



New national and regional Annex I Habitat records: from #60 to #82

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Abstract

New Italian data on the distribution of the Annex I Habitats are reported in this contribution. Specifically, 8 new occurrences in Natura 2000 sites are presented and 49 new cells are added in the EEA 10 km × 10 km reference grid. The new data refer to the Italian administrative regions of Campania, Calabria, Marche, Piedmont, Sardinia, Sicily, Tuscany and Umbria. Relevés and figures are provided as Supplementary material respectively 1 and 2.

Keywords

1240, 1310, 1420, 2250*, 3130, 3220, 3260, 3270, 3280, 4090, 6110*, 6430, 7210*, 8210, 91AA*, 91B0, 91E0*, 92A0, 92D0, 9330

Introduction

This is the eighth contribution reporting records of new occurrences of Annex I Habitats in Europe. By comparing the results of the 4th Report ex-Art. 17 of Annex I Habitat Monitoring in Europe (Eionet 2019), these cell occurrences are newly recorded for Italy. The related phytosociological relevés of each contribution are reported and archived in the Italian database “VegItaly” (Gigante et al. 2012; Landucci et al. 2012).

Habitats records

Following the standard format of Gigante et al. (2019b), all species data, site data and descriptions of the new habitat records are hereafter provided. We report a synthetic overview in Tab. 1, offering an overview of the novelties. We used the open source QGIS Geographic information System (QGIS.org 2023) for mapping purposes. All the tables referring to the new relevés are provided as Supplementary Material 1. All the figures and the maps with the new cell distribution in Italy and closeup pictures of vegetation types are provided as Supplementary Material 2.

#60. Annex I Habitat: 1240 Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp. (Stinca A, Mei G, Ravo M, Esposito A)

EUNIS Classification system: B3.3 - Rocky habitats (cliffs, beaches and islets) with halophytic vegetation

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Crithmo-Limonietum remotispiculi* Bartolo, Brullo and Signorello 1989, *Crithmo maritimi-Staticion* Molinier 1934, *Crithmo maritimi-staticetalia* Molinier 1934, *Crithmo maritimi-Staticetalia* Br.-Bl. in Br.-Bl., Roussine and Nègre 1952 em. Biondi 2007 (Bartolo et al. 1989, Biondi and Blasi 2015).

Geographic information: Italy, Calabria, Cosenza, Scalea, between loc. Grotta della Pecora and loc. Lainello, 8 m a.s.l., Coordinates: 39.819750 N, 15.783111 E (Suppl. Material 1, Table S1, Rel. 1); 10 m a.s.l., Coordinates: 39.819472 N, 15.783250 E (Suppl. Material 1, Table S1, Rel. 2); 8 m a.s.l. Coordinates: 39.819068 N, 15.783341 E (Suppl. Material 1, Table S1, Rel. 3); 5 m a.s.l., Coordinates: 39.818958 N, 15.783439 E (Suppl. Material 1, Table S1, Rel. 4); 5 m a.s.l., Coordinates: 39.818705 N, 15.783888 E (Suppl. Material 1, Table S1, Rel. 5).

Cells ID in the EEA reference grid: 10kmE481N187 (Suppl. Material 2, Figure S1).

Natura 2000 Site Code: Currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S1, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: In the current state of knowledge, within the alliance *Crithmo maritimi-Staticion* Molinier 1934, 14 halophilous associations have been recognized for Italy especially for the presence of the different species of *Limonium* (Bartolo et al. 1989). Our relevés describe a chamaephytic plant community with *Limonium remotispicumum* (Lacaita) Pignatti discovered near the southern limit of species distribution (Suppl. Material 2, Figure S2). Indeed, it is a rare Italian endemic vascular plant known from Sorrento Peninsula (central Campania) to Cirella Island (northern Calabria) where it grows only on Tyrrhenian coastal cliffs. The studied vegetation is threatened by human activities such as trampling and waste dumping. Particularly, the absence of *Crithmum maritimum* L., a species generally abundant in the habitat 1240 along the rocky coasts of southern Italy, also seems to be related to negative human activities.

#61 Annex I Habitat: 1310 *Salicornia* and other annuals colonizing mud and sand (Mascia F)

EUNIS Classification system: A2.6513 - *Salicornia* spp. pioneer saltmarshes

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Cressetum creticae* Brullo & Furnari 1976, *Thero-Suaedion* Br.-Bl. in Br.-Bl., Roussine and Nègre 1952, *Thero-Suaedetalia* Br.-Bl. and O. Bolòs 1958, *Thero-Salicornietea* Pignatti 1953 em. R.Tx. 1974 (Biondi and Blasi 2015).

Geographic information: Italy, Sardinia, Sud Sardegna, Ex Stagno di Serrenti, 94 m a.s.l., Coordinates: 39.470955 N, 8.981005 E (Suppl. Material 1, Table S2, Rel. 1); Italy, Sardinia, Sud Sardegna, Serdiana, Su stani saliu, 100 m a.s.l., Coordinates: 39.354386 N, 9.119117 E (Suppl. Material 1, Table S2, Rel. 2).

Cell ID in the EEA reference grid: 10kmE423N182; 10kmE424N180 (Suppl. Material 2, Figure S3).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S2, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: Therophytic, halo-nitrophilous communities referred to *Cressetum creticae* Brullo and Furnari 1976 (*Thero-Suaedion*, *Thero-Suaedetalia*, *Thero-Salicornietea*). Such vegetation develops on halomorphic, silty-clayly substrates on the bottom of inland endorheic basins, flooded from late autumn to late spring, and completely dried up and cracked in summer. The formation has

Table 1. Synthetic overview of the newly reported data.

| Hab ID | Hab name | Cell ID | Country | BR | N2000 Site | Authors |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|------|-------------------------|------------------------------------------------------|
| 1240 | Vegetated sea cliffs of the Mediterranean coasts with endemic <i>Limonium</i> spp. | 10kmE481N187 | Italy | MED | - | Stinca A., Mei G., Ravo M., Esposito A. |
| 1310 | <i>Salicornia</i> and other annuals colonizing mud and sand | 10kmE423N182, 10kmE424N180 | Italy | MED | - | Mascia F. |
| 1420 | Mediterranean and thermo-Atlantic halophilous scrubs (<i>Sarcocornetea fruticosi</i>) | 10kmE423N182, 10kmE424N180 10kmE473N168 | Italy | MED | - | Mascia F. Tavilla G., Ranno V., Crisafulli A. |
| 2250* | Coastal dunes with <i>Juniperus</i> spp. | 10kmE486N178 | Italy | MED | - | Morabito A., Musarella C.M., Spampinato G. |
| 3130 | Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i> | 10kmE448N223 | Italy | MED | IT5210020 | Bonini F., Gigante D. |
| 3220 | Alpine rivers and the herbaceous vegetation along their banks | 10kmE412N249 | Italy | ALP | IT1201000 | Mainetti A., Ferrarato M., Lonati M. |
| 3260 | Water courses of plain to montane levels with the <i>Ranunculion fluitantis</i> and <i>Callitricho-Batrachion</i> vegetation | 10kmE440N217, 10kmE440N226, 10kmE442N226 | Italy | MED | - | Fiaschi T., Cannucci S., Fanfarillo E., Angiolini C. |
| 3270 | Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidention</i> p.p. vegetation | 10kmE444N223 | Italy | MED | - | Fiaschi T., Cannucci S., Fanfarillo E., Angiolini C. |
| 3280 | Constantly flowing Mediterranean rivers with <i>Paspalo-Agrostidion</i> species and hanging curtains of <i>Salix</i> and <i>Populus alba</i> | 10kmE444N223 | Italy | MED | - | Fiaschi T., Fanfarillo E., Angiolini C. |
| 4090 | Endemic oro-Mediterranean heaths with gorse | 10kmE469N166 | Italy | MED | ITA020018 | Bazan G., Guarino R., Ilardi V. |
| 7210* | Calcareous fens with <i>Cladium mariscus</i> and species of the <i>Caricion davallianae</i> | 10kmE416N194 | Italy | MED | - | Rivieccio G., Caria M.C., Bagella S., Farris E. |
| 6110* | Rupicolous calcareous or basophilic grasslands of the <i>Alyso-Sedion albi</i> | 10kmE444N223 | Italy | MED | - | Fanfarillo E., Fiaschi T., Angiolini C. |
| 6430 | Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels | 10kmE444N223 | Italy | MED | - | Fanfarillo E., Fiaschi T., Angiolini C. |
| 8210 | Calcareous rocky slopes with chas-mophytic vegetation | 10kmE459N164 | Italy | MED | - | de Simone L. |
| 91AA* | Eastern white oak woods | 10kmE486N177, 10kmE487N178, 10kmE483N175, 10kmE488N176, 10kmE484N173, 10kmE488N174, 10kmE487N173, 10kmE488N172, 10kmE486N169, 10kmE485N169, 10kmE485N179, 10kmE482N167 | Italy | MED | - | Morabito A., Musarella C.M., Spampinato G. |
| 91B0 | Thermophilous <i>Fraxinus angustifolia</i> wood | 10kmE455N225 | Italy | CONT | - | Tesei G., Camilletti M., Allegrezza M. |
| | | 110kmE478N167, 10kmE477N167, 10kmE478N168 | | | ITA030007, ITA030019 | Gianguzzi L., Sciandrello S., Bazan G. |
| 91E0* | Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>) | 10kmE486N178, 10kmE488N174, 10kmE488N178, 10kmE487N177, 10kmE487N175, 10kmE487N176, 10kmE482N170, 10kmE485N171 | Italy | MED | IT9340120, IT9350300 | Morabito A., Musarella C.M., Spampinato G. |
| | | 10kmE443N224 | | | - | Fanfarillo E., Fiaschi T., Cannucci S., Angiolini C. |
| 92A0 | <i>Salix alba</i> and <i>Populus alba</i> gallerie | 10kmE486N178 | Italy | MED | - | Morabito A., Musarella C.M., Spampinato G. |
| 92D0 | Southern riparian galleries and thickets (<i>Nerio-Tamaricetea</i> and <i>Securinegion tinctoriae</i>) | 10kmE477N190 | Italy | MED | IT8050013 | Patera G. |
| 9330 | <i>Quercus suber</i> forests | 10kmE485N178, 10kmE487N175, 10kmE489N175 | Italy | MED | - | Morabito A., Musarella C.M., Spampinato G. |

connections with perennial formations of *Salicornietea fruticosae*.

#62 Annex I Habitat: 1420 Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) (Mascia F)

EUNIS Classification system: A2.5 - Coastal saltmarshes and saline reedbeds

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Arthrocnemion glauci* Rivas-Mart. and Costa M. 1984, *Salicornietalia fruticosae* Br.-Bl. 1933, *Salicornietea fruticosae* Br.-Bl. and Tx. ex A. Bolòs y Vayreda and O. de Bolòs in A. Bolòs & Vayreda 1950 (Biondi and Blasi 2015).

Geographic information: Italy, Sardinia, Sud Sardegna, Ex Stagno di Serrenti, 94 m a.s.l., Coordinates: 39.470955 N, 8.981803 E (Suppl. Material 1, Table S3, Rel.1); Sardinia, Sud Sardegna, Serdiana, Su stani saliu, 104 m a.s.l., Coordinates: 39.35639 N, 9.119761 E (Suppl. Material 1, Table S3, Rel.2).

Cell ID in the EEA reference grid: 10kmE423N182, 10kmE424N180 (Suppl. Material 2, Figure S4).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S3, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: The communities detected are referred to *Arthrocnemion glauci* order (Suppl. Material 2, Figure S5). These are often relegated to very small surfaces, along the banks of inland astatic basins with brackish to salt waters, or field ditches of partially reclaimed endorheic ponds. Rarely extending over 5000 m², these communities are strongly threatened by long-term land reclamation processes for agricultural purposes, that are leading to the definitive disappearance of the original habitat.

#63. Annex I Habitat: 1420: Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) (Tavilla G, Ranno V, Crisafulli A)

EUNIS Classification system: A2.5 - Coastal saltmarshes and saline reedbeds (Chytrý et al. 2020)

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Salicornion fruticosae* Br.-Bl. 1933, *Salicornietalia fruticosae* Br.-Bl. 1933, *Salicornietea fruticosae* Br.-Bl. & Tx. ex A. Bolos y Vayreda and O. de Bolos in A. Bolos y Vayreda 1950 (Mucina et al. 2016).

Geographic information: Italy, Sicily, Messina, Capo d'Orlando, 3 m a.s.l., Coordinates: 38.165122 N, 14.749621 E (Suppl. Material 1, Table S4, Rels. 1 to 4).

Cells ID in the EEA reference grid: 10kmE473N168 (Suppl. Material 2, Figure S4).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S4, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: The habitat has been identified near to Capo d'Orlando (Messina) on Sicily's Tyrrhenian coast. This coastal wetland hosts a halophilous plant community, even though impoverished, characterized by perennial species belonging to the class *Salicornietea fruticosea*. Currently, salt marshes are mostly reported along Sicily's southern and western coasts, with no data for the northern coast (Sciandrello 2020). Therefore, this report represents the first one in the north Sicilian coast.

#64. Annex I Habitat: 2250* Coastal dunes with *Juniperus* spp. (Morabito A, Musarella CM, Spampinato G)

EUNIS Classification system: N1B21 (formerly, B1.631) - Dune prickly juniper thickets (Chytrý et al. 2020).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Pistacio lentisci-Juniperetum macrocarpae* Caneva, De Marco and Mossa 1981, *Juniperion turbinatae* Rivas-Martínez 1975 corr. 1987, *Pistacio lentisci-Rhamnetalia alaterni* Riv.-Mart. 1974, *Quercetea ilicis* Br.-Bl. 1947 in Br.-Bl., Roussine and Nègre 1952 (REFERENCE).

Geographic information: Italy, Calabria, Catanzaro, Lamezia Terme, Contrada Maricello, 5 m a.s.l. Coordinates: 38.917158 N, 16.220564 E (Suppl. Material 1, Table S5, Rel. 1).

Cells ID in the EEA reference grid: 10kmE486N178 (Suppl. Material 2, Figure S6).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S5, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: The association *Pistacio lentisci-Juniperetum macrocarpae* Caneva, De Marco and Mossa 1981, is a type of dense and intricate psammophilous scrub that constitutes the first woody vegetation colonizing sandy dune. This vegetation has been described for Sardinia region (Caneva et al. 1981) and brought back to Tuscany (Arrigoni et al. 1985; De Dominicis et al. 1988), currently limited in a few coastal stretches not exploited for tourist or residential purposes (Costa and Ercole 2015). The scrub with *Juniperus macrocarpa* Sm. is fundamental for the con-

servation of coastal dunes, as it contributes significantly to the consolidation of coastal sand dunes. In the survey carried out there are invasive alien species including *Acacia saligna* (Labill.) H.L.Wendl, which compromises the structure and conservation of the habitat (Spampinato et al. 2022). These new records report for the first time the *Pistacio lentisci-Juniperetum macrocarpae* association for the Calabria Region, expanding the distribution area of the 2250* habitat in the region.

#65. Annex I Habitat: 3130 Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* (Bonini F, Gigante D)

EUNIS Classification system: C3.4 - Species-poor beds of low-growing water-fringing or amphibious vegetation

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Callitricho brutiae-Juncetum bulbosi* Gigante, Maneli and Venanzoni 2013, *Littorellion uniflorae* Koch ex Klika 1935 (syn.: *Eleocharition acicularis* Pietsch 1965), *Littorelletea uniflorae* Koch ex Tx. 1937, *Littorelletea uniflorae* Br.-Bl. and Tx. ex Westhoff et al. 1946 (Gigante et al. 2013; Mucina et al. 2016).

Geographic information: Precise coordinates are not reported in Gigante et al. (2013), however those relevés refer to the same areas where the new relevés, here reported, have been carried out, i.e. to the close surroundings of the hereafter specified coordinates. Italy, Umbria, Perugia, Castiglione del Lago, Monelli, 275 m a.s.l., Coordinates: 43.165204 N, 11.994307 E [Suppl. Material 1, Table S6, Rel. 1; Tab. 9, Rels 32, 33, 37, 39, 41-43, 46, 49 in Gigante et al. (2013)]; Italy, Umbria, Perugia, Castiglione del Lago, Monelli, 274 m a.s.l., Coordinates: 43.165470 N, 11.994228 E (Suppl. Material 1, Table S6, Rel. 2); Italy, Umbria, Perugia, Castiglione del Lago, SE of Ferretto. 273 m a.s.l., Coordinates: 43.173427 N, 12.000636 E [Suppl. Material 1, Table S6, Rel. 3; Tab. 9, Rels 34-36 in Gigante et al. (2013)]; Italy, Umbria, Perugia, Castiglione del Lago, Podere Marella, 295 m a.s.l., Coordinates: 43.167699 N, 11.971008 E [Suppl. Material 1, Table S6, Rel. 4; Tab. 9, Rels 40, 50-51 in Gigante et al. (2013)]; Italy, Umbria, Perugia, Castiglione del Lago, Le Sette Strade, 271 m a.s.l., Coordinates: 43.160542 N, 12.006662 E [Tab. 9, Rels 38, 44-45, 47-48, 52 in Gigante et al. (2013)].

Cells ID in the EEA reference grid: 10kmE448N223 (Suppl. Material 2, Figure S7).

Natura 2000 Site Code: SAC IT5210020 “Boschi di Ferretto - Bagnolo”.

Phytosociological table: Tab. 9 in Gigante et al. (2013); Suppl. Material 1, Table S6, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: The habitat is represented by *Juncus bulbosus*-dominated vegetation occurring in 20-40 cm depth temporary ponds with steep borders (Suppl. Material 2, Figure S8). Ponds are found inside glades of *Quercus cerris* and *Q. pubescens* forests (H91M0), in mosaic with waterlogged soils characterized by *Isoëtes hystrix* (H3170*) and dry heatlands dominated by *Calluna vulgaris* (H4030) (Pedrotti 1982; Gigante et al. 2007).

Following the syntaxonomic arrangement in Gigante et al. (2013), this perennial amphibious vegetation has been referred to the habitat subtype 22.12 x 22.3 belonging to the *Littorelletea uniflorae* order.

The recent surveys (Suppl. Material 1, Table S6) have been carried out during the activities of the Integrated project LIFE19 IPE/IT/000015 “LIFE IMAGINE Umbria - Integrated Management and Grant Investments for the N2000 Network in Umbria” (<https://www.lifeimagine.eu/>): one of the project actions aimed at conserving this habitat type will involve the manual removal of leaf litter deriving from long-lived oak leaves that accumulates in the ponds and leads to their progressive burial.

#66. Annex I Habitat: 3220 Alpine rivers and the herbaceous vegetation along their banks (Mainetti A, Ferrarato M, Lonati M)

EUNIS Classification system: U71 - unvegetated or sparsely vegetated shore with mobile sediments in montane and alpine regions (Chytrý et al. 2020)

Biogeographical Region: Alpine

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Epilobion fleischeri* G. Br.-Bl. ex Br.-Bl. 1950, *Epilobietalia fleischeri* Moor 1958, *Thlaspietea rotundifolii* Br.-Bl. 1948 (Mucina et al. 2016).

Geographic information: Italy, Piedmont, Valprato Soana, Loc. Azaria, 1550 m a.s.l., Coordinates: 45.55668 N, 7.512335 E (Suppl. Material 1, Table S7, Rels. 1 to 5); Italy, Piedmont, Ronco Canavese, Loc. Lasinetto, 1110 m a.s.l., Coordinates: 45.502689 N, 7.503595 E (Suppl. Material 1, Table S7, Rel. 6).

Cells ID in the EEA reference grid: 10kmE412N249 (Suppl. Material 2, Figure S9).

Natura 2000 Site Code: SAC/SPA IT1201000 'Parco Nazionale Gran Paradiso'

Phytosociological table: Suppl. Material 1, Table S7, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: Gravel banks of the *Epilobion fleischeri* are quite frequent in the Alpine **Biogeographical Region** and in the Western Alps, although the naturalness of Alpine rivers has been generally compromised over the years. In the SAC/SPA IT1201000 'Parco Nazionale Gran Paradiso' the habitat code 3220 was reported for all cells except for the one reported here. The Orco and Forzo mountain streams actually have limited areas colonised by the habitat, how-

ever these have a significant value because they are set on streams that are not currently artificially regulated by dams or weirs.

#67. Annex I Habitat: 3260 Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitriche-Batrachion* vegetation (Fiaschi T, Cannucci S, Fanfarillo E, Angiolini C)

EUNIS Classification system: C2.3 Permanent non-tidal, smooth-flowing watercourses

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Batrachion fluitantis* Neuhäusl 1959, *Potamogetalia pectinati* Koch 1926, *Potamogetonetea* Klika in Klika et Novák 1941 (Mucina et al. 2016).

Geographic information: Italy, Tuscany, Grosseto, Grosseto, 2 m a.s.l., Coordinates: 42.7009232 N, 11.0349177 E (Suppl. Material 1, Table S8, Rel. 1); Italy, Tuscany, Firenze, Barberino Tavarnelle, 77 m a.s.l., Coordinates: 43.514722 N, 11.081389 E (Suppl. Material 1, Table S8, Rel. 2); Italy, Tuscany, Siena, Radda in Chianti, 367 m a.s.l., Coordinates: 43.458847 N, 11.34022 E (Suppl. Material 1, Table S8, Rel. 3).

Cell ID in the EEA reference grid: 10kmE440N217 (Tab. 9, Rel. 1); 10kmE440N226 (Suppl. Material 1, Table S8, Rel. 2); 10kmE442N226 (Suppl. Material 1, Table S8, Rel. 3) (Suppl. Material 2, Figure S10).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Supplementary Tabs 11, 13, and 14 in Fanfarillo et al. (2023); Suppl. Material 1, Table S8, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: The attribution of vegetation dominated by *Potamogeton* sp. pl. to the habitat 3260, instead of the habitat 3150 “Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation”, is based on the occurrence of such communities in rivers (Rivieccio et al. 2020, 2021; Tavilla et al. 2022).

#68. Annex I Habitat: 3270 Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidention* p.p. vegetation (Fiaschi T, Cannucci S, Fanfarillo E, Angiolini C).

EUNIS Classification system: C3.5 - Periodically inundated shores with pioneer and ephemeral vegetation

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Polygono lapathifolii-Xanthietum italici* Pirola et Rossetti 1974, *Chenopodion rubri* (Tx. in Poli et J. Tx., 1960) Hilbig et Jage 1972, *Bidentetalia* Br.-Bl. et Tx. ex Klika et Hadač 1944, *Bidentetea* Tx. et al., ex von Rochow 1951 (Mucina et al. 2016; Fanfarillo et al. 2023).

Geographic information: Italy, Tuscany, Siena, Asciano, 200 m a.s.l. [Supplementary Tab. 15, Rels. 43-45 in Fanfarillo et al. (2023)].

Cell ID in the EEA reference grid: 10kmE444N223 (Suppl. Material 2, Figure S11).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Supplementary Tab. 15 in Fanfarillo et al. (2023).

Notes: In the detection area, this habitat is abundantly present on gravel beds from mid-summer to early autumn (Fanfarillo et al. 2023).

#69. Annex I Habitat: 3280 Constantly flowing Mediterranean rivers with *Paspalo-Agrostidion* species and hanging curtains of *Salix* and *Populus alba* (Fiaschi T, Fanfarillo E, Angiolini C)

EUNIS Classification system: E5.4 - Moist or wet tall-herb and fern fringes and meadows

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Paspalo paspaloidis-Polypogonum viridis* Br.-Bl. 1952, *Paspalo-Agrostion semiverticillati* Br.-Bl. in Br.-Bl. et al. 1952, *Paspalo-Heleochoetalia* Br.-Bl. ex Rivas Goday 1956, *Bidentetea* Tx. et al., ex von Rochow 1951 (Mucina et al. 2016; Fanfarillo et al. 2023).

Geographic information: Italy, Tuscany, Siena, Asciano, 200 m a.s.l. [Supplementary Tab. 6, Rel. 15 in Fanfarillo et al. (2023)].

Cell ID in the EEA reference grid: 10kmE444N223 (Suppl. Material 2, Figure S12).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Supplementary Tab. 6 in Fanfarillo et al. (2023).

Notes: In the detection sites, this habitat is mainly represented by short grasslands dominated by *Paspalum distichum*, one of the few alien species colonizing wetlands in the area, which are in general well-preserved (Fanfarillo et al. 2023; Fiaschi et al. 2023).

#70. Annex I Habitat: 4090 Endemic oro-Mediterranean heaths with gorse (Bazan G., Guarino R., Ilardi V.)

EUNIS Classification system: Pal. 31.77 Madonie and Apennine hedgehog-heaths (Hedgehog-heaths formed by *Astragalus* spp. or *Genista* spp., of the mountains of the southern Italian peninsula and Sicily, except Etna).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Cytiso villosi-Genistion tyrrhenae* Biondi 2000 nom. mut. propos. (= *Calicotomo villosae-Genistion tyrrhenae* Biondi 1997, Coll. Phytosoc. XXVII: 127), *Lavanduletales stoechadis* Br.-Bl. in Br.-Bl., Molinier and Wagner 1940 em. Rivas-Mart. 1968, *Cisto-Lavanduletea stoechadis* Br.-Bl. in Br.-Bl., Molinier and Wagner 1940 (Mucina et al. 2016)

Geographic information: Italy, Sicily, Palermo, San Mauro Castelverde (Contrada Serra di Prato; Contrada Cerrito), 1151-1164 m a.s.l., Coordinates: 37.927921 N, 14.196102 E (Suppl. Material 1, Table S9, Rel. 1).

Cell ID in the EEA reference grid: 10kmE469N166. (Suppl. Material 2, Figure S13)

Natura 2000 Site Code: ITA020018 "Foce del Fiume Polina e Monte Tardara".

Phytosociological table: Suppl. Material 1, Table S9, taxonomic nomenclature according to Pignatti et al. (2017-2019).

Notes: *Genista* sect. Voglera (P. Gaertn., B. Mey. and Schreb.) Spach is represented in Sicily by three endemic species: *G. aristata* C. Presl, *G. cupanii* Guss. and *G. madoniensis* Raimondo (Marino et al. 2012). While the first of these has a range extended to all the northern mountain range of Sicily (Madonie, Nebrodi and Peloritani), the other two were hitherto known exclusively from the Madonie Massif. The finding of *G. cupanii* on the heights of San Mauro Castelverde makes it possible to extend the range of this species to the flyschoid substrata of the extreme western outposts of Nebrodi Mountains.

The mountain garrigue here described colonizes summit ridges and eroded slopes, in part resulting from deforestation carried out until a few decades ago. The garrigue is dominated by *Genista cupanii* and a few other elements of the class *Cisto-Lavanduletea*, along with many herbaceous species typical of mountain rangelands of N-Sicily (*Cirsietalia vallis-demonis* Brullo and Grillo 1978; *Poetalia bulbosae* Rivas Goday and Rivas-Mart. in Rivas Goday and Ladero 1970).

From the bioclimatic point of view, the surveyed vegetation falls in a transitional belt between the upper Mesomediterranean unit - in the surveyed area characterized by woods classified into the *Festuco heterophyllae-Quercetum congestae* Brullo and Marcenò 1985 - and the Supramediterranean unit, characterized by the *Arrhenathero nebrodensi-Quercetum cerridis* Brullo, Minissale and Spampinato 1996 (Bazan et al. 2015). Our study area

represents the western limit of the distribution range of *Quercus cerris* in Sicily.

The presence of *Helleborus bocconeii* subsp. *intermedius*, endemic to north-western Sicily and only sporadically recorded from the Nebrodi Mts. (Giardina et al. 2007) suggests a certain autonomy of the studied garrigue with respect to the *Genista cupanii* associations described for the Madonie Mts., although a more in-depth study would be necessary to better circumscribe its syntaxonomic framework.

#71. Annex I Habitat: 6110* Rupicolous calcareous or basophilic grasslands of the Alysso-Sedion albi (Fanfarillo E, Fiaschi T, Angiolini C).

EUNIS Classification system: E1.1 - Inland sand and rock with open vegetation

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Alyso alyssoidis-Sedion* Oberd. et T. Müller in T. Müller 1961, *Alyso-Sedetalia* Moravec 1967, *Sedo-Scleranthetea* Br.-Bl. 1955 (Mucina et al. 2016; Fanfarillo et al. 2023).

Geographic information: Italy, Tuscany, Siena, Asciano, 200 m a.s.l. [Supplementary Tab. 33, Rels. 88-90 in Fanfarillo et al. (2023)].

Cell ID in the EEA reference grid: 10kmE444N223 (Suppl. Material 2, Figure S14).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Supplementary Tab. 33 in Fanfarillo et al. (2023).

Notes: The presence of alien and ruderal species in the detected habitat shows signs of degradation due to human pressures such as intensive agriculture (Stinca et al. 2021; Fanfarillo et al. 2023).

#72. Annex I Habitat: 6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (Fanfarillo E, Fiaschi T, Angiolini C).

EUNIS Classification system: E5.4 - Moist or wet tall-herb and fern fringes and meadows

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Convolvulo-Epilobietum hirsuti* Hilbig, Heinrich et Niemann 1972, *Calystegio-Equisetum telmateiae* Jovanović 1993, *Senecionion fluviatilis* Tx. ex Moor 1958, *Convolvuletales sepium* Tx. ex Moor

1958, *Epilobietea angustifolii* Tx. et Preising ex von Rochow 1951 (Mucina et al. 2016; Fanfarillo et al. 2023).

Geographic information: Italy, Tuscany, Siena, Asciano, 200 m a.s.l. [Supplementary Tab. 16, Rel. 46 in Fanfarillo et al. (2023)].

Cell ID in the EEA reference grid: 10kmE444N223 (Suppl. Material 2, Figure S15).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Supplementary Tab. 16 in Fanfarillo et al. (2023).

Notes: The presence of the habitat was recorded only in one site of limited extension (Fanfarillo et al. 2023).

#73. Annex I Habitat: 7210* Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (Rivieccio G, Caria MC, Bagella S, Farris E)

EUNIS Classification system: D5.24 Fen *Cladium mariscus* beds (wider).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Magnocaricion elatae* Koch 1926, *Magnocaricetalia elatae* Pignatti 1953, *Phragmito australis-Magnocaricetea elatae* Klika in Klika and Novák 1941 (Biondi and Blasi, 2015; Venanzoni et al. 2018).

Geographic information: Italy, Sardinia, Sassari, Alghero, Sant'Imbenia, 2 m a.s.l., Coordinates: 40.619097 N, 8.197149 E (Suppl. Material 1, Table S10, Rel. 1); Coordinates: 40.619113 N, 8.197532 E (Suppl. Material 1, Table S10, Rel. 2); Coordinates: 40.619130N, 8.197467 E (Suppl. Material 1, Table S10, Rel. 3).

Cells ID in the EEA reference grid: 10kmE416N194 (Suppl. Material 2, Figure S16).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S10, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: This is the third record of the habitat 7210* in Sardinia region (Gigante et al. 2019a; Gianguzzi et al. 2020). The site is located close to Natura 2000 Site ZSC ITB010042 "Capo Caccia (con le isole Foradada e Piana) e Punta del Giglio". The vegetation structure is characterized by the presence of *Cladium mariscus* and *Phragmites australis*. This site represents the last or one of the last sites for several plant species in NW Sardinia coastal areas (*Euphorbia hirsuta*, *Juncus subnodulosus*, *Ranunculus macrophyllus*, among others), and it is important also for animals like *Circus aeruginosus* and *Emys orbicularis* (this one probably extinct less than 10 years ago). This fen receives fresh water during all year from an underground karstic system.

#74. Annex I Habitat: 8210 Calcareous rocky slopes with chasmophytic vegetation (de Simone L)

EUNIS Classification system: H3.2 - Basic and ultra-basic inland cliffs

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Dianthion rupicolae* Brullo & Marcenò 1979, *Asplenietalia glandulosi* Br.-Bl. & Meier in Meier & Br.-Bl. 1934, *Asplenietea trichomanis* (Br.-Bl. in Meier & Br.-Bl. 1934) Oberdorfer 1977 (Biondi and Blasi 2015; Brullo and Marcenò 1979).

Geographic information: Italy, Sicily, Palermo, Monte Maranfusa, 300 m a.s.l., Coordinates: 37.855908 N, 13.133745 E (Suppl. Material 1, Table S11, Rel.1); 37.855148 N, 13.131571 E (Suppl. Material 1, Table S11, Rel. 2); 37.85593N 13.13403 E (Suppl. Material 1, Table S11, Rel.3).

Cells ID in the EEA reference grid: 10kmE459N164 (Suppl. Material 2, Figure S17).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S11, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: The relevées have been carried out in the northern slopes of the mountain, where the habitat 8210 is currently present.

#75. Annex I Habitat: 91AA* Eastern white oak woods (Morabito A, Musarella CM, Spampinato G)

EUNIS Classification system: T1932 (formerly, G1.732) - Italo-Sicilian *Quercus pubescens* woods (Chytrý et al. 2020).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Erico arboreae-Quercion ilicis* Brullo, Di Martino and Marcenò 1977; *Quercetalia ilicis* Br.-Bl. ex Molinier 1934; *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine and Nègre 1952 (Biondi and Blasi 2015).

Geographic information: Italy, Calabria, Catanzaro, Gizzeria, Contrada Jacona, 75 m a.s.l., Coordinates: 38.841122 N, 16.290958 E (Suppl. Material 1, Table S12, Rel. 1); Italy, Calabria, Catanzaro, Serrastretta Timpone Chianta, 393 m a.s.l., Coordinates: 38.956261 N, 16.413381 E (Suppl. Material 1, Table S12, Rel. 2); Italy, Calabria, Vibo Valentia, Parghelia, S. Antonio, 89 m a.s.l., Coordinates: 38.678453 N, 15.917989 E (Suppl. Material 1, Table S12, Rel. 3); Italy, Calabria, Catanzaro, Cenadi, Contrada Griffi, 485 m a.s.l. Coordinates: 38.716733 N, 16.415092 E

(Suppl. Material 1, Table S12, Rel. 4); Italy, Calabria, Vibo Valentia, Nicotera, S. Francesco, 116 m a.s.l., Coordinates: 38.552583 N, 15.931750 E (Suppl. Material 1, Table S12, Rel. 5); Italy, Calabria, Catanzaro, Santa Caterina dello Ionio, Monte Cervaro, 1176 m a.s.l., Coordinates: 38.561517 N, 16.440864 E (Suppl. Material 1, Table S12, Rel. 6); Italy, Calabria, Catanzaro, Isca sullo Ionio, Le Baracche, 1007 m a.s.l., Coordinates: 38.576092 N, 16.446147 E (Suppl. Material 1, Table S12, Rel. 7); Italy, Calabria, Catanzaro, Isca sullo Ionio, Le Baracche, 1021 m a.s.l., Coordinates: 38.577169 N, 16.445275 E (Suppl. Material 1, Table S12, Rel. 8); Italy, Calabria, Vibo Valentia, Nardodipace, Albani, 672 m a.s.l., Coordinates: 38.451739 N, 16.348911 E (Suppl. Material 1, Table S12, Rel. 9); Italy, Calabria, Vibo Valentia, Nardodipace, Albani, 662 m a.s.l., Coordinates: 38.451222 N, 16.349028 E (Suppl. Material 1, Table S12, Rel. 10); Italy, Calabria, Reggio Calabria, Caulonia, Rovera, 65 m a.s.l., Coordinates: 38.389144 N, 16.397900 E (Suppl. Material 1, Table S12, Rel. 11); Italy, Calabria, Reggio Calabria, Benestare, Fiumara Careri, 45 m a.s.l., Coordinates: 38.156086 N, 16.128778 E (Suppl. Material 1, Table S12, Rel. 12); Italy, Calabria, Reggio Calabria, San Luca, Brancato, 205 m a.s.l., Coordinates: 38.135914 N, 16.050669 E (Suppl. Material 1, Table S12, Rel. 13); Italy, Calabria, Reggio Calabria, Motta San Giovanni, Castello di S. Aniceto (rud.i), 591 m a.s.l. Coordinates: 38.025456 N, 15.705636 E (Suppl. Material 1, Table S12, Rel. 14).

Cells ID in the EEA reference grid: 10kmE486N177 (Tab. 13, Rel. 1), 10kmE487N178 (Suppl. Material 1, Table S12, Rel. 2), 10kmE483N175 (Suppl. Material 1, Table S12, Rel. 3), 10kmE488N176 (Suppl. Material 1, Table S12, Rel. 4), 10kmE484N173 (Suppl. Material 1, Table S12, Rel. 5), 10kmE488N174 (Suppl. Material 1, Table S12, Rels. 5, 7, 8), 10kmE487N173 (Suppl. Material 1, Table S12, Rels 9, 10), 10kmE488N172 (Suppl. Material 1, Table S12, Rel. 11), 10kmE486N169 (Suppl. Material 1, Table S12, Rel. 12), 10kmE485N169 (Suppl. Material 1, Table S12, Rel. 13), 10kmE485N179 (Suppl. Material 1, Table S12, Rel. 14), 10kmE482N167 (Suppl. Material 1, Table S12, Rel. 15) (Suppl. Material 2, Figure S18).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S12, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: In the Calabria Region, the group of *Quercus pubescens* L. has remarkable forestry importance and has been interpreted differently by various authors who have dealt with the taxonomy of this species (Musarella et al. 2018; Di Pietro et al. 2020, 2021). Brullo et al. (2001) attributed the acidophilous thermo-xerophilous oaks woods of Calabria to the *Erico arboreae-Quercetum virgiliana* (Brullo and Marcenò 1985), an association located in the thermo and meso Mediterranean belt. Several authors claim that the forest coenoses with *Quercus pubescens* s.l. of southern Italy and islands, due to the relevance of the evergreen sclerophyllous species in the floristic assemblage, fall in the class *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine et

Nègre 1952 (Brullo et al. 2001; Bacchetta et al. 2004; Brullo et al. 2008).

#76. Annex I Habitat: 91B0 Thermophilous *Fraxinus angustifolia* woods (Tesei G, Camilletti M, Allegrezza M)

EUNIS Classification system: T19B6 - Thermophilous *Fraxinus* forests (EUNIS terrestrial habitat classification 2021); G1.7C6 - Thermophilous *Fraxinus* woods (EUNIS Habitat Classification 2012)

Biogeographical Region: Continental

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Salici apenninae-Fraxinetum oxycarpae* Allegrezza, Mentoni et Tesei 2010 subass. *quercetosum dalechampii* Allegrezza, Mentoni and Tesei 2010, *Lauro nobilis-Fraxinion angustifoliae* I. Kárpáti et V. Kárpáti 1961, *Populion albae* Br.-Bl. Ex. Tchou 1948, *Populetales albae* Br.-Bl. Ex Tchou 1948, *Alno glutinosae-Populetea albae* P. Fukarek et Fabijanić 1968 (Mucina et al. 2016).

Geographic information: Italy, Marche, Ancona, Fabriano, 415 m a.s.l., Coordinates: 43.357843 N, 12.831927 E [Tab. 4, Rel. 6 in Allegrezza et al. (2010)]; 43.357615 N, 12.831786 E [Tab. 4, Rel. 7 in Allegrezza et al. (2010)].

Cells ID in the EEA reference grid: 10kmE455N225 (Suppl. Material 2, Figure S19).

Natura 2000 Site Code: currently not included in any Natura 2000 Site

Phytosociological table: Tab. 4, Rels 6 and 7 in Allegrezza et al. (2010).

Notes: the reported habitat, although not included within any N2000 site, falls within floristic area no. 43 "Prato umido presso Fabriano" where the presence of *Fraxinus oxycarpa* had already been reported. The floristic areas were established by the Marche Region (R.L. 52/74) with the aim of protecting natural environments where rare or endangered plants grow and are worthy of protection.

The *Salix apenninae-Fraxinetum oxycarpae* plant community refers to a mixed lowland woodland vegetation dominated by *Fraxinus oxycarpa* (= *Fraxinus angustifolia* subsp. *oxycarpa*) which is typically present on the accumulations of the silty-clayey blanket, characterised by relatively high humidity conditions and flat or slightly depressed morphology. The following species are considered characteristic and differential of the association: *Salix apennina*, *Populus canescens*, *Rubus caesius*, *Acer campestre*, *Prunus avium* and *Fraxinus ornus*. The subassociation *quercetosum dalechampii* differs from the typical one and refers to *Fraxinus oxycarpa* forests present along the poorly incised ditches with a typically seasonal regime (dry for most of the year) that run through cultivated fields. In this community, *Fraxinus oxycarpa* is present in the dominate layer while the dominated layer is characterised by the constant presence of *Ulmus minor*. *Quercus dalechampii*,

Ligustrum vulgare and *Brachypodium sylvaticum* are indicated as differential species of the subassociation *quercetosum dalechampii* (Allegrezza et al. 2010).

#77. Annex I Habitat: 91EO* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) (Gianguzzi L, Sciandrello S, Bazan G)

EUNIS Classification system: G1.131 - Southern *Alnus glutinosa* galleries

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Platano orientalis-Alnetum glutinosae* (Brullo et Spampinato 1990) Sciandrello et al. 2023; *Osmundo regalis-Alnion glutinosae* (Br.-Bl. et al. 1956) Dierschke and Rivas-Martínez 1975; *Populetales albae* Br.-Bl. ex Tchou 1948, *Alno glutinosae-Populetea albae* P. Fukarek et Fabijanić 1968.

Geographic information: Italy, Sicily, Fondachelli Fantina (ME), Fiumara Madriddi, 450 m a.s.l., Coordinates: 38.006454 N, 15.194476 E (Suppl. Material 1, Table S13, Rel. 1); Italy, Sicily, Fondachelli Fantina (ME), Fiumara Madriddi, 490 m a.s.l., Coordinates: 37.996369 N, 15.189085 E (Suppl. Material 1, Table S13, Rel. 2); Italy, Sicily, Santa Lucia del Mela (ME), Fiumara D'Agrò, 270 m a.s.l., Coordinates: 38.098094 N, 15.284146 E (Suppl. Material 1, Table S13, Rel. 3); Italy, Sicily, Santa Lucia del Mela (ME), Fiumara D'Agrò, 285 m a.s.l., Coordinates: 38.097861 N, 15.283677 E (Suppl. Material 1, Table S13, Rel. 4); Italy, Sicily, Antillo (ME), Affluente dell'Agrò in località Pinazzo, 280 m a.s.l., Coordinates: 37.975230 N, 15.240598 E (Suppl. Material 1, Table S13, Rel. 5);

Cells ID in the EEA reference grid: 110kmE478N167 (Suppl. Material 1, Table S13, Rels 1 and 5), 10kmE477N167 (Suppl. Material 1, Table S13, Rel. 2), 10kmE478N168 (Suppl. Material 1, Table S13, Rels 3 and 4), (Suppl. Material 2, Figure S20).

Natura 2000 Site Code: Rels 1-2 in Table 14 currently are not included in any Natura 2000 site; Rels 3-4 in Table 14 are included in the ZSC ITA030007 "Affluenti del Torrente Mela"; Rel. 5 in Table 14 is included in the ZSC ITA030019 "Tratto Montano del Bacino della Fiumara di Agrò" (Suppl. Material 2, Figure S20).

Phytosociological table: Suppl. Material 1, Table S13, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: A recent study on riparian vegetation dominated by *Alnus glutinosa* L. in Italy and the Tyrrhenian Islands (Sciandrello et al. 2022) provides a syntaxonomic and distributional overview of the different plant communities identified there. These communities are classified within the order *Populetales albae* Br.-Bl. ex Tchou 1948 (class *Alno glutinosae-Populetea albae* P. Fukarek et Fabijanić 1968), which is further divided into the alliances

Ligustro vulgaris-Alnion glutinosae Poldini, Sburlino and Venanzoni 2015 in Biondi et al. 2015 (riparian meso-thermophilous forests of the submediterranean regions of the Northern and Central Apennine Peninsula) and *Osmundo regalis-Alnion glutinosae* (Br.-Bl. et al. 1956) Dierschke and Rivas-Martínez in Rivas-Martínez 1975 (with an Iberian-Atlantic-Mediterranean distribution). The latter is divided into the sub-alliances *Struthioptero-Alnenion glutinosae* Sciandrello et al. 2022 (thermo-mesophilous communities of central Italy, up to the mountains of Sardinia and Corsica) and *Hyperico hircini-Alnenion glutinosae* Dierschke 1975 (thermophilous communities with a circum-Tyrrhenian distribution: Corsica, Sardinia, Tyrrhenian coasts of the Italian peninsula, and northeastern Sicily). These last Sicilian formations are limited to the Peloritani Mountains, where they are attributed to the association *Platano orientalis-Alnetum glutinosae* (Brullo and Spampinato 1990) by Sciandrello et al. 2022 (Suppl. Material 2, Figure S21). The most interesting nuclei are located on the Tyrrhenian slope, particularly in the upper part of the hydrographic basin of the Fiumara d'Agrò, in the territory of Antillo (Torrente Fonderia, C.de Pianamare, Rosignolo, Pinazzo, etc.), as well as in the rivers S. Paolo (Francavilla di Sicilia) and Alcantara. Other almost punctiform and floristically impoverished nuclei are also present on the Tyrrhenian slope, particularly in the Fiumara Madriddi (Fondachelli Fantina) and in the Torrente Mela (S. Lucia del Mela). Overall, these are relict nuclei, just like other formations and/or species also linked to watercourses or humid environments of the Peloritani Mountains (Brullo and Spampinato 1990; Sciandrello et al. 2015), as well as the Nebrodi Mountains (Brullo et al. 1976; De Castro et al. 2015; Gianguzzi et al. 2021; Gianguzzi and La Mantia 2004) and other reliefs of the northern ridge of Sicily (Raimondo et al. 1994; Brullo and Brullo 2021; Gianguzzi et al. 2013).

#78. Annex I Habitat: 91EO* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) (Morabito A, Musarella CM, Spampinato G)

EUNIS Classification system: T14B13 (formerly, G1.1313): Western Mediterranean alder and ash-alder galleries (Chytrý et al. 2020).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Ligustro vulgaris-Alnion glutinosae* Poldini, Sburlino and Venanzoni 2015 in Biondi et al. 2015, *Populetales albae* Br.-Bl. ex Tchou 1948, *Salici purpureae-Populetea nigrae* (Rivas-Mart. et Cantó ex Rivas-Mart. et al. 1991) Rivas-Mart. et Cantó 2002 (Biondi and Blasi 2015).

Geographic information: Italy, Calabria, Catanzaro, Lamezia Terme, Caronte, 248 m a.s.l., Coordinates: 38.975917 N, 16.258431 E (Suppl. Material 1, Table S14, Rel.1); Italy, Calabria, Vibo Valentia, Brognaturo, Lacina, 1004 m a.s.l., Coordinates: 38.588022 N, 16.393328 E (Suppl. Material 1, Table S14, Rel.2); 1014 m a.s.l., Coordinates: 38.588147 N, 16.392011 E (Suppl. Material 1, Table S14, Rel.3); Italy, Calabria, Catanzaro, Serrastretta, Valle Apite, 607 m a.s.l., Coordinates: 38.975397 N, 16.427989 E (Suppl. Material 1, Table S14, Rel. 4); Calabria, Catanzaro, Girifalco, C. Pellegrini, 358 m a.s.l., Coordinates: 38.829164 N, 16.404547 E (Suppl. Material 1, Table S14, Rel. 5); Coordinates: 38.829097 N, 16.405750 E (Suppl. Material 1, Table S14, Rel. 6); Calabria, Vibo Valentia, Capistrano, Spicchiali, 666 m a.s.l., Coordinates: 38.699014 N, 16.324903 E (Suppl. Material 1, Table S14, Rel. 7); Calabria, Vibo Valentia, Filadelfia, Masone, 731 m a.s.l., Coordinates: 38.777242 N, 16.346686 E (Suppl. Material 1, Table S14, Rel. 8); Calabria, Vibo Valentia, Brognaturo, Lacina, 997 m a.s.l., Coordinates: 38.594142 N, 16.399900 E (Suppl. Material 1, Table S14, Rel. 9); 1001 m a.s.l., Coordinates: 38.594478 N, 16.399725 E (Suppl. Material 1, Table S14, Rel. 10); Calabria, Reggio Calabria, Scilla, Fra di Favazzina, 41 m a.s.l., Coordinates: 38.259411 N, 15.763797 E (Suppl. Material 1, Table S14, Rel. 11); Calabria, Reggio Calabria, Molochio, T. Palata, 317 m a.s.l., Coordinates: 38.310544 N, 16.054958 E (Suppl. Material 1, Table S14, Rel. 12).

Cells ID in the EEA reference grid: 10kmE486N178 (Suppl. Material 1, Table S14, Rel. 1), 10kmE488N174 (Suppl. Material 1, Table S14, Rels 2–3 and 9–10), 10kmE488N178 (Suppl. Material 1, Table S14, Rel. 4), 10kmE487N177 (Suppl. Material 1, Table S14, Rels 5–6), 10kmE487N175 (Suppl. Material 1, Table S14, Rel. 7), 10kmE487N176 (Suppl. Material 1, Table S14, Rel. 8), 10kmE482N170 (Suppl. Material 1, Table S14, Rel. 11), 10kmE485N171 (Suppl. Material 1, Table S14, Rel. 12) (Suppl. Material 2, Figure S20).

Natura 2000 Site Code: currently not included in any Natura 2000 Site (Rels 1, 4, 5, 6, 7, 8, 10, 12 in Suppl. Material 1, Table S14), IT9340120 - “Lacina” (Rels 2, 3, 9 in Suppl. Material 1, Table S14), IT9350300 - “Costa Viola” (Rel. 11, in Suppl. Material 1, Table S14).

Phytosociological table: Suppl. Material 1, Table S14, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: In accordance with Biondi et al. (2015) and Sciandrello et al. (2022) the riparian woodland with *Alnus glutinosa* of Calabria are referred to the *Ligustro vulgaris*-*Alnion glutinosae* Poldini, Sburlino and Venanzoni in Biondi et al. 2015, alliance that brings together the riparian meso-thermophilous forests dominated by *Alnus glutinosa* (L.) Gaertn. of *Populetales albae* growing in the sub-mediterranean regions of the Apennine Peninsula. The alder woods found occupy a wide altitude range and in some reliefs present invasive alien species such as *Robinia pseudoacacia* L., *Ailanthus altissima* (Mill.) Swingle and *Catalpa bignonioides* Walter, expanding species that compromise habitat conservation (Spampinato et al. 2022).

These new records allow to expand the distribution area of habitat 91E0* in the Calabria Region, given the ecological importance recognized in the Habitats Directive of the European Union (European Commission 2013).

#79. Annex I Habitat: 91E0* Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) (Fanfarillo E, Fiaschi T, Cannucci S, Angiolini C)

EUNIS Classification system: G1.131 - Southern *Alnus glutinosa* galleries

Biogeographical Region: Mediterranean

National Habitat Checklist of reference:

Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Ligustro vulgaris*-*Alnion glutinosae* Poldini, Sburlino et Venanzoni in Biondi et al. 2015, *Populetales albae* Br.-Bl. ex Tchou 1948, *Alno glutinosae*-*Populetea albae* P. Fukarek and Fabijanić 1968 (Mucina et al. 2016).

Geographic information: Italy, Tuscany, Siena, Castelnuovo Berardenga, 186 m a.s.l., Coordinates: 43.304447 N, 11.414165 E (Suppl. Material 1, Table S15, Rel.1).

Cell ID in the EEA reference grid: 10kmE443N224 (Suppl. Material 2, Figure S20).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S15, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: The habitat was detected in the lower part of the Arbia River, where such forests represent remnants of naturalness within a human-altered riverscape where woods are mostly dominated by alien species due to human pressures (Angiolini et al. 2023).

#80. Annex I Habitat: 92A0 *Salix alba* and *Populus alba* galleries (Morabito A, Musarella CM, Spampinato G)

EUNIS Classification system: G1.314; T1424 (formerly) - Italic poplar galleries (Chytrý et al. 2020).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Populion albae* Br.-Bl. ex Tchou 1948, *Populetales albae* Br.-Bl. ex Tchou 1948, *Salici purpureae*-*Populetea nigrae* Rivas-Martínez & Cantó ex Rivas-Martínez, Báscones, T.E. Díaz, Fernández-González & Loidi 2001 (Biondi and Blasi 2015).

Geographic information: Italy, Calabria, Catanzaro, Lamezia Terme, Caronte, 210 m a.s.l., Coordinates: 38.970150 N, 16.258033 E (Suppl. Material 1, Table S16, Rel. 1)

Cells ID in the EEA reference grid: 10kmE486N178 (Suppl. Material 2, Figure S22).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S16, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: The riparian vegetation with white willow is a particular azonal formation growing along the Calabrian watercourses with silty sandy floods, variable flow and high level of the aquifer (Brullo and Spampinato 1997). These riparian forests, which belong to the *Populion albae* alliance, are composed of deciduous softwood species such as willows, poplars, and alders, and are widespread mainly in the hilly and submontane belt of the region, being linked by a macrobioclimate between thermo- and meso-mediterranean (Brullo et al. 2001).

#81. Annex I Habitat: 92D0 Southern riparian galleries and thickets (*Nerio-Tamaricetea* and *Securinegion tinctoriae*) (Patera G)

EUNIS Classification system: F9.31 - [*Nerium oleander*], [*Vitex agnus-castus*] and [*Tamarix*] galleries

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Tamarici africanae-Vitacetum agni-casti* Brullo and Spampinato 1997, *Rubio ulmi-folii-Nerion oleandri* Bolos 1985, *Tamaricetalia africanae* Br.-Bl. and O. Bolòs 1958, *Nerio oleandri-Tamaricetea africanae* Br.-Bl. and O. Bolòs 1958 (Biondi and Blasi 2015).

Geographic information: Italy, Campania, Salerno, Centola, 34 m a.s.l., Coordinates: 40.085320 N, 15.349371 E (Suppl. Material 1, Table S17, Rel. 1).

Cells ID in the EEA reference grid: 10kmE477N190 (Suppl. Material 2, Figure S23).

Natura 2000 Site Code: ZSC IT8050013 "Fiume Mingardo".

Phytosociological table: Suppl. Material 1, Table S17, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: Riparian shrublands characterized by *Tamarix africana* grow on the pebbly edge in the terminal part of Mingardo river, on alluvial soils submerged only during floods (Suppl. Material 2, Figure S24). The cenoses detected is referred to *Tamarici africanae-Vitacetum agni-casti*, a thermophilic association exclusive to the thermo-Mediterranean thermotype (Brullo and Spampinato 1997).

#82. Annex I Habitat: 9330 *Quercus suber* forests (Morabito A, Musarella CM, Spampinato G)

EUNIS Classification system: T211 (formerly G2.11) - *Quercus suber* forest (Chytrý et al. 2020).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Italian Interpretation Manual of the Directive 92/43/EEC Habitats (Biondi et al. 2009).

Phytosociological reference: *Helleboro-Quercetum suberis* Signorello 1984; variante a *Myrtus communis* L. (Mercurio and Spampinato 2003), *Erico arboreae-Quercion ilicis* Brullo, Di Martino et Marcenò 1977; *Quercetalia ilicis* Br.-Bl. ex Molinier 1934; *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine et Nègre 1952 (Biondi and Blasi 2015).

Geographic information: Italy, Calabria, Catanzaro, Gizzeria, Contrada Jacona, 75 m a.s.l., Coordinates: 38.953347 N, 16.179847 E (Suppl. Material 1, Table S18, Rel. 1); Italy, Calabria, Vibo Valentia, Capistrano, Contrada Bufalo, 579 m a.s.l., Coordinates: 38.683064 N, 16.292239 E (Suppl. Material 1, Table S18, Rel. 2); Italy, Calabria, Catanzaro, San Sostene, Contrada Bufalo, 580 m a.s.l., Coordinates: 38.638206 N, 16.510347 E (Suppl. Material 1, Table S18, Rel. 3).

Cells ID in the EEA reference grid: 10kmE485N178 (Suppl. Material 1, Table S18, Rel. 1), 10kmE487N175 (Suppl. Material 1, Table S18, Rel. 2), 10kmE489N175 (Suppl. Material 1, Table S18, Rel. 3) (Suppl. Material 2, Figure S25).

Natura 2000 Site Code: currently not included in any Natura 2000 Site.

Phytosociological table: Suppl. Material 1, Table S18, nomenclature and taxa delimitation according to Portal to the Flora of Italy (2023).

Notes: Italian cork oaks for their acidophilic species assemblage have been referred by Brullo and Marceno (1984) to the *Erico-Quercion ilicis*. This alliance groups forest associations dominated by evergreen sclerophyllous species with a high presence of calcifugous species, which develop on siliceous or strongly leached soils, in subhumid to humid Mediterranean macrobioclimates (Biondi and Blasi 2015). At the association level, the communities detected (Suppl. Material 1, Table S18, Rels 1-3) are to be ascribed to the *Helleboro-Quercetum suberis* Signorello 1984, community spread in Calabria region (Signorello 1984; Brullo et al. 2001) and in particular to the variant of *Myrtus communis* (Mercurio and Spampinato 2003) that group to the thermo-xerophilous cork oaks, located in the thermo-Mediterranean settled in more xeric environmental conditions than those typical of the association which instead is characterized by an assemblage of mesophilous species and bioclimatic conditions of meso-Mediterranean type. These new records expand the distribution area of the habitat 9330 in the Calabria Region.

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Supplementary material 1

Tables S1–S18

Authors: Antonio Morabito, Marina Allegrezza, Claudia Angiolini, Simonetta Bagella, Giuseppe Bazan, Federica Bonini, Matteo Camilletti, Silvia Cannucci, Maria Carmela Caria, Alessandro Crisafulli, Leopoldo de Simone, Assunta Esposito, Emanuele Fanfarillo, Emmanuele Farris, Tiberio Fiaschi, Lorenzo Gianguzzi, Daniela Gigante, Riccardo Guarino, Vincenzo Ilardi, Francesco Mascia, Giacomo Mei, Carmelo Maria Musarella, Glauco Patera, Maria Ravo, Saverio Sciandrello, Giovanni Spampinato, Adriano Stinca, Gianmarco Tavilla, Giulio Tesei, Giovanni Riviaccio

Data type: tables

Explanation note: Phytosociological tables

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Link: <https://doi.org/10.3897/pls2023601/05.suppl1>

Supplementary material 2

Figures S1–S25

Authors: Antonio Morabito, Marina Allegrezza, Claudia Angiolini, Simonetta Bagella, Giuseppe Bazan, Federica Bonini, Matteo Camilletti, Silvia Cannucci, Maria Carmela Caria, Alessandro Crisafulli, Leopoldo de Simone, Assunta Esposito, Emanuele Fanfarillo, Emmanuele Farris, Tiberio Fiaschi, Lorenzo Gianguzzi, Daniela Gigante, Riccardo Guarino, Vincenzo Ilardi, Francesco Mascia, Giacomo Mei, Carmelo Maria Musarella, Glauco Patera, Maria Ravo, Saverio Sciandrello, Giovanni Spampinato, Adriano Stinca, Gianmarco Tavilla, Giulio Tesei, Giovanni Riviaccio

Data type: maps and photos

Explanation note: Figures with the new cells distribution in

Italy and maps with closeup pictures of vegetation types

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