

Fisher Habitat and Forest Management Workshop

100 Mile House February 23, 2017

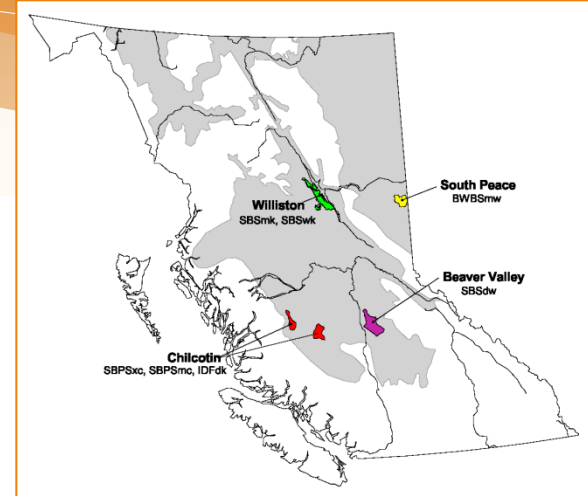
Larry Davis, Davis Environmental Ltd.
Kane Copley, FLNRO





Who is the Fisher Habitat Working Group?

- * Group of biologists from the 4 provincial fisher projects
- * Extension specialists
- * **Common goal**



FISH AND WILDLIFE
COMPENSATION PROGRAM

A partnership between BC Hydro, the Province of B.C.
and Fisheries and Oceans Canada



Ministry of
Environment

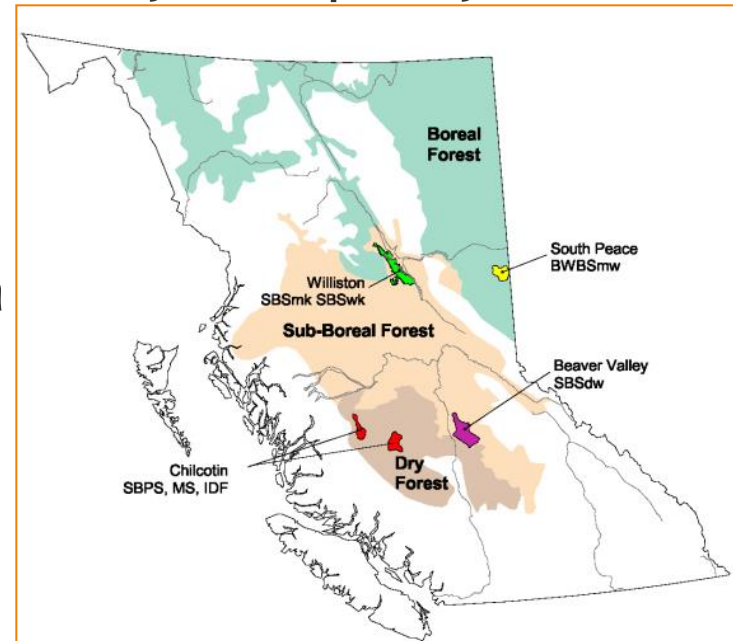
Fishers and forestry can co-exist (and need to co-exist)

- * Fishers **do not rely solely on late-successional forests**
 - though, key habitat features are found in these forests
- * Fisher is a **blue-listed and *Identified Wildlife*** species
 - IWMS (under FRPA) requires that limiting habitats will be maintained
- * Forest harvesting is an integral part of BC's economy
 - but, it “needs” to meet environmental standards (i.e., third-party **forest certifications**)
 - common tenet of certifications - biological diversity is conserved and wildlife habitat is maintained

Why does the Extension Initiative exist?

Common goal:

- * Get the information learned from the 4 projects out to the people that can affect the quantity and quality of fisher habitat
- * Thus, aiding in the conservation, recruitment, and enhancement of fisher habitat in British Columbia



How will our *Initiative* help you?

- * It will inform you of the **key habitat features and conditions required by fishers**
 - Many of the same features/conditions are needed by other wildlife species (e.g., cavity-dependent species, furbearers)
- * It will provide you with a resource that will:
 - assist you in **better managing your forests for fishers** (and other wildlife), and
 - assist you in **meeting certification requirements**

Workshop Objectives

By the end of the workshop, participants will :

1. be familiar with **online resources** to support desired fisher habitat outcomes;
2. be able to **identify forest resources or vegetation structure** that constitute good habitat for fishers;
3. be able to **determine the amount and distribution of forest resources** that fishers require;
4. be aware of **how to incorporate habitat conditions and targets** into future forest management decisions, and
5. **provide feedback** on their ability to implement the desired targets and conditions

We know a bit about fishers, but... we're not forestry folks

We need your help.



- * **Feedback** from you will help us design useful, appropriate, and effective habitat management guidelines and tools that will be easy for the forest industry to implement.
- * We want to make this workshop as **interactive** as possible.
- * We want to develop guidelines and tools that will make **YOUR** job as easy as possible.

Workshop Focus

- * **Provide information to help guide forest planning decisions** to more efficiently incorporate fisher habitat needs into forest development plans
 - * Identify fisher habitat using **spatial data**
- * **Operational activities/training** is part of a different workshop aimed at “boots on the ground” pre-harvest and harvest activities.



Workshop Outline

1. Fisher ecology
2. Habitats that fishers need
3. How much fishers need
4. Operational Toolbox
5. Example applications
6. Field trials





Fisher Ecology, Habitats, and Implications for Forestry

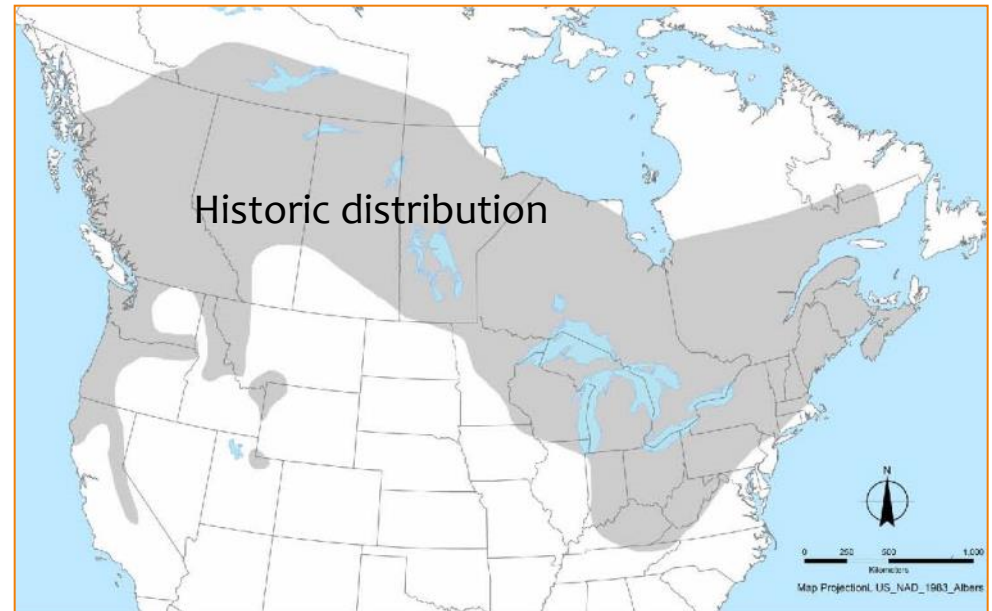


What is a fisher?

- Member of the weasel family
- About the size of housecat
 - Males weigh ~3.5 – 5 kg; 90-120 cm in length
 - Females ~2 – 3 kg; 75-95 cm in length
- Designed for semi-arboreal lifestyle
 - 5 toes with retractable claws, relatively large feet



Distribution in BC and across North America



Strong Association with Forests and Forest Structure



- Require forest cover
- Riparian stands important
- Often associated with deciduous trees/stands
- Elements of old forest important (large trees, large woody debris, and complex structure)
- Reflect habitats of prey species

Fishers don't fish: Diet



- Opportunistic predator
- Prey on mid – small sized mammals, birds, reptiles, insects, and plant material.
- Ungulate carrion used extensively when available
- Snowshoe hare, red squirrels, and mice most often consumed prey in BC

Fisher Life Cycle

- * Live 4-6 years for males, 5-8 years females
- * Females give birth in early April and produce 3-4 litters of 2-3 kits during lifetime
- * Mating occurs 7-10 days later followed by delayed implantation
- * Dispersal of young occurs between fall and next spring, but may take up to 2 years
- * Survival of adults is ~80% year-to-year, ~50% for kits to one year



Status in British Columbia

- *Identified Wildlife* and Blue-listed in BC (S2S3) with population estimate of fewer than 3800 animals.
- Legally harvested as a “furbearer” in Central & Northern BC, but closed to trapping in Southern BC.
- Vulnerable to habitat loss and trapping.
- Trend – projected **population decline in short and long term.**

Why be concerned about fishers?



- Closely associated with structural features of late-successional forests
- Short legs, big territories
- Don't respond well to habitat change:
 - Low density
 - Low reproductive capacity
- Regulatory requirements

What we know about fishers in BC

1. Beaver Valley [SBSdw]

- 1990-1993
- 19 fishers

2. Williston [SBSmk, SBSwk]

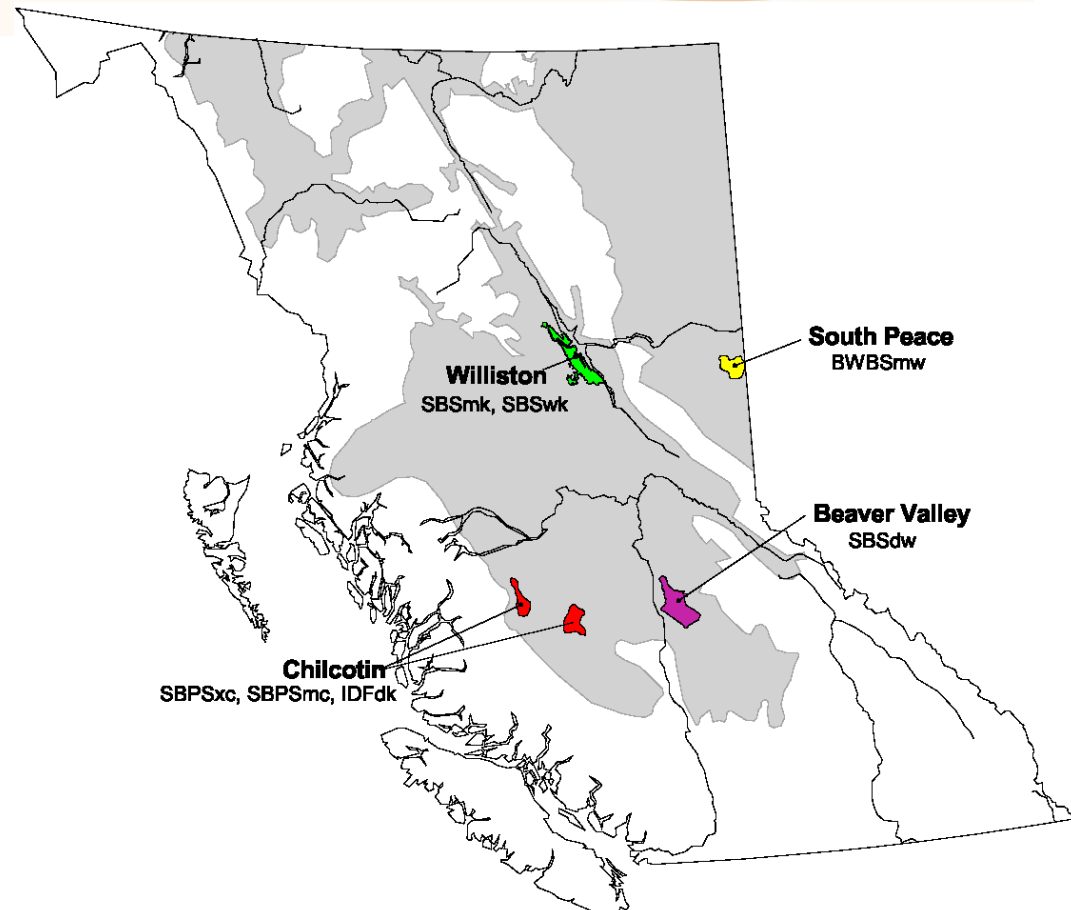
- 1996-2000
- 22 fishers

3. Chilcotin [SBPSxc, SBPSmc, IDFdk]

- 2005-2009
- 24 fishers

4. South Peace [BWBSmw]

- 2005-2009
- 24 fishers



Sub-Boreal fisher studies: Major findings

- Density of ~8.8 fishers/1,000 km²
- Home ranges very large (F: 25-50 km², M: 160-210 km²)
- Large portions of landscape not suitable for home ranges
- Fishers closely tied to large, uncommon forest structures for reproduction and resting:
 - Large declining cottonwood trees used as reproductive dens
 - Rust brooms in hybrid spruce commonly used for resting, but also used cavities in large aspen and cottonwoods
 - Large pieces of woody debris important during periods of extreme cold

Dry Zone fisher studies: Major findings

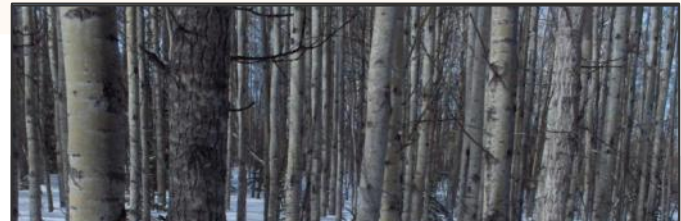
- Density of ~12 fishers/1,000 km²
- Home ranges fairly large (F: 30 km², M: 156 km²)
- Wider range of den tree species than elsewhere
- Fishers still closely tied to large, uncommon forest structures for reproduction and resting:
 - Large declining aspen, lodgepole pine and Douglas-fir trees used as reproductive dens
 - Rust brooms in white spruce commonly used for resting, but also used cavities in large aspen pine and Douglas-fir
 - Woody debris piles and animal burrows important during periods of extreme cold

Forest Management and Fishers

Forest harvesting and other management affects these 4 habitats for fishers:

- * Denning
- * Resting
- * Foraging
- * Movement & Dispersal

Main impacts are from loss of large old structures found mostly in late-successional forests



Challenges



- * Some forest activities can remove habitat needed by fishers for a significant time period.



Opportunities



- * Other forest activities can enhance habitat for some activities (e.g., snowshoe hare habitat, CWD resting habitat)



Opportunities

- * The trees and structures that fishers actually need are quite different than what the mills like to get.



Getting new information into forest management decisions



- * Small tweaks to current forest management can have big payback for fisher habitat
- * May actually help with some forest management barriers (e.g., leaving CWD) and certification requirements

Summary

- Fishers are **important forest carnivores** in central and northern BC.
- Fishers rely on forests for **4 habitat needs**.
- Forest management plays a key role in **the supply of these habitats**.
- **Targeted information** can help forest managers enhance their ability to conserve habitat needed by fishers.





What is Fisher Habitat?

- * Occurs at a bunch of different scales ranging from single trees to whole landscapes
- * Is different for different activities:

Denning

Resting

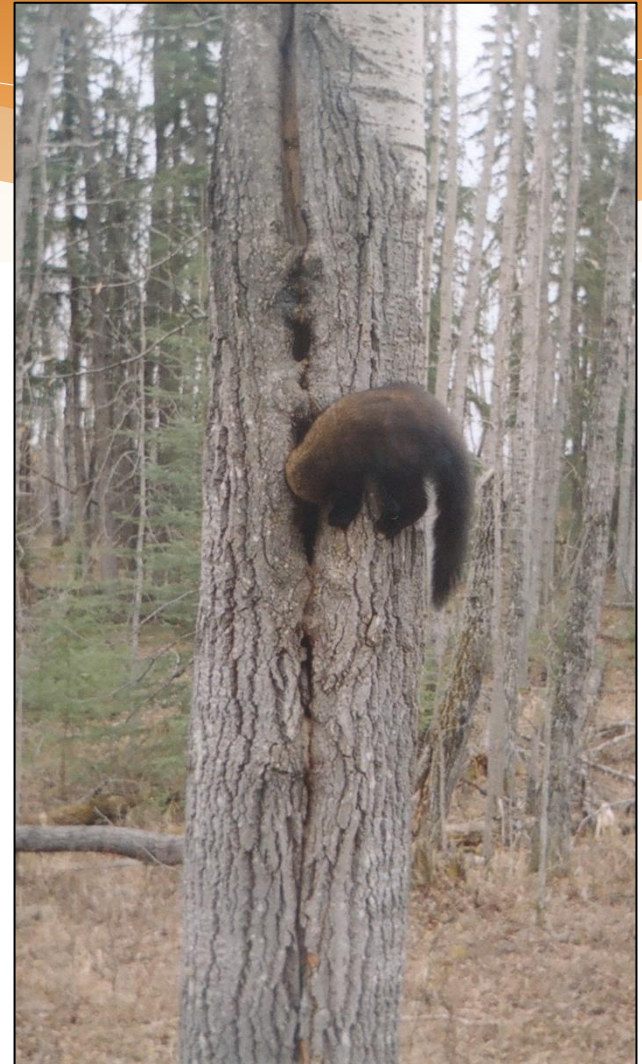
Foraging

Movement



1) Denning Habitat

- Dens in heart rot cavities of large-diameter trees
- Forest cover at den sites generally >25%
- Habitats characteristics at den trees dependent on the tree species
- Often use more than one den tree for raising a litter
- Den trees re-used among years



2) Resting Habitat

- * Generally habitats with tree cover, **spruce** most often used tree species
- * **Rest trees** generally larger than other trees in a patch and have **structures associated with disease or decay**
- * **Ground rest site** use linked to **cold weather**, larger diameter logs, and snow cover



3) Foraging Habitat



- Reflects habitats of primary prey species, but always with forest cover
- Young stands with sufficient tree cover for abundant snowshoe hare populations can also be used

4) Movement & Dispersal Habitat

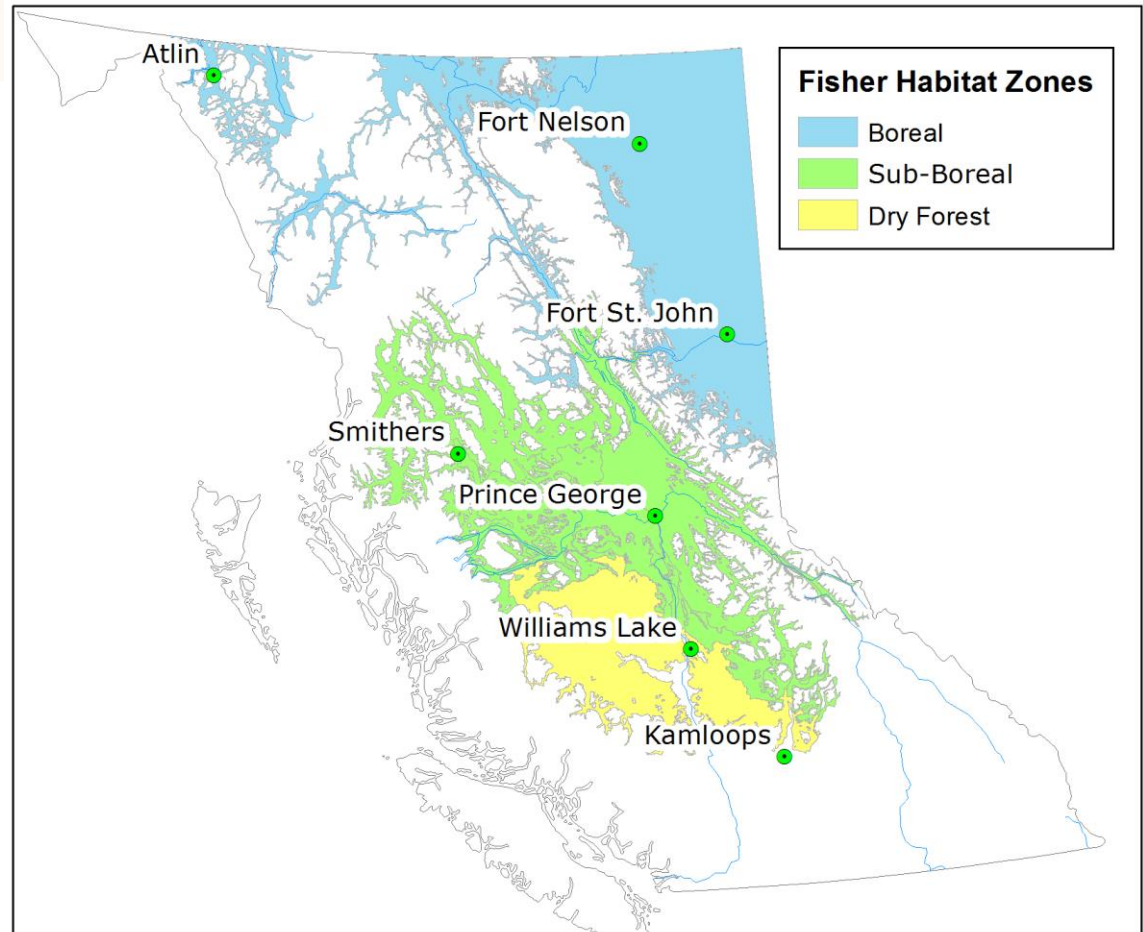


- * Forest cover with escape terrain (e.g., larger trees or complex woody debris)
- * Will cross narrow openings (e.g., 50 m)
- * Need to provide connectivity along riparian areas and to upland habitats

Fisher Habitat Zones

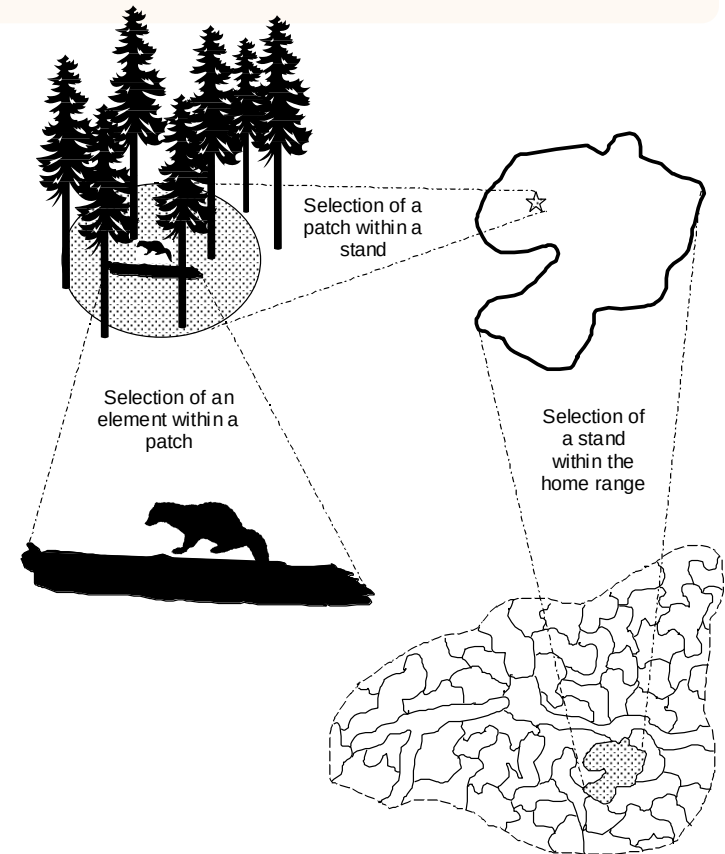
Habitat relationships for each activity vary by forest region:

- Boreal forests
BWBS zone
Cold, dry climate
- Sub-boreal forests
SBS zone
Cold, moist climate
- Dry forests
SBPS, MS, and IDF zones
Cool, very dry climate



Fishers in each Habitat Zone

- * Fishers need to find habitats for denning, resting, foraging, and dispersal within their home range area.
- * Fishers use structural attributes of forests, such as elements and patches, to meet many of these needs.
- * Type I stands are those that are used most often by fishers for each habitat need.
- * Home ranges need to have sufficient area in these Type I stands to support fishers.
- * This presentation outlines appropriate habitat conditions and targets that will help conserve fisher habitat in the Sub-boreal and Boreal Habitat Zones.



Forestry affects fisher habitat

Two primary spatial scales at which forestry operations affect supply of fisher habitat:

- * COARSE SCALE – Supply of habitat within fisher home ranges
- * FINE SCALE – Supply of habitat within stands

Throughout workshop, we will focus on how planning decisions can affect habitat at these 2 scales.

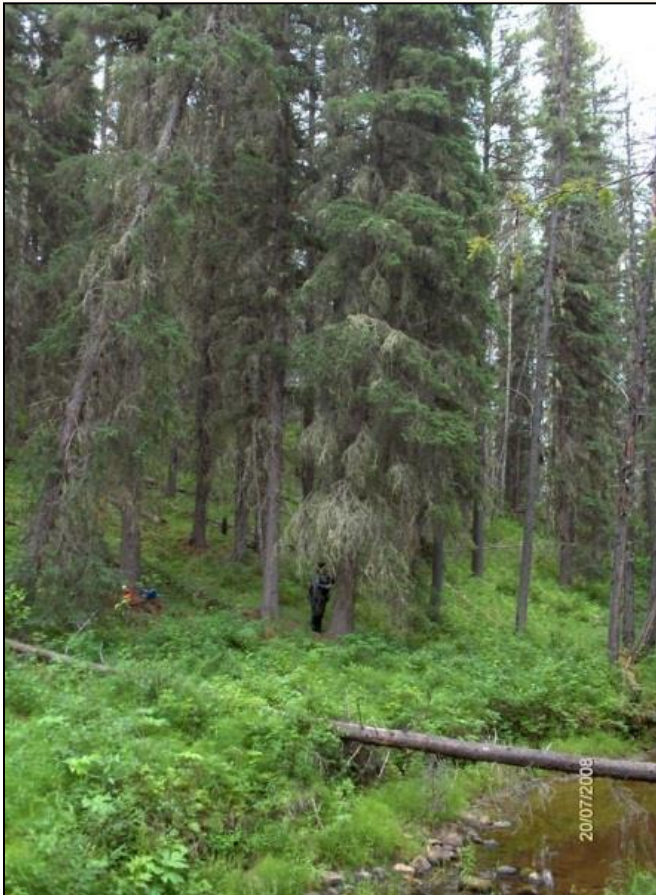


Habitat Conditions and Targets



Habitat supply at the
landscape and stand scales

Overview



- * What is a condition?
- * What is a target?
- * Fisher data used
- * Characterizing habitat conditions needed by fishers
- * Target estimation

Conditions and Targets



Provide forestry personnel with an idea of:

- What good fisher habitat looks like at coarse and fine scale
- How much of it is needed by fishers at each scale

Used to provide guidance to help make operational decisions in fisher habitat

Conditions and Targets

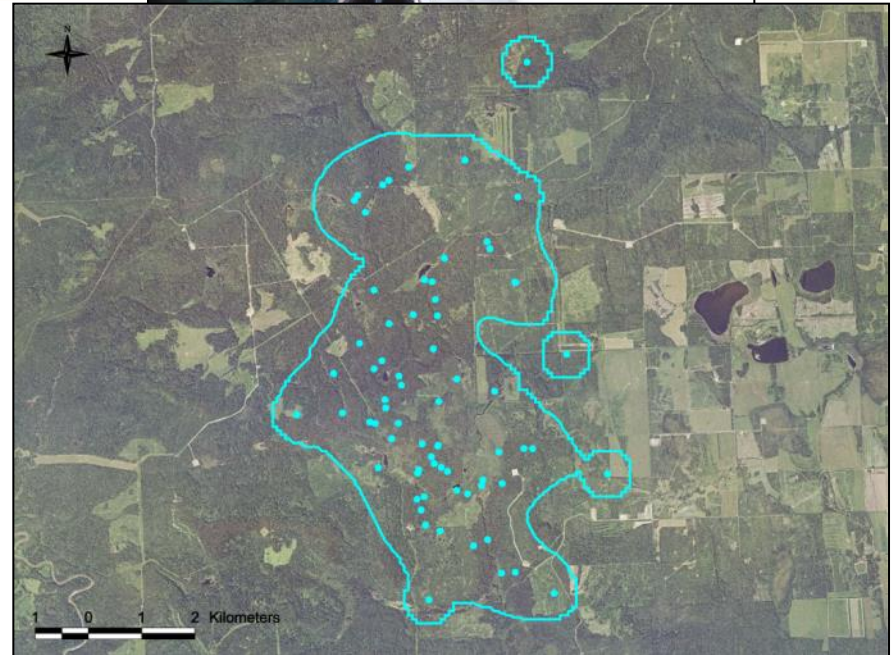


Have been identified for:

- * Each habitat need
- * Each Fisher Habitat Zone
 - * Boreal
 - * Sub-Boreal
 - * Dry Forest
- * For multiple planning and operational scales

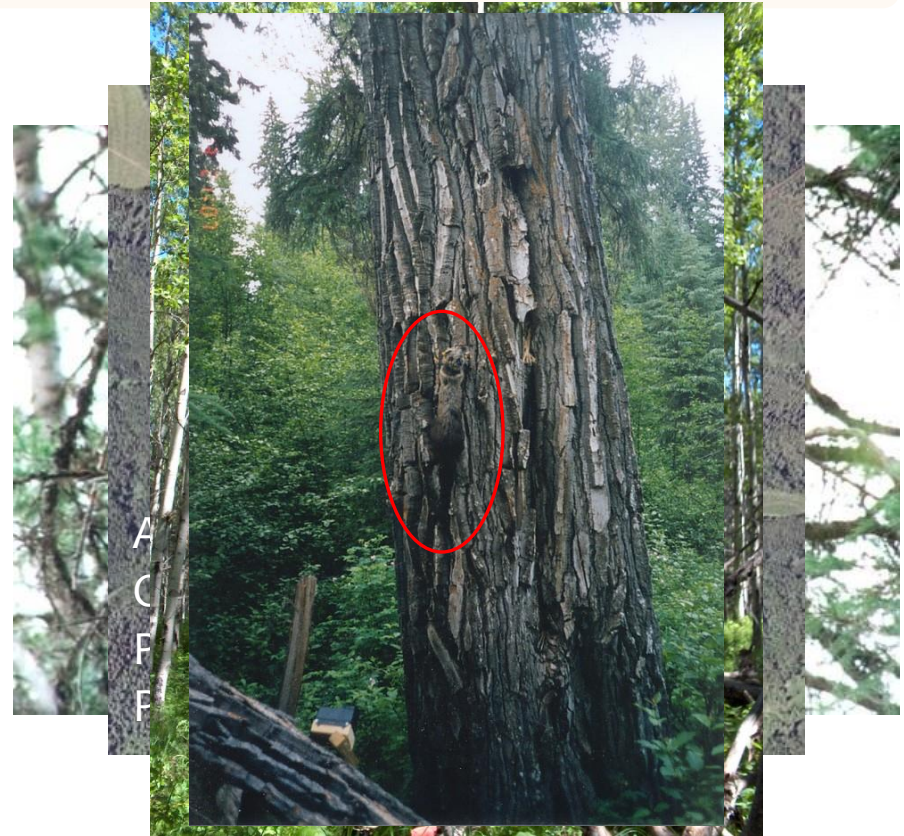
What do fishers need?

1. Collect information on fishers
 - * Capture, radiotag and monitor fishers to:
 1. Identify the structures used by fishers for rearing offspring and resting.
 2. Identify the stands used by fishers for rearing, resting, foraging, and movement.
 3. Determine the size and composition of the home range of each tagged fisher.



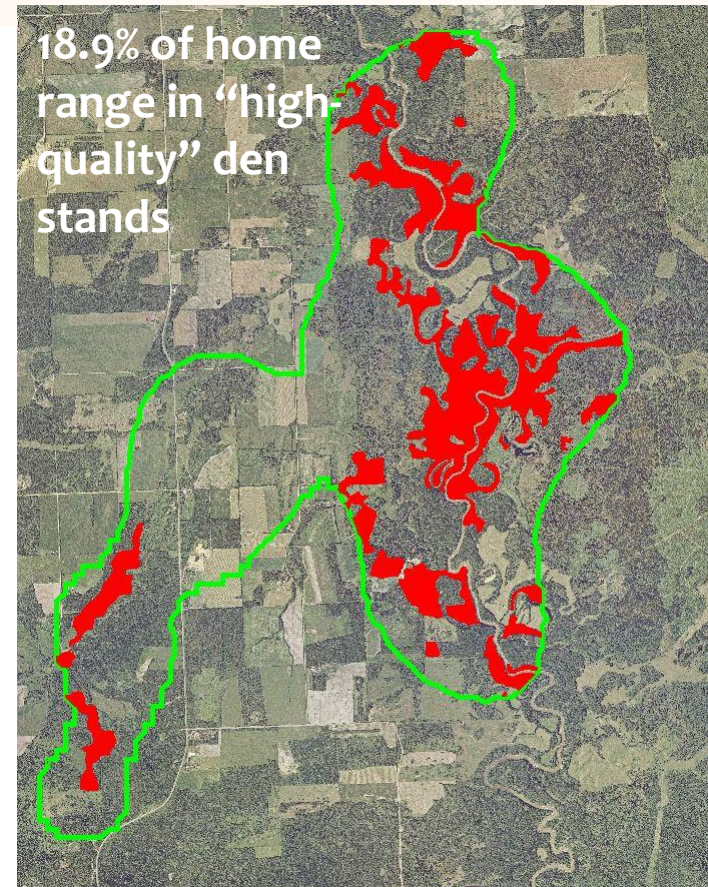
What do fishers need?

1. Collect information on fishers
2. Measure habitats used by fishers
 - a) Characterize the **STRUCTURAL ATTRIBUTES** of rearing and resting sites
 - b) Characterize **STAND ATTRIBUTES** of stands used by fishers → **TYPE I stands** [spatial data]
 - c) Estimate density of structures with “minimum structural attributes” in Type I stands



How much do fishers need?

1. Collect information on fishers
2. Measure habitats used by fishers
3. Estimate targets
 - a) Estimate the **MINIMUM DENSITY** of TYPE I stands needed for each behaviour within each home range
 - b) Estimate the **NUMBER OF STRUCTURES** that need to occur within the home range.



A Few Important Notes



1

Not all trees that meet the minimum criteria are suitable

- Things we can measure vs. things fishers need

TARGETS are based on the things we can measure

- Refining the minimum criteria to better reflect what fishers need would refine the target.

A Few Important Notes



2

Males don't really matter!

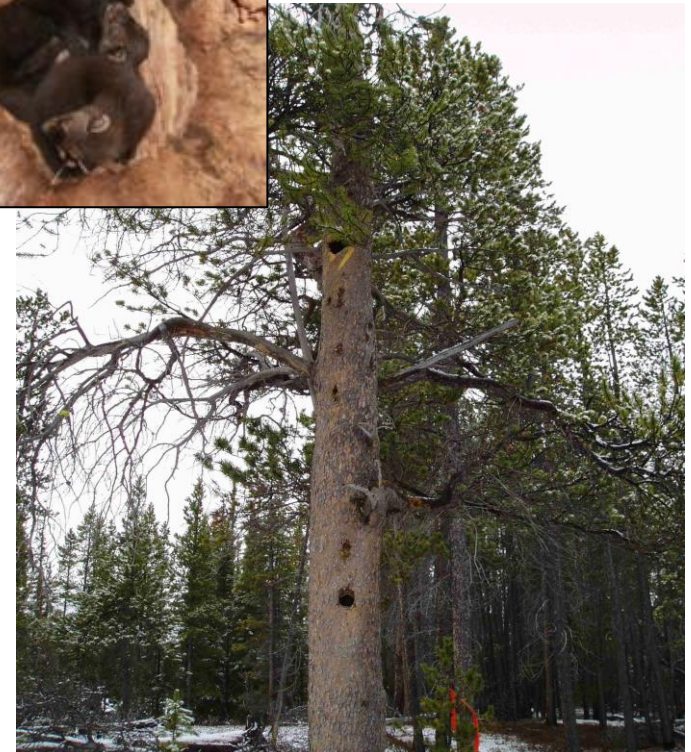
- * Female fishers are the real habitat specialists
 - Have to find enough structures and habitats to support themselves in a smaller area than males
- * Males simply go wherever the girls are...and pick up food along the way

Conditions and targets that we present are derived from data on female fishers

Rearing Habitat

Females need rearing sites that provide:

- * Thermal protection
- * Predator protection
- * Security cover surrounding the den for both her and her young.



Habitat Resources



Fishers require very specific features:

- * A tree with a cavity >30 cm inside diameter with an opening 5-10 cm wide
- * Overhead cover surrounding the cavity-tree and connecting to forest

Minimum Structural Attributes



Black cottonwood:

- * ≥ 90 cm dbh
- * signs of internal decay
- * branch-hole entrance
- * surrounded by $\geq 60\%$ tree & shrub cover

Minimum Structural Attributes



Trembling aspen:

- * ≥ 44 cm dbh
- * signs of internal decay
- * fire-scar or branch-hole entrance
- * $\geq 15\%$ tree & shrub cover

Lodgepole pine:

- * ≥ 35 cm dbh
- * signs of internal decay
- * Branch hole, pileated woodpecker entrance
- * $\geq 5\%$ tree cover

Douglas-fir:

- * ≥ 65 cm dbh
- * signs of internal decay
- * branch-hole entrance
- * $\geq 15\%$ tree cover

Habitat Conditions and Targets:



Resting Habitat

What are fishers looking for?



Resource needs that must be met for a site to be successfully used by fishers:

- * Thermal protection
- * Predator protection
- * Prey detection

In what types of habitats do they find these resources?

Habitat resources that we know meet these resource needs:

- * **Branch sites:** Rust brooms, nests, or large branches that form elevated platforms that can hold a fisher and have cover,
- * **Tree cavities:** >20 cm inside diameter with access >5 cm wide,
- * **Woody debris sites:** cavities >20 cm diameter under the snow surface,
- * **Ground burrows:** dug by other animals (bears, woodchucks, beavers),

Combined with

- * Overhead cover surrounding these structures and connecting to adjacent forest

Minimum Structural Attributes



Branch sites:

- * Large rust brooms on Sx ≥ 39 cm dbh,
- * Large limbs of Act ≥ 112 cm dbh,

Cavity sites:

- * Act ≥ 77 cm dbh, ≥ 23 m tall with advanced decay, surrounded by 70% tree and shrub cover
- * At ≥ 59 cm dbh, ≥ 14 m tall with branch-holes, surrounded by 25% tree and shrub cover
- * Fd ≥ 97 cm dbh, ≥ 29 m tall with advanced decay, surrounded by 55% tree and shrub cover

CWD sites:

- * any tree species, ≥ 35 cm diameter,
- * decay class 2 or 3,
- * ≥ 7 m in length,
- * elevated 25-50 cm above ground

Woody debris piles:

- * most pieces 10-15 cm diameter
- * $\sim 15\%$ of volume in pieces ≥ 25 cm diameter
- * $> 10 \text{ m}^3$ (minimum dimensions: 8 m x 4 m x 2 m)

Minimum Structural Attributes



Branch sites:

- * Large rust brooms on Sx ≥ 27 cm dbh,
- * Fd ≥ 39 cm dbh,
- * Pl ≥ 23 cm dbh with mistletoe clumps

Cavity sites:

- * At ≥ 40 cm dbh, ≥ 23 m tall with branch-holes or fire-scar entrances
- * Fd ≥ 46 cm dbh with advanced decay and branch-hole entrance

CWD sites:

- * any tree species, ≥ 20 cm diameter,
- * decay class 2 or 3,
- * ≥ 10 m in length,
- * elevated 25-50 cm above ground

Woody debris piles:

- * most pieces 10-15 cm diameter
- * $\sim 15\%$ of volume in pieces ≥ 25 cm diameter
- * $> 10 \text{ m}^3$ (minimum dimensions: 8 m x 4 m x 2 m)



Habitat Conditions and Targets:



Foraging Habitat

Grocery List

Foraging habitat to be successfully used by fishers:

- * Catchable snowshoe hares
- * Catchable tree squirrels
- * Catchable grouse and other birds
- * Catchable mice and voles
- * Protection from predators (overhead cover)



Snowshoe Hares



High-quality Snowshoe hare Foraging Areas:

- * Dense young conifers and deciduous trees, and willows that support high densities of snowshoe hares
- * Tree or shrub height >3 m
- * High density of stems (>3000 stems/ha)
- * Lots of overhead cover (30-80% tree or shrub cover)

Tree Squirrels



High-quality Squirrel Foraging Areas:

- * Tree Canopy Closure $\geq 50\%$
- * Coniferous Height ≥ 15 m
- * $\geq 50\%$ Pine, Spruce and Fir in Tree Canopy Spruce in Tree Canopy
- * Tree canopy comprised of $\geq 60\%$ spruce (red squirrels only)
- * Tree canopy height ≥ 21 m
- * ≥ 2 stems/ha of large deciduous trees ≥ 35 cm dbh (flying squirrels only)

Grouse



High-quality Ruffed Grouse Foraging Areas

- * Thought to be $\geq 20\%$ deciduous species in the overstory, $\geq 6\%$ crown closure, Deciduous canopy height ≥ 10 m
- * We are looking for a better model that reflects local habitats

Voles and Mice

High-quality Vole and Mice Foraging Areas:

- * Not mappable
- * Strongly associated with CWD and herb or shrub cover



Habitat Conditions and Targets:



Movement & Dispersal Habitat

What are fishers looking for?



Resource needs that must be met for movement habitat to be successfully used by fishers:

- * Protection from predators

In what types of habitats do they find these resources?



Habitat resources that we know meet these resource needs:

- * Trees and shrubs that provide overhead cover

Minimum Structural Attributes



Concealment cover:

- * Trees provide vertical cover and escape terrain
- * Shrubs provide vertical and horizontal cover
- * Some escape trees required in habitats dominated by shrub cover or young conifers

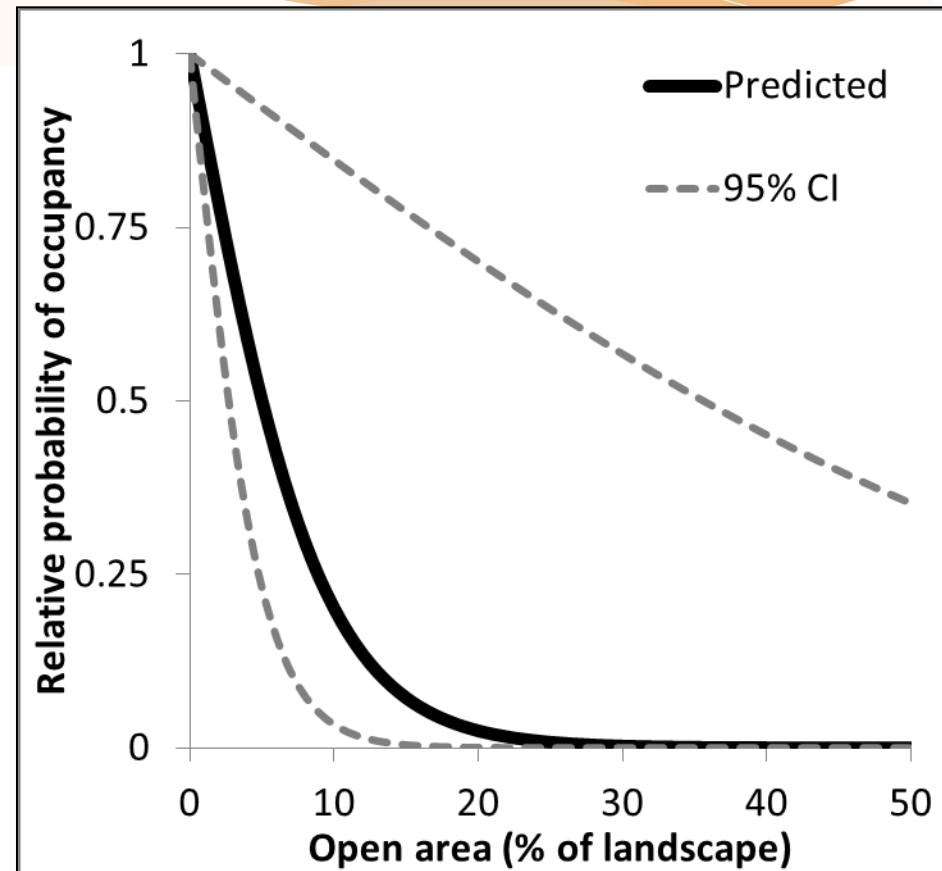
Type I Stand Attributes

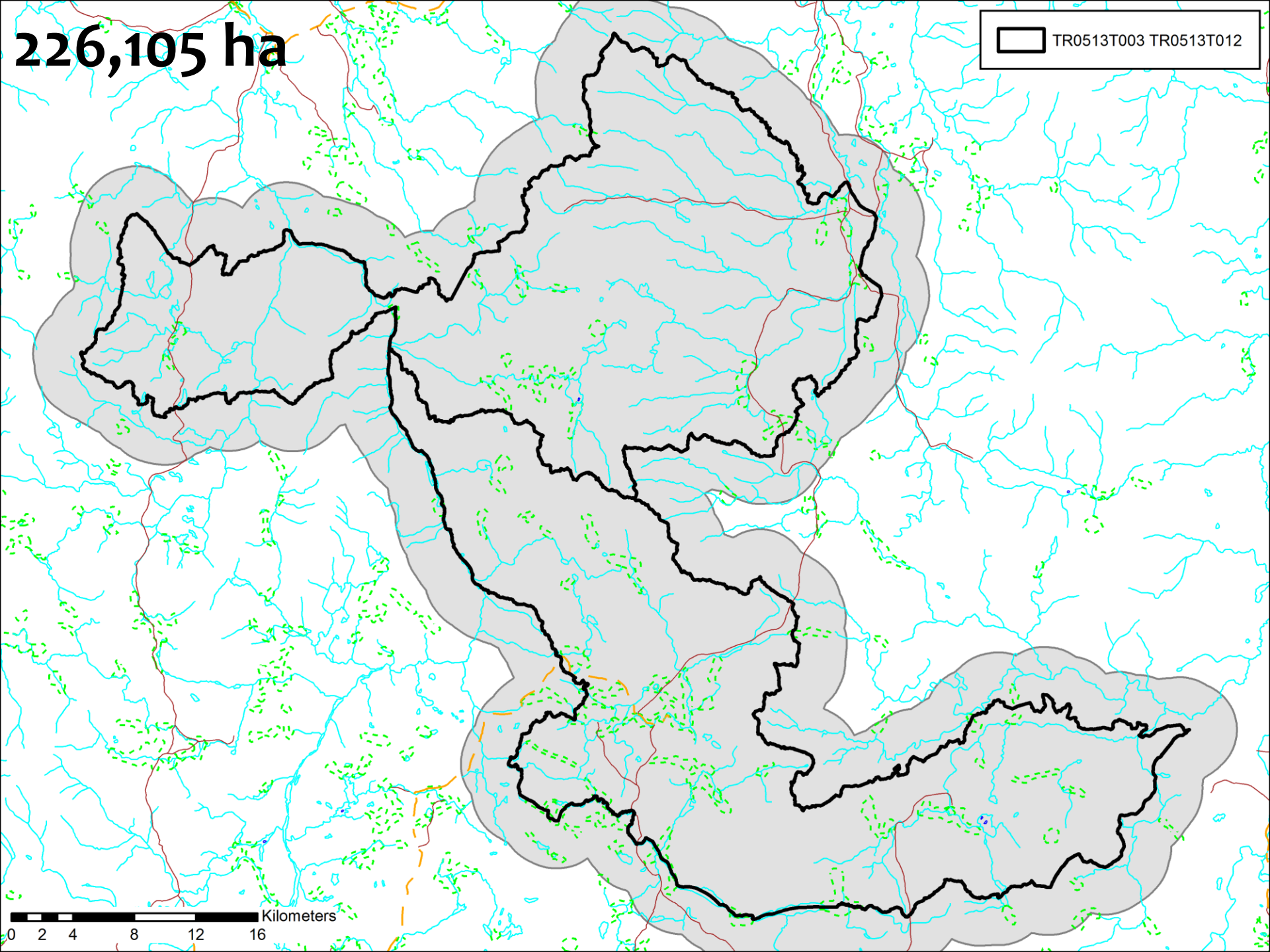
- * "High-quality" movement stands are those where the total cover $\geq 50\%$
- * Movement habitat is likely suitable if total cover (combination of tree and shrub cover) is $>20\%$



Fishers and “Open” Landscapes

- * Work from Williston (SBS) and NW Idaho
- * Strong negative relationship between amount of “open” areas within a home range and relative probability of occupancy
- * Recent forest harvesting (within last 12 years)
- * Wetlands





226,105 ha

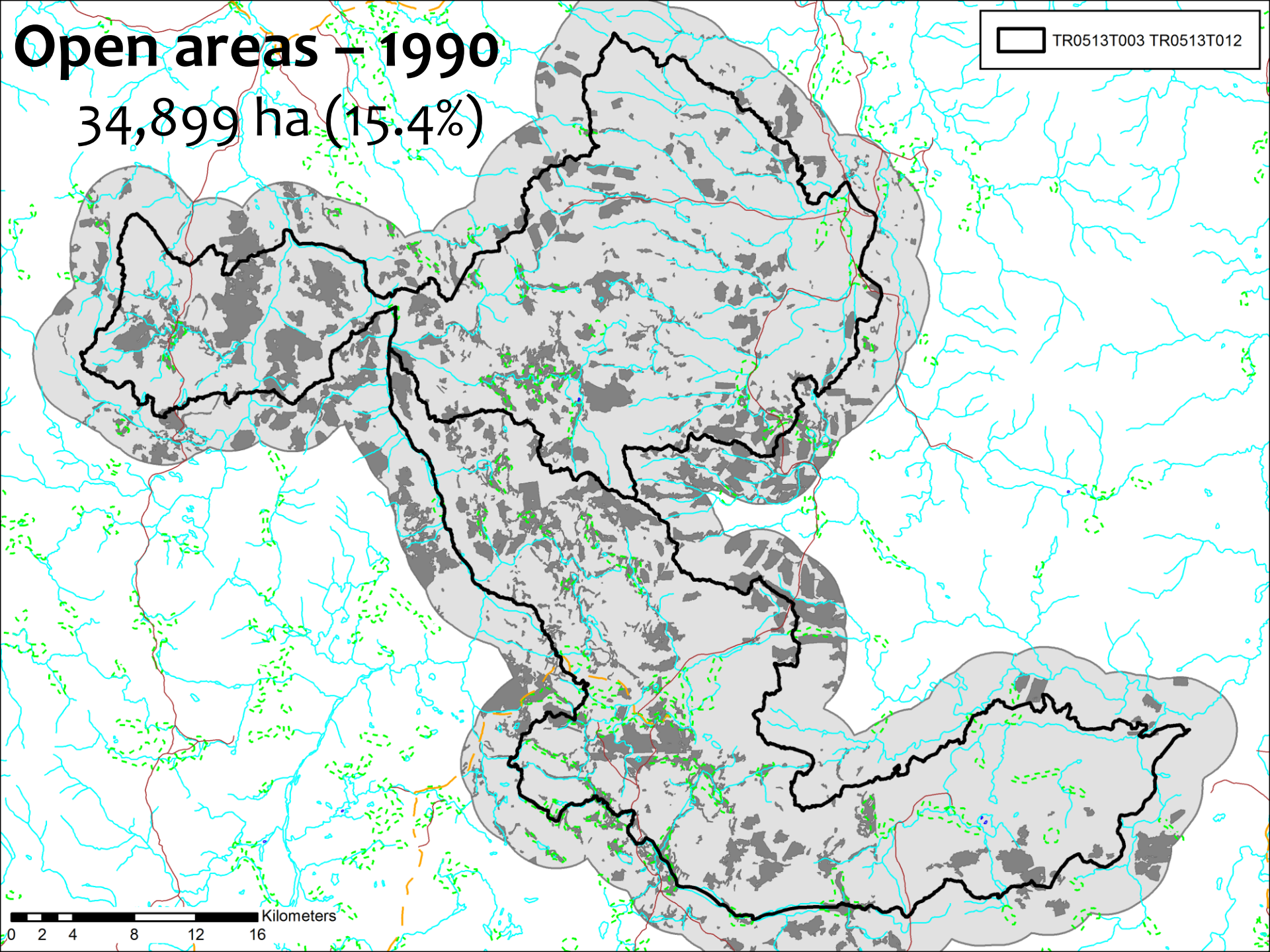
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0 2 4 8 12 16 Kilometers

Open areas – 1990

34,899 ha (15.4%)

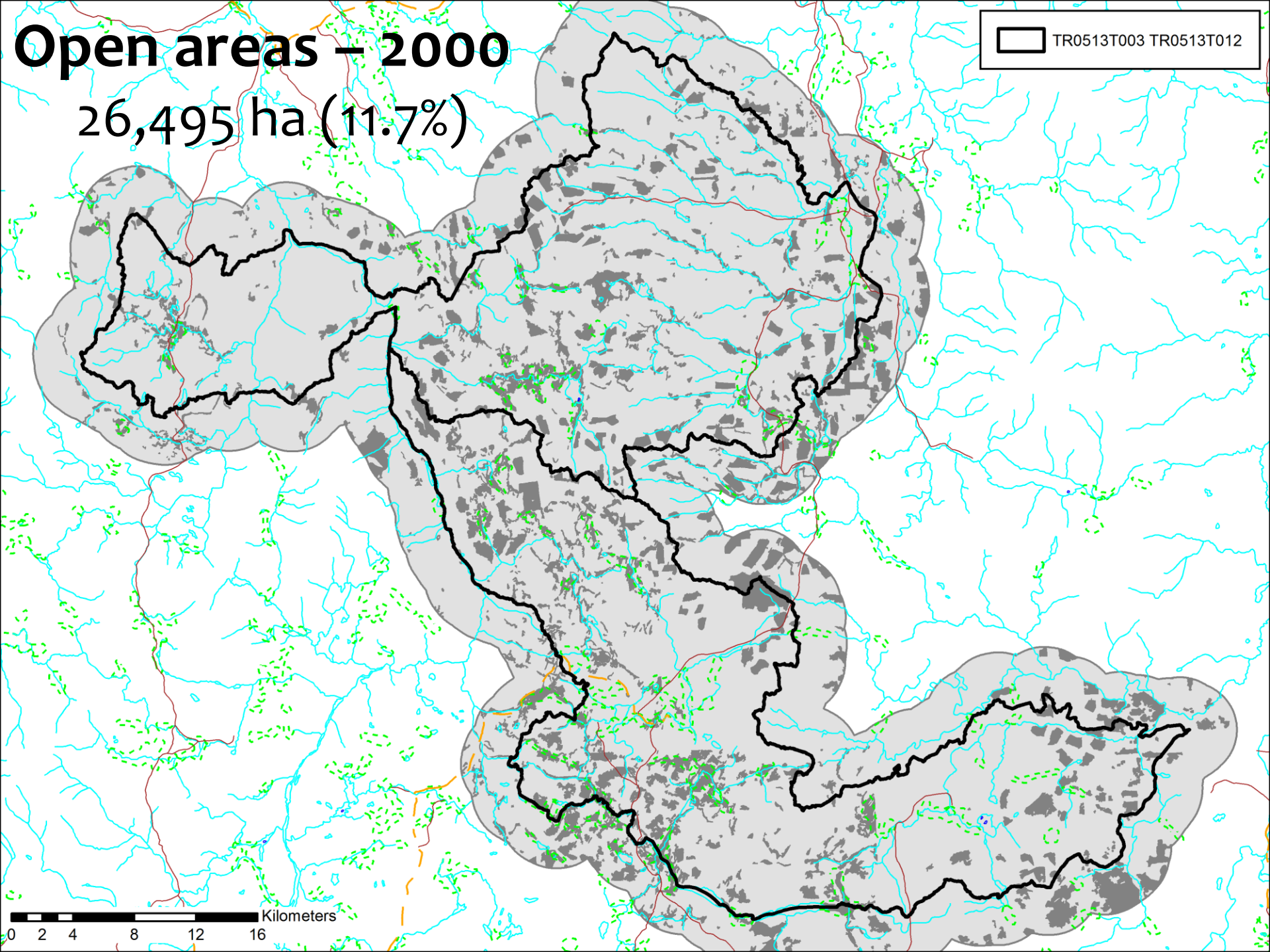
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Open areas – 2000

26,495 ha (11.7%)

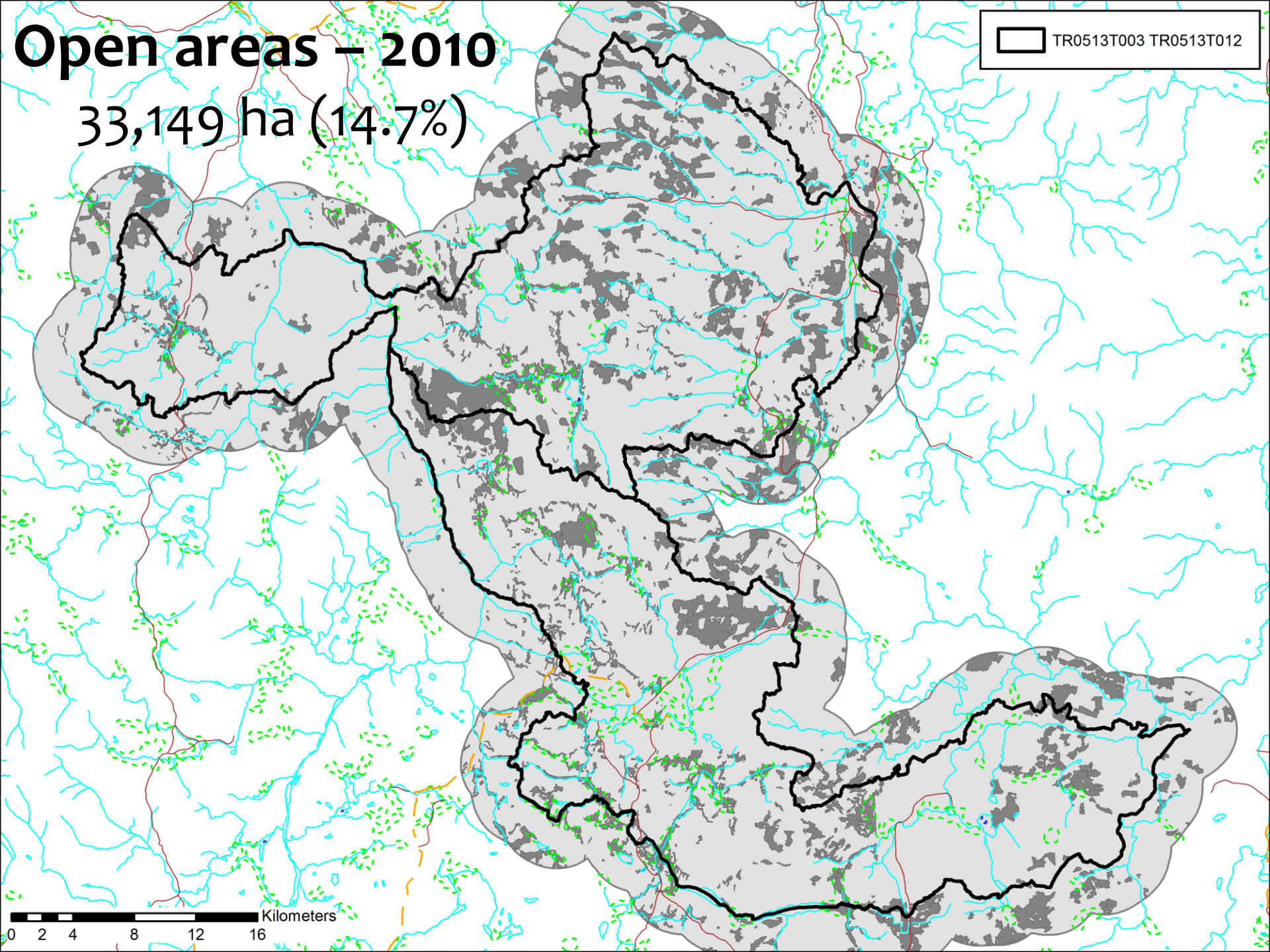
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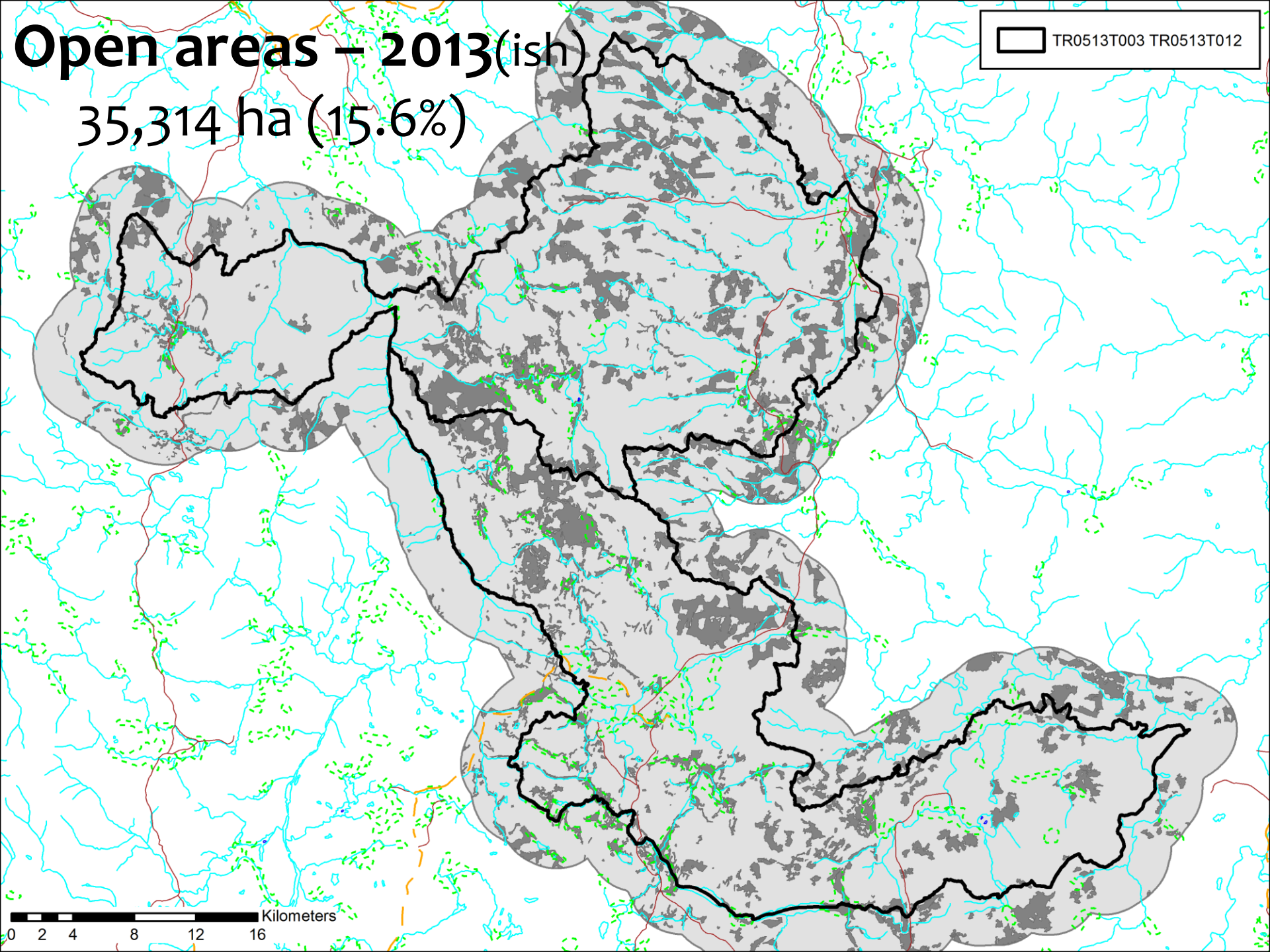
Open areas – 2010

33,149 ha (14.7%)

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0 2 4 8 12 16 Kilometers

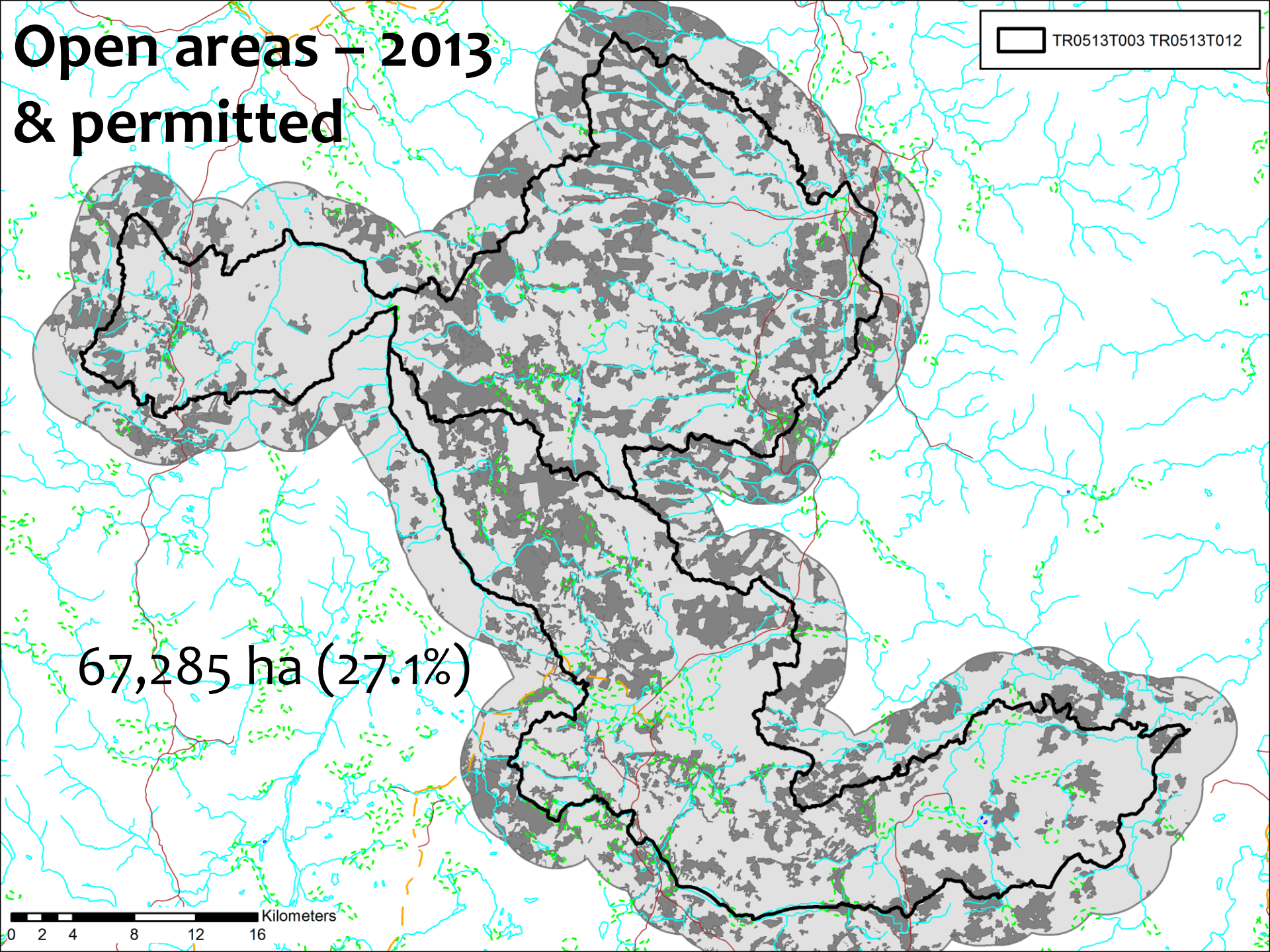


Open areas – 2013 & permitted

TR0513T003 TR0513T012

67,285 ha (27.1%)

0 2 4 8 12 16 Kilometers

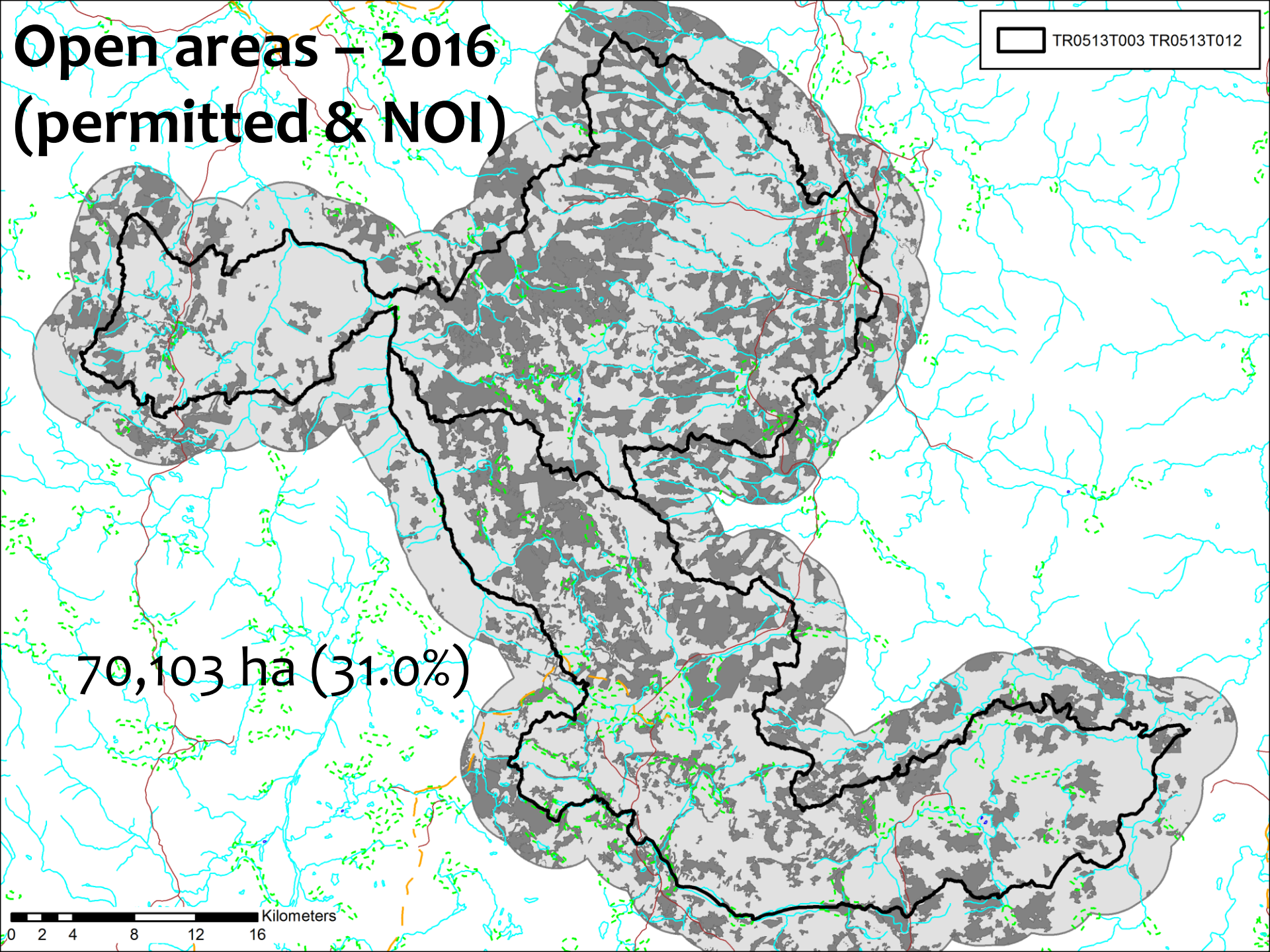


Open areas – 2016 (permitted & NOI)

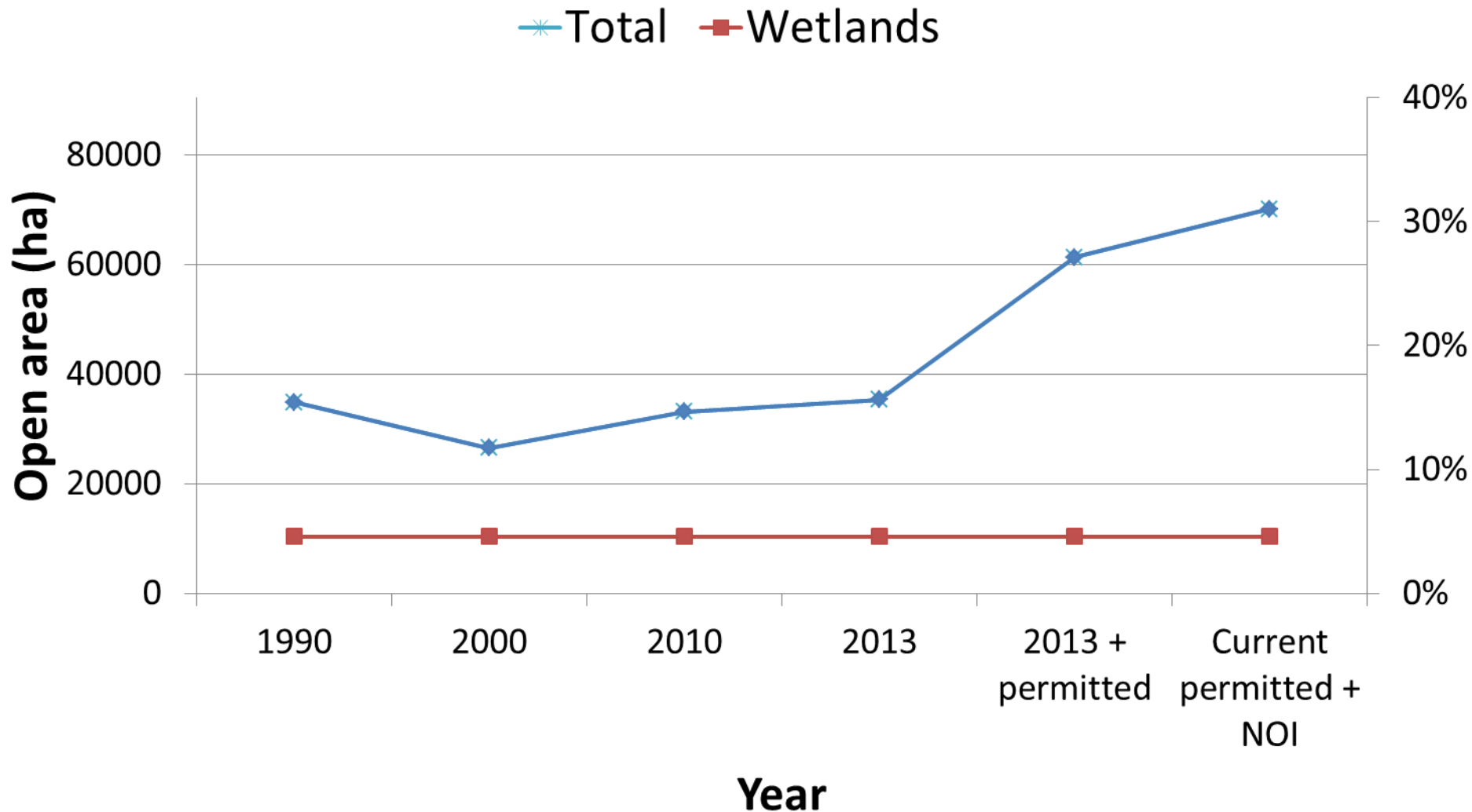
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70,103 ha (31.0%)

0 2 4 8 12 16 Kilometers



Change in “open” area over time

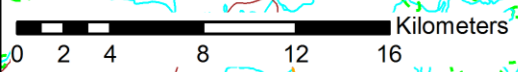
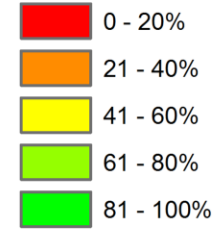


1990

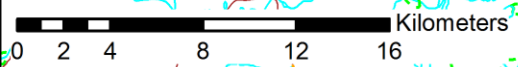
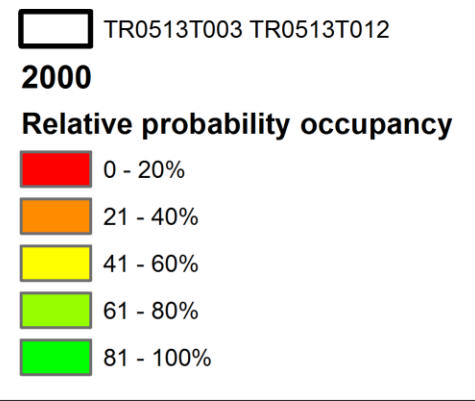
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1990

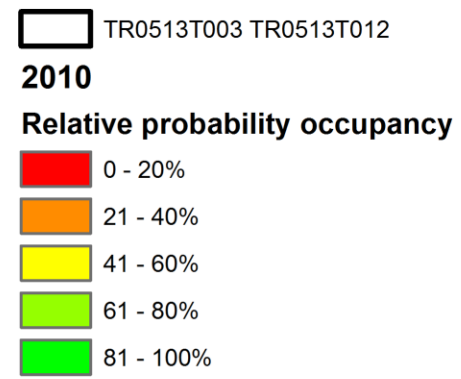
Relative probability occupancy



2000



2010



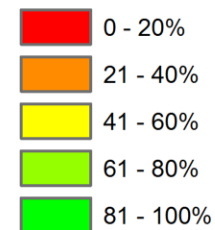
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2013(ish)

TR0513T003 TR0513T012

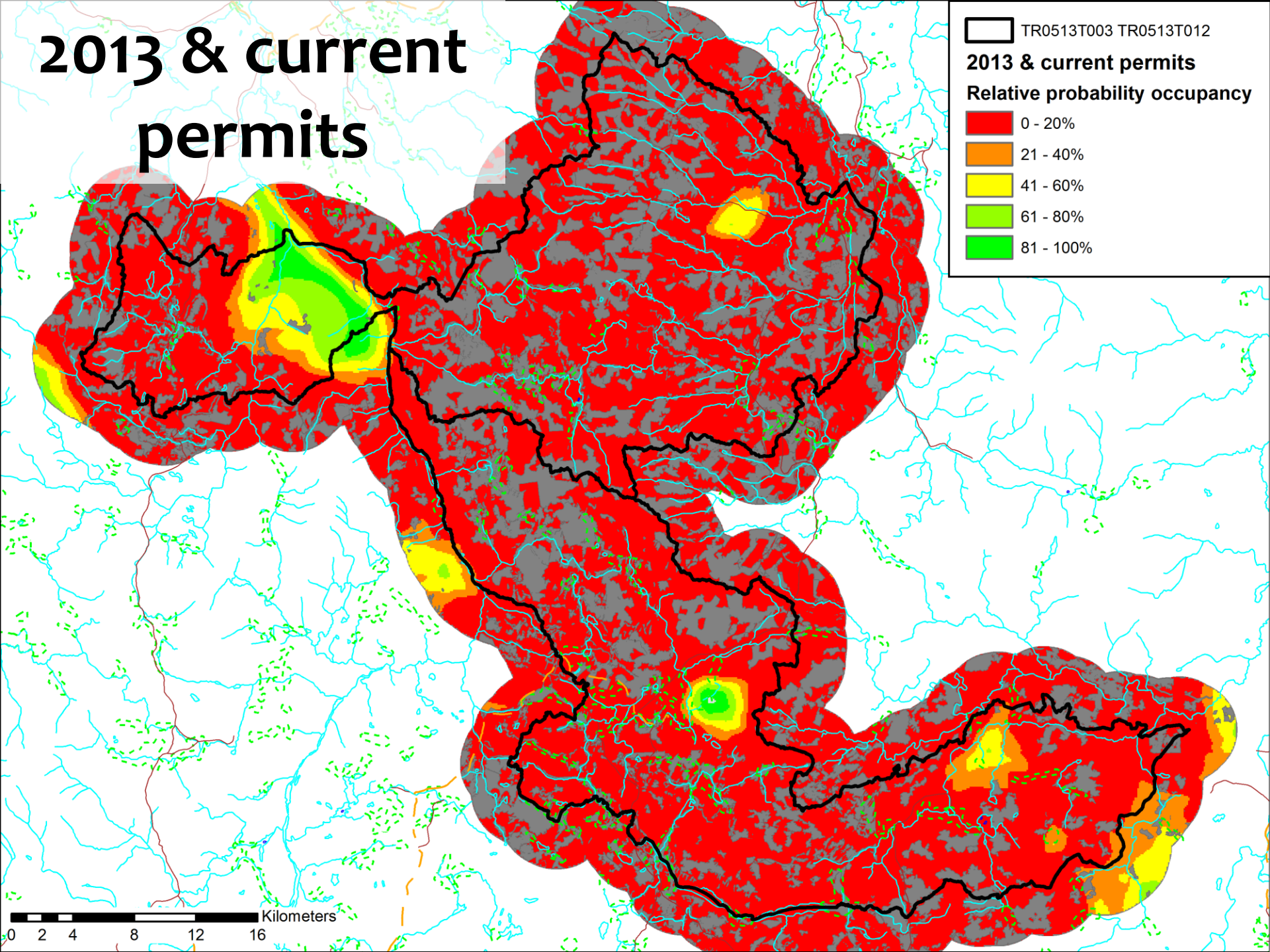
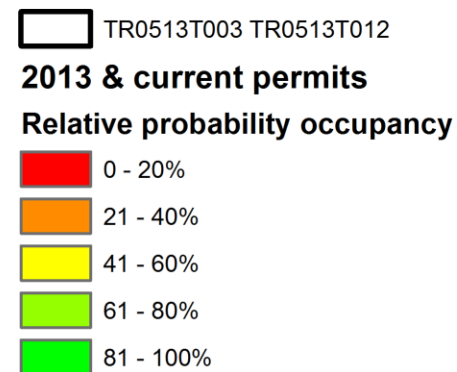
2013(ish)

Relative probability occupancy



0 2 4 8 12 16 Kilometers

2013 & current permits

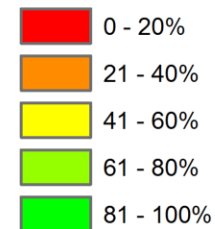


2013 & current permits & NOI

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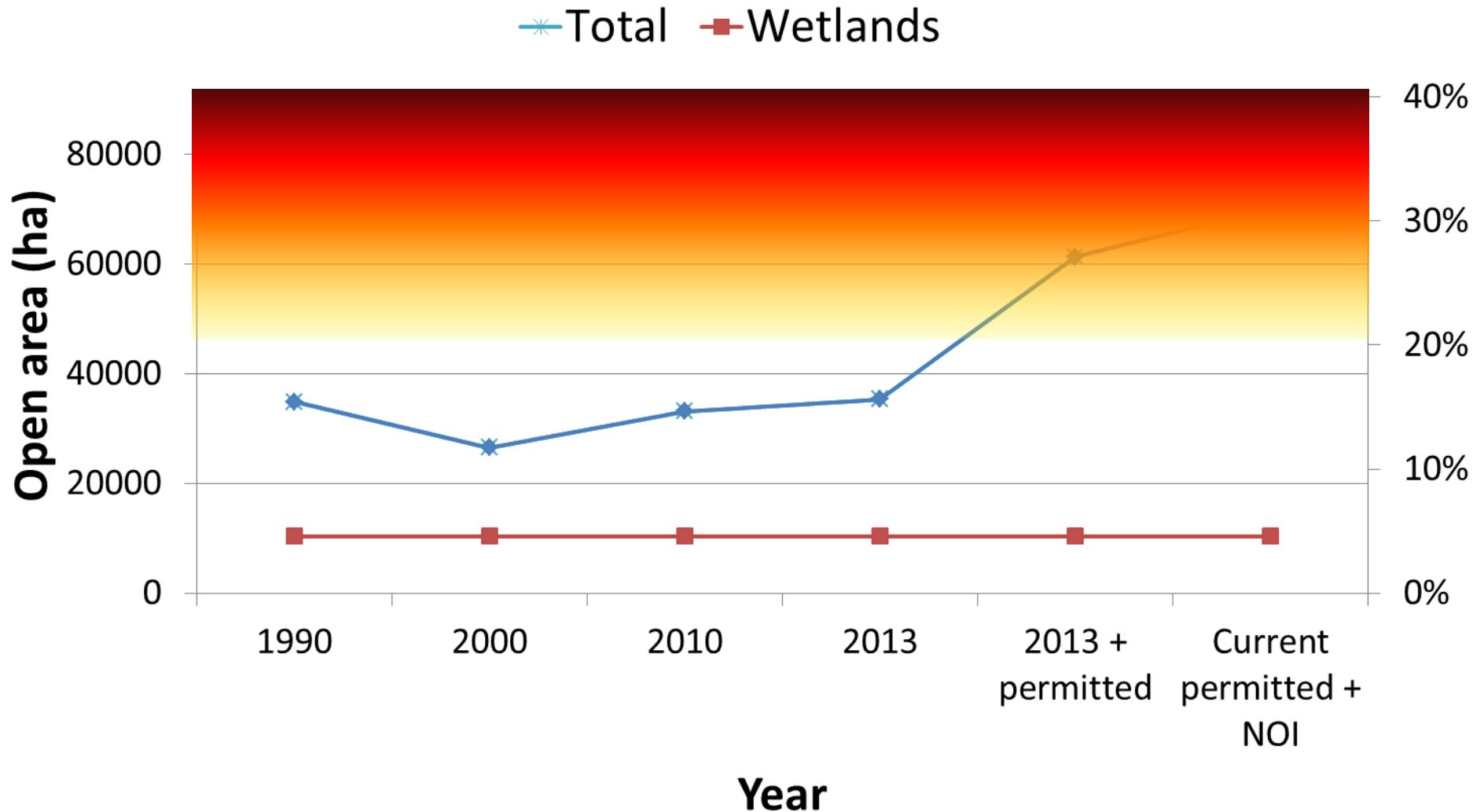
2013 & permits & NOI

Relative probability occupancy



0 2 4 8 12 16 Kilometers

Fisher habitat needs at landscape scale



Final Comments

- * Many fisher life history needs can be met by the same tree, patch, or stand.
- * Providing the stand level structures and high quality stands required by fishers distributed throughout 30 or 50 km² home range sized areas will help maintain viable populations.
- * Lastly, structures used by fishers are valuable to other wildlife (e.g. cavity-dependent and CWD-using species) which may assist you in meeting forest certification requirements.





Incorporating fisher habitat needs into planning: Options for Landscapes to Stands



Strategies to conserve fisher habitat within forestry operations

1. Conserve habitat at coarse spatial scale

→ Supply of Type I stands in landscape.

2. Conserve habitat at fine spatial scale

→ Supply of structural attributes (e.g., den trees) within stands.



Habitats needed by fishers:

Habitat Conditions

- * Type I stands are those VRI stands used most frequently by fishers for each activity (denning, resting, foraging, and movement)
- * Habitat features are those trees and other structures that are needed by fishers for specific activities (denning, resting)

COARSE SCALE

FINE SCALE

Targets and Warnings

We modelled the entire VRI in each Habitat Zone to output 2 bits of spatial data needed by planners to identify specific targets for each stand:

1. Stand condition:
Whether stand is Type I or Type II
2. Landscape condition:
Density of Type I stands within typical home range

Target 1:

Maintaining habitat within landscapes

Type I: VRI stand descriptions of important habitats

← Condition

Target : Amount of Type I needed within a 50-km²
(moist/wet subzone) or 25-km² (dry subzone)
implementation unit (i.e., fisher home range)

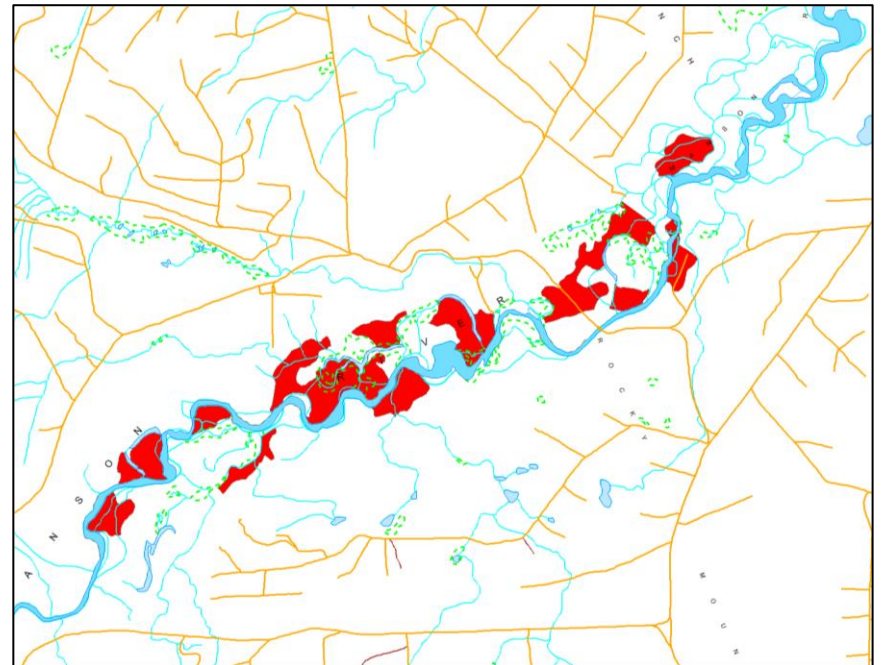
← Target

Where's the good stuff?

Type I stands in the landscape

Use VRI attributes of stands that account for the majority of use by fishers for each behaviour → **TYPE I stands**.

- * Denning
- * Resting in rust brooms
- * Resting in cavity trees
- * Resting in CWD
- * Foraging for

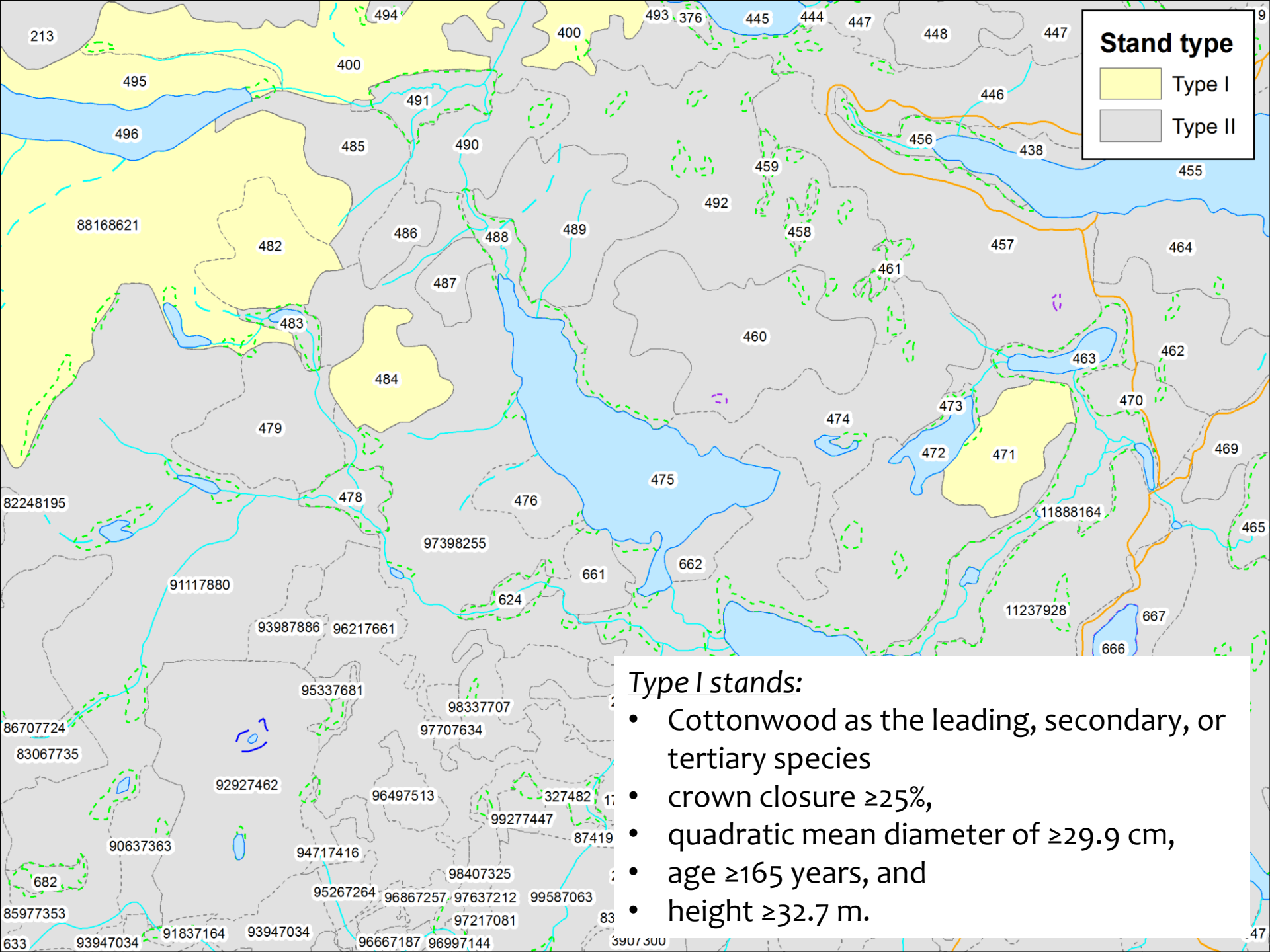


Type I stands

For example, stands used for resting on rust brooms in the SBS moist subzones have the following VRI attributes:

- * (SPECIES_CD_1 LIKE 'S%') or
(SPECIES_CD_2 LIKE 'S%') or
(SPECIES_CD_3 LIKE 'S%')
- * PROJ_AGE_1>=135
- * CROWN_CLOSURE>=30
- * QUAD_DIAM_125>=22.7
- * BASAL_AREA>=35
- * PROJ_HEIGHT_1>=23.7

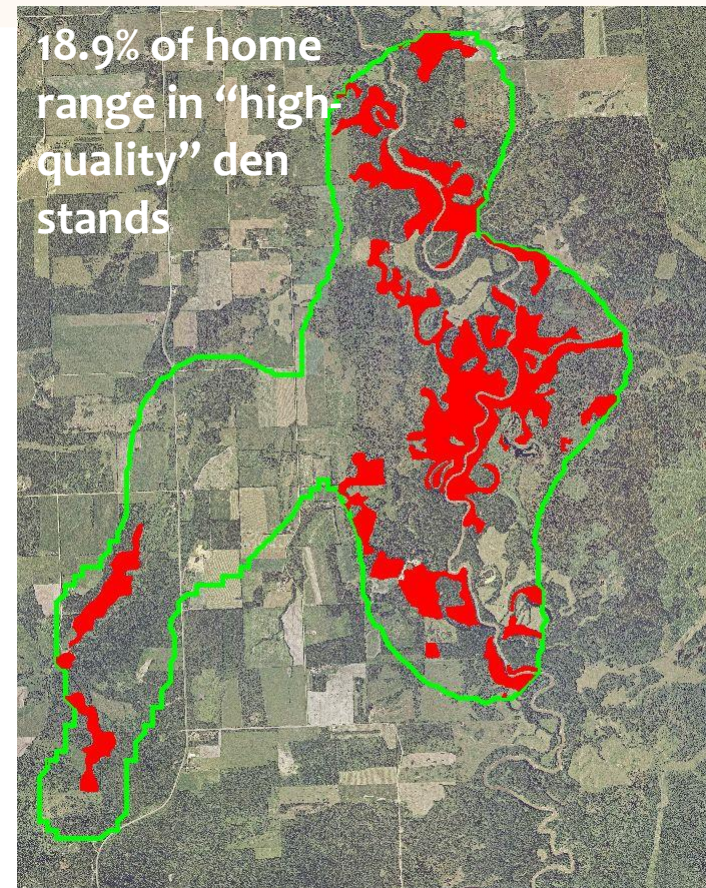




Fishers need a supply of Type I stands within their home ranges

Used research data to see how MUCH Type I stands are needed within a specified area to support a female fisher.

- * For example, in the SBS moist subzones, 75% of all female fishers had at least 1097 ha of these Type I broom resting stands in their home ranges.



Determining landscape targets through Type I habitat supply

Used this 75th percentile as a target to identify how well the landscape is doing at supplying these Type I stands for most fishers.

3 categories:

1. Above target density
2. Near target density
(75th-85th percentile)
3. Below target density
(75th percentile)

Landscape Targets

- * Not to say that landscapes where the density of Type I stands is below the target don't support fishers!
 - * 25% of fishers seem to do okay with less than this density.
 - * fishers have to “switch” scales of selection to finer scales (e.g., habitat features).
- * The supply of finer-scale features become more important in depauperate landscapes.

Target 2:

Maintaining habitat within cutblocks

Structural Attributes:

identify characteristics of important habitat structures and patches

← conditions

Strategies:

Retention of appropriate structures within cutblock ← target



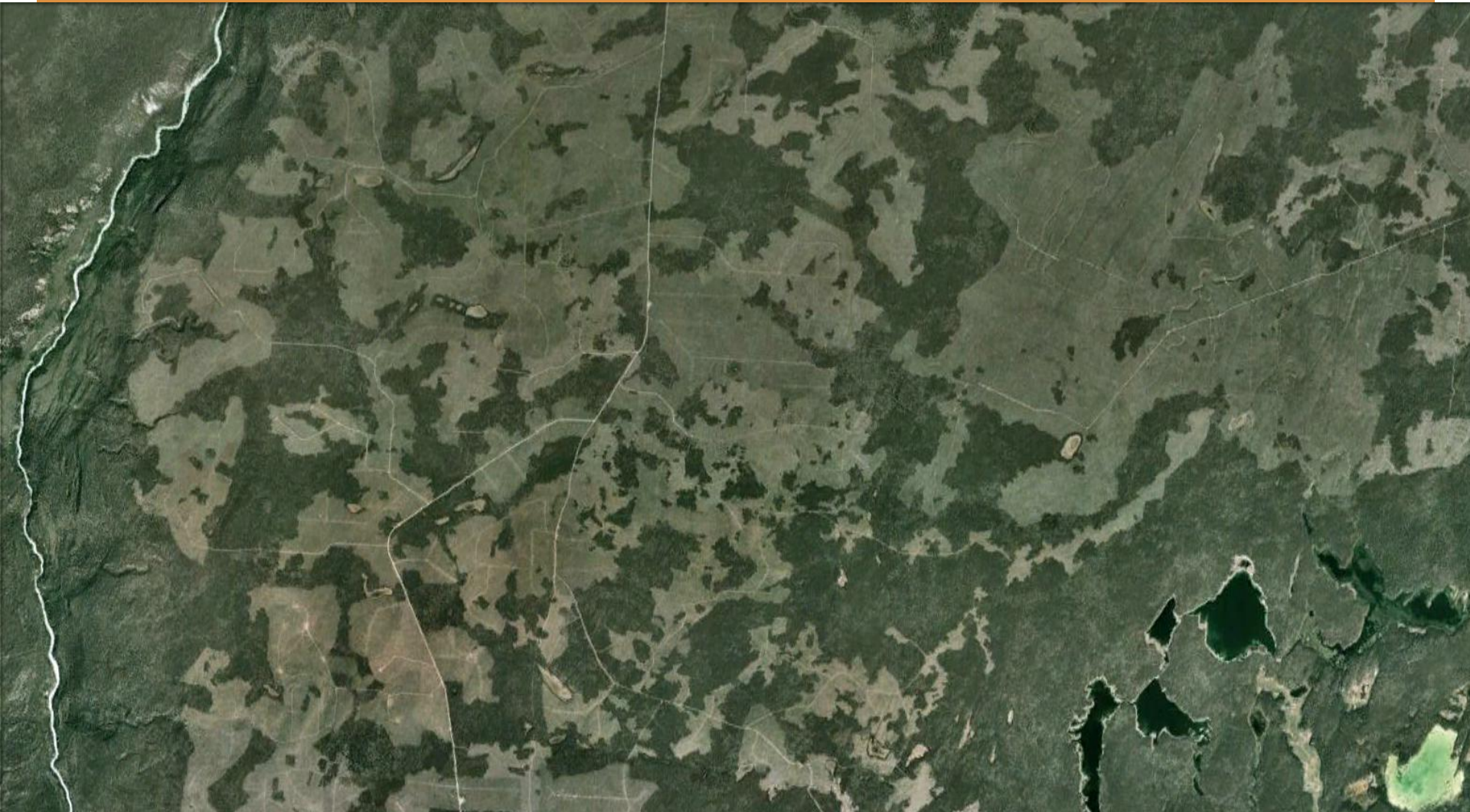
Supply of habitat features in stands

- * Targets are based upon field data collected at random or representative sites within Type I and Type II stands.
- * For trees and structures needed by fishers for:
 - * Denning
 - * Resting in rust brooms
 - * Resting in cavities
 - * Resting in/under CWD



In landscapes with an abundant Type I stands, there is sufficient supply that some reduction in the area of these stands and habitat features is tolerable.

In depauperate landscapes, however, conservation of Type I stands and the structures found within them become ever more important for fishers because there are fewer habitats available in the landscape for fishers to use successfully.



Within-stand Retention Targets

- * Whether harvest is scheduled in a Type I or Type II stand [**STAND CONDITION**]
- * Dependent upon the density of Type I stands in landscape [**LANDSCAPE CONDITION**]

<u>Stand condition</u>	<u>Landscape condition</u>		
	Below	Near	Above
Type I	18	13.5	4.5
Type II	1.3	1.0	0.3

Within-stand retention targets: Denning Habitat



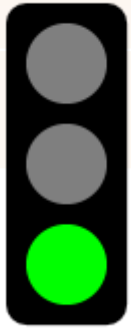
$Acb \geq 90$ cm
dbh

Landscape condition

Stand condition

	Below	Near	Above
Type I	18	13.5	4.5
Type II	1.3	1.0	0.3

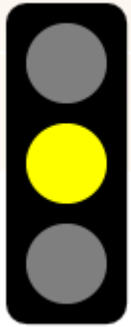
Within-stand retention targets: Denning Habitat



Landscape condition

<u>Stand condition</u>	Below	Near	Above
Type I	18	13.5	4.5
Type II	1.3	1.0	0.3

Within-stand retention targets: Denning Habitat

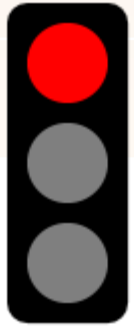


Landscape condition

Stand condition

	Below	Near	Above
Type I	18	13.5	4.5
Type II	1.3	1.0	0.3

Within-stand retention targets: Denning Habitat



Landscape condition

Stand condition

	Below	Near	Above
Type I	18	13.5	4.5
Type II	1.3	1.0	0.3

Within-stand retention targets: Denning Habitat

Landscape condition

<u>Stand condition</u>	Below	Near	Above
Type I	18	13.5	4.5
Type II	1.3	1.0	0.3

Home range level examples of habitat management

- * Insufficient habitat for a fisher home range (white circle) and little potential movement habitat (dashed line)
- * Insufficient habitat for a fisher home range but some movement habitat present
- * Actual fisher home range outlined in red. Efficient travel corridors allow access to all habitats in home range, interactions with adjacent fishers, and dispersal



Summary

This process allows us to:

Desired Habitat Conditions	1. Identify the minimum characteristics of trees used by fishers for rearing and resting. 2. Identify high- and low-use stands for each activity (Type I and II stands).
Targets	3. Identify the minimum density of Type I stands that support fishers. 4. Estimate the total number of structures¹ that fishers need within home ranges. ¹ that meet minimum criteria of (1)



Using Spatial Data in Forest Planning

An abstract graphic at the bottom of the slide depicts a landscape with rolling hills. The hills are represented by overlapping, wavy shapes in various shades of orange and cream, creating a sense of depth and movement.

What does Spatial Data look like?

Stand Condition

1. Entire Habitat Zone categorized into Type I and Type II stands for each habitat need.
2. Density of Type I stands within a typical fisher home range is calculated.
3. Determination is made as to whether this density is above, near, or below that which usually supports a female fisher.

Landscape Condition

This spatial data arms planners with 2 new key bits of information

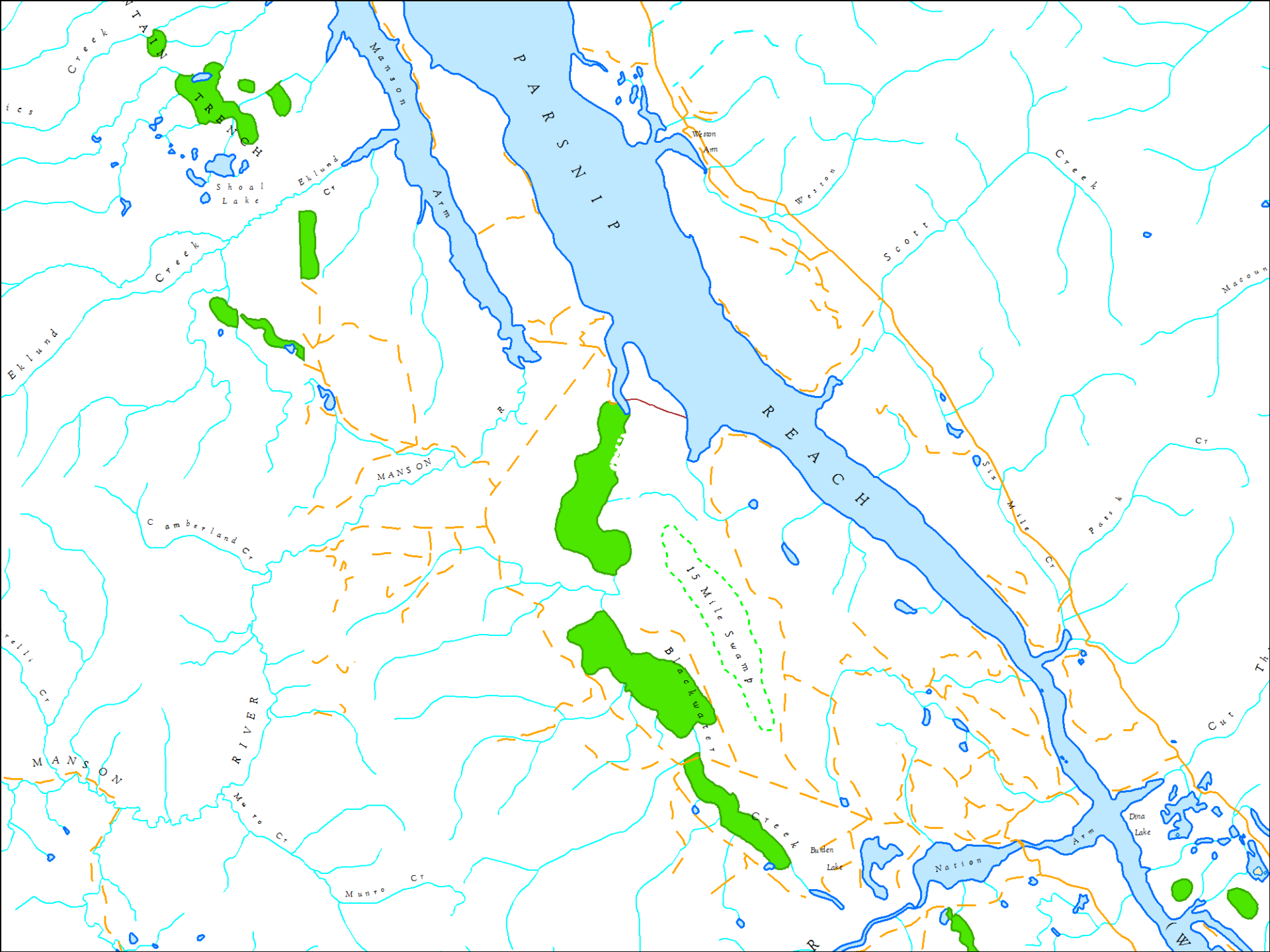
- **Stand Condition** of the proposed CP harvest area
 - How much “good” stuff might be removed?
- **Landscape Condition** – density of Type I stands around the CP
 - Is there a little or a lot of Type I stands around?

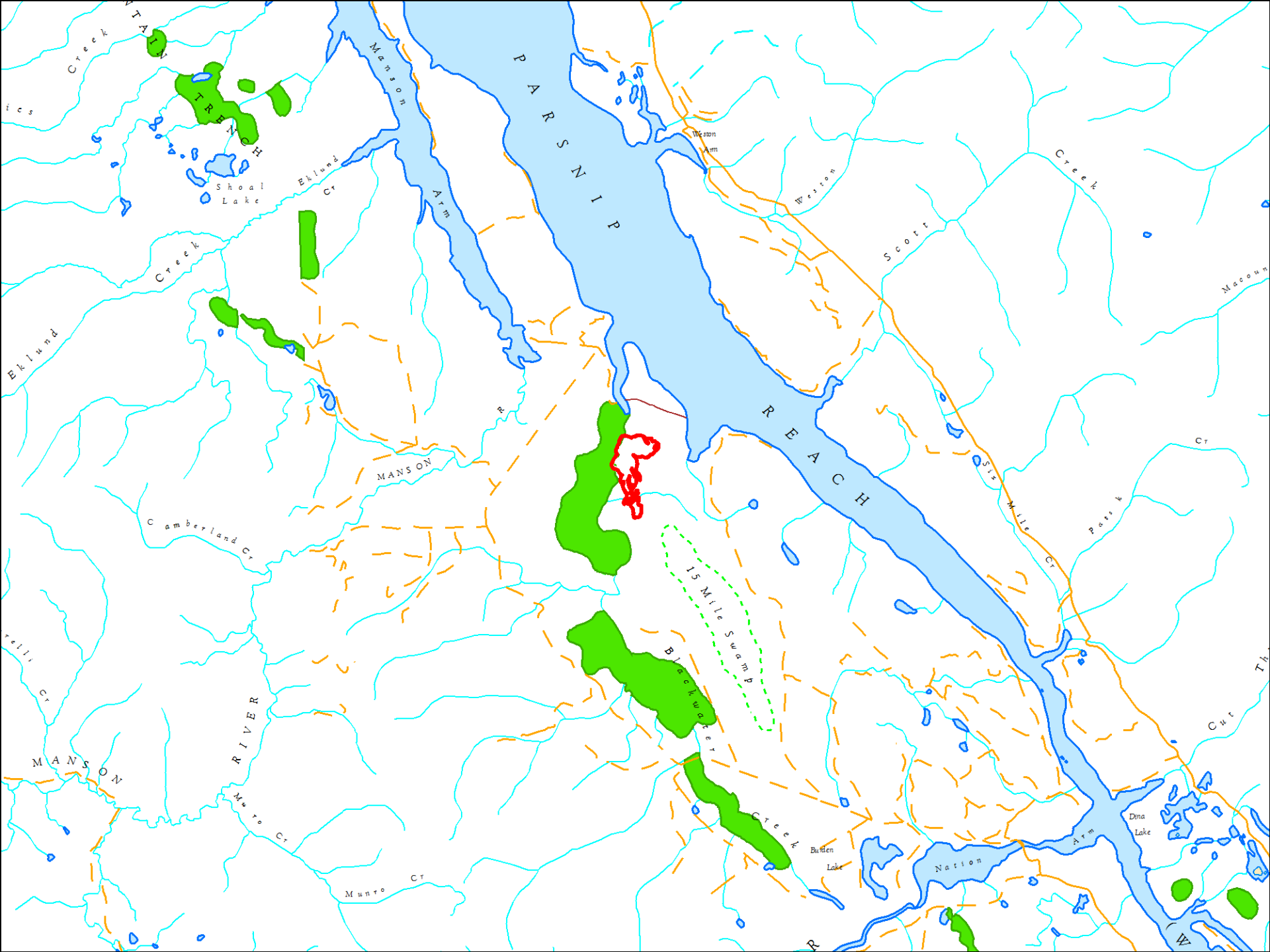
These 2 pieces of information can be used to help inform planning decisions.

Within-stand retention targets: Denning Habitat

Landscape condition

<u>Stand condition</u>	Below	Near	Above
Type I	18	13.5	4.5
Type II	1.3	1.0	0.3







0 250 500 1,000 1,500 2,000
Metres

Proposed Block SBSmk2

 BUR121 (385 ha)

0 250 500 1,000 1,500 2,000
 Metres

Proposed Block SBSmk2

 BUR121 (385 ha)

Denning

 Below landscape threshold, Type I stand

 Below landscape threshold, Type II stand

Landscape condition

Stand condition

WARNING!
RECONSIDER HARVEST –
supply of Type I stands in
the landscape is below
target

0 250 500 1,000 1,500 2,000
Metres

		Landscape condition
Stand condition	Retention target	Below
Type I	If harvest must proceed, retain 18.0 potential den trees (i.e., Act >90 cm dbh)/ha	18.8
Type II	Retain 1.3 potential den trees (i.e., Act >90 cm dbh)/ha	366.5

Proposed Block SBSmk2

 BUR121 (385 ha)

Broom resting

 Below landscape threshold, Type I stand

 Below landscape threshold, Type II stand

WARNING!
RECONSIDER HARVEST –
supply of Type I stands in
the landscape is below
target

Sum of Area (ha)		Landscape condition
Stand condition	Retention target	Below
Type I	If harvest must proceed, retain 4.7 potential rust-broom rest trees (i.e., $S_x > 39$ cm dbh with rust brooms)/ha	29.0
Type II	Retain 0.8 potential rust-broom rest trees (i.e., $S_x > 39$ cm dbh with rust brooms)/ha	356.4

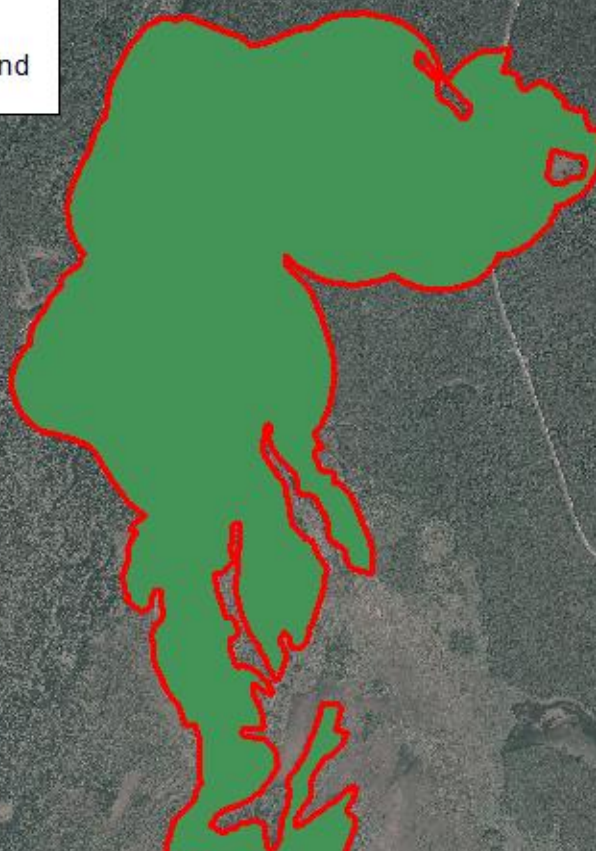
0 250 500 1,000

Proposed Block SBSmk2

 BUR121 (385 ha)

Cavity resting

 Below landscape threshold, Type II stand



Sum of Area (ha)		Landscape condition
Stand condition	Retention target	Below
Type II	Retain 0.1 potential cavity trees (i.e., Act >77 cm dbh and >23 m tall, At >59 cm dbh and >14 m tall)/ha	385.3

0 250 500 1,000 1,500 2,000



Proposed Block SBSmk2

 BUR121 (385 ha)

CWD resting

 Below landscape threshold, Type I stand

 Below landscape threshold, Type II stand

WARNING!
RECONSIDER HARVEST –
supply of Type I stands in
the landscape is below
target

Sum of Area (ha)		Landscape condition
Stand condition	Retention target	Below
Type I	If harvest must proceed, retain 2.7 potential rest pieces of CWD (i.e., Hard logs >35 cm diameter, >7 m in length, and elevated 25-50 cm above ground)/ha	109.9
Type II	Retain 0.6 potential rest pieces of CWD (i.e., Hard logs >35 cm diameter, >7 m in length, and elevated 25-50 cm above ground)/ha	275.4

0 250 500 1,000

Proposed Block SBSmk2

 BUR121 (385 ha)

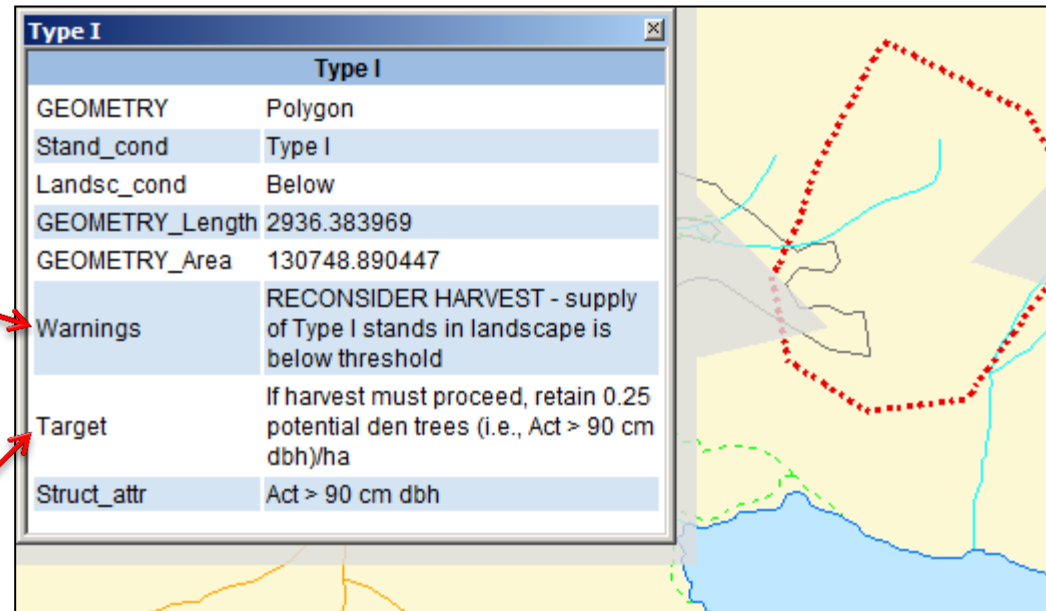


0 250 500 1,000 1,500 2,000
 Metres

Actual GIS Output

Helps identify:

- Which stands okay to harvest, which stands to avoid if possible
- Also provide guidance on the density of habitat structures to retain in cutblocks for fishers





You've done your planning – now what?

Applying targets in forestry operations



Tools for on-the-ground decision-makers

Information to help logging supervisors, field crews, machine operators, and other staff

Fisher Habitat Guidelines: Sub-Boreal Habitat Zone—Coarse Woody Debris (CWD)

Resting Habitat (CWD): CWD provides rest sites for fishers and their prey, especially in winter.



Man-made CWD piles:

- Creating piles throughout cutblocks will help create rest sites in the regenerating stand.
- Pieces should not be stacked neatly, but be in a jumbled pile to create spaces for fishers.



Single Piece CWD	• ≥ 35 cm diameter by ≥ 7 m in length • Elevated 25- 50 cm above ground
Man-made CWD Piles	• Pile dimensions ≥ 3 m wide by 5 m long by 2 m high • CWD piles should have $\geq 30\%$ pieces ≥ 20 cm diameter ≥ 3 m long



The Fisher Habitat Working Group recognizes the Habitat Conservation Trust Foundation and anglers, hunters, trappers and guides who contribute to the Trust, for making a significant financial contribution to support the British Columbia Fisher Habitat and Forestry Web Module. Without such support, this project would not have been possible.



The Fisher Habitat Working Group gratefully acknowledges the financial support of the Fish and Wildlife Compensation Program for its contribution to the British Columbia Fisher Habitat and Forestry Web Module.

Contact Information

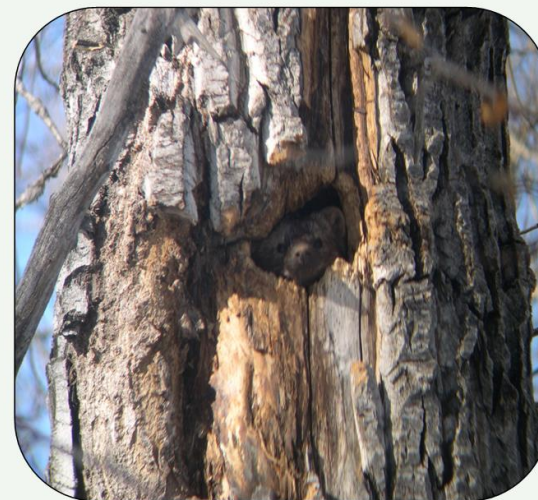
Richard D. Weir, R.P.Bio. I, Carnivore Conservation Specialist
Ecosystems Branch, Ministry of Environment
Email: Rich.Weir@gov.bc.ca | 250.356.8186



Tools for on-the-ground decision-makers

Information to help logging supervisors, field crews, machine operators, and other staff

Denning Habitat: The shape may vary, but den openings are just slightly larger than the size of a female fishers head. Den tree cavities **always** have an entrance hole that is **5–10 cm wide by 7–15 cm tall** and 1.5 m to 17 m from ground.



Fisher Habitat Toolbox

www.BCfisherhabitat.ca



BC Fisher Habitat

British Columbia Fisher Habitat and Forestry Web Module

[Home](#) [Fisher Ecology](#) [Habitat Tools](#) ▾ [Learning Resources](#) [About Us](#) [Contact Us](#)

Welcome to the BC Fisher Habitat Website!

As rare, wide-ranging predators, fishers are sensitive to human activities and need special management attention in British Columbia. The Fisher Habitat Working Group is working to make sure their needs are met by raising public awareness about fishers and by working with resource-users to develop management tools that enable them to reduce impacts and improve habitat conditions for fishers.

We encourage you to look around the site to learn more.

Resource Professionals...

Here you'll find the [information and tools](#) you need to help you manage for fisher habitat in B.C.

Please [contact us](#) if you need further assistance.



Fisher Basics

Learn about B.C. fisher ecology



Learning Resources

Links to valuable fisher information



Habitat Tools

Tools for the forestry industry and others interested in enhancement of fisher habitat



About Us

Learn about the Fisher Habitat Working Group and funding supporters of this effort



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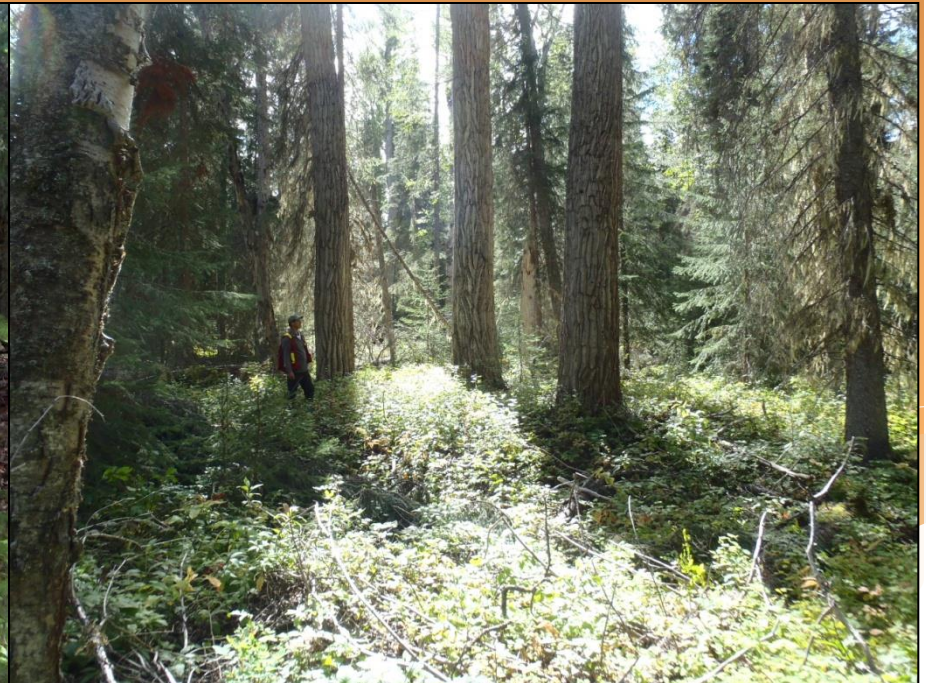


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FOUNDATION

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Summary



Planning Summary - Landscape

- * Keep landscape <25-30% “new” harvest
 - * Any more than this and fishers will not be expected to occur.
- * Retention of important stands and habitat elements is critical.



Planning Summary - Habitats

- * Fishers need forests to supply habitat for 4 activities:

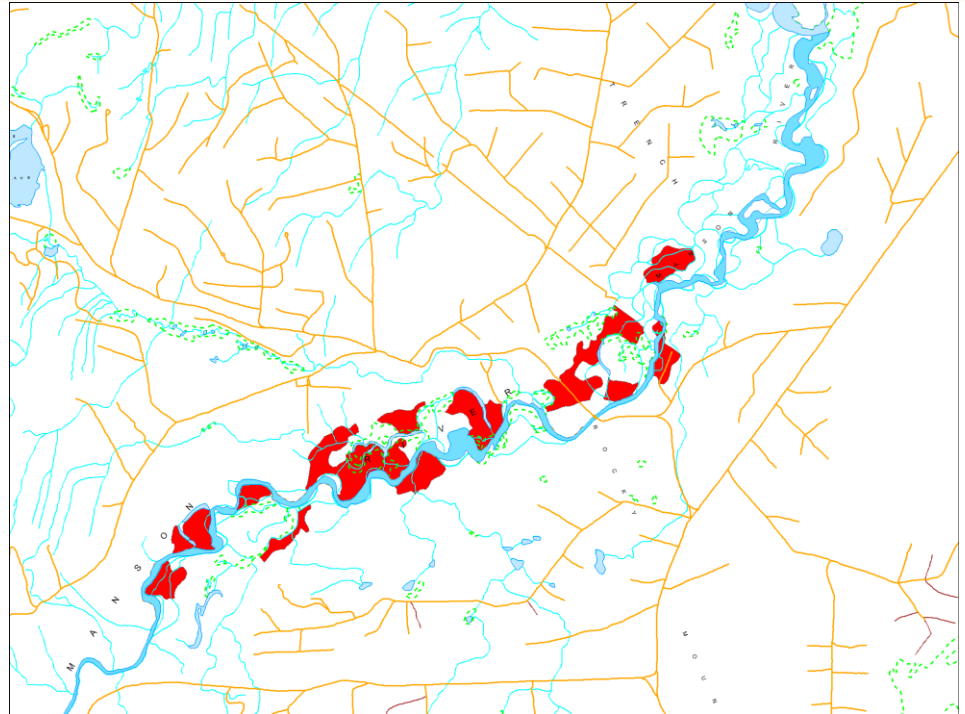
- * Denning,
- * Resting,
- * Foraging,
- * Movement



Planning Summary – Fisher Habitats

Information on priority limiting habitats in each Habitat Zone:

1. Denning
2. Resting in rust brooms
3. Resting in cavity trees
4. Resting in/under CWD



Planning Summary - Implementation

- * Supply of Type I stands within landscape affect ability of area to support fishers
- * Keeping the landscape with a density of Type I stands “above” the threshold creates more flexibility in habitat conservation options



Planning Summary – Spatial Data

Spatial data is key to helping planners identify retention targets for:

- * Type I stands within fisher home ranges in the landscape.
- * Key habitat attributes within harvested stands.

Available for Denning,
Resting habitats

Stand condition	Landscape condition		
	Below	Near	Above
Type I	18	13.5	4.5
Type II	1.3	1.0	0.3

What we hope to have achieved

- * You will have learned more about the **habitat needs of fishers** in your operating areas
- * You will be able to better **identify fisher habitat** both on-the-ground and from VRI data
- * You will have a better idea of **how much of the different habitats fisher need**
- * You will have some **tools to incorporate this information** into your forest management plans

Where to go for resource support

→ Information and resources are available at:

www.BCfisherhabitat.ca

- Spatial data with stand and landscape retention targets
- Management tables for each habitat zone
- Background information on fishers and fisher habitat
- Operational Toolbox available for boots-on-the-ground staff and contractors

Future offerings

- * Training programs and materials for staff and contractors that make decisions about which trees to retain or cut, how the sites are processed, and what residual structures occur within harvested cutblocks.
 - timber cruising crews,
 - layout personnel,
 - operational foresters,
 - silvicultural foresters,
 - machine operators,
 - trappers, and
 - reforestation contractors
- * Delivered as stand-alone training sessions that we will come to your workplace and deliver, or as materials to be included with your own in-house contractor training.

Want to apply these conditions and targets?



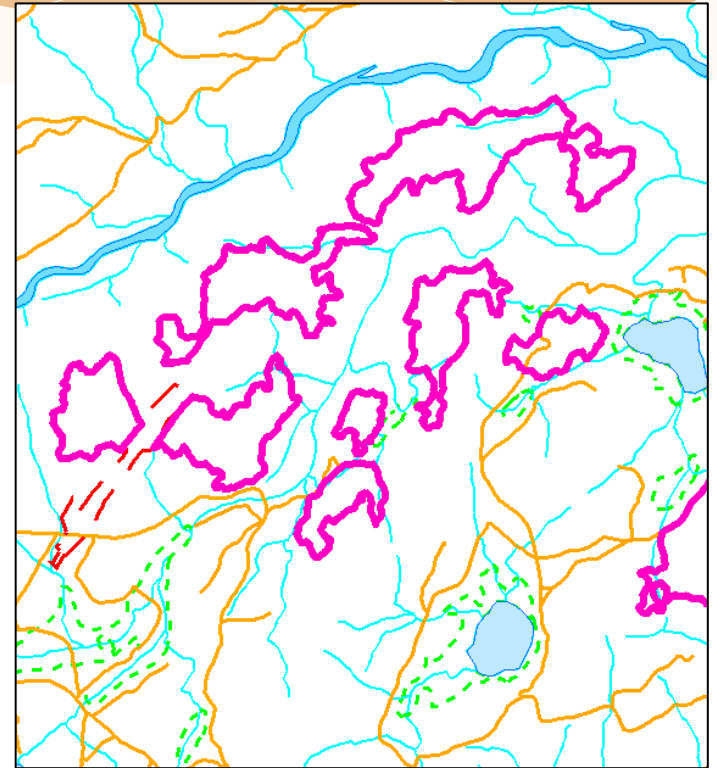
We are a free resource to help you incorporate these conditions and targets in your forest development plans:

1. Provide spatial data for your operating area (VRI update).
2. Identify targets for each type of habitat in each of your proposed CPs.
3. Help develop language for your FSP to create allowances for fisher habitat (e.g., CWD piles).
4. Help you implement and evaluate application of the conditions and targets.

Do you have a CP that you are willing to try this in?

We are looking for industry partners in the to apply these conditions and targets in-the-field.

- * Pre- and post-harvest assessments of habitat conditions and barriers to implementation (including costs and changes to harvest outcomes).
- * Evaluation reports on the efficacy of the field trials is produced and distributed to involved.



Thank-you!



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**FISH AND WILDLIFE
COMPENSATION PROGRAM**

A partnership between BC Hydro, the Province of B.C.
and Fisheries and Oceans Canada

**Ministry of
Environment**

For more information

Fisher Habitat and Forest Management Web Module

[**www.BCfisherhabitat.ca**](http://www.BCfisherhabitat.ca)

- * Rich Weir – Ministry of Environment, Victoria
- * Larry Davis – Davis Environmental, 108 Mile Ranch
- * Inge-Jean Hansen – FLNRO, Dawson Creek

Evaluations