ground or broken, traces of bark (DTEIF 1990).

Sub-Boreal Forests – Landscape Level Management **Continued**

Fisher life history component	Structural attributes required	Primary stand attributes	Minimum targets	Strategies	Why?
Foraging habitat: ***squirrels***	Not applicable	Optimal red squirrel stands: • Tree Canopy Closure >50%. • Coniferous canopy height ≥ 15 m. • Conifer (pine, spruce and Subalpine-fir) tree canopy ≥ 50%. • Spruce in Tree Canopy ≥60%. Optimal flying squirrel stands: • Tree Canopy Closure 50-85%. • Coniferous canopy height ≥21 m. • Conifer (pine, spruce and Douglas-fir) tree canopy 30-80%. • Large Deciduous tree density (>35 cm dbh): ≥2 stems/ha.	Moist/wet subzones: • 21.6 km² of Primary stands needed in 50 km² (43.2% of home range). Dry subzones: • 294 ha of Primary stands needed in 25 km² (11.8% of home range).	• Mapping exercises can identify areas with suitable squirrel habitat and ensure that sufficient area in Primary stands are retained in a fishers home range at all times. • Harvested areas will not provide suitable squirrel habitat for a considerable time; however, suitable sized WTPs and riparian reserves can provide some habitat after harvesting.	• Squirrel habitat makes up a relatively large component of fisher home ranges in the Sub-boreal Region. Their importance in fisher diets is supported by a study in BC that found red squirrels comprising the second highest frequency of occurrence in the stomachs of fisher (after snowshoe hare).
Foraging habitat: **snowshoe hare**	Not applicable	Optimal snowshoe hare stands: • Average tree heights ≥3 m. • Tree density: ≥8000 stems/ha optimal, >3000 stems/ha required to provide any habitat value. • Cover (trees and shrubs <3 m) 80-100% optimal, 30-80% increasing suitability, and <30% unsuitable for hare.	Moist/wet subzones: • 116 ha of Primary stands needed in 50 km² (2.3% of home range). Dry subzones: • 5 ha of Primary stands needed in 25 km² (0.2% of home range).	• Plant >3000 stems/ha, protect patches of deciduous stems, and retain woody debris on block to provide additional cover. • Avoid spacing stands where conifer growth is not stagnating. Where spacing is necessary, retain 25% of the stand in dense patches and strips that provide habitat and facilitate snowshoe hare dispersal.	• Snowshoe hare habitat did not make up a large proportion of fisher home ranges in the Sub-boreal Region. Despite this, hares are important prey for fishers throughout BC that provide a relatively large source of calories per kill.
Movement habitat	Tree/CWD characteristics: • Structural attributes that provide cover or facilitate escape from predators, such as trees, security cover, and complex piles of CWD.	Movement stands • No empirical data currently available, but movement habitat is likely suitable if total cover (combination of tree and shrub cover) is >20% based on observations of fisher habitat-use patterns. • "High-quality" movement stands are believed to be stands with total cover ≥50% (30% shrub and 20% tree cover.	Moist/wet subzones: • 20.8 km² of Primary stands needed in 50 km² (41.7% of home range). Dry subzones: • 656 ha of Primary stands needed in 25 km² (26.2% of home range). Other stands: • Movement habitat should also be supplied in harvested areas using reserves, non-merchantable patches, and coarse woody debris.	• Movement habitat can be overlapped effectively with riparian reserves to form linear arrangements of habitat that facilitate dispersal. • Linear arrays of non-merchantable timber within cut blocks can be used by fisher to cross openings. • Piles of CWD spaced appropriately can provide escape habitat in harvested areas and can be used with other retention to help fishers cross openings. • Design blocks to limit the “dash distance” fishers have to travel without forested cover or other escape habitat.	• Movement habitat is needed so fishers can safely travel between important habitats within their home range, and to access new areas when dispersing.

Stand Level Management: practices that should be conducted at the cutblock level to retain fisher habitat. *Primary stand attributes* are identifiable stand features that describe stands which likely contain the important habitat features required by fishers. *Minimum targets* provide minimum estimates of the area of habitat and number of individual features an average female fisher is thought to require. Primary stands will contain most of the structures used by fisher in its home range, but a lower density of structures is also required in other stands. *Strategies* provide ideas for implementing the targets to address fisher habitat needs. Note that the most effective strategy for retaining life history components will be to avoid logging high-quality structures, patches, and stands. Finally, the table describes *why* these attributes are required for fisher. It is also important to note that multiple fisher life history components may be met by the same tree, patch, or stand.

Sub-Boreal Forests *(Dry SBS: SBSdw, SBSdh, SBSdk Moist or wet SBS: SBSwk, SBSmk, SBSmc, SBSmm, SBSmw)*

Fisher life history component	Structural attributes required	Primary stand attributes	Minimum targets	Strategies	Why?
Rearing or breeding habitat	Tree characteristics: • Black cottonwood (Act) ≥90 cm dbh, declining[3] with ≥60% tree and shrub cover immediately surrounding. • The most valuable trees for present use by fisher have cavities with entrance holes (>1.5m from ground) that have typical dimensions of 5–10 cm wide by 7–15 cm tall. • Larger Act trees (>30 cm dbh) with multiple infection points for the recruitment of future den trees.	Moist/wet subzones: • Act leading, secondary, or tertiary species (or hybrid spruce (Sx) as only species). • Crown closure ≥30% • QMD ≥28.5 cm • Basal area ≥ 29.75 m²/ha • Stand age ≥125 years Dry subzones: • Act leading, secondary, or tertiary species (or hybrid spruce (Sx) as only species).Crown closure ≥20% • QMD ≥30 cm. • Basal area ≥30 m²/ha. • Stand age ≥125 years.	Moist/wet subzones: • Total of 6,030 trees per 50 km²[4]. – 4,520 (18 trees/ha) in Primary stands. – 1,510 (0.66 trees/ha) in other stands. Dry subzones: • 52 trees per 25 km² female home range: – 39 (0.3 trees/ha) in Primary stands. – 13 (0.002 trees/ha) in other stands.	• Retain trees with required structural attributes in or adjacent to harvested areas. • Where possible, protect suitable trees in wind-firm retention areas, or maintain advanced regen/brush around the trees to provide concealment cover (≥45% total cover [tree and shrub combined]). • Stands not defined as Primary will also have scattered trees or small patches of trees with the required structural attributes. Trained field crews can identify these trees for retention.	• Fishers require den cavities for birthing and raising their young. In the Sub-boreal forest, den cavities have only been found in larger diameter cottonwood trees containing heart-rot cavities. • Female fishers often use more than one den tree in a single year. Given this, fishers need multiple suitable trees for the present and will also require new den trees to develop in the future when existing trees fall. • Den trees also occur in stands that are not Primary as individual trees or small patches that are not mappable.
Resting habitat: ***branch-limb sites***	Tree characteristics: • Cottonwood branches >12 cm diameter. • Will be captured by rearing habitat structural attributes (above).	• Will be captured by rearing habitat stand attributes (above).	• Will be achieved through rearing habitat targets (above).	• The tree characteristics, stand attributes, and targets for branch-limb rest sites are very similar to rearing habitat. This overlap allows these components to be met with strategies used for rearing habitat.	• Rest sites in tree cavities provide fishers with safer and thermally superior rest sites than branches. • Cavity rest sites may also act as reproductive dens. However, females appear to require smaller entrance holes to denning cavities than to resting cavities, likely to provide greater protection for their kits.

[3] Declining: appearance code 2; tree live, but unhealthy; internal decay or growth deformities present; often dead leader (DTEIF 1990).
[4] Fishers in moist/wet subzones have a larger home range (50km²) than fishers in dry subzones (25km²). The respective home range sizes represent the area that should meet all the habitat requirements for a female fisher in each subzone type.

Sub-Boreal Forests – Stand Level Management **Continued**

Fisher life history component	Structural attributes required	Primary stand attributes	Minimum targets	Strategies	Why?
Resting habitat: ***rust brooms***	Tree characteristics: • Sx ≥39 cm dbh with large rust brooms • Rust brooms should be >40cm diameter to provide a platform for fisher.	Moist/wet subzones: • Sx leading, secondary, or tertiary species. • Crown closure ≥30%. • QMD ≥22.7 cm. • Basal area ≥35 m²/ha. • Stand age ≥135 years; height ≥23.7 m. Dry subzones: • Sx leading, secondary, or tertiary species (or hybrid spruce as only species) • crown closure ≥25%. • QMD ≥19.6 cm. • basal area ≥32 m²/ha. • stand age ≥72 years.	Moist/wet subzones: • Total of 5,970 trees per 50 km². – 4,480 (4.7 trees/ha) in Primary stands. – 1490 (0.4 trees/ha) in other stands. Dry subzones: • 2,430 trees per 25 km² female home range: – 1,820 (3.3 trees/ha) in Primary stands. – 610 (0.2 trees/ha) in other stands.	• Where possible, protect the trees in windfirm wildlife tree patches with crown closure ≥30 % in wet/moist subzones and ≥25% in dry subzones.	• Rest sites provide fishers with protection from predators, thermal cover, and opportunities for prey detection. • Tree-based sites are used year round, but are used more often when temperatures are moderate (e.g. >-10˚ C).
Resting habitat: ***cavity sites***	Tree characteristics: • *Act ≥77 cm dbh, ≥23m tall, surrounded by 70% tree and shrub cover* • Trembling aspen (At) ≥59 cm dbh, ≥14 m tall, surrounded by 25% tree and shrub cover. • Fd ≥97 cm dbh, ≥29 m tall with advanced decay, surrounded by 55% tree and shrub cover.	*All subzones*: • At or Act as the leading, secondary species, or tertiary species. • Crown closure ≥25% • QMD ≥30 cm • Basal area ≥32 m²/ha • Stand height ≥35 m	Moist/wet subzones: • Total of 90 trees per 50 km². – 70 (9.9 trees/ha) in Primary stands. – 20 (0.01 trees/ha) in other stands. Dry subzones: • 40 trees per 25 km² female home range: – 30 (2 trees/ha) in Primary stands. – 10 (0.08 trees/ha) in other stands.	• Retain trees with required structural attributes in or adjacent to harvested areas. • Where possible, protect suitable trees in wind-firm retention areas, or maintain advanced regen/brush around the trees to provide concealment cover (≥45% total cover [tree and shrub combined]). • Stands not defined as high-quality will also have scattered trees or small patches of trees with the required structural attributes. Trained field crews can identify these trees for retention.	• Rest sites in tree cavities provide fishers with safer and thermally superior rest sites than branches. • Cavity rest sites may also act as reproductive dens. However, females appear to require smaller entrance holes to denning cavities than to resting cavities, likely to provide greater protection for their kits.

Sub-Boreal Forests – Stand Level Management **Continued**

Area	Minimum structural attributes	Primary stand attributes	Targets	Strategies	Why?
Resting habitat: ***coarse woody debris sites***	CWD characteristics: • ≥35 cm diameter. • ≥7 m in length. • Decay class 2-3[5]. • Elevated 25-50 cm above ground. • Any tree species.	CWD rest stands: • QMD ≥22.7 cm. • Stand age ≥135 years; • Stand height ≥23.7 m.	Moist/wet subzones: • Total of 5,010 pieces per 50 km². – 3,760 (2.7 logs/ha) in Primary stands. – 1,250 (0.3 logs/ha) in other stands. Dry subzones: • Total of 830 pieces per 25 km² female home range: – 620 (1.7 logs/ha) in Primary stands. – 210 (0.09 logs/ha) in other stands.	• Protect natural accumulations of CWD using machine free zones, or create piles of CWD using machinery. • Man-made piles should be generally > 20 m³.	• Together, CWD and snow provide fishers with thermally efficient rest sites during winter. The long, thin body of a fisher is thermally inefficient due to their high surface area to body weight ratio. • Micro habitats that minimize heat loss are important for fishers, especially for areas with cold winter climates such as BC.
Movement habitat	Tree/CWD characteristics: • Structural attributes that facilitate escape from predators, such as trees/shrubs (>20% cover) and complex piles of CWD.	Movement stands • No empirical data currently available but, based on fisher habitat-use patterns, movement habitat is likely suitable if total cover (combination of tree and shrub cover) is >20%. • "High-quality" movement stands are believed to be stands with total cover ≥50% (30% shrub and 20% tree cover.	• Assess the block and make the best use of retention areas, regen patches, single tree retention, and CWD piles to provide movement habitat across large open areas. Continuous cover is best, but if it is not possible, try to keep “dash distances <100m. • Travel corridors will benefit both prey and fishers and will generally overlap with riparian management areas and wildlife tree patches. Avoid leaving large areas without some kind of connective cover.	• Use riparian reserve zones to provide movement habitat. • Protect non-merchantable trees and shrubs in gullies crossing cut blocks. • Combine non-merchantable protection, WTPs, single trees and CWD piles to provide linear travel habitats with “dash distances of <100m.	• Movement habitat is needed so fishers can safely travel between important habitats within their home range, and to access new areas when dispersing.

[5] Decay class 2: intact log, hard to partly decaying, elevated but slightly sagging, bark intact or partly missing; Decay class 3: hard large pieces, partly decaying, sagging near ground or broken, traces of bark (DTEIF 1990).

Sub-Boreal Forests – Stand Level Management **Continued**

Area	Minimum structural attributes	Primary stand attributes	Targets	Strategies	Why?
Foraging habitat: ***snowshoe hare and squirrels***	Not applicable	Optimal snowshoe hare stands: • Average tree heights ≥3 m. • Tree density: ≥8000 stems/ha optimal, >3000 stems/ha required to provide any habitat value • Cover (trees and shrubs <3 m) 80-100% optimal, 30-80% increasing suitability, and <30% unsuitable for hare. Optimal red squirrel stands: • Tree Canopy Closure >50%. • Coniferous canopy height ≥ 15m. • Conifer (pine, spruce and Subalpine-fir) tree canopy ≥ 50%. • Spruce in Tree Canopy ≥60%. Optimal flying squirrel stands: • Tree Canopy Closure 50-85%. • Coniferous canopy height ≥21 m. • Conifer (pine, spruce and Douglas-fir) tree canopy 30-80%. • Large Deciduous tree density (>35 cm dbh): ≥2stems/ha.	• Targets for the different habitats will depend on structural/floristic attributes of the proposed cut block and harvesting constraints. Greater amounts of prey habitat are more likely to support viable prey populations. • During spacing, reserve 25% of the area in non-spaced patches or linear arrays.	• Assess the attributes of each block and target the optimal habitats for each prey species, where present, for management. • Snowshoe hare: Protect natural patches of high density regen, plant patches at higher densities, reserve areas from spacing activities, protect deciduous stems, and retain complex woody debris. • Squirrels: concentrate WTPs on patches of forest meeting the optimal structural attributes. Home range size varies with habitat quality, but larger WTPs (>1.5 ha) are more likely to be suitable. Connecting WTPs with adjacent mature timber will also increase habitat quality for squirrels. Squirrel middens are usually located on mesic or wetter sites that can be targeted for WTPs.	• Fisher require catchable prey to survive and will target different prey species in different habitats, although, the habitats of some prey will overlap.
Foraging habitat: ***Ruffed grouse and small rodents***	Not applicable	Optimal ruffed grouse stands: • *Under development.* Optimal small rodent stands: • Contains abundant patches with increased cover in CWD, shrubs, and regen.	Ruffed grouse Primary stands: • *Under development.* Small rodents Primary stands: • Targets will depend on structural/floristic attributes of the proposed cut block and harvesting constraints.	• Small rodents: protect areas of advanced regeneration and natural CWD characteristics using machine free zones; retain individual pieces of CWD in various sizes (length and diameter) on block; and create complex piles of CWD.	• Fisher require catchable prey to survive and will target different prey species in different habitats, although, the habitats of some prey will overlap.