Incorporation of origin and regions of provenance in the Forest Map of Spain (FMS): a case study with *Pinus pinaster* Ait and *Taxus baccata* L.

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INTRODUCTION: some key concepts.

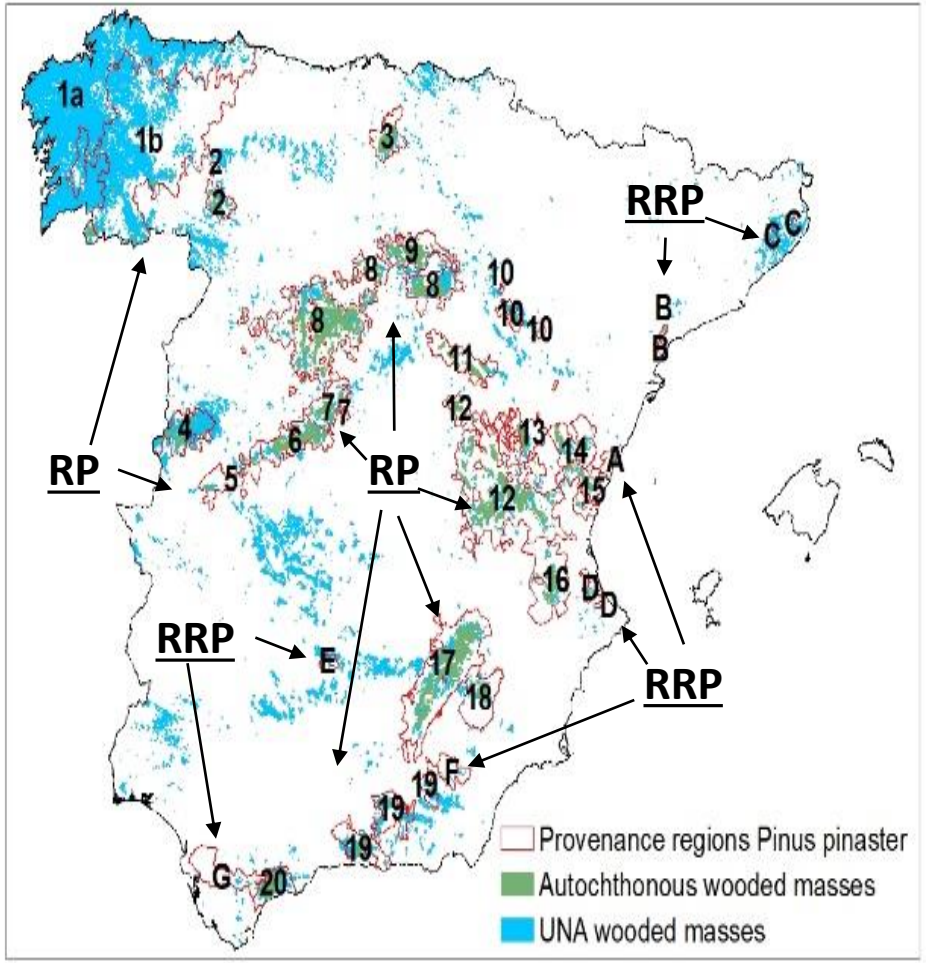
1. The Iberian Peninsula and Balearic islands are hotspots of arboreal diversity.

2. Adequate Forest Reproductive Material (FRM) is required for sustainability of forest masses.

3. Genetic differences between populations can be reflected by **regions of provenance (RP).**

3. **RP:** area or group of areas subject to sufficiently uniform conditions for seed sources or stands to have similar phenotypic or genetic characteristics (RD 289/2003).

4. **<u>Restricted RPs (RRP):</u>** confinements of species to small favourable enclaves distant from main distribution areas.

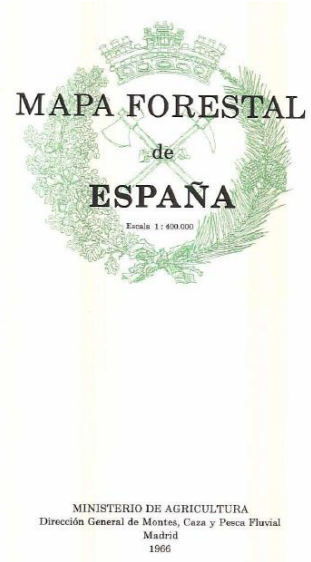


INTRODUCTION: some more key concepts.

6. A seed source or stand is considered **<u>autochthonous</u>** when regenerated with FRM from same seed source or stand, or seed sources or stands located near by (RD 289/03).

ORIGIN	PROVENANCE	
Base Material	Base Material	FRM
Location A	Location A	Autochthonous (A)
Location B	Location A	Non-Autochthonous of Known Origin (NAK)
?	Location A	Non-Authochthonous of Unknown Origin (NAU)

7. In Spain, most reforestations were performed in the 1940s: **<u>historical information</u>** can be accepted as adequate source to assess the autochthonous character of base materials.



Hydrological-forest correction works.

1947

1956

2002

8. <u>RPs are useful to</u>:
   a. know where FRM comes from, thus facilitating commercialization.
   b. identify geographic limits within which seed collected from seed sources or stands can be mixed.
   c. facilitate recommendations for use, possible improvement, and conservation actions.

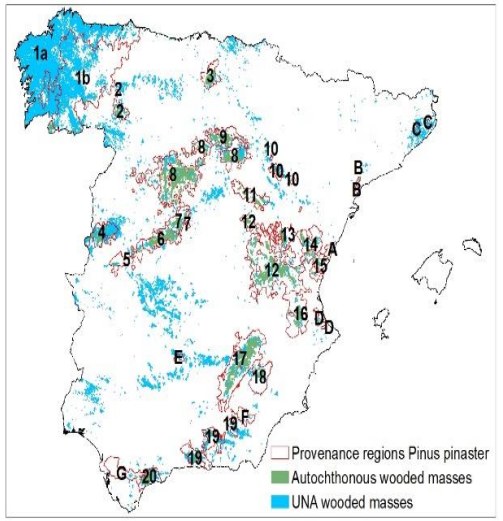
Objectives.

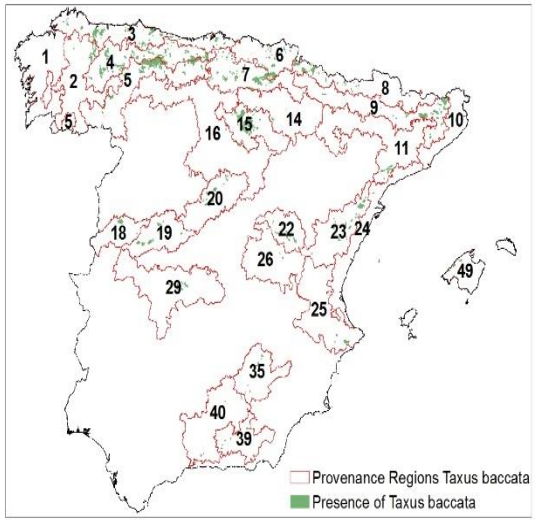
1. Include origin and RP of autochthonous wooded masses into a new update of the Forest Map of Spain (FMS FP2015).

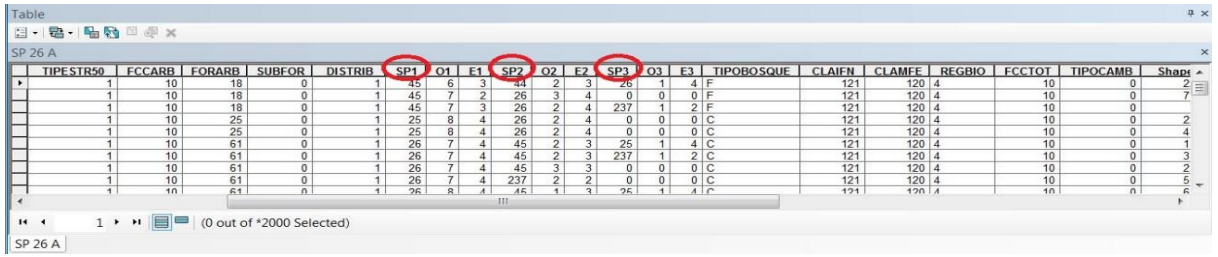
2. Update the information on the distribution and origin of the forest masses.

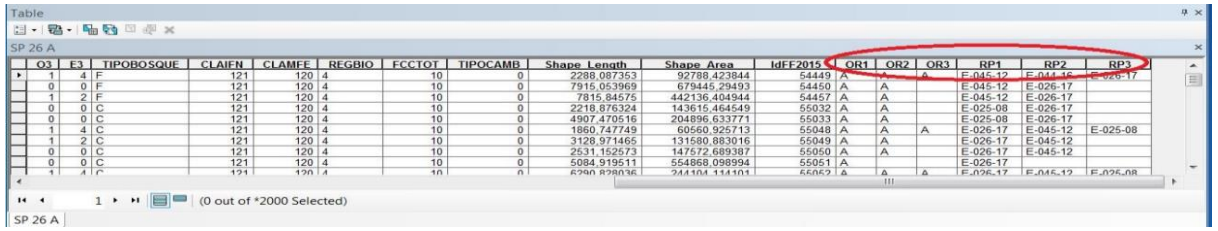
3. Identify and understand the divergences between original RP maps and FMS FP2015.

4. Check the status of RRP.









DATA SOURCES AND METHODS.

1. **Data sources** (many and diverse)**:**
   a. FMS 400, 200, 50, FF2015 (25 in part).
   b. NFI (NFI2 AND NFI3).
   c. Seed sources (Regional governments).
   d. Research/development projects, field work.

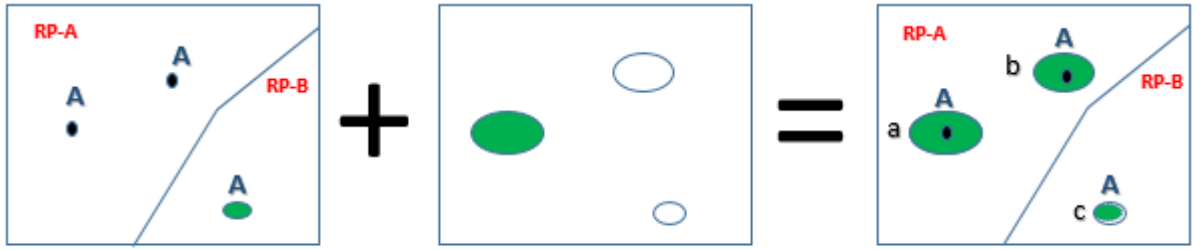
1. **Agglomerative species** (*Pinus pinaster* Ait.): the masses (or seed sources or stands) that have similar ecological, phenotypic or genetic characteristics are united in the same RP.

2. **Divisive species** (*Taxus baccata* L.): a territorial division is made into areas with similar ecological characteristics, which are supposed to give rise to seed sources or stands with similar phenotypic or genetic characteristics.

GIS overlay: agglomerative species.

RP SFM SFM_RP

GIS overlay: divisive species.

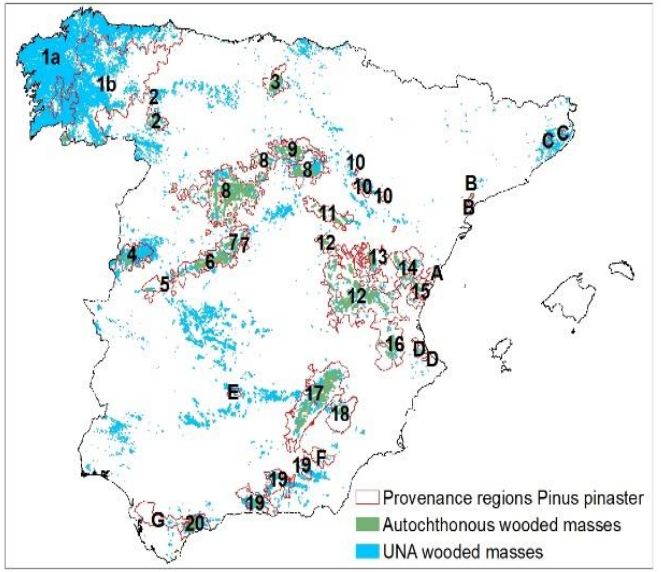


RP SFM SFM_RP

Results (*P. pinaster* Ait.).

Table 1. Autochthonous wooded masses for *Pinus pinaster* Ait. Units: hectares and percentages

RP	INIA RP	FF2015	FF2015 %	RPORIG %	RPAMP %	RPPRES	RPPRES %
E-026-01a	10417.6	3018.6	29.0	88.8	11.2	-	-
E-026-01b	7607.6	3808.1	50.1	79.3	20.7	-	-
E-026-02	12926.4	5604.0	43.4	100.0	-	-	-
E-026-03	19109.3	18415.9	96.4	100.0	-	-	-
E-026-04	14881.5	7708.9	51.8	91.8	8.2	-	-
E-026-05	4885.5	3356.8	68.7	94.5	5.5	-	-
E-026-06	38666.9	35051.6	90.7	97.5	2.5	-	-
E-026-07	19742.6	17216.3	87.2	95.6	4.4	-	-
E-026-08	156054.3	153363.0	98.3	100.0	-	-	-
E-026-09	38302.1	36571.4	95.5	100.0	-	-	-
E-026-10	3480.4	2985.0	85.8	95.6	4.4	-	-
E-026-11	28735.3	18455.8	64.2	100.0	-	-	-
E-026-12	129543.2	105777.7	81.7	98.0	2.0	-	-
E-026-13	11857.1	11208.3	94.5	90.9	9.1	-	-
E-026-14	19387.9	13399.5	69.1	88.6	11.4	-	-
E-026-15	24937.6	12154.5	48.7	91.3	8.7	-	-
E-026-16	36856.0	12944.3	35.1	81.8	18.2	-	-
E-026-17	101311.6	95311.0	94.1	88.1	11.9	-	-
E-026-18	14109.7	12595.6	89.3	90.4	9.6	-	-
E-026-19	13265.4	10852.7	81.8	63.1	36.9	-	-
E-026-20	21568.3	23589.4	109.4	70.7	29.3	-	-
E-026-A	2315.1	1606.7	69.4	51.4	48.6	-	-
E-026-B	145.7	183.8	126.1	35.1	64.9	-	-
E-026-C	169.8	3.1	1.8	-	-	103.2	60.8
E-026-D	1216.9	286.4	23.5	74.5	25.5	122.5	10.1
E-026-E	12.2	-	-	-	-	12.2	100.0
E-026-F	124.3	80.2	64.5	-	100.0	-	-
E-026-G	591.6	722.8	122.2	12.3	87.7	-	-
Total	732221.9	606271.1	82.8	93.9	6.1	237.9	0.03%



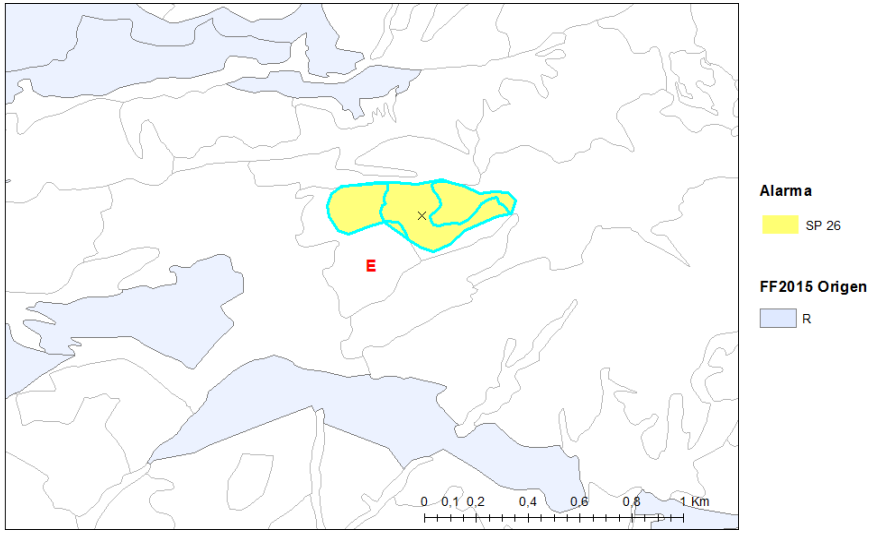
Caution needed with some RRPs.

Good match considering variety of cartographic RP sources.

Example RRP with caution (*Pinus pinaster* Ait.).

Region of Provenance E-026-E, serranía de Ronda (Andalucía).

PRESERVE!



The yellow polygons are related with a specific RP study (i.e. SOURCE RP).

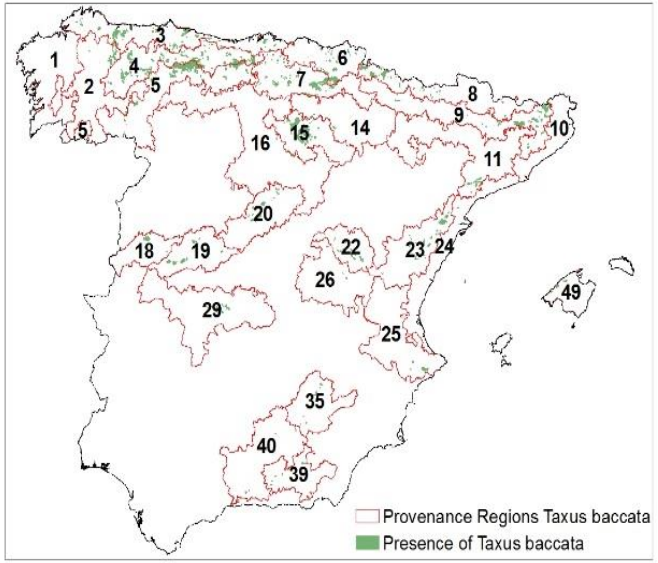
FMS FF2015 has little overlap. Does not mention *Pinus pinaster*.

Ancillary information is associated to the new FMS through the polygons' ids.

IdFF2015	SP	ORI	RP	DOM	FUENTE	DESARB	PLANT	FA
344718	26	A	E-026-E	D	RP	Si	No	6,45
347242	26	A	E-026-E	D	RP	No	No	31,63
348321	26	A	E-026-E	D	RP	Si	No	24,9

Results (*Taxus baccata* L.).

Presence of *Taxus baccata* L.	Units: hectares.	
RP	FF2015	RPPRES
E-014-01	-	80.5
E-014-02	160.2	5442.1
E-014-03	375.8	26542.4
E-014-04	413.9	45041.8
E-014-05	499.2	47120.3
E-014-06	65.8	14289.5
E-014-07	368.1	25352.5
E-014-08	172.0	16768.5
E-014-09	243.9	21019.6
E-014-10	-	885.6
E-014-11	-	4983.4
E-014-14	-	721.8
E-014-15	18.3	28868.9
E-014-16	-	1077.5
E-014-18	35.1	3970.1
E-014-19	-	6655.5
E-014-20	76.2	6406.4
E-014-22	17.3	5413.1
E-014-23	182.2	9281.8
E-014-24	-	304.8
E-014-25	-	3404.5
E-014-26	-	676.8
E-014-29	-	4222.4
E-014-35	-	1474.4
E-014-39	-	1204.9
E-014-40	-	1060.3
E-014-49	-	1836.6
Total	2628.0 (0,9%)	284105.9 (99,1%)

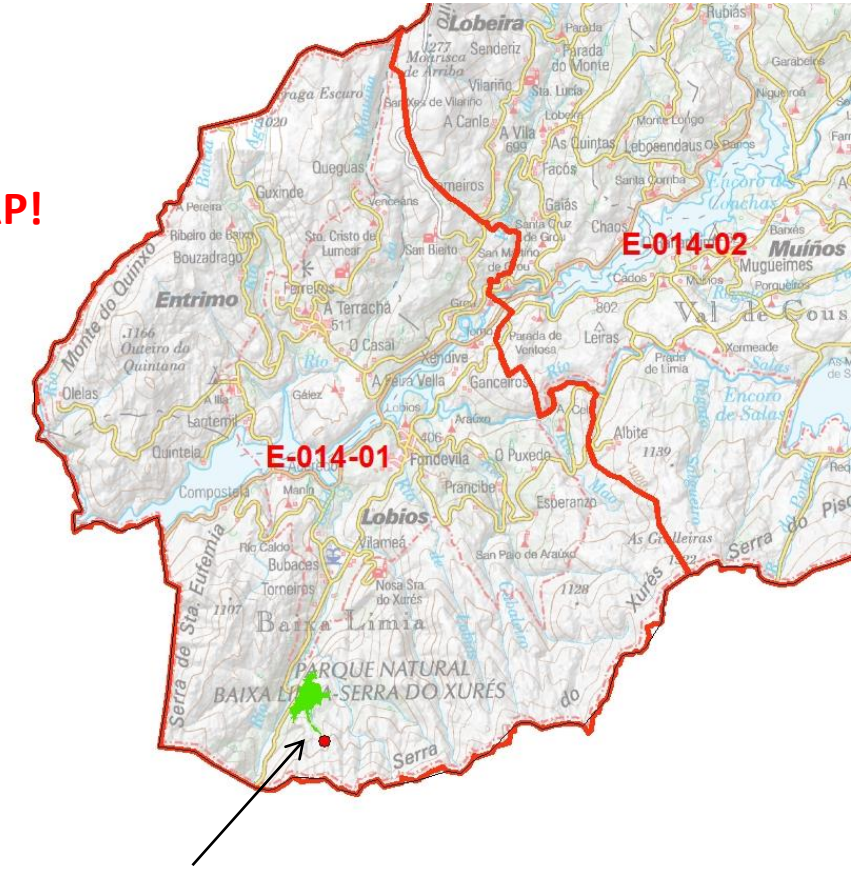


As expected, MFE FF2015P only identifies the species when there is 1st-3rd dominance.

There is need to associate presence based on RP cartographic sources.

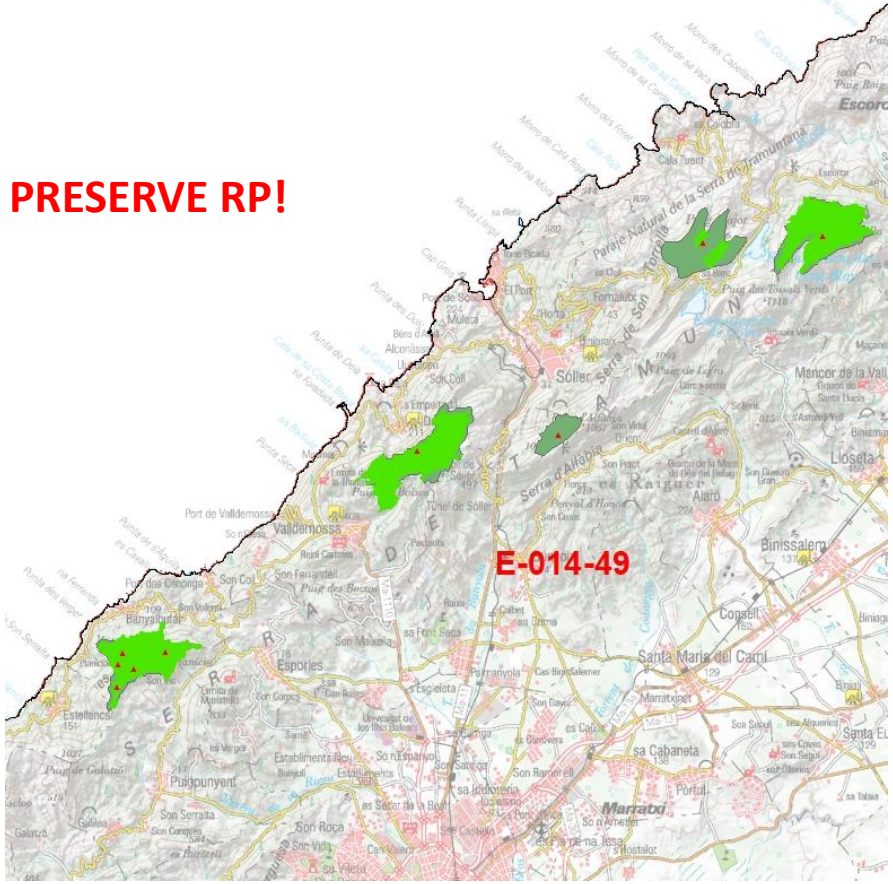
Extending the new FMS with ancillary RP info.

NEW RP!



E-014-01 (Ourense, Galicia)
RP Source: Life baccata Project.

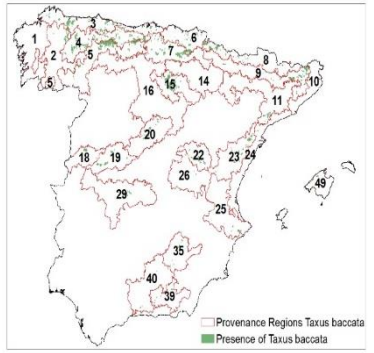
PRESERVE RP!



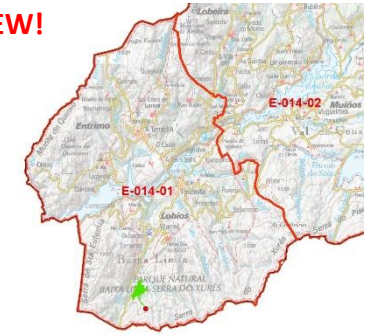
E-014-49 (Tramuntana mountains, Mallorca, Balearic islands)
RP Taxus baccata Source: MFS 200 from mid 80-90s.

Conclusions.

1. The updating of FMS (~10 years) also provide opportunity to:
   a) update species distribution maps.
   b) Update origin and provenance regions.

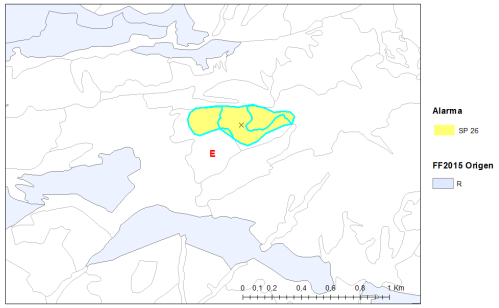


NEW!



2. For some (R)RPs there is need to keep ancillary RP information.

PRESERVE!



3. It is expected to make public the origin and RP info associated to the FMS map soon https://www.miteco.gob.es/es/biodiversidad/servicios/banco-datos-naturaleza

IdFF2015	SP	ORI	RP	DOM	FUENTE	DESARB	PLANT	FA
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THANK YOU FOR YOUR ATTENTION!

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