Identification of sites with a high potential for intensification of wood production

1. Introduction and potential productivity

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ECANUSA 2010 congress presentation

Ressources naturelles et Faune
Québec

Presentation plan

Part 1

1. **Introduction**
2. **Mandate of the Direction des inventaires forestiers (DIF) of the MRNF**
3. **Site productivity**

Part 2

4. Management constraints
5. Spatial analysis
6. Conclusion

Introduction

Commission d'étude sur la gestion de la forêt publique québécoise (2004)

"That the ministry implements an intensive silviculture strategy aiming the increase of wood production …….. on high potential sites."

Loi sur l'aménagement durable du territoire forestier (2010)

"The ministry determines the criteria allowing the identification of areas with a high forestry potential presenting a particular interest for intensification of wood production."

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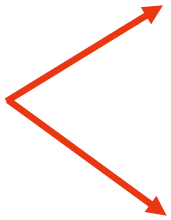
Mandate of the DIF

" Identify areas most likely to be assigned as sites with a high potential for intensification of wood production "



High productivity

Low constraints

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Productivity - Factors influencing growth

Potential

- Climatic factors
  - Temperature, precipitations,…
- Site factors
  - Surficial deposit, drainage,…

Reductants

- Historical factors
  - Competition
  - Natural perturbations (ex-SBW)

Productivity - two indexes of potential

1. **Conifers and intolerant hardwoods:**
   - **Site index$_{potential}$** → dominant height (m) of a 50 year old stand after correction of growth inhibitions (reductants)
     - Stem analysis developed by DIF
2. **Tolerant hardwoods:**
   - **Increments in tree basal area (TBA$_{potential}$)** → average of best increments per decennial period
     - Developed method by Direction de la recherche forestière of the MRNF

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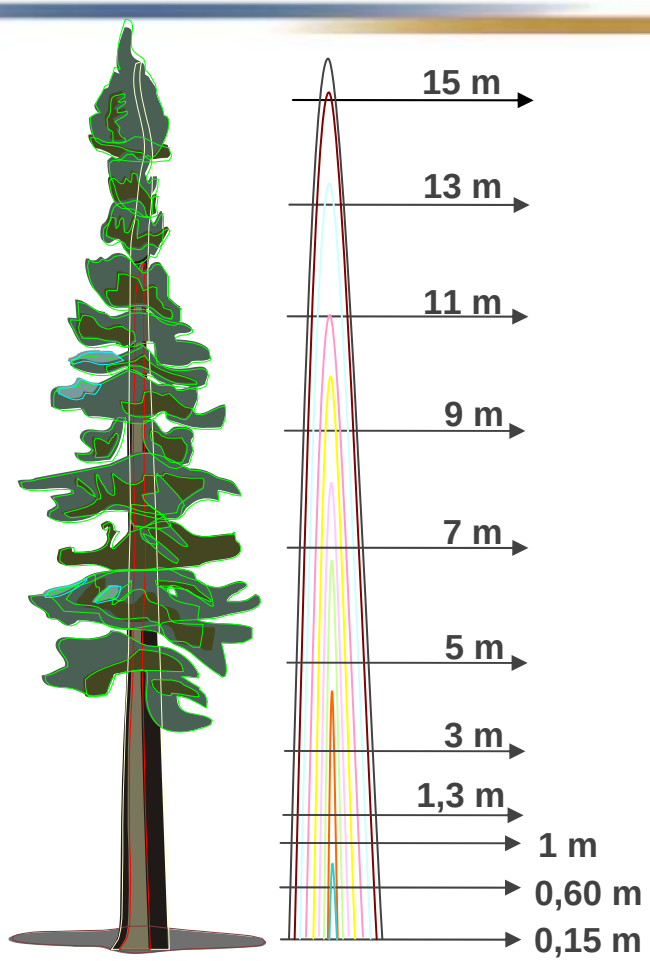
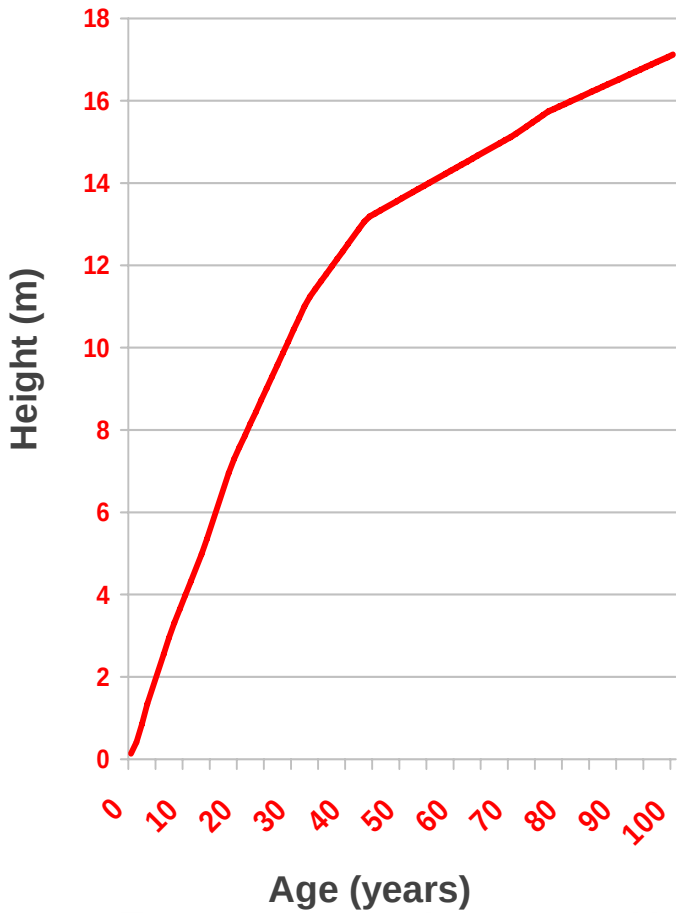
Productivity - Stem analysis



Adapted from Grondin 2001



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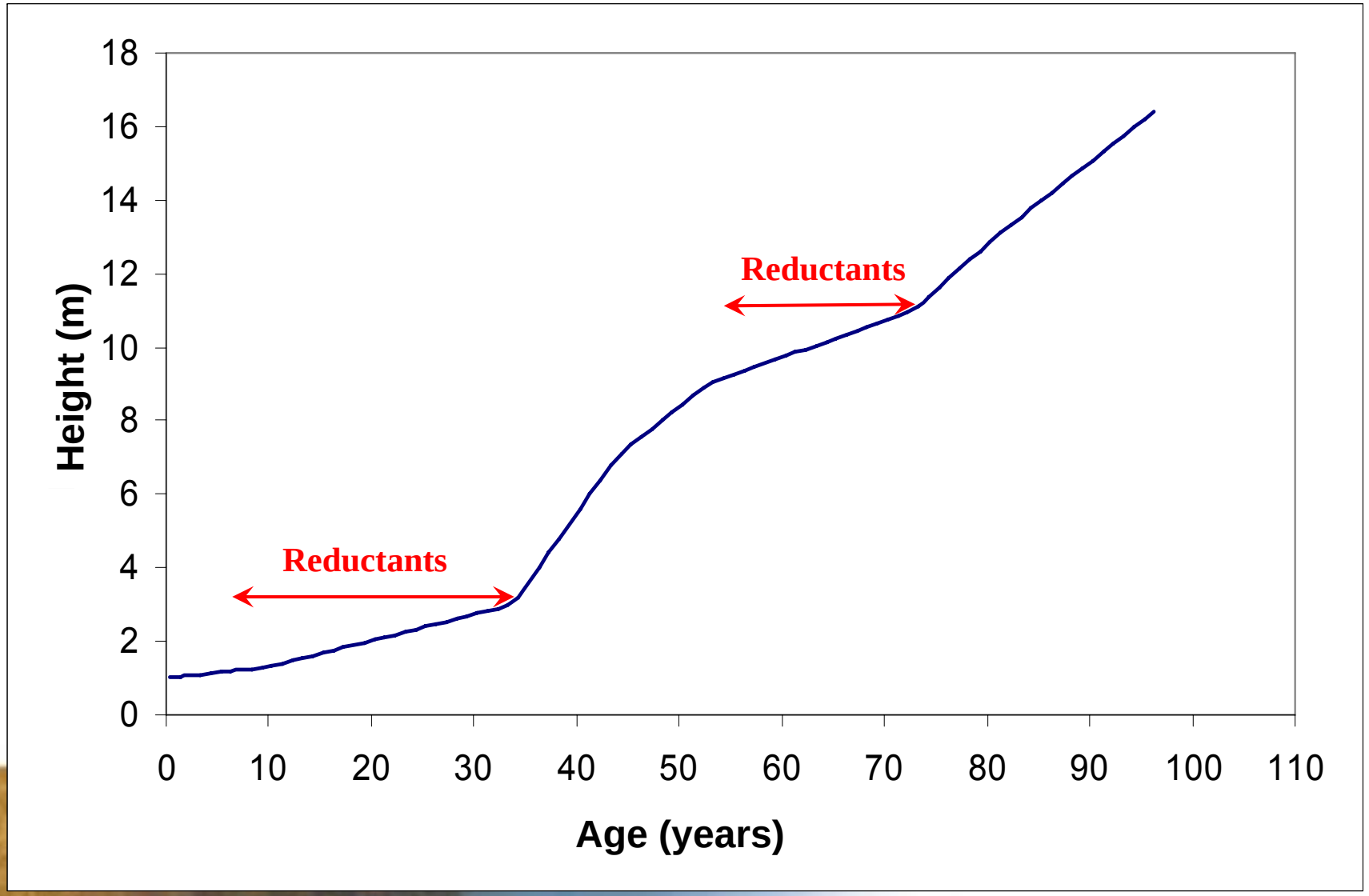
Productivity - Conifers and intolerant hardwoods



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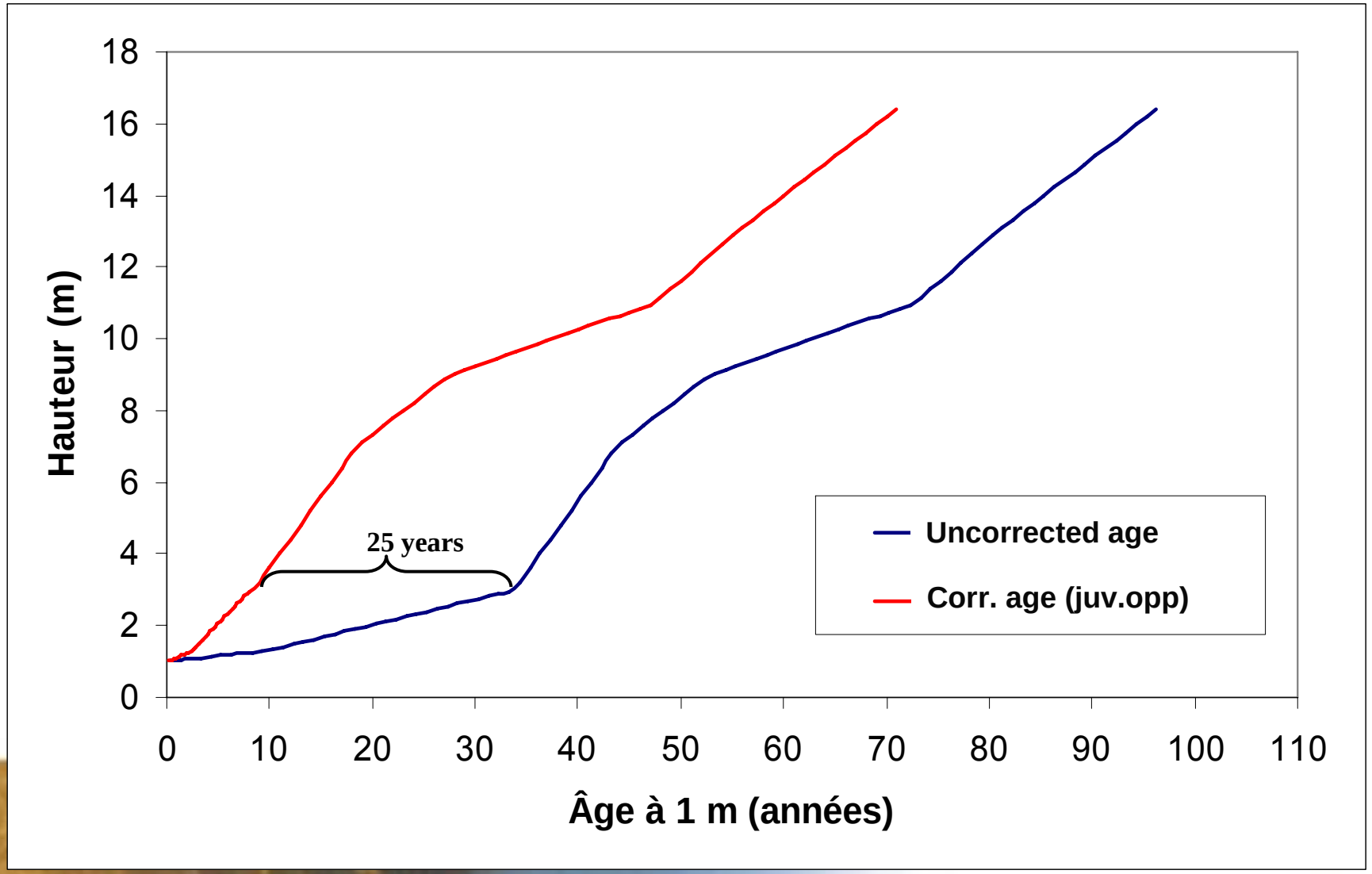
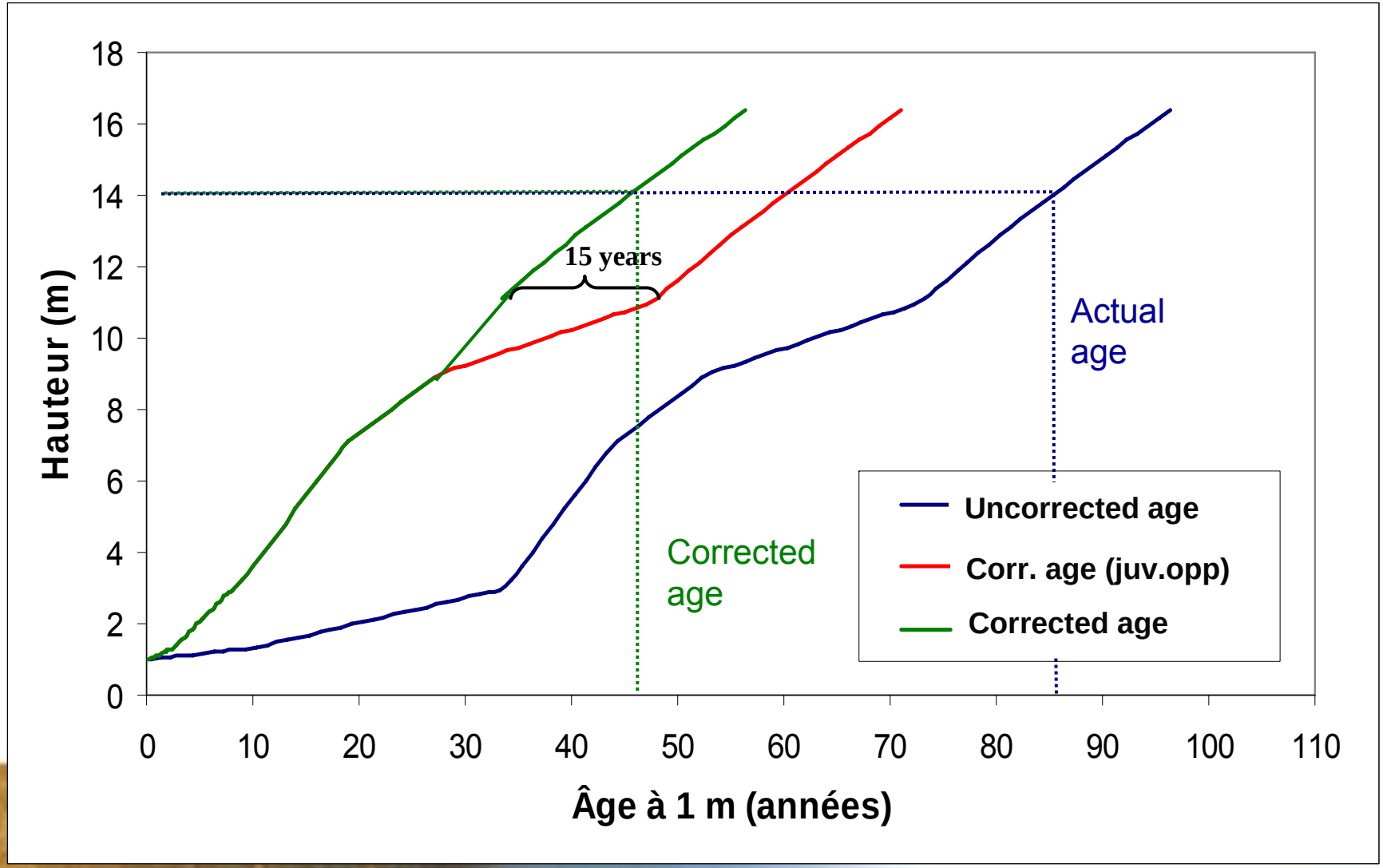


Productivity - Conifers and intolerant hardwoods



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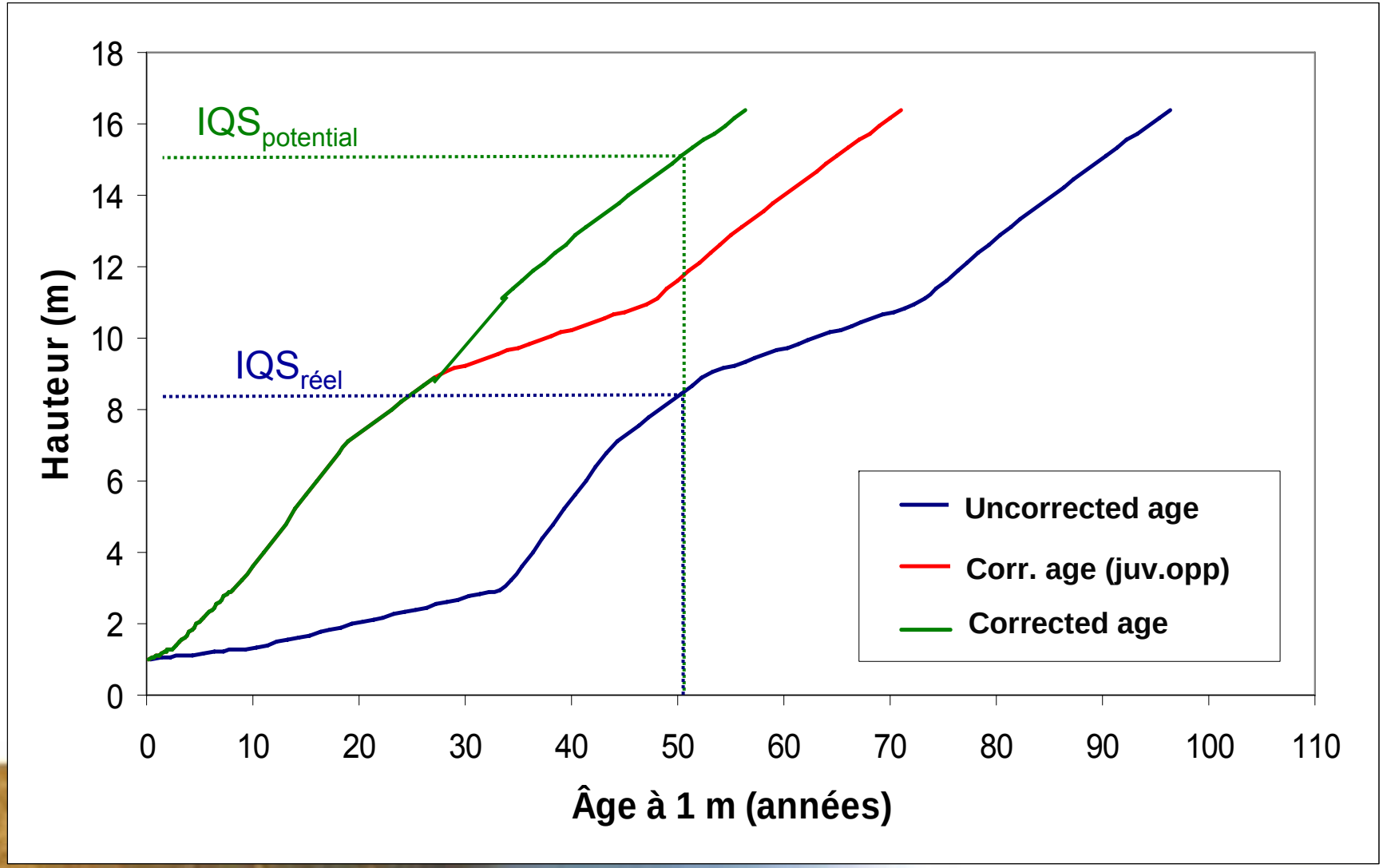

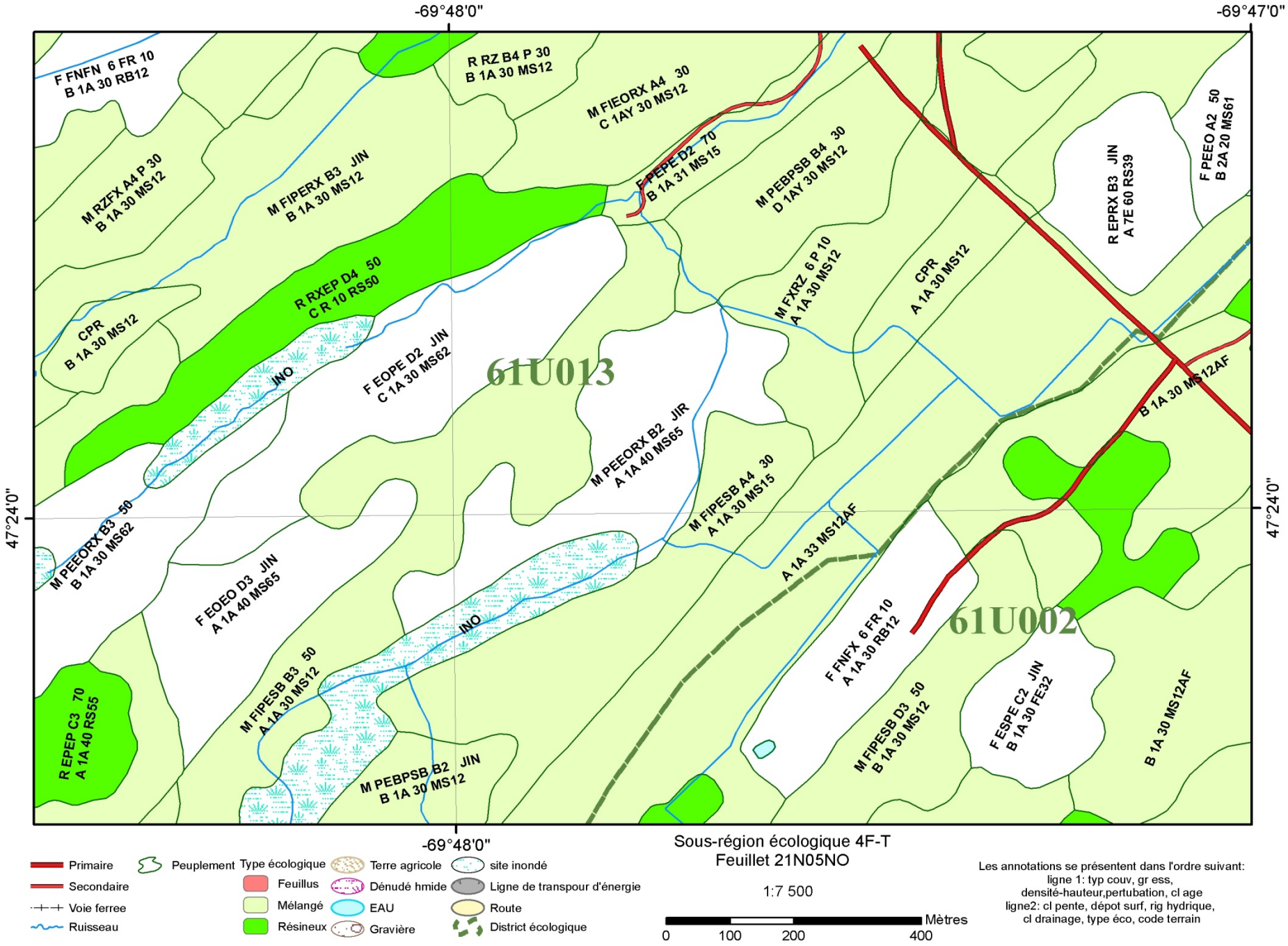
-69°48'0"
-69°47'0"
47°24'0"
F FNFN 6 FR 10
B 1A 30 RB12
R RZ B4 P 30
B 1A 30 MS12
M FIEORX A4 30
C 1AY 30 MS12
M RZFX A4 P 30
B 1A 30 MS12
M FIPERX B3 JIN
B 1A 30 MS12
F PEPE D2 70
B 1A 31 MS15
M PEBPSB B4 30
D 1AY 30 MS12
R EPRX B3 JIN
A 7E 60 RS39
F PEEO A2 50
B 2A 20 MS61
R RXEP D4 50
C R 10 RS50
M FXRZ 6 P 10
A 1A 30 MS12
CPR
A 1A 30 MS12
CPR
B 1A 30 MS12
INO
F EOPE D2 JIN
C 1A 30 MS62
61U013
M PEEORX B2 JIR
A 1A 40 MS65
B 1A 30 MS12AF
M PEEORX B3 50
B 1A 30 MS62
M FIPESB A4 30
A 1A 30 MS15
A 1A 33 MS12AF
F EOEO D3 JIN
A 1A 40 MS65
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F FNFX 6 FR 10
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61U002
M FIPESB B3 50
A 1A 30 MS12
R EPEP C3 70
A 1A 40 RS55
M FIPESB D3 50
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-69°48'0"
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Primaire
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Voie ferree
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Type écologique
Feuillus
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Résineux
Terre agricole
Dénudé hmide
EAU
Gravière
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Ligne de transpour d'énergie
Route
District écologique
Sous-région écologique 4F-T
Feuillet 21N05NO
1:7 500
Mètres
0
100
200
400
Les annotations se présentent dans l'ordre suivant:
ligne 1: typ couv, gr ess,
densité-hauteur,pertubation, cl age
ligne2: cl pente, dépot surf, rig hydrique,
cl drainage, type éco, code terrain

Productivity - Modeling

Inventory data

(Stem analyses (PAT), Increment cores (PET et PEP))

Vegetation characteristics

(Type of stand)

Climatic characteristics

(Degree day, precipitations, aridity,…)

Physical characteristics

(Surficial deposit, texture, drainage,….)

$IQS_{potential}$ modeling per species

Height = f (corrected age, vegetation, climate, physical environment)

$IQS_{potential}$ value per species and **per "ecoforest" polygon (stand)**

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Productivity - Modeling

Inventory data

Stand characteristics

Vegetation caracteristics

Climatic characteristics

Physical characteristics

Inc. TBA modeling per species

Inc. TBA = f (vegetation, climate, physical environment)

Inc.TBA$_{potential}$ value per species and **per "ecoforest" polygon (stand)**

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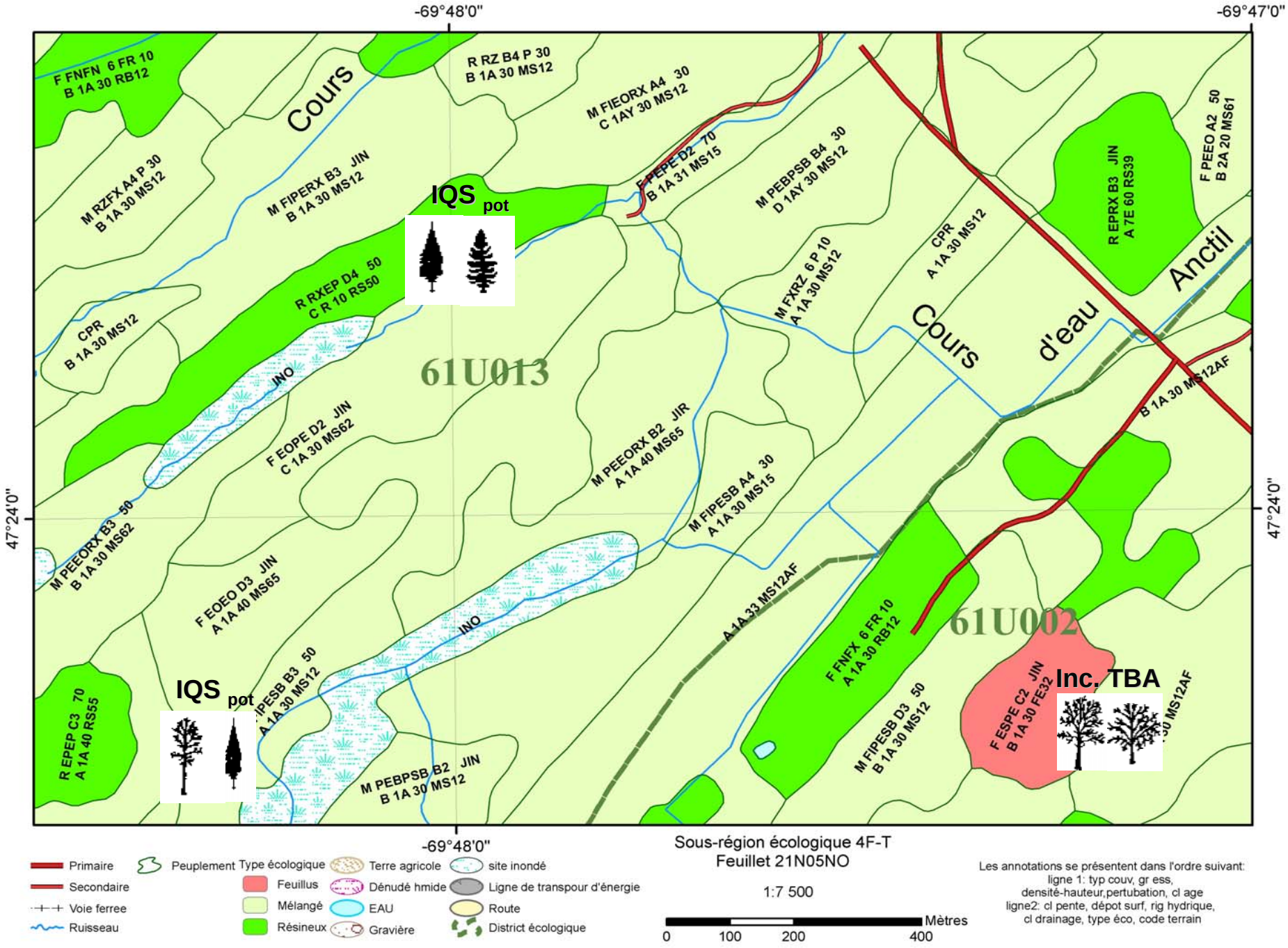
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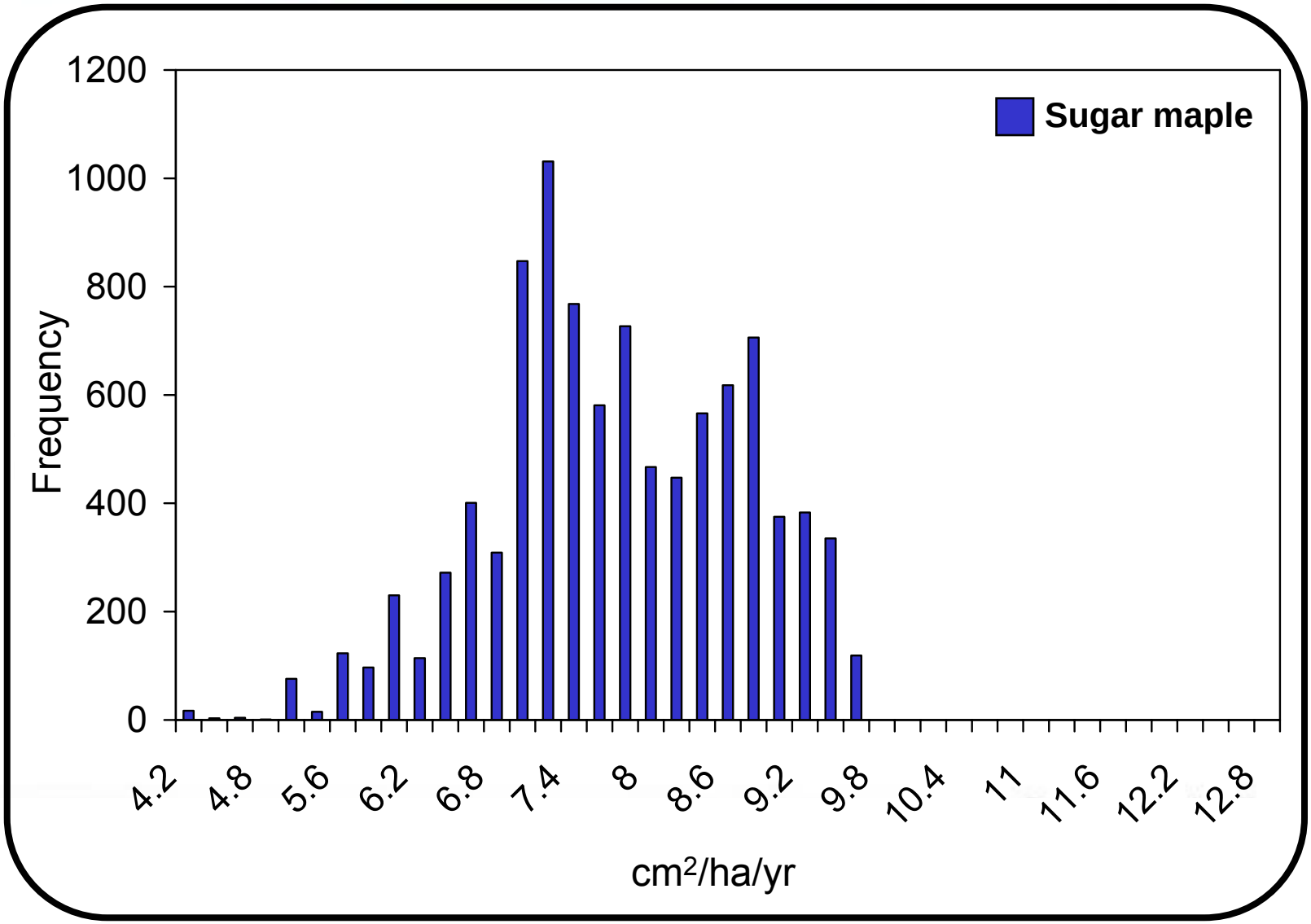
Productivity - Before standardisation



From Périé 2009

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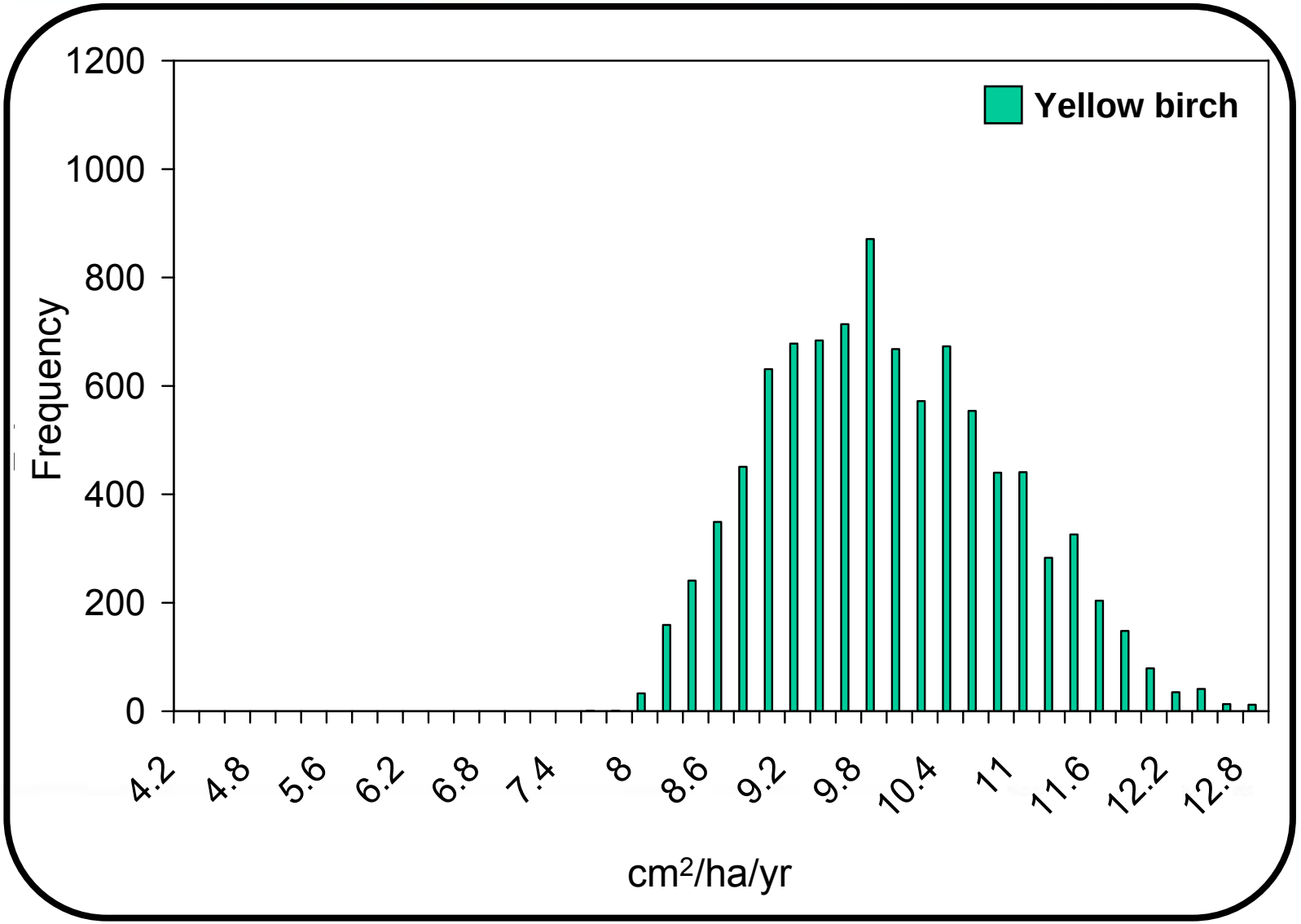

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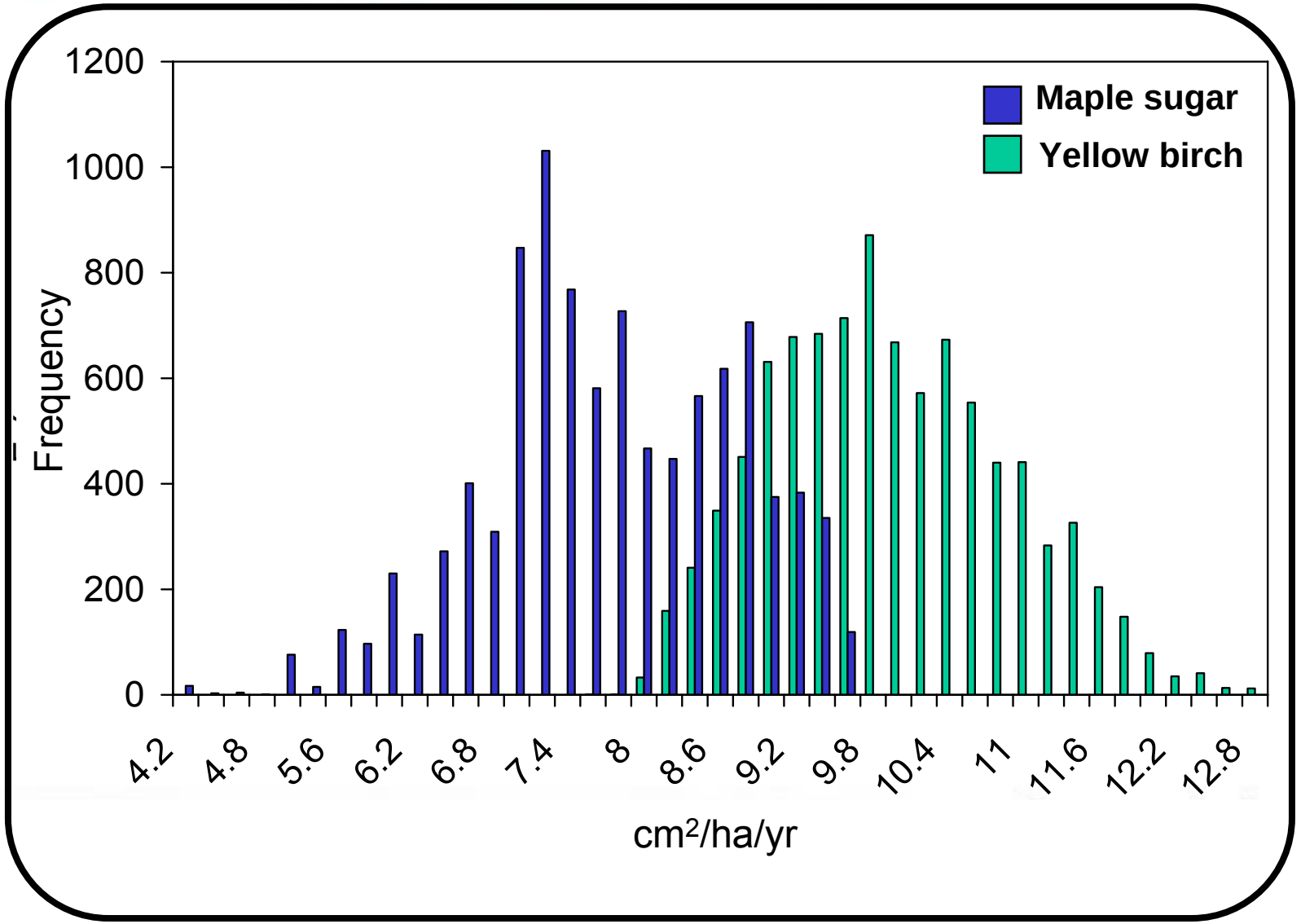

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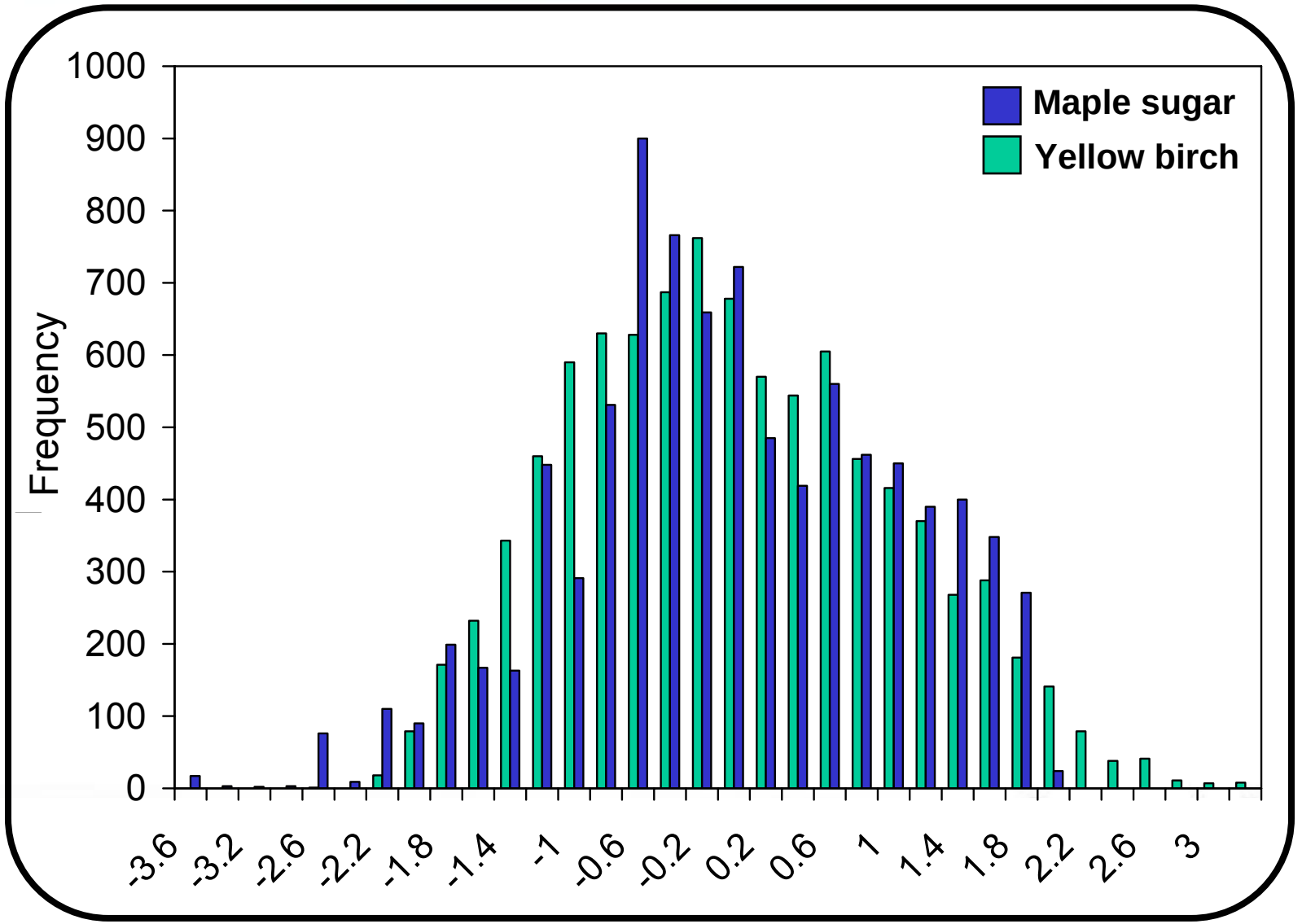

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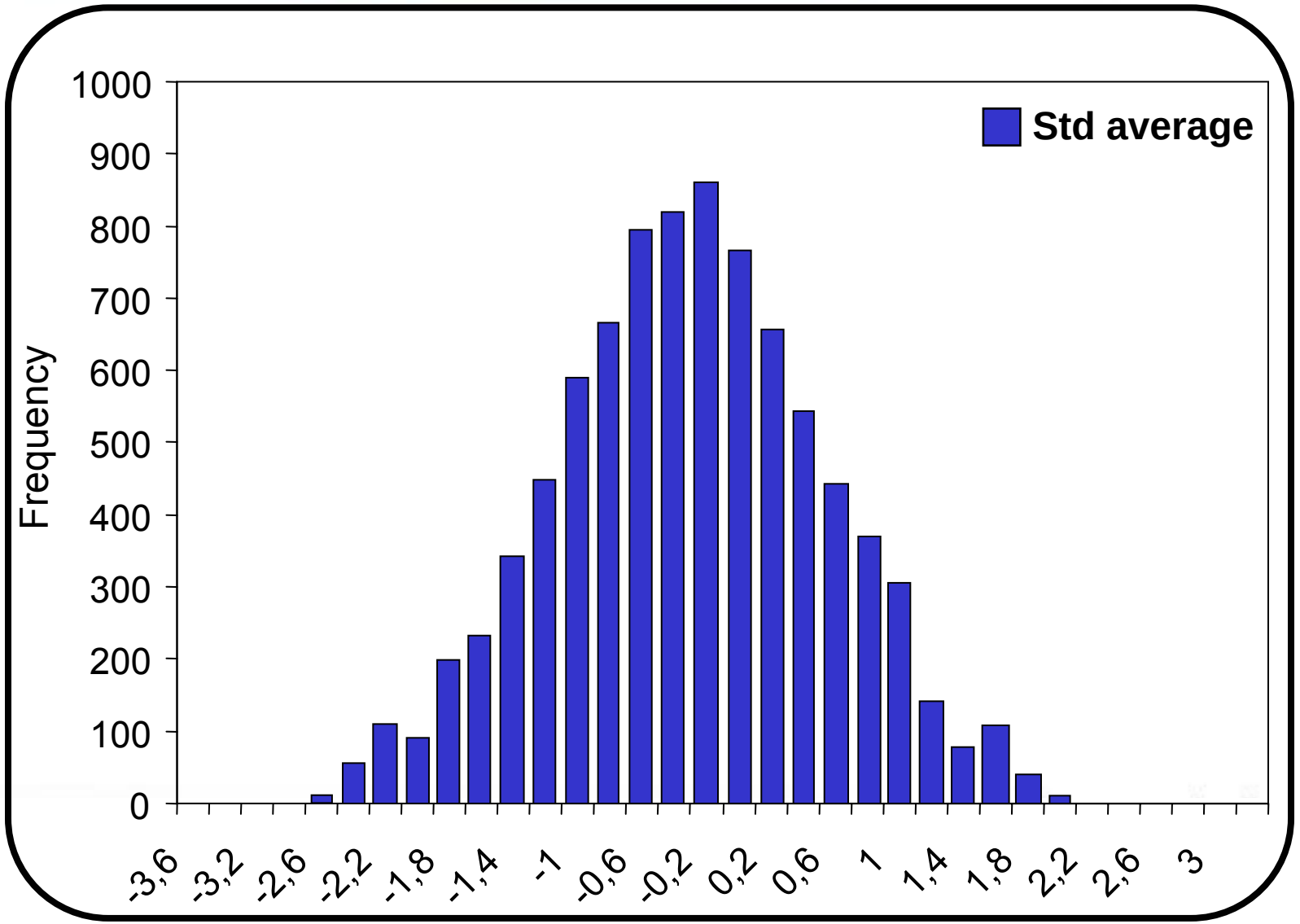
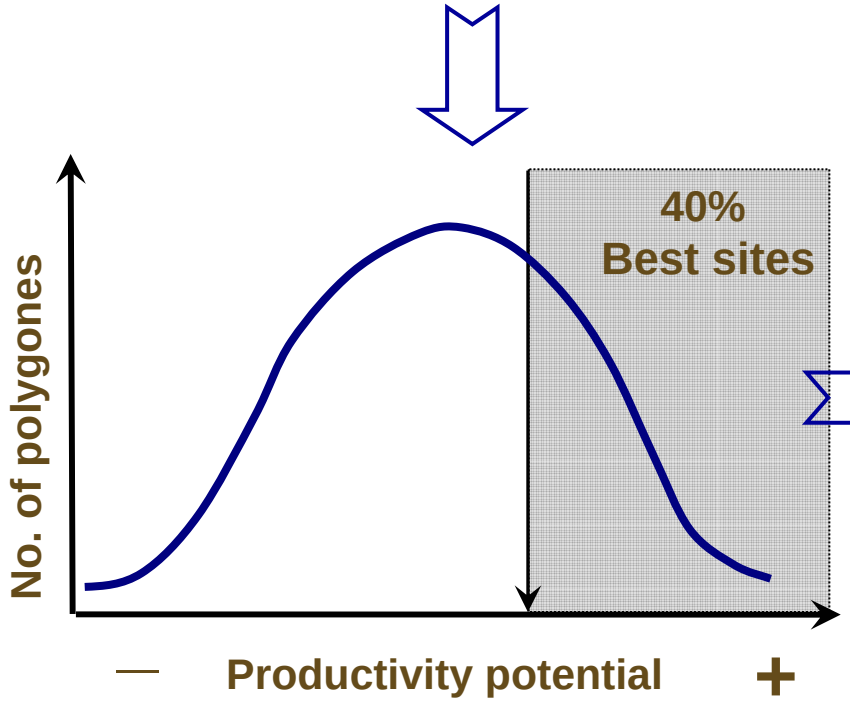


Productivity - Selection of best sites

Knowing the average standardised productivity potential of each polygon of a given territory, it is possible to identify the polygons with the highest potential productivity



Sites with a high potential for intensification of wood production

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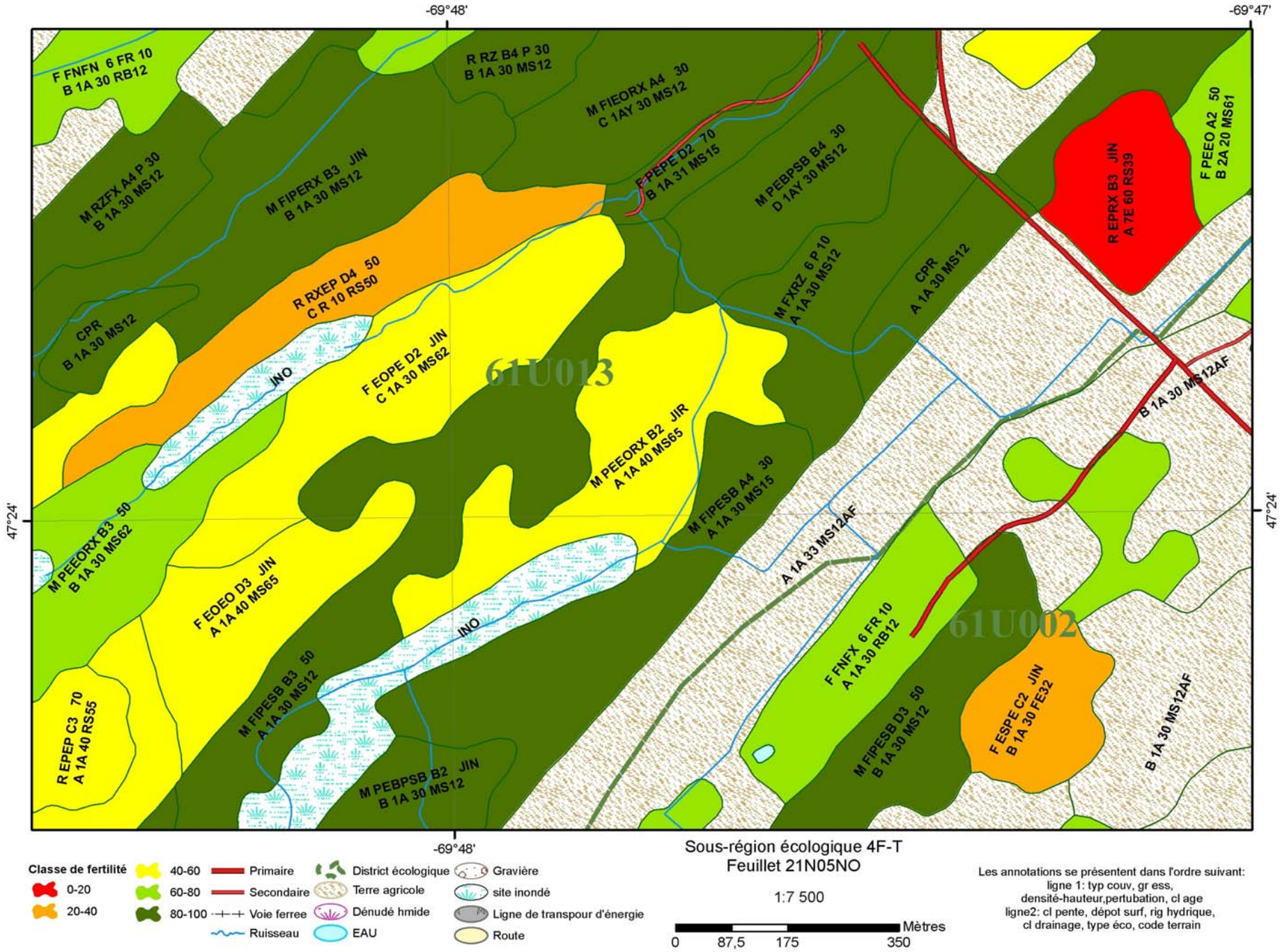

Classe de fertilité

- 0-20
- 20-40
- 40-60
- 60-80
- 80-100
- Primaire
- Secondaire
- Voie ferree
- Ruisseau
- District écologique
- Terre agricole
- Dénudé hmide
- EAU
- Gravière
- site inondé
- Ligne de transpour d'énergie
- Route

Sous-région écologique 4F-T
Feuillet 21N05NO

1:7 500

0 87,5 175 350 Mètres

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APPENDIX

1. Comparison of gross values for species in each polygon

Polygon	PotVeg	YB		WS		BF		…	MOY
		Δ G	std v.	IQS	std v.	IQS	std v.		
1	FE3	10.7	**1.2**						**0.8**
2	MJ1	10.5	**0.6**			16.8	**1.1**		**0.3**
3	MJ2	10.3	**-0.2**	18.2	**1.3**	16.4	**0.7**		**0.1**
4	MS1	10.0	**-0.9**	17.9	**0.3**	15.9	**0.2**		**-0.1**
5	MS2			17.1	**-0.1**	15.3	**-0.1**		**-0.5**
6	RS5			16.4	**-0.8**	14.9	**-0.4**		**-1.2**
7	RS2					14.5	**-1.2**		
…									

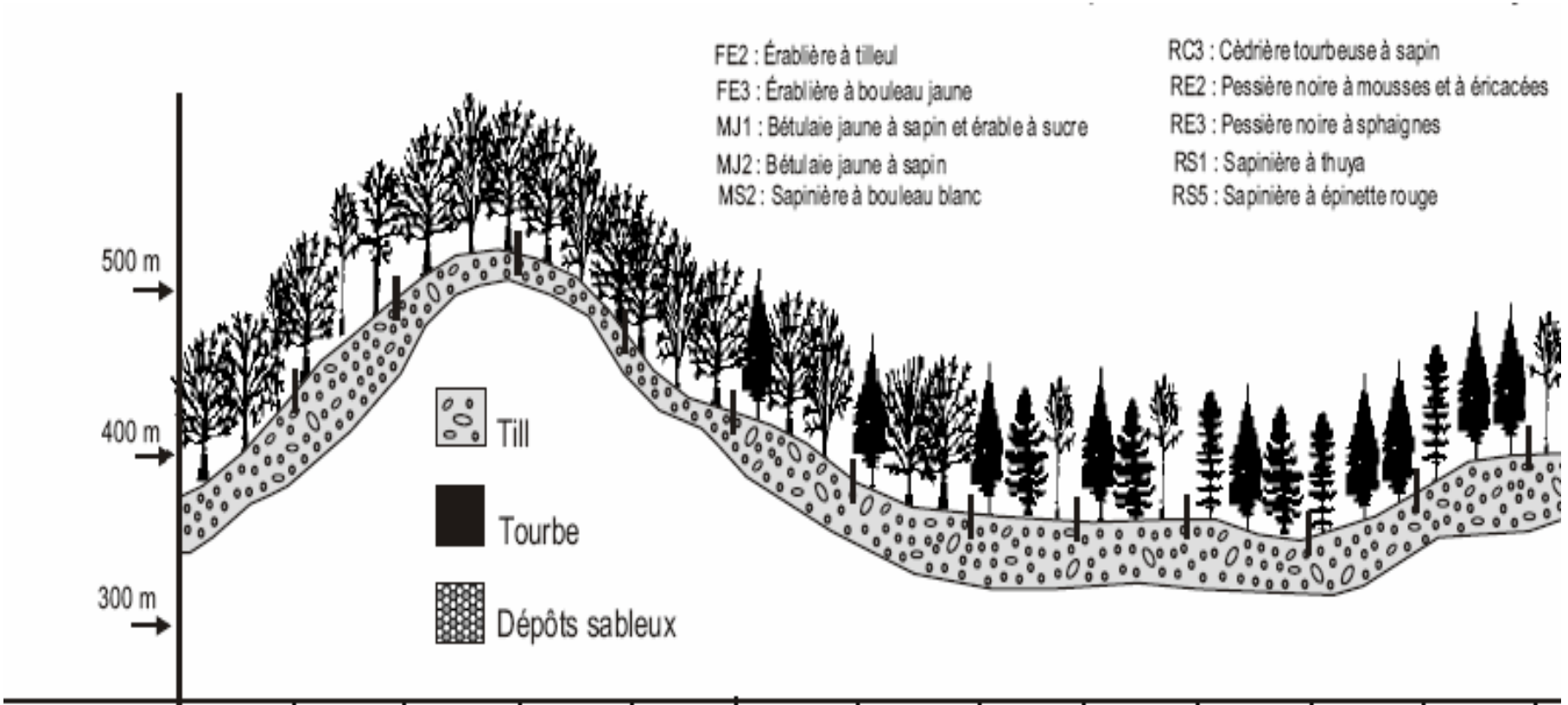
2. Weighted average of std values by relative importance of each species

3. Standardised values per polygon

Productivité - Modèle IQS_{pot}

Végétations potentielles résineuses	Résineux et feuillus tolérants
RB1 : Pessière blanche ou cédrière issue d'agriculture	SAB, EPB, BOP, THO
RB2 : Pessière blanche maritime	EPB
RB3 : Pessière blanche ou sapinière à épinette blanche subalpine	EPB, SAB
RB5 : Pessière blanche issue de broutage	EPB, SAB, BOP
RC3 : Cédrière tourbeuse à sapin	THO, SAB
RE1 : Pessière noire à lichens	EPN, PIG
RE2 : Pessière noire à mousses ou à éricacées	EPN, PIG
RE3 : Pessière noire à sphaignes	EPN
RE4 :Pessière noire à mousses ou à éricacées montagnarde	EPN, PIG
RE7 : Pessière noire maritime	EPN, SAB
RP1 : Pinède blanche ou pinède rouge	SAB, PET, PIB
RS1 : Sapinière à thuya	SAB, THO
RS2 : Sapinière à épinette noire	SAB, EPN, BOP
RS3 : Sapinière à épinette noire et sphaignes	SAB, EPN
RS4 : Sapinière à épinette noire montagnarde	SAB, EPN
RS5 : Sapinière à épinette rouge	SAB, BOP, EPR, EPB
RS7 : Sapinière à épinette noire maritime	SAB, EPN
RT1 : Prucheraie	SAB

Sère physiographique



Type écologique(1-3)	FE25	FE22	FE32	FE32H	FE35	MJ12 (MJ22)	MJ15 (MJ25)	MJ28	RS15	RS18	RS55 (RS25)	RS52 (RS22)