Seed regions and breeding zones in Poland

Jan Kowalczyk, Jan Matras
Forest Research Institute
Poland

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Delineation of Breeding Zones

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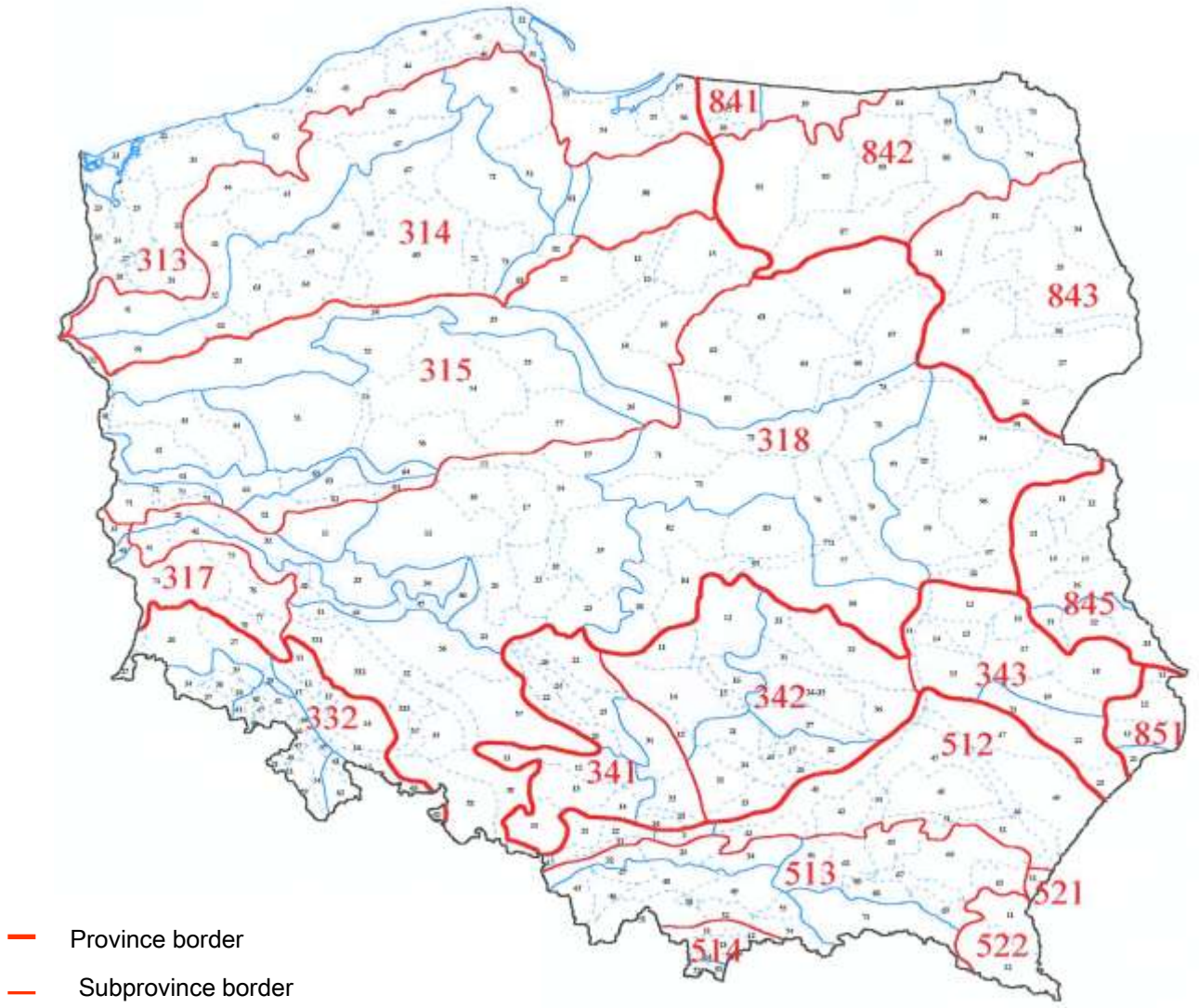
Main points:

- Poland is not simple
  - is divided by climatic zones
  - historical background
  - not equal forest cover
- Seed region division and seed transfer rules (breeding zones) is one conception based on:
  - results from provenance trials (partly)
  - forest localisation (old tratitional regions)
  - local circumstances (borders, …)

Geographical division of Poland (Kondracki 1998)



Changes in the time in number of region of provenances:

- 1994 – 106
- 1997 – 108
- 2004 – 92
- 2006 – 91

Main aims of seed regions:

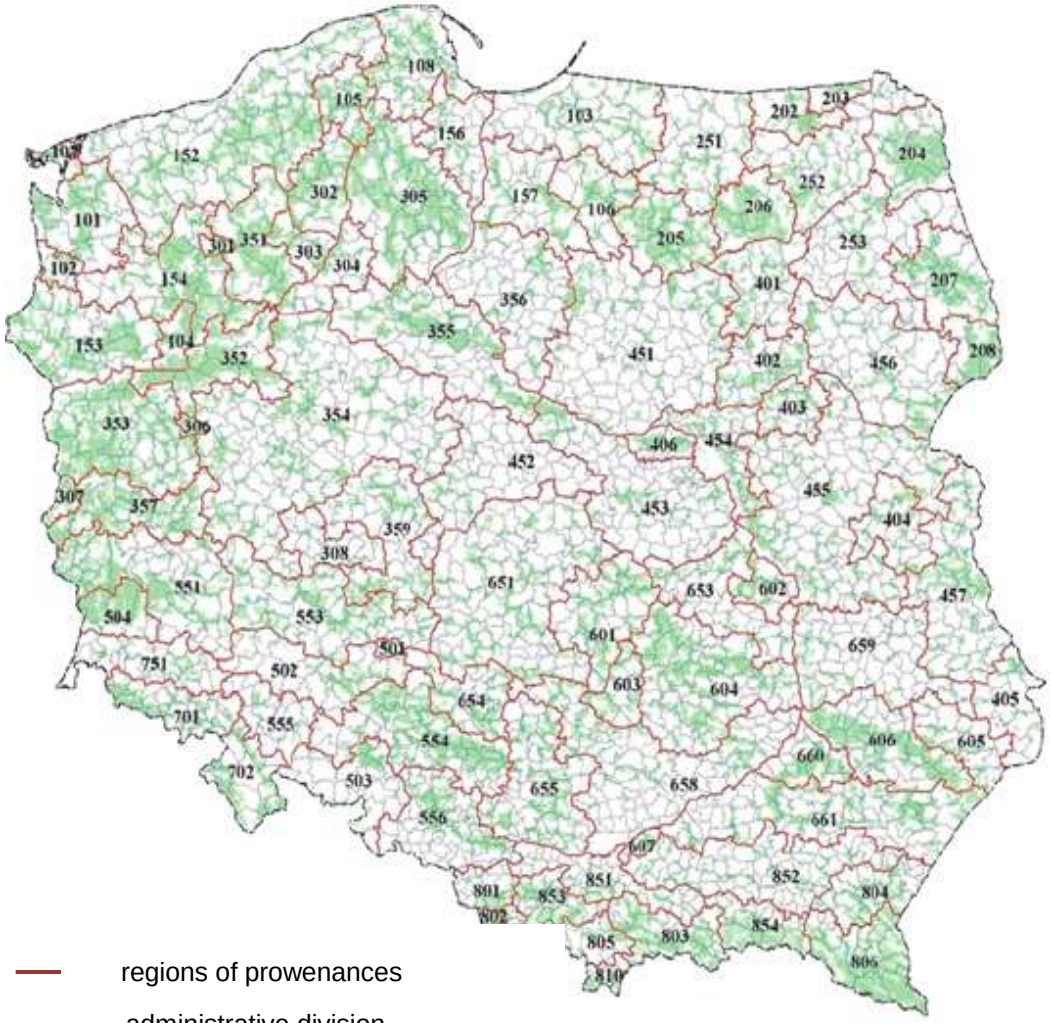
- Identify and save “separately” as much as possible autochthonous populations,
- Increase the area of the valuable populations of forest tree species,
- Recommend which seed sources should be used for the forest purposes on the areas where local populations represent low breeding value or if area of local FBM is too small to produce enough FRM,
- Defining the rules for transfer the forest reproductive material to other regions and reduce to minimum uncontrolled transfer the forest reproductive materials,
- Creation the system for recording the information about FRM using for forest purposes

Seed regions in Poland

Name of forest „Kraina „ :

- *Bałtycka*
- *Mazursko-Podlaska*
- *Wielkopolsko-Pomorska*
- *Mazowiecko-Podlaska*
- *Śląska*
- *Małopolska*
- *Sudecka*
- *Karpacka*

Seed regions and forest cover and administrative borders



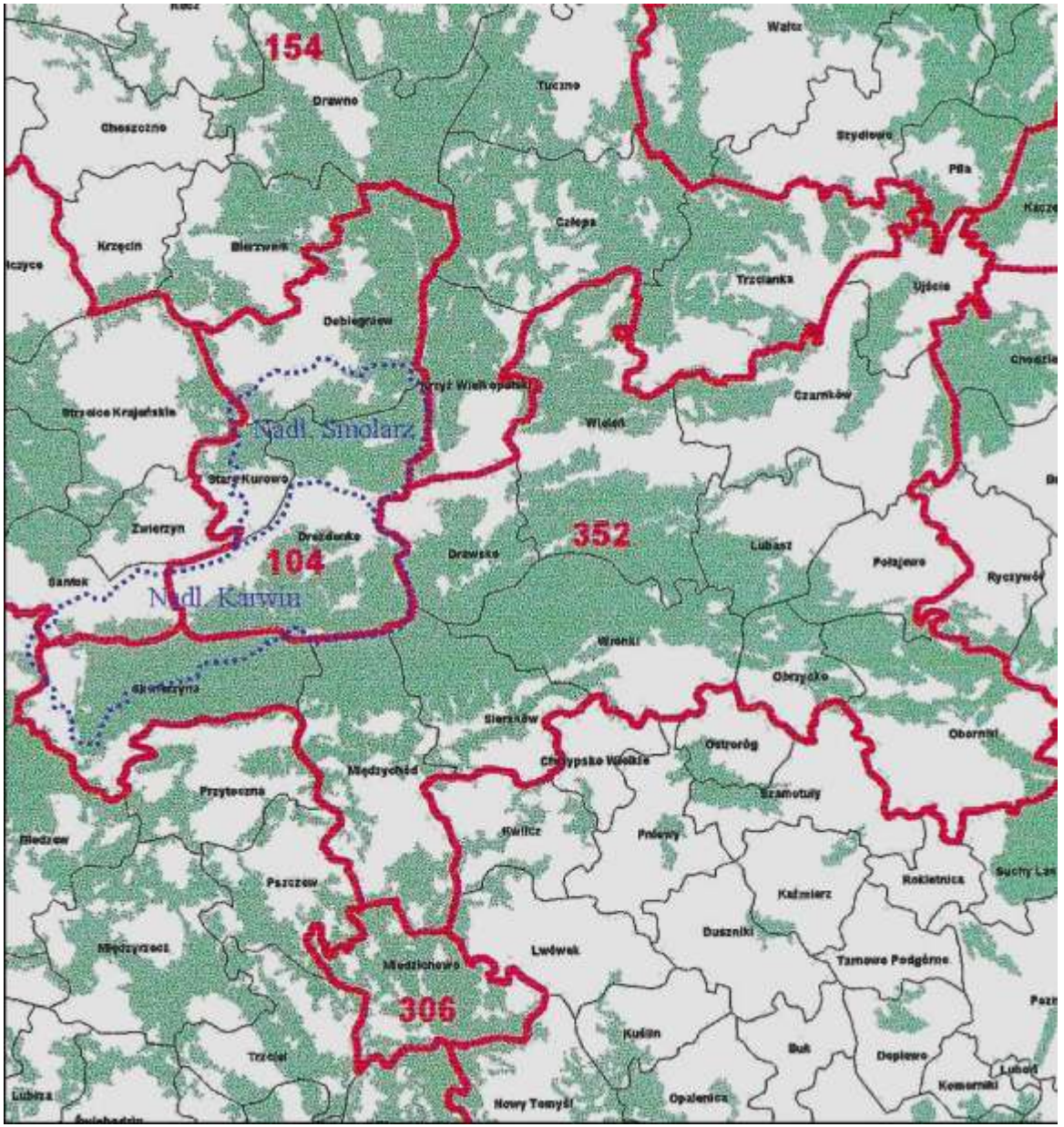
regions of prowenances

administrative division (commune)

101,810 region of provenances nos.

Forests

Detail border



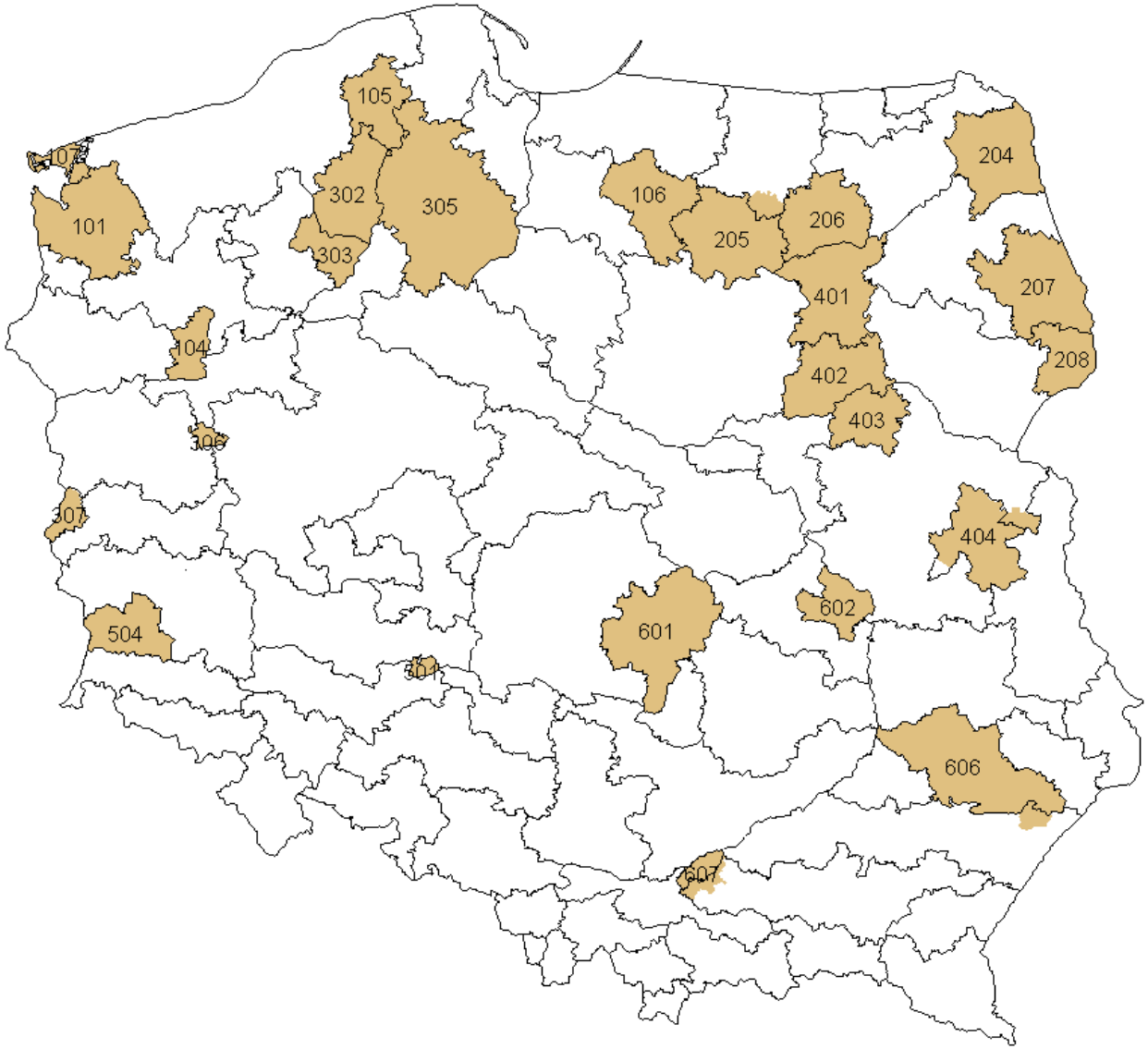
Communes belong to regions of provenances o FBM

Region of provenances	Communes
1	2
101[2)]	Dobra (powiat goleniowski), Dobra Szczecińska, Golczewo, Goleniów, Kobylanka, Maszewo (powiat goleniowski), Nowe Warpno, Nowogard, Osina, Police, Przybiernów, Stara Dąbrowa, Stargard Szczeciński, Stepnica, Szczecin
102	Bielice, Gryfino, Kołbaskowo, Stare Czarnowo
103	Braniewo, Dobre Miasto, Elbląg, Frombork, Godkowo, Górowo Iławeckie, Gronowo Elbląskie, Krynica Morska, Lelkowo, Lichnowy, Lidzbark Warmiński, Lubomino, Markusy, Milejewo, Miłakowo, Młynary, Nowy Dwór Gdański, Nowy Staw, Orneta, Ostaszewo, Pasłęk, Pieniężno, Płoskinia, Stare Pole, Stegna, Sztutowo, Świątki, Tolkmicko, Wilczęta
104	Dobiegniew, Drezdenko, Stare Kurowo
105	Borzytuchom, Bytów, Czarna Dąbrówka, Dębnica Kaszubska, Kolczygłowy, Potęgowo, Studzienice
106	Dąbrówno, Gietrzwałd, Grunwald, Jonkowo, Łukta, Małdyty, Miłomłyn, Morąg, Ostróda, Zalewo
107	Świnoujście, Międzyzdroje, Wolin
108	Cewice, Chmielno, Choczewo, Gdańsk, Gdynia, Gniewino, Hel, Jastarnia, Kartuzy, Kosakowo, Krokowa, Linia, Luzino, Łęczyce, Przodkowo, Puck, Reda, Rumia, Sierakowice, Somonino, Sopot, Stężyca (powiat kartuski), Szemud, Wejherowo, Władysławowo
152	Barwice, Będzino, Białogard, Biały Bór, Biesiekierz, Bobolice, Brójce (powiat gryficki), Brzeźno, Damnica, Darłowo, Dygowo, Dziwnów, Główczyce, Gościno, Gryfice, Grzmiąca, Ińsko, Kamień Pomorski, Karlino, Karnice, Kępice, Kobylnica, Kołobrzeg, Koszalin, Lębork, Łeba, Łobez, Malechowo, Manowo, Miastko, Mielno, Nowa Wieś Lęborska, Płoty, Polanów, Połczyn-Zdrój, Postomino, Radowo Małe, Rąbino, Resko, Rewal, Rymań, Sianów, Siemyśl, Sławno, Sławoborze, Słupsk, Smołdzino, Świdwin, Świerzno, Świeszyno, Trzebiatów, Trzebielino, Tychowo, Ustka, Ustronie Morskie, Węgorzyno, Wicko
153	Banie, Barlinek, Bogdaniec, Boleszkowice, Cedynia, Chojna, Dębno (powiat myśliborski), Gorzów Wielkopolski, Kłodawa (powiat gorzowski), Kostrzyn (powiat gorzowski), Kozielice, Lipiany, Lubiszyn, Mieszkowice, Moryń, Myślibórz, Nowogródek Pomorski, Pełczyce, Santok, Strzelce Krajeńskie, Trzcińsko-Zdrój, Widuchowa, Witnica, Zwierzyn
154	Bierzwnik, Chociwel, Choszczno, Człopa, Dobrzany, Dolice, Drawno, Drawsko Pomorskie, Kalisz Pomorski, Krzęcin, Krzyż Wielkopolski, Marianowo, Mirosławiec, Ostrowice, Przelewice, Pyrzyce, Recz, Suchań, Trzcianka, Tuczno, Warnice, Złocieniec

Regions are created for:

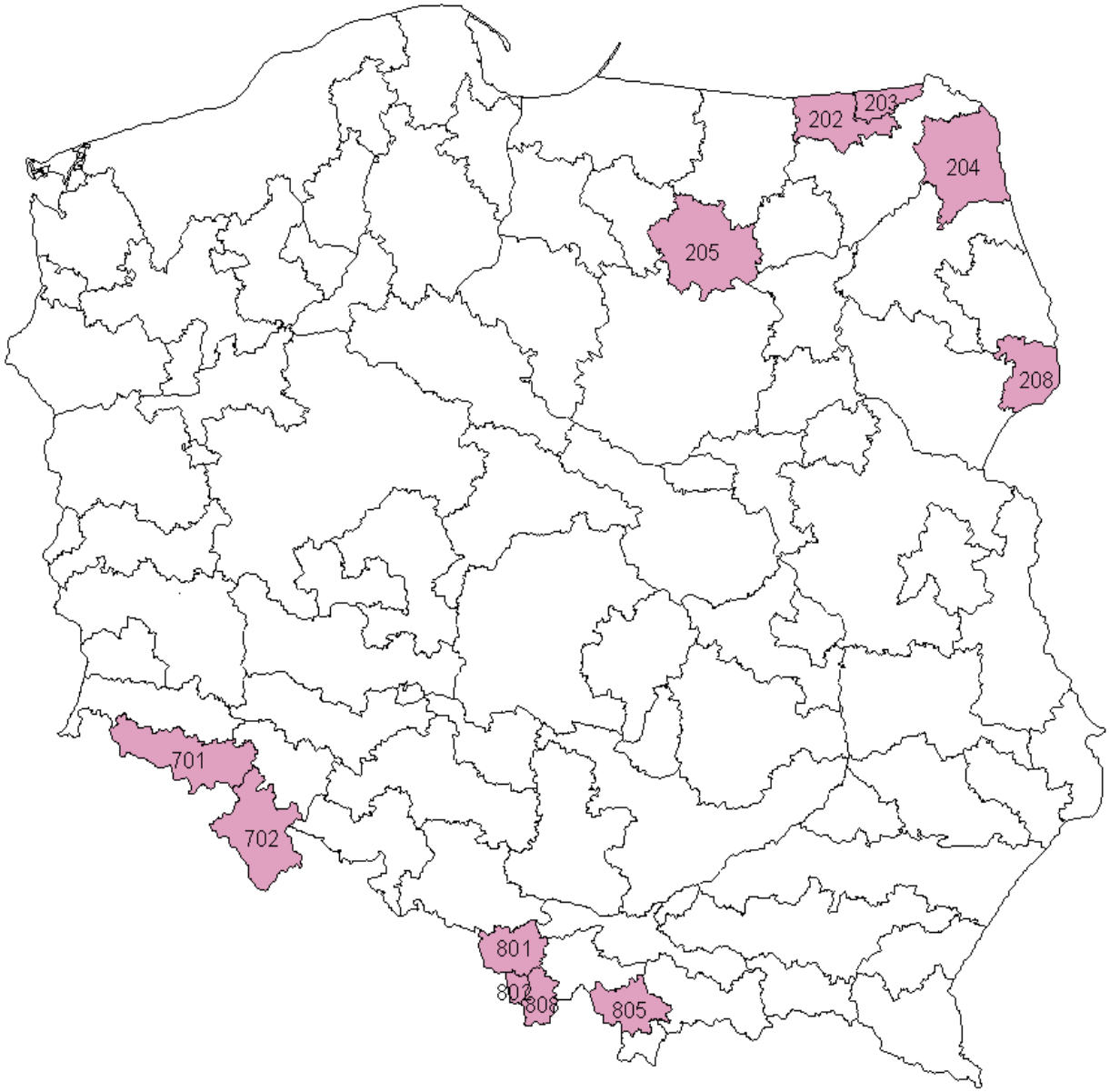
1. Silver birch (*Betula pendula* Roth.)
2. Common beech (*Fagus sylvatica* L.)
3. Sessile oak (*Quercus petraea* Liebl.)
4. Pedunculate oak (*Quercus robur* L.)
5. Common fir (*Abies alba* Mill.)
6. European larch (*Larix decidua* Mill.)
7. Black alder (*Alnus glutinosa* Gaertn.)
8. Scots pine (*Pinus sylvestris* L.)
9. Norway spruce (*Picea abies* Karst.)

Special value regions of provenances for pine */Pinus sylvestris* L./



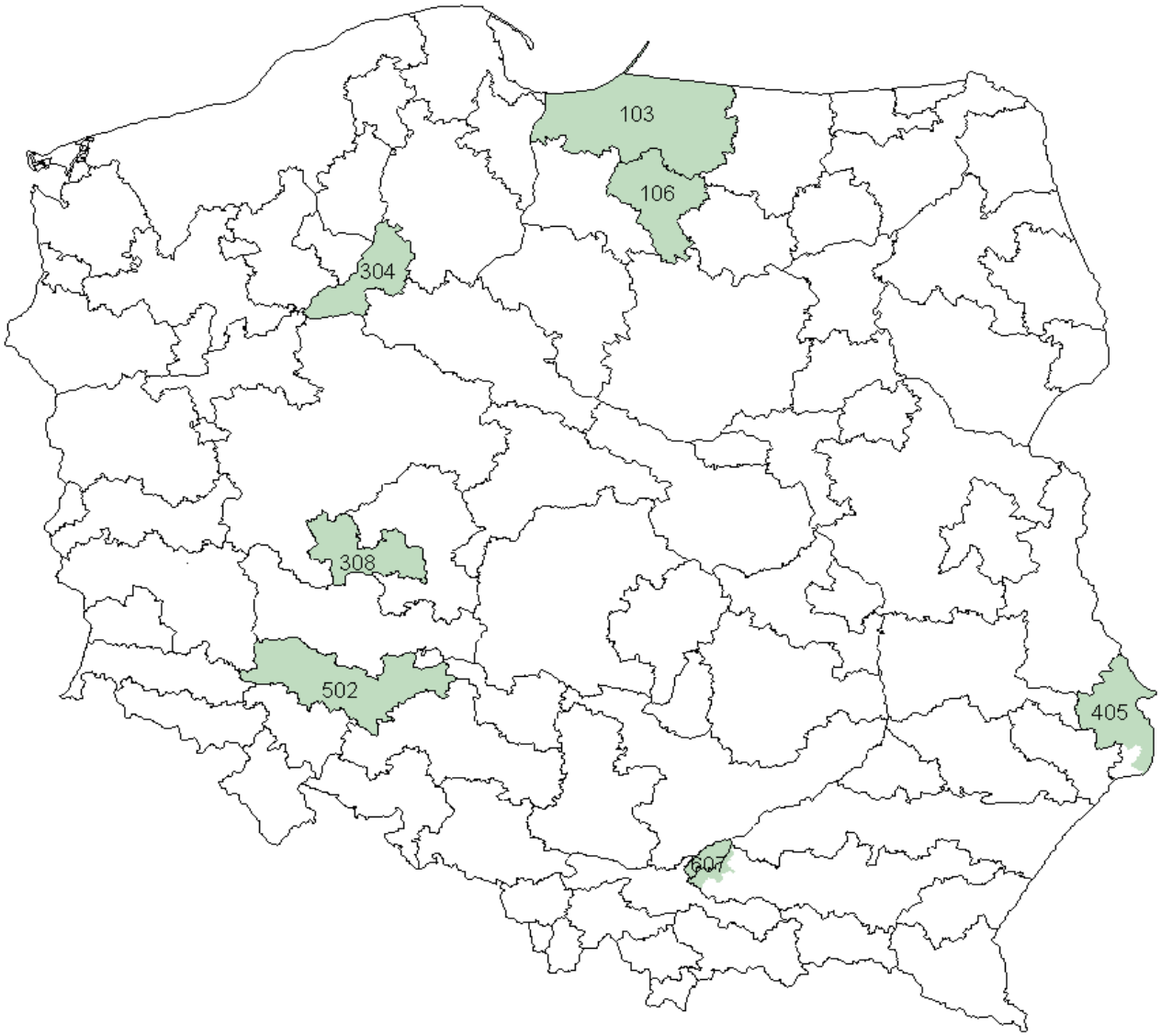
Special value regions of provenances for Larch */Larix decidua* Mill./

Special value regions of provenances for spruce */Picea abies (*L.) Karst./

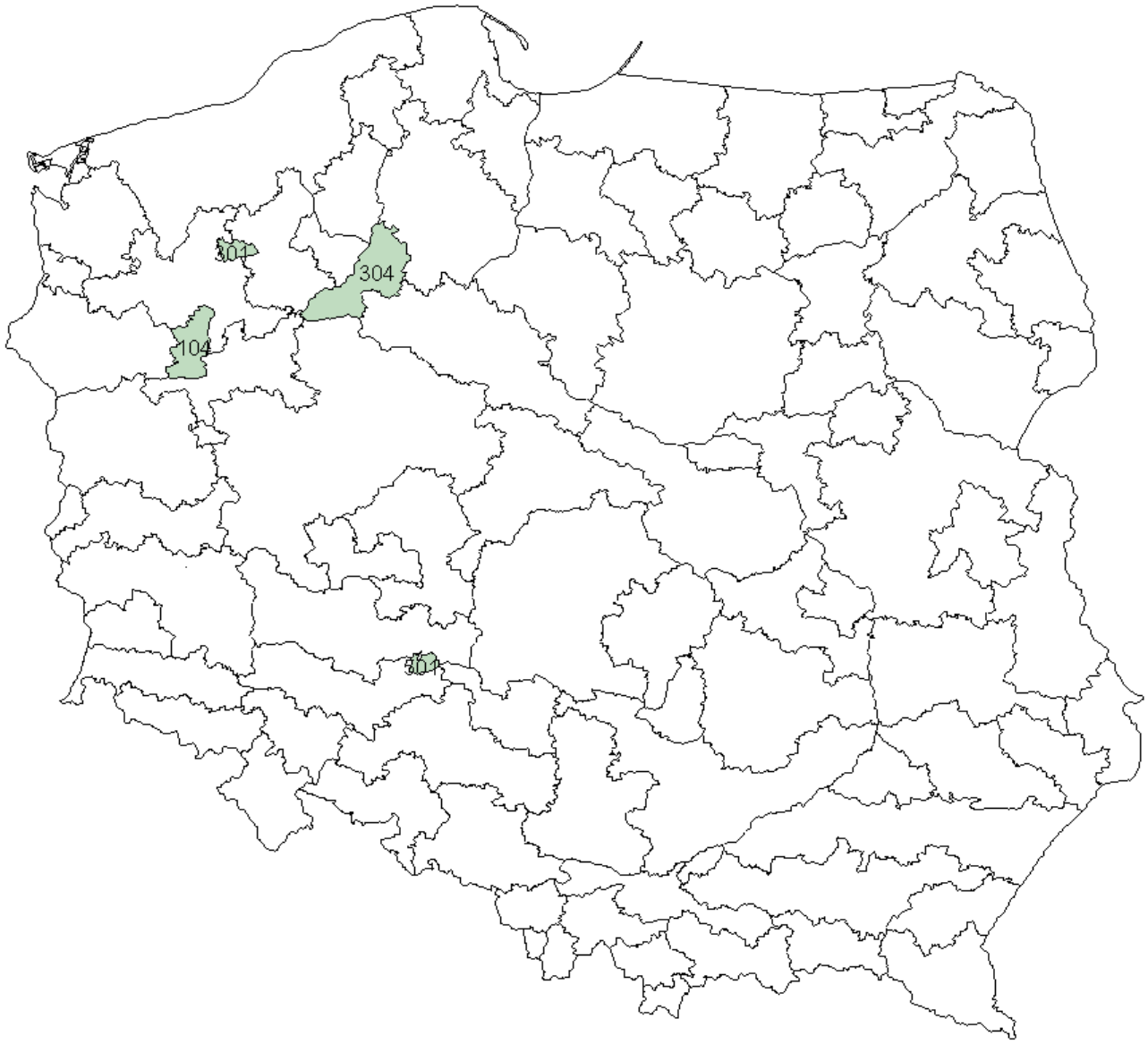


Special value regions of provenances for Fir */Abies alba* Mill./

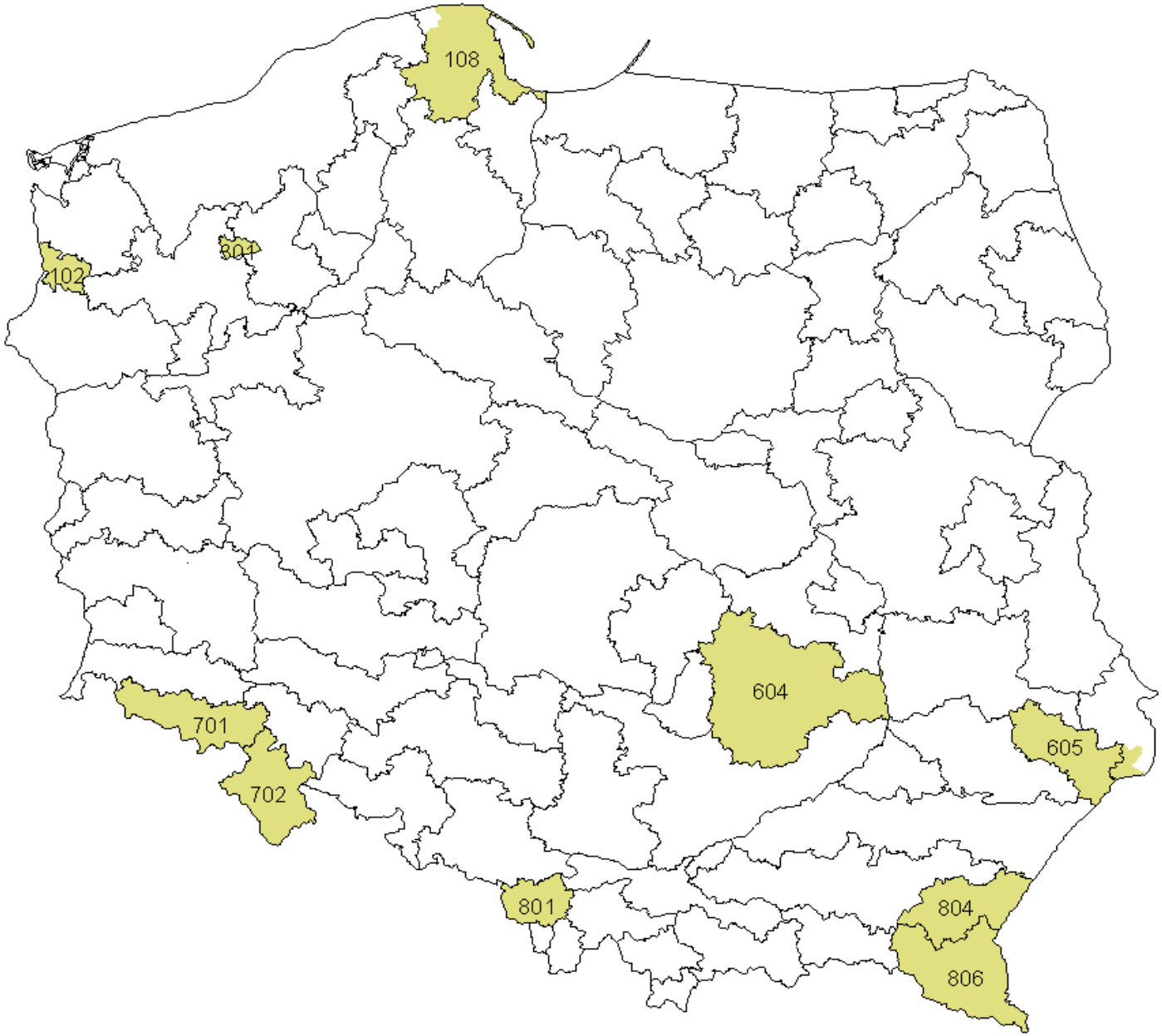
Special value regions of provenances for Oak */Quercus robur* L./



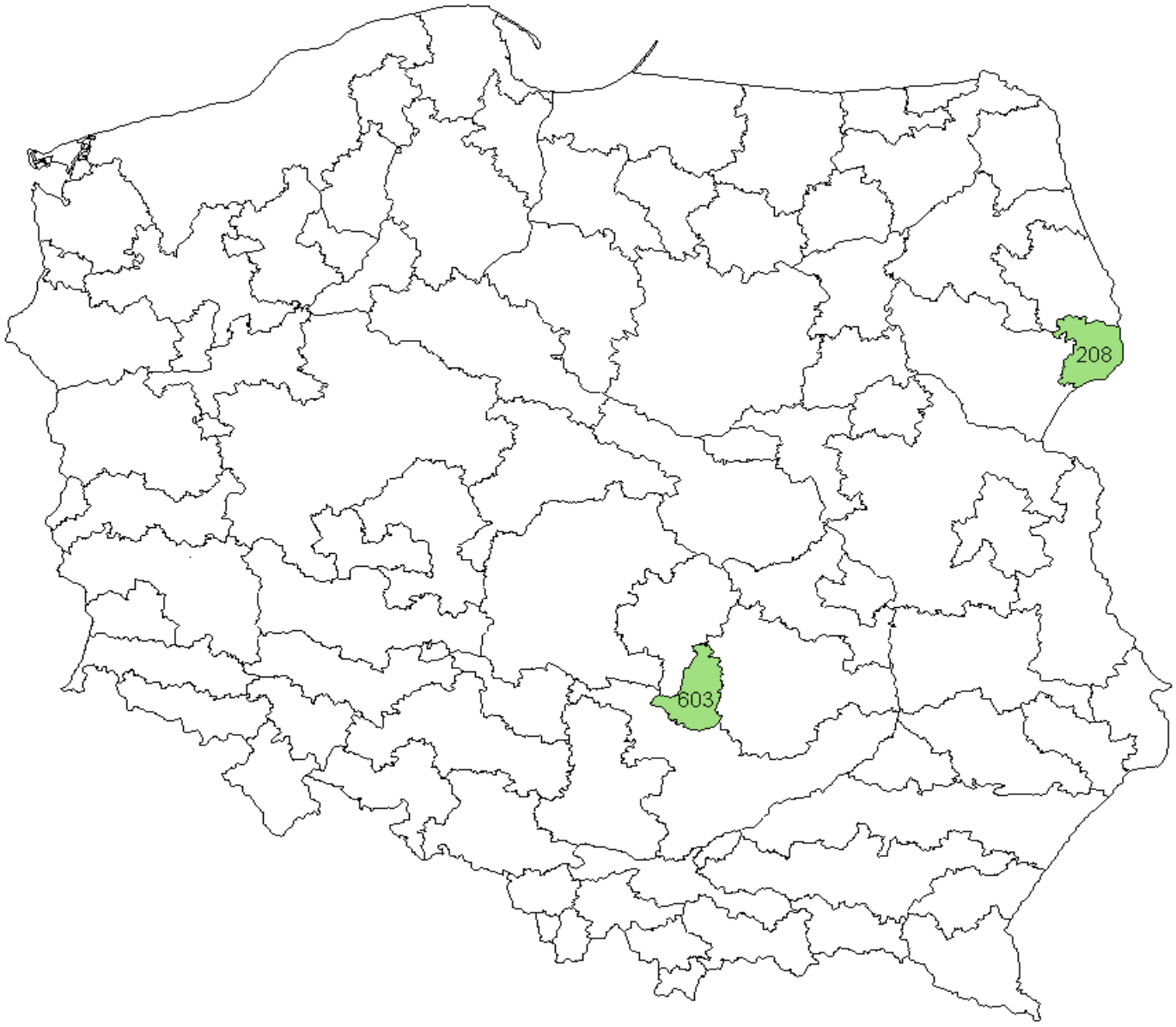
Special value regions of provenances for oak */Quercus petraea* Liebl./



Special value regions of provenances for beech / *Fagus sylvatica* L./

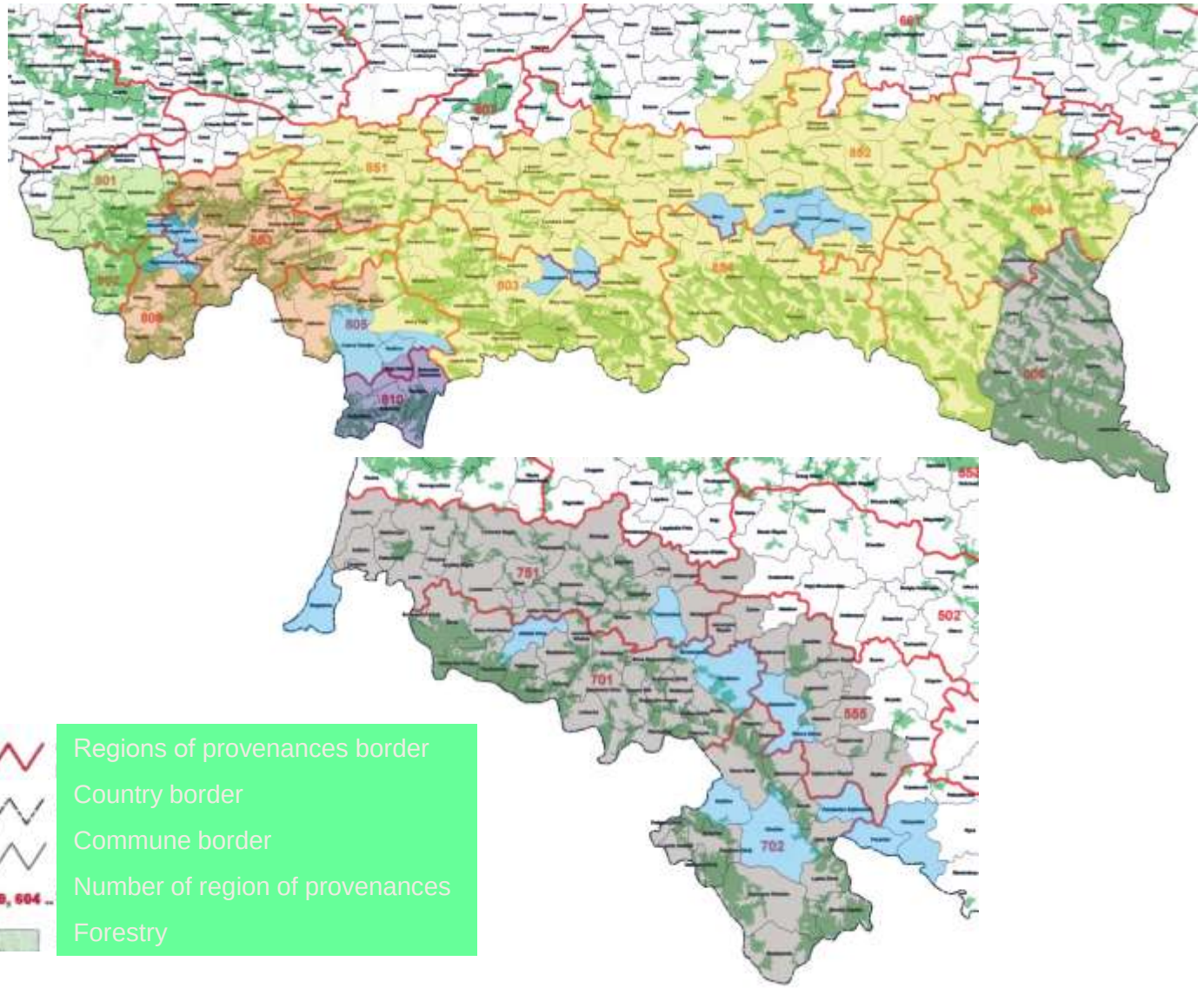


Special value regions of provenances for black alder */Alnus glutinosa (*L.*) Gaertn./*



Special value regions of provenances for birch */Betula pendula* Roth./

Altitudinal variants for transfer FRM in Karpaty and Sudety mountains



Relation between mean annual temperature and altitude in variant s A, B, C, D, E on different slope in west Beskid and Taty mountains

Mean temperature [°C}	Altitude n.p.m. (m)								
	A		B		C		D	E	
	South slope	North slope	South slope	North slope	South slope	North slope	North slope	South slope	North slope
-0,5	-	1730	-	-	-	-	-	-	-
0,0	-	1670	-	-	-	-	-	-	-
0,5	-	1610	-	-	-	-	-	-	1760
1,0	1720	1540	-	-	-	-	-	-	1680
1,5	1660	1480	-	-	-	-	-	1780	1630
2,0	1600	1400	-	1280	-	-	-	1680	1550
2,5	1520	1320	-	1220	-	1360	-	1580	1480
3,0	1430	1230	1300	1160	-	1270	-	1460	1370
3,5	1340	1160	1240	1090	1400	1180	-	1350	1280
4,0	1250	1080	1180	1000	1300	1100	960	1230	1150
4,5	1180	990	1090	910	1200	1020	720	1140	1050
5,0	1080	890	1000	820	1100	920	610	950	850
5,5	950	780	910	750	1000	850	530	850	-
6,0	830	670	800	660	890	730	490	-	-
6,5	720	570	710	550	770	640	440	-	-
7,0	590	450	600	450	650	510	390	-	-
7,5	470	350	500	350	550	440	-	-	-
8.0	300	200	300	200	430	300	-	-	-

Relation between mean annual temperature and altitude in variants A, B, C on different slope in Sudety mountains

Mean temperature °C	Altitude n.p.m. (w m)					
	A		B		C	
	South slope	North slope	South slope	North slope	South slope	North slope
3,5	1340	1160	1240	1090	1400	1180
4,0	1250	1080	1180	1000	1300	1100
4,5	1180	990	1090	910	1200	1020
5,0	1080	890	1000	820	1100	920
5,5	950	780	910	750	1000	850
6,0	830	670	800	660	890	730
6,5	720	570	710	550	770	640
7,0	590	450	600	450	650	510
7,5	470	350	500	350	550	440
8.0	300	200	300	200	430	300

Breeding – seed zones

- Detail table for seed transfer for each region (91 regions= rows).
- Table define breeding zones - polygon feature within which a single population of improved trees can be planted without fear of mis-adaptation,
- Term breeding zones is not used
- Seeds are mostly used locally
- The “testing program” is not fully in agreement with the breeding zones

Seed transfer table

Region of provenances	Pine	Spruce	Fir	Larch	Oak p.	Oak s.	Beech	Alder b.	Birch
1	2	3	4	5	6	7	8	9	10
101	101	102 - 108, 152 - 154, 156 - 157, 301 - 305, 351	-	102 - 108, 152 - 154, 156 - 157	102, 103, 107, 108, 152	102 - 104, 107, 108, 152 - 154	102, 152	102 - 108, 152 - 154, 156 - 157	102 - 108, 152 - 154, 156 - 157
102	101, 153, 154	101, 103 - 108, 152 - 154, 156 - 157, 301 - 305, 351	-	101, 103 - 108, 152 - 154, 156 - 157	101, 103, 104, 107, 108, 152 - 154	101, 103, 104, 107, 108, 152 - 154	102	101, 103 - 108, 152 - 154, 156 - 157	101, 103 - 108, 152 - 154, 156 - 157
103	106, 107[1)], 156, 157	106, 157, 205, 251	-	101, 102, 106 - 108, 152, 157	103	106, 156, 157, 251	108, 156, 157	106, 156, 157, 251	106, 156, 157, 251
104	104, 153[2)], 154[2)], 352[2)]	101 - 103, 105 - 108, 152 - 154, 156 - 157, 301 - 305, 351	-	101 - 103, 105 - 108, 152 - 154, 156 - 157	153, 154, 352	104	102, 153, 154, 352	101 - 103, 105 - 108, 152 - 154, 156 - 157	101 - 103, 105 - 108, 152 - 154, 156 - 157
105	105	101 - 104, 106 - 108, 152 - 157, 301 - 305, 351	-	103, 104, 106, 108, 153 - 157, 301 - 305, 351	108, 152, 155, 156, 304	108, 152, 155, 156, 301	108, 152, 156, 302, 305	104, 106, 108, 152 - 154, 156 - 157, 301 - 305, 351	104, 106, 108, 152, 153 - 154, 301 - 305, 351

Possibility of seed transfer