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PENSOFT

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New national and regional Annex I Habitat records: from #26 to #36

Giovanni Rivieccio[1], Michele Aleffi[2], Claudia Angiolini[3], Simonetta Bagella[4], Giuseppe Bazan[5], Federica Bonini[6], Maria Carmela Caria[4], Simona Casavecchia[7], Miris Castello[8], Davide Dagnino[9], Maria Carla de Francesco[10], Emanuele Farris[4], Emanuele Fanfarillo[3], Tiberio Fiaschi[3], Luigi Forte[11], Lorenzo Gianguzzi[12], Flavia Landucci[14], Fabio Maneli[14], Francesca Mantino[15], Mauro Mariotti[9], Gianfranco Pirone[16], Livio Poldini[8], Silvia Poponessi[17], Safiya Praleskouskaya[14], Angela Stanisci[10], Valeria Tomaselli[15], Francesco Pio Tozzi[10], Claudia Turcato[18], Roberto Venanzoni[14], Daniela Gigante[6]

1 *Desertification Research Centre, University of Sassari, Via de Nicola, I-07100, Sassari, Italy*
2 *School of Biosciences and Veterinary Medicine, Plant Diversity & Ecosystems Management Unit, Bryology Laboratory & Herbarium, University of Camerino, Via Pontoni 5, I-62032 Camerino, Italy*
3 *Department of Life Sciences, University of Siena, Via P.A. Mattioli 4, I-53100, Siena, Italy*
4 *Department of Chemistry and Pharmacy, University of Sassari, Via Piandanna 4, 07100, I-Sassari, Italy*
5 *Department of Biological, Chemical, and Pharmaceutical Sciences and Technologies, University of Palermo, Via Archirafi 18, I-90123, Palermo, Italy*
6 *Department of Agriculture, Food and Environmental Sciences, University of Perugia, Borgo XX giugno 74, I-06121, Perugia, Italy*
7 *Department of Agricultural, Food and Environmental Sciences, Polytechnic University of Marche, Via Brecce Bianche, I-60131, Ancona, Italy*
8 *Department of Life Sciences, University of Trieste, Via L. Giorgieri 10, I-34127, Trieste, Italy*
9 *Department of Earth, Environment and Life Sciences, University of Genova, Viale Benedetto XV 5, I-16100, Genova, Italy*
10 *Department of Biosciences and Territory, University of Molise, Via Duca degli Abruzzi 67, I-86039, Termoli, Italy*
11 *Department of Biology and Botanical Garden Museum, University of Bari "Aldo Moro", Via Orabona 4, I-70125, Bari, Italy*
12 *Department Agricultural, Food and Forest Sciences - University of Palermo, Viale delle Scienze Ed. 4, I-90128, Palermo, Italy*
13 *Department of Botany and Zoology, Faculty of Science, Masaryk University, Brno, Czech Republic*
14 *Department of Chemistry, Biology and Biotechnology, University of Perugia, Polo Didattico, Via del Giochetto 16, Ed. A, I-06122, Perugia, Italy*
15 *Department of Biology, University of Bari "Aldo Moro", Via Orabona 4, I-70125, Bari, Italy*
16 *Department of Life, Health & Environmental Science, University of L'Aquila, Coppito, L'Aquila, Italy*
17 *Department of Environmental and Life Science, University of Cagliari, Via S. Ignazio da Laconi 13, I-09123, Cagliari, Italy*
18 *Ce.S.Bi.N. s.r.l., Via San Vincenzo 2, I-16121, Genova, Italy*

Corresponding author: Giovanni Rivieccio (giorivieccio@gmail.com)

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Abstract

New Italian data on the distribution of the Annex I Habitats 1510*, 2130*, 2250*, 3180*, 3260, 5230*, 6410, 7140, 7220*, 9320 are reported in this contribution. Specifically, 14 new occurrences in Natura 2000 sites are presented and 20 new cells are added in the EEA 10 km × 10 km reference grid. The new data refer to the Italian administrative regions of Abruzzo, Apulia, Friuli Venezia Giulia, Liguria, Marche, Molise, Sardinia, Sicily, Tuscany and Umbria.

Keywords

1510*, 2130*, 2250*, 3180*, 3260, 5230*, 6410, 7140, 7220*, 9320, conservation, vegetation, 92/43/EEC Directive

Introduction

We are halfway through the 5th (2019-2024) six-year periodical Habitat reporting. The section might be beneficial in representing a collaborative and scientifically validated tool for collecting updated distribution data on the habitats. To date, 36 are the contributions for 90 new cells of EEA 10 km x 10 km Reference grid and 48 new occurrences in Natura 2000 Sites. This is the sixth 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. (2019a), all species data, site data and descriptions of the new habitat records are hereafter provided. We report a synthetic overview in Tab. 1. We used the open-source QGIS Geographic Information System (QGIS.org 2020) for mapping purposes.

#26. Annex I Habitat: 1510* Mediterranean salt steppes (*Limonietalia*) (Bagella S, Caria MC, Farris E, Rivieccio G)

EUNIS Classification system: E6.11 - Mediterranean (*Limonium*) salt steppes
Biogeographical Region: Mediterranean
National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).
Phytosociological reference: *Limonietum narbonense-glomerati* Biondi, Diana, Farris&Filigheddu 2001, *limonietosum glomerati* Biondi, Diana, Farris & Filigheddu 2001 and limonietosum virgati Biondi, Diana, Farris & Filigheddu 2001; *Artemisio densiflorae-Limonietum pulviniformis* Biondi, Diana, Farris & Filigheddu 2001; *Triglochino barrelieri-Limonion glomerati* Biondi, Diana, Farris & Filigheddu 2001, *Limonietalia* Br.-BI. & O. Bolòs 1958, *Salicornietea fruticosae* Br.-BI. & Tüxen ex A. & O. Bolòs 1950 (Biondi et al. 2001).
Geographic information: unpublished relevés: Italy, Sardinia, Sassari, Golfo di Olbia, ex Peschiera, from - 1 to 1 m a.s.l., Coordinates in Tab. 2 (Rels 1 to 7). Published relevés: Italy, Sardinia, Sassari, Lido del Sole, Coordinates: unknown [Tab. 1 in Biondi et al. (2001), Rels 3 to 7, 12 and 13]; Italy, Sardinia, Nuoro, Siniscola, La Caletta, Coordinates: unknown [Tab. 1 in Biondi et al. (2001), Rels 10 and 11]; Italy, Sardinia, Nuoro, Posada, S. Giovanni,

Table 1. Synthetic overview of the newly reported data.

Hab ID	Hab name	Cell ID	Country	BR	N2000 Site	Authors
1510*	Mediterranean salt steppes (*Limonietalia*)	10kmE427N197, 10kmE428N197, 10kmE429N194, 10kmE426N201	Italy	MED	-	Bagella S., Caria M.C., Farris E., Rivieccio G.,
2130*	Fixed coastal dunes with herbaceous vegetation (grey dunes)	10kmE465N217, 10kmE467N215, 10kmE474N210, 10kmE480N210, 10kmE477N210, 10kmE478N210	Italy	CONT MED	IT7120215, IT7282216, IT9110001, IT9110037, IT9110015	Casavecchia S., de Francesco M.C., Pirone G., Stanisci A., Tozzi F.P.
2250*	Coastal dunes with *Juniperus* spp.	10kmE492N202	Italy	MED	-	Mantino F., Forte L., Tomaselli V.
3180*	Turloughs	10kmE456N217, 10kmE456N222	Italy	MED CONT	IT5210068, IT5330019, IT5330028	Bonini F., Landucci F., Gigante D.
3180*	Turloughs	10kmE459N253	Italy	CONT	IT3340006, IT3341002	Castello M., Poldini L.
3260	Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	10kmE443N224	Italy	MED	-	Fiaschi T., Fanfarillo E., Angiolini C.
5230*	Arborescent matorral with *Laurus nobilis*	10kmE472N167	Italy	MED	-	Bazan G., Gianguzzi L.
6410	Molinia meadows on calcareous, peaty or clayey-siltladen soils (*Molinion caeruleae*)	10kmE413N233	Italy	ALP	IT1314610	Dagnino D., Mariotti M., Turcato C.
7140	Transition mires and quaking bogs	10KmE458N219	Italy	CONT	IT5210071	Praleskouskaya S., Gigante D., Maneli F., Aleffi M., Poponessi S., Venanzoni R.
7220*	Petrifying springs with tufa formation (*Cratoneurion*)	10kmE455N222	Italy	CONT	IT5330020	Poponessi S., Gigante D.
9320	*Olea* and *Ceratonia* forests	10kmE459N161	Italy	MED	ITA040009	Bazan G., Gianguzzi L.

Coordinates: unknown [Tab. 1 in Biondi et al. (2001), Rels 8 and 9]; Italy, Sardinia, Nuoro, Posada, Stagno di Posada, Coordinates: unknown [Tab. 1 in Biondi et al. (2001), Rel. 14]; Italy, Sardinia, Sassari, Porto Pozzo, Coordinates: unknown [Tab. 5 in Biondi et al. (2001), Rels 1, 2, 6, 7]; Italy, Sardinia, Sassari, Porto Liscia, Coordinates: unknown [Tab. 5 in Biondi et al. (2001), Rels 3, 4, 5].

Cells ID in the EEA reference grid: 10kmE427N197 (Tab. 2, Rels 1 to 7); for the published data, although precise coordinates are not available, relevés can be localized with precision enough to point out the corresponding cells: 10kmE428N197 (Tab. 1, Rels 3 to 7, 12 and 13 in Biondi et al. 2001); 10kmE429N194 (Tab. 1, Rels 8, 9 and 14 in Biondi et al. 2001); 10kmE426N201 (Tab. 5, Rels 1 to 7 in Biondi et al. 2001) (Fig. 1).

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

Phytosociological table: Tab. 2 (unpublished relevés); taxonomic nomenclature according to Bartolucci et al. (2018); published relevés: Tab. 1 (Rels 1 to 14) and Tab. 5 (Rels 1 to 7) in Biondi et al. (2001).

Notes: Based on species occurring, structural characteristics, and ecology, we referred these communities to the priority Habitat 1510* (Biondi et al. 2004). Particularly relevant are the populations in the ex Peschiera site, where a unique large nucleus occupies an area of just over 2600 m^2, and in Porto Pozzo and Porto Liscia, where the narrow endemic *Limonium pulviniforme* is hosted (Tab. 5 in Biondi et al. 2001). Farris et al. (2007) stressed that this habitat is underestimated in Sardinia. Despite the presence in several sites, no implementation has been proposed in the third (2007–2012) and the fourth (2013–2018) report.

#27. Annex I Habitat: 2130*: Fixed coastal dunes with herbaceous vegetation (grey dunes) (Casavecchia S, de Francesco MC, Pirone G, Stanisci A, Tozzi FP)

EUNIS Classification system: N16 (formerly B1.4) Mediterranean and Macaronesian coastal dune grassland (grey dune) (Chytrý et al. 2020).

Biogeographical Region: #27a: Continental; #27b: Mediterranean

National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009)

Phytosociological reference: *Verbasco garganici-Euphorbietum terracinae* Biondi, Casavecchia & Biscotti 2007, *Echio plantaginei-Galactition tomentosae* O. Bolòs & Molinier 1969, *Thero-Brometalia* (Rivas Goday & Rivas-Martínez ex Esteve 1973) O. Bolòs 1975, *Stellarietea mediae* Tüxen, Lohmeyer & Preising ex von Rochow 1951 (Biondi et al. 2007).

Geographic information: unpublished relevés: #27a: Italy, Abruzzo, Teramo, Torre del Cerrano, 0 m a.s.l., Coordinates: 42.59306 N, 14.08217 E (Tab. 3, Rel. 1); 1 m a.s.l., Coordinates: 42.59104 N, 14.0839 E (Tab. 3, Rel. 2); 1 m a.s.l., Coordinates: 42.58943 N, 14.08512 E (Tab. 3, Rel. 3); Italy, Abruzzo, Chieti, Foro, 2 m a.s.l., Coordinates: 42.39233 N, 14.34526 E (Tab. 3, Rel. 4); #27b: Italy, Molise,

Figure 1. Distribution in Italy of the Habitat 1510*: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013-2018; Eionet 2019).

Table 2. Habitat 1510*.

Relevé number	1	2	3	4	5	6	7	
Cell ID	10km E427N197	10km E427N197	10km E427N197	10km E427N197	10km E427N197	10km E427N197	10km E427N197	
Latitude	40.917386	40.917307	40.914588	40.916768	40.916602	40.916661	40.916641	
Longitude	9.503935	9.503807	9.504323	9.503725	9.503964	9.503844	9.503911	
Date	6/26/2020	6/26/2020	7/2/2020	8/5/2020	8/5/2020	8/5/2020	8/5/2020	
Area (m²)	2	2	2	2	2	2	2	
Altitude (m a.s.l.)	1	1		0	0	0	0	
Cover (%)	98	95	95	95	70	100	90	
Average vegetation height (cm)	30	30	30	30	30	30	30	Presence
Charact. and diff. Taxa of *Limonietum narbonense-glomerati* and subass *limonietosum virgati*								
^*Limonium virgatum* (Willd.) Fourr.	5	5	3	1	1	1	1	7
^*Limonium narbonense* Mill.	.	.	.	3	3	4	3	4
Frankenia laevis L. subsp. *laevis*	.	.	+	.	.	.	.	1
Other species								
Thinopyrum junceum (L.) Á.Löve	3	2	+	+	1	2	2	7
Halimione portulacoides (L.) Aellen	.	.	2	1	1	.	2	4
Salicornia fruticosa (L.) L.	.	.	1	3	.	2	2	4
Parapholis incurva (L.) Hubbard	2	2	.	1	1	.	.	4
Salicornia perennans Willd. subsp. *perennans*	1	+	1	+	.	.	.	4
Phleum pratense L. subsp. *pratense*	1	.	.	.	.	.	.	1
Trigonella smalii Coulot & Rabaute	+	.	.	.	.	.	.	1

^ Reference plant species of the Habitat 1510*, from Biondi et al. (2009).

Campobasso, Marina di Santa Cristina port, 1 m a.s.l., Coordinates: 41.94625 N, 15.07366 E (Tab. 3, Rel. 5); 3 m a.s.l., Coordinates: 41.94595 N, 15.07424 E (Tab. 3, Rel. 6). Published relevés: Italy, Puglia, Foggia, Foce Varano, 1 m a.s.l., Coordinates: 41.9192861 N, 15.787761 E [Tab. 1 in Biondi et al. (2007), Rel. 2]; 3 m a.s.l., Coordinates: 41.9200556 N, 15.794875 E [Tab. 1 in Biondi et al. (2007), Rel. 3]; Italy, Puglia, Foggia, Istmo di Lesina, 3 m a.s.l., Coordinates: 41.9098611 N, 15.511717 E [Tab. 1 in Biondi et al. (2007), Rel. 4]; 2 m a.s.l., Coordinates: 41.9184361 N, 15.569406 E [Tab. 1 in Biondi et al. (2007), Rel. 5].

Cells ID in the EEA reference grid: #27a: 10kmE465N217 (Tab. 3, Rels 1 to 3); 10kmE467N215 (Tab. 3, Rel 4). #27b: 10kmE474N210 (Tab. 3, Rels 5 and 6); from Tab. 1 in Biondi et al. (2007): 10kmE480N210 (Rels 2 and 3); 10kmE477N210 (Rel 4); 10kmE478N210 (Rel. 5) (Fig. 2).

Natura 2000 Site Code: #27a: IT7120215 "Torre del Cerrano" (Tab. 3, Rels. 1 to 3); currently not included in any Natura 2000 Site (Tab. 3, Rel. 4). #27b: IT7282216 "Foce Biferno-Litorale di Campomarino" (Tab. 3, Rels 5 and 6); IT9110001 "Isola e Lago di Varano" [Tab. 1 in Biondi et al. (2007), Rels 2 and 3]; IT9110037 "Laghi di Lesina e Varano" [Tab. 1 in Biondi et al. (2007), Rel. 3]; IT9110015 "Duna e Lago di Lesina e Foce Del Fortore" [Tab. 1 in Biondi et al. (2007), Rels 4 and 5].

Phytosociological table: Tab. 3 (unpublished relevés); taxonomic nomenclature according to Pignatti et al. (2017-2019); published relevés: Tab. 1 (Rels 2 to 5) in Biondi et al. (2007).

Notes: The plant species cover follows Braun-Blanquet's abundance-dominance scale. We propose to include in this habitat also the Adriatic grey dunes with grass communities with *Verbascum niveum* subsp. *garganicum* and *Euphorbia terracina* (referable to Corine Biotopes 16.228 "Dune *Malcolmia* annual-herb communities").

#28. Annex I Habitat: 2250* Coastal dunes with *Juniperus* spp. (Mantino F, Forte L, Tomaselli V)

EUNIS Classification system: N1B (formerly: B1.6) Mediterranean and Black Sea coastal dune scrub (Chytrý et al. 2020).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).

Phytosociological reference: *Asparago acutifolii-Juniperetum macrocarpae* (Molinier et R. Molinier 1955) O. de Bolòs 1962, *Juniperion turbinatae* Rivas-Martinez (1975) 1987, *Pistacio-Rhamnetalia alaterni* Rivas-Martinez 1975, *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine & Nègre 1952 (Biondi et al. 2014).

Geographic information: Italy, Apulia, Costa Ripagnola, Polignano a Mare (Bari), 7 m a.s.l. Coordinates: 41.032425 N, 17.155910 E (Tab. 4, Rel. 1); 41.032367 N, 17.154936 E (Tab. 4, Rel. 2).

Cells ID in the EEA reference grid: 10kmE492N202 (Fig. 3).

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

Phytosociological table: Tab. 4; taxonomic nomenclature according to Bartolucci et al. (2018) and Galasso et al. (2018), and later updates.

Notes: This priority habitat is present on sandy stabilized dunes and it is distributed in Apulia Region along the Adriatic and Jonian coasts (Brullo et al. 2001, Forte 2001, Forte et al. 2002, Biondi et al. 2006, Tomaselli et al. 2010, Perrino et al. 2013, Medagli et al. 2015, Veronico et al. 2017, Eionet 2019). The recorded community is located in the recently established Regional Natural Park "Costa Ripagnola", between Mola di Bari and Polignano a Mare,

Figure 2. Distribution in Italy of the Habitat 2130*: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013-2018; Eionet 2019).

Table 3. Habitat 2130*.

Relevé number	1	2	3	4	5	6	
Cell ID	10km E465N217	10km E465N217	10km E465N217	10km E467N215	10km E474N210	10km E474N210	
Latitude	42.59306	42.59104	42.58943	42.39233	41.94625	41.94595	
Longitude	14.08217	14.0839	14.08512	14.34526	15.07366	15.07424	
Date	5/31/2021	5/31/2021	5/31/2021	6/3/2021	6/10/2021	6/10/2021	
Area (m²)	4	4	4	4	4	4	
Slope (°)	0	0	0	0	0	0	
Altitude (m a.s.l.)	0	1	1	2	1	3	
Vegetation Cover (%)	65	50	50	70	60	80	
Sea distance (m)	30	45	60	75	80	65	Presences
Diagnostic species							
^*Phleum arenarium* L. subsp. *caesium* H.Scholz	.	.	1	3	2	3	4
^*Festuca fasciculata* Forssk.	.	.	1	+	.	.	2
^*Cerastium semidecandrum* L.	+	.	.	.	.	.	1
Charact. and diff. taxa of *Verbasco garganici-Euphorbietum terracinae*							
**Euphorbia terracina* L.	1	1	2	2	1	1	6
**Verbascum niveum* subsp. *garganicum* (Ten.) Murb	2	2	1	1	2	2	6
**Sixalix atropurpurea* (L.) Greuter et Burdet	.	.	.	.	1	2	2
Other species							
Silene colorata Poir.	1	1	2	1	1	.	5
Lotus cytisoides L.	1	1	2	.	1	3	5
Elymus farctus (Viv.) Runemark ex Melderis	.	.	1	1	1	.	3
Medicago marina L.	1	.	.	1	2	.	3
Oenothera stucchii Soldano	.	3	.	3	2	.	3
Rostraria litorea (All.) Holub	2	1	1	.	.	.	3
Anisantha madritensis (L.) Nevski	+	.	.	.	.	2	2
Lagurus ovatus L.	+	.	.	.	.	1	2
Avena barbata Pott ex Link	.	.	.	.	1	1	2
Cenchrus incertus M.A.Curtis	2	.	1	.	.	.	2
Erodium laciniatum (Cav.) Willd.	+	.	.	+	.	.	2
Ambrosia psilostachya DC.	1	.	.	.	.	.	1
Artemisia campestris L.	.	.	.	.	.	1	1
Bartsia trixago L.	.	.	.	.	1	.	1
Catapodium rigidum (L.) C.E.Hubb.	+	.	.	.	.	.	1
Corynephorus articulatus (Desf.) P.Beauv.	.	.	.	.	1	.	1
Dittrichia viscosa (L.) Greuter	.	.	.	1	.	.	1

Table 3. Continuation.

Relevé number	1	2	3	4	5	6	
Cell ID	10km E465N217	10km E465N217	10km E465N217	10km E467N215	10km E474N210	10km E474N210	
Latitude	42.59306	42.59104	42.58943	42.39233	41.94625	41.94595	
Longitude	14.08217	14.0839	14.08512	14.34526	15.07366	15.07424	
Date	5/31/2021	5/31/2021	5/31/2021	6/3/2021	6/10/2021	6/10/2021	
Area (m²)	4	4	4	4	4	4	
Slope (°)	0	0	0	0	0	0	
Altitude (m a.s.l.)	0	1	1	2	1	3	
Vegetation Cover (%)	65	50	50	70	60	80	
Sea distance (m)	30	45	60	75	80	65	Presences
Echinophora spinosa L.	.	.	.	.	r	.	1
Erigeron sumatrensis Retz.	.	.	.	+	.	.	1
Hypochaeris achyrophorus L.	.	.	.	.	.	1	1
Medicago littoralis Rohde ex Loisel.	.	.	.	.	.	1	1
Ononis variegata L.	.	1	.	.	.	.	1
Parapholis incurva (L.) C.E.Hubb.	.	.	.	.	.	1	1
Salsola kali L.	.	.	.	+	.	.	1
Sporobolus virginicus (L.) Kunth	1	.	.	.	.	.	1

^ Reference plant species of the Habitat 2130*, from Biondi et al. (2009).
* New proposed reference species

Figure 3. Distribution in Italy of the Habitat 2250*: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013-2018; Eionet 2019).

and it is placed in an isolated site along the calcarenitic coast, on sandy-silt deposits derived from the erosion of the rocks, as described in Biondi et al. (2006).

The phytocoenosis, dominated by tall plants of *Juniperus macrocarpa* Sm. and referable to *Asparago acutifolii-Juniperetum macrocarpae* (Molinier et R. Molinier 1955) O. de Bolòs 1962, extends for only 9000 m² and presents a mature aspect with a poor floristic composition. The landscape matrix surrounding the site is characterised by cultivated fields, *Opuntia ficus-indica* (L.) Mill. stands and scattered sclerophyllous maquis of *Pistacio-Rhamnetalia alaterni* Rivas-Martinez 1975, while along the coast there is the presence of small patches belonging to the *Arthrocaulon macrostachyum* (Moric.) Piirainen & G. Kadereit community.

Until the establishment of the Regional Park, the principal threats to which the site was exposed have been tourism, fire and agricultural practices. The diachronic analysis of orthophotos from 2005 to 2015 highlights the reduction of the community due to fire and plowing; moreover, the possibility to reach the coast by car increased the pressure due to tourism exploitation.

Table 4. Habitat 2250*.

Relevé number	1	2	
Cell ID	10kmE492N202	10kmE492N202	
Latitude	41.032425	41.032367	
Longitude	17.15591	17.154936	
Date	9/22/2021	11/12/2021	
Area (m²)	100	100	
Altitude (m a.s.l.)	7	7	
Cover (%)	100	100	
Average vegetation height (m)	4.5	4.5	Presence
Diff. of *Asparago acutifolii-Juniperetum macrocarpae*			
^*Juniperus macrocarpa* Sm.	5	5	2
Charact. of *Juniperion turbinatae*			
^*Juniperus turbinata* Guss.	+	+	2
Charact. of *Pistacio lentisci-Rhamnetalia alaterni* and *Quercetea ilicis*			
Pistacia lentiscus L.	1	1	2
Rubia peregrina L.	1	1	2
Asparagus acutifolius L.	1	+	2
Phillyrea latifolia L.	+	+	2
Stachys major (L.) Bartolucci & Peruzzi	.	+	1
Olea europaea L.	.	+	1
Other species			
Pinus halepensis Mill.	+	+	2
Carpobrotus edulis (L.) N.E. Br.	+	+	2
Pancratium maritimum L.	.	+	1
Oloptum miliaceum (L.) Röser & H.R. Hamasha	+	.	1
Arisarum vulgare O. Targ.Tozz.	.	+	1

^ Reference plant species of the Habitat 2250*, from Biondi et al. (2009).

Figure 4. Habitat 2250* in the Regional Natural Park "Costa Ripagnola" (Apulia).

The high distance from other Adriatic coastal juniper communities, distributed on Gargano and Salento, confers to this formation a relict character.

In a recent study on the conservation status of Italian coastal dune habitats (Prisco et al. 2020), the overall assessment of 2250* results Unfavorable-Bad for all the considered criteria (range, area, structure and function, future prospects).

#29. Annex I Habitat: 3180* Turloughs (Bonini F, Landucci F, Gigante D)

EUNIS Classification system: C1.6 Temporary lakes, ponds and pools (narrower), C1.67 Turlough and lake-bottom meadows (narrower)

Biogeographical Region: #29a: Mediterranean; #29b: Continental.

National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).

Phytosociological reference: #29a: *Ranunculo acri-Caricetum hirtae* Biondi & Ballelli 1995, Potentillion anserinae Tüxen 1947, *Potentillo-Polygonetalia avicularis* Tüxen 1947, *Molinio-Arrhenatheretea* Tüxen 1937; #29b: *Deschampsio-Caricetum distantis* Pedrotti 1978 and *Hordeo-Ranunculetum velutini* Pedrotti 1978, *Ranunculion velutini* Pedrotti 1978, *Trifolio-Hordeetalia* Horvatić 1963, *Molinio-Arrhenatheretea* Tüxen 1937; the syntaxonomic frame is in accordance with Mucina et al. (2016).

Geographic information: #29a: Italy, Umbria, Perugia, Sant'Anatolia di Narco, Laghetti di Gavelli, 1,122 m a.s.l., Coordinates: 42.681726 N, 12.908217 E; #29b: Italy, Marche, Macerata, Sefro, Piani di Monte Lago, 925 m a.s.l., Coordinates: 43.108911 N, 12.975154E (upper plain); 892 m a.s.l., 43.120255 N, 12.968448 E (lower plain).

Cells ID in the EEA reference grid: #29a: 10kmE456N217; #29b: 10kmE456N222 (Fig. 5).

Natura 2000 Site Code: #29a: SCI IT5210068 "Laghetto e piano di Gavelli (Monte Coscerno)"; #29b: SCI IT5330019

"Piani di Montelago", included in the SPA IT5330028 "Valle Scurosa, Piano di Montelago e Gola di Pioraco".

Phytosociological table: #29a Tab. 8 in Biondi and Ballelli (1995); #29b Tab. 1 in Pedrotti (1978).

Notes: Although this habitat's inclusion in Annex I was originally based on Irish reports only (European Commission 2013), its occurrence is nowadays acknowledged in Ireland, United Kingdom, Germany, Estonia, Slovenia, and Croatia, in several Biogeographic Regions (Atlantic, Continental, Boreal, Alpine, and Mediterranean), according to the latest Annex I habitats Reporting cycle (Eionet 2013-18). This priority habitat has been mentioned for the first time in Italy by Landucci in the assessment of the habitat "C1.6a Temperate temporary water body", in Janssen et al. (2016), and first reported by Gigante et al. (2019b) at Castel S. Maria plain in central Italy. Then, Castello et al. (2021) reported it at Lake Doberdò in North-East Italy. The two sites here reported are characterized by long-standing flooding in winter, with partial emergence of the bottom sediment in summer (Pedrotti 1978, Biondi and Ballelli 1995). As a consequence, the vegetation is strongly affected by the water gradient and the level of the water table, giving rise to a complex of vegetation types typically including phytocoenoses from several alliances: *Magnocaricion gracilis* Géhu 1961, *Ranunculion velutini* Pedrotti 1978, *Potentillion anserinae* Tx. 1947, among the others. In particular, the alliance *Ranunculion velutini* Pedrotti 1976 seems particularly related to the ecological conditions of temporary flooding affecting this complex Annex I habitat type in Central Italy, however in other areas it can include variously composed mosaics of vegetation types (see the following Habitat Record #30). Both the areas have been investigated in recent years by the authors (unpublished data), confirming the occurrence of the mentioned plant communities; the coordinates of the reference points, missing in the original papers (Pedrotti 1978, Biondi and Ballelli 1995), have been registered in the field in areas representative of the habitat variability. Other similar sites occurring along the many Apenninic karstic highlands are certainly to be referred to this priority habitat type, including for instance the plain of Castel S. Maria and the temporary lake close to Grutti, both in the Province of Perugia, in central Italy, at present under investigation by the authors.

#30. Annex I Habitat: 3180* Turloughs (Castello M, Poldini L)

EUNIS Classification system: C1.6 Temporary lakes, ponds and pools (narrower), C1.67 Turlough and lake-bottom meadows (narrower)

Biogeographical Region: Continental

National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).

Phytosociological reference: this habitat includes a complex of vegetation types, the most significant of which belong to: *Fontinalion antipyreticae* W. Koch 1936, *Leptodictyetalia riparii* Philippi 1956, *Platyhypnidio-Fontinalietea antipyreticae* Philippi 1956; *Bidentetea* Tüxen et al. ex von Rochow 1951; *Isoëto-Nanojuncetea* Br.-Bl. & Tüxen in Br.-Bl. et al. 1952; *Eleocharito palustris-Sagittarion sagittifoliae* Passarge 1964, *Oenanthetalia aquaticae* Hejný ex Balátová-Tuláčková et al. 1993, *Phragmito-Magnocaricetea* Klika in

Figure 5. Distribution in Italy of the Habitat 3180*: in black the new cells.

Klika & Novák 1941; *Potentillion anserinae* Tüxen 1947, *Potentillo-Polygonetalia avicularis* Tüxen 1947, *Arrhenatherion elatioris* Luquet 1926 (hygrophilous and oligo-mesotrophic coenoses), *Arrhenatheretalia elatioris* Tüxen 1931, *Molinio-Arrhenatheretea* Tüxen 1937; the syntaxonomic frame is in accordance with Mucina et al. (2016).

Geographic information: Italy, Friuli Venezia Giulia, Gorizia, Lago di Doberdò (Lake Doberdò), 4.5 m a.s.l., Coordinates: 45.831078 N, 13.562322 E [Tabs S1, S7, S10 (Rels 2 to 24), S11, S12 (Rel. 1) in Supplementary material 1 in Castello et al. (2021)].

Cell ID in the EEA reference grid: 10kmE459N253 (Fig. 5).

Nature 2000 Site Code: SAC IT3340006 "Carso Triestino e Goriziano", SPA IT3341002 "Aree Carsiche della Venezia Giulia".

Phytosociological table: Tabs S1, S7, S10 (Rels 2 to 24), S11, S12 (Rel. 1) in Supplementary material 1 in Castello et al. (2021).

Notes: This priority habitat, modelled on the temporary lakes of Ireland called "turloughs" and currently reported from other States of the EU (Eionet 2013–2018), corresponds to a geomorphological unit (Bunce et al. 2013) in which the seasonal transitions between water and terrestrial conditions result in strongly variable mosaics of communities. The occurrence of the habitat 3180* from the Italian Karst at Lake Doberdò is discussed by Castello et al. (2021). Lake Doberdò is a typical disappearing lake being the result of the emersion of the groundwater: its water regime is strongly variable, with water level fluctuations that can be higher than 6 m at seasonal high water. A phytosociological survey carried out in 2015–2018 provided the full picture of the wide range of plant communities correlated with the variable environmental conditions due to the hydrological regime of the lake and traditional agricultural land-use. Limited areas of permanent open water allow the presence of aquatic communities of *Lemnetea* O. Bolòs & Masclans 1955 and *Potamogetonetea* Klika in Klika & Novák 1941, but this habitat type is characterized by communities associated with large oscillations of water level dependent on fluctuations of groundwater. The exposed muddy water margins are colonized by pioneer communities of *Bidentetea*, *Isoëto-Nanojuncetea* and *Eleocharito palustris-Sagittarion sagittifoliae*. Most of the lake bottom is covered by marsh communities dominated by reed and sedge beds of *Phragmition communis* Koch 1926, *Magnocaricion elata*e Koch 1926 and *Magnocaricion gracilis* Géhu 1961. The peculiar hydrological regime of the site is well expressed by the stands of *Cinclidotus fontinaloides* and *Fontinalis antipyretica*, the *Potentillion anserinae* wet meadows covering the lake shores, and a periodically flooded meadow corresponding to *Leucojo aestivi-Poetum pratensis* Tasinazzo ex Castello, Poldini & Altobelli 2021, an association considered as a hygrophilous, oligo-mesotrophic waterside expression of *Arrhenatherion* meadows tending towards the communities of *Molinion caeruleae* Koch 1926 and showing considerable affinities with the periodically-flooded meadows of *Trifolio-Hordeetalia* Horvatić 1963.

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

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

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).

Phytosociological reference: *Batrachion fluitantis* Neuhäusl 1959, *Callitricho hamulatae-Ranunculetalia aquatilis* Passarge ex Theurillat in Theurillat et al. 2015, *Potamogetonetea* Klika in Klika et Novák 1941 (Lastrucci et al. 2010; Mereu et al. 2010; Mucina et al. 2016).

Geographic information: Italy, Tuscany, Siena, Asciano, 169 m a.s.l., Coordinates: 43.278535 N, 11.384239 E (Tab. 5, Rel. 1); 172 m a.s.l., Coordinates: 43.278025 N, 11.383466 E (Tab. 5, Rel. 2); Italy, Tuscany, Siena, Castelnuovo Berardenga, 185 m a.s.l., Coordinates: 43.303939 N, 11.414234 E (Tab. 5, Rel. 3); 185 m a.s.l., Coordinates: 43.303783 N, 11.414386 E (Tab. 5, Rel. 4).

Cell ID in the EEA reference grid: 10kmE443N224 (Fig. 6).

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

Phytosociological table: Tab. 5; taxonomic nomenclature according to Bartolucci et al. (2018) for vascular plants and Aleffi et al. (2020) for mosses.

Notes: The interpretation of the communities dominated by *Potamogeton* species can be critical, since in lentic waters these species are also diagnostic of the habitat 3150 "Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation" according to Biondi et al. (2009). However, in particular ecological conditions like running water with seasonal water fluctuations as in the study sites, the attribution of these communities to the habitat 3260 appears appropriate. The habitat was detected in the central stretch of the Arbia river, where it is well represented. The new occurrences are located not far from the SACs "Monti del Chianti" and "Crete di Camposodo e Crete di Leonina". The presence of this habitat was already known for nearby cells. These new records allow to deepen the knowledge of Habitat 3260 in central-southern Tuscany.

#32. Annex I Habitat: 5230* Arborescent matorral with *Laurus nobilis* (Gianguzzi L, Bazan G)

EUNIS Classification system: T22 (formerly: G2.2) Mainland laurophyllous forest (Chytrý et al. 2020).

Biogeographical Region: Mediterranean

National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).

Figure 6. Distribution in Italy of the Habitat 3260: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013–2018; Eionet 2019), in white (black outline) the cells later reported for Umbria region (Rivieccio et al. 2020).

Table 5. Habitat 3260.

Relevé number	1	2	3	4	
Cell ID	10kmE443N224	10kmE443N224	10kmE443N224	10kmE443N224	
Latitude	43.278535	43.278025	43.303939	43.303783	
Longitude	11.384239	11.383466	11.414234	11.414386	
Date	7/27/2021	7/27/2021	6/15/2021	6/15/2021	
Area (m²)	2	1.5	1	2	
Altitude (m a.s.l.)	169	172	185	185	
Cover (%)	95	90	40	70	
Slope (°)	0	0	0	0	Presences
Charact. and diff. of *Batrachion fluitantis*, *Callitricho hamulatae-Ranunculetalia aquatilis* and *Potamogetonetea*					
^*Potamogeton natans* L.	5	5	.	.	2
^*Potamogeton nodosus* Poir.	.	.	3	4	2
Mentha aquatica L. subsp. *aquatica*	.		+	+	2
Other species					
Agrostis stolonifera L. subsp. *stolonifera*	.	1	+	+	3
Rorippa sylvestris (L.) Besser subsp. *sylvestris*	.	+	.	.	1
Alisma plantago-aquatica L.	.		1	.	1
^*Fontinalis antipyretica* Hedw.	.		+	.	1
^*Veronica anagallis-aquatica* L. subsp. *anagallis-aquatica*	.	+	.	.	1
Lycopus europaeus L.	.	.	.	+	1

^ Reference plant species of the Habitat 3260, from Biondi et al. (2009).

Phytosociological reference: *Acantho mollis-Lauretum nobilis* Gianguzzi, D'Amico & Romano 2010, *Asparago acutifolii-Laurion nobilis Gianguzzi, Cuttonaro, Cusimano & Romano 2010, Que*rcetalia ilicis Br.-Bl. ex Molinier 1934, *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine et Nègre 1952 (Gianguzzi et al. 2016).

Geographic information: Italy, Sicilia, S. Fratello, left bank of Vallone Mascarino, 440 m a.s.l., Coordinates: 38.029877 N, 14.584034 E (Tab. 6, Rel. 1); Italy, Sicilia, Santa Margherita Belice, Contrada Dragonara, 310 m a.s.l., Coordinates: 37.673176 N, 13.018921 E (Tab. 6, Rel. 2); Italy, Sicilia, Santa Margherita Belice, Contrada Dragonara, 315 m a.s.l., Coordinates: 37.673751 N, 13.012809 E (Tab. 6, Rel. 3); Italy, Sicilia, Santa Margherita Belice, Contrada Senia, 345 m a.s.l., Coordinates: 37.674376 N, 13.010698 E (Tab. 6, Rel. 4).

Cell ID in the EEA reference grid: 10kmE472N167 (Tab. 6, Rel. 1); 10kmE458N162 (Tab. 6, Rels 2 to 4) (Fig. 7).

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

Phytosociological table: Tab. 6; taxonomic nomenclature according to Bartolucci et al. (2018).

Notes: The forest formations of *Laurus nobilis* in Sicily have fragmentary and spotted distribution, denoting an evident relictual character (Marino et al. 2014; Romano et al. 2021). From the phytosociological point of view, they are ascribed to *Acantho mollis-Lauretum nobilis*, an association previously referred to the A*rbuto-Laurion nobilis* alliance (Gianguzzi et al. 2010), described by Rivas-Martínez et al. (2001) for the Iberian Peninsula and ascribed to *Pistacio-Rhamnetalia alaterni*. In a more recent study, the same vegetation was re-proposed by Gianguzzi et al. (2016) as a cenosis of the order *Quercetalia ilicis* and for this reason referred to a new alliance, with Tyrrhenian gravitation, described as *Asparago acutifolii-Laurion nobilis* Gianguzzi, Cuttonaro, Cusimano & Romano 2016. The first of the new stations, reported in this work, is located on the Tyrrhenian side of the Nebrodi Mountains, between 430–450 m a.s.l., where it covers about 2000 m². It is localized in the bioclimatic belt of the sub-humid thermo-Mediterranean area, colonizing a cool and shady slope, linked to hydromorphic clayey soils, on a detrital matrix of carbonatic nature (Fig. 8). It is a residual station, which must be added to the other interesting wet sites recently reported for the Nebrodi Mountains (De Castro et al. 2008, 2015; Gianguzzi et al. 2017; Troia et al. 2017) and for other reliefs of the central-western part of Sicily (Caldarella et al. 2009, 2013, 2021; Caruso et al. 2012; Gianguzzi et al. 2009; 2013; De Castro et al. 2008, 2015). The second station is located near Santa Margherita Belice (SW-Sicily), where there are several nuclei, the largest of which is more than 1.5 hectares (Fig. 9). In this area, characterized by calcarenitic substrates, the laurel has a high potential by building dense phytocoenoses in the valleys and gorges as well as creating hedges and borders between the fields that define agricultural landscapes with high diffuse naturalness that are the result of the long interaction between human history and nature of this area of Sicily (Bazan et al. 2019, 2020).

Figure 8. Habitat 5230*: relict aspects of *Laurus nobilis* formation near Vallone Mascarino (S. Fratello, NE Sicily, Italy).

Figure 7. Distribution in Italy of the Habitat 5230*: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013-2018; Eionet 2019).

Table 6. Habitat 5230*.

Relevé number	1	2	3	4	
Cell ID	10kmE472N167	10kmE458N162	10kmE458N162	10kmE458N162	
Latitude	38.029877	37.673176	37.673751	37.674376	
Longitude	14.584034	13.018921	13.012809	13.010698	
Date	2/25/2010	10/23/2021	10/23/2021	10/23/2021	
Area (m²)	100	100	100	100	
Altitude (m a.s.l.)	483	310	315	245	
Exposition	W-NW	NW	NE	NE	
Slope (°)	5	25	40	10	
Cover (%)	100	100	100	100	
Average vegetation height (m)	8	6	10	8	Presences
Charact. and diff. of *Acantho mollis-Lauretum nobilis*					
^*Laurus nobilis* L.	5	5	5	5	4
^*Hedera helix* L.	5	3	4	4	4
Acanthus mollis L.	3	2	3	3	4
Charact. of *Pistacio-Rhamnetalia* and *Quercetea ilicis*					
^*Smilax aspera* L.	2	+	2	1	4
Asparagus acutifolius L.	+	1	1	1	4
Arisarum vulgare Targ.-Tozz.	2	.	+	+	3
Rubia peregrina L.	.	+	1	+	3
Osyris alba L.	.	.	1	+	2
Carex distachya Desf.	.	.	+	+	2
^*Ruscus aculeatus* L	1	.	.	.	1
Olea europaea L. var. *sylvestris* (Mill.) Lehr.	.	1	.	.	1
Rhamnus alaternus L.	.	1	.	.	1
^*Quercus virgiliana* Ten.	.	.	1	.	1
Euphorbia characias L.	.	.	.	+	1
Trasgressives of *Salici-Populetea*					
^*Ulmus minor* Mill.	3	1	1	.	3
^*Ficus carica* L. var. *caprificus* (Risso) Tschirch & Ravasini	.	+	1	1	3
^*Arum italicum* Mill.	1	1	.	.	2
Trasgr. of *Rhamno-Prunetea*					
Rubus gr. *ulmifolius* Schott	3	1	+	1	3
Rosa sempervirens L.	2	+	.	.	2
Rhus coriaria L.	.	1	.	2	2
Solanum dulcamara L.	.	+	.	+	2
Clematis vitalba L.	1	.	.	.	1
Carex pendula Huds.	1	.	.	.	1
Populus nigra L.	.	.	1	.	1
Other species					
Ailanthus altissima (Mill.) Swingle	.	1	1	2	3
Arundo donax L.	.	+	1	1	3
Parietaria judaica L.	.	.	+	+	2
Euonymus europaeus L.	1	.	.	.	1
Pteridium aquilinum (L.) Kuhn.	+	.	.	.	1
Symphytum tuberosum L.	+	.	.	.	1
Helleborus viridis subsp. *bocconei* (Ten.) Peruzzi	2	.	.	.	1
Phytolacca americana L.	.	+	.	.	1
Sonchus tenerrimus L.	.	.	+	.	1
Picris echioides L.	.	.	+	.	1

^ Reference plant species of the Habitat 5230*, from Biondi et al. (2009).

#33. Annex I Habitat: 6410 Molinia meadows on calcareous, peaty or clayey-siltladen soils (*Molinion caeruleae*) (Dagnino D, Mariotti M, Turcato C)

EUNIS Classification system: R27 Temperate and boreal moist or wet oligotrophic grassland (Chytrý et al. 2020).
Biogeographical Region: Alpine
National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).
Phytosociological reference: *Molinion caeruleae* Koch 1926, *Molinietalia caeruleae* Koch 1926, *Molinio-Arrhenatheretea* Tüxen 1937 (Biondi & Blasi 2015)

Geographic information: Italy, Liguria, Imperia, Rio Banea, between 1610 and 1630 m a.s.l., Coordinates: 44.098970 N, 7.728850 E (Tab. 7, Rel. 1); 44.099039 N, 7.729067 E (Tab. 7, Rel. 2).
Cells ID in the EEA reference grid: 10kmE413N233 (Fig. 10).
Natura 2000 Site Code: SAC IT1314610 "M. Saccarello – M. Frontè".
Phytosociological table: Tab. 7; taxonomic nomenclature according to Bartolucci et al. (2018) and later updates and Aleffi et al. (2020).
Notes: The finding occurs during the activities of the Interreg ALCOTRA CoBiodiv and GeBiodiv projects.

Figure 9. Habitat 5230*: *Laurus nobilis* formation at Contrada Dragonara (Santa Margherita Belice, SW Sicily, Italy).

#34. Annex I Habitat: 7140 Transition mires and quaking bogs (Praleskouskaya S, Gigante D, Maneli F, Aleffi M, Poponessi S, Venanzoni R)

EUNIS Classification system: Q25 Non-calcareous quaking mire (Chytrý et al. 2020).
Biogeographical Region: Continental
National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).
Phytosociological reference: *Caricion nigrae* Koch 1926 em. Klika 1934 nom. mut. propos., *Caricetalia nigrae* Koch 1926 nom. mut. propos., *Scheuchzerio palustris-Caricetea nigrae* nom. mut. propos. ex Steiner 1992 (Biondi et al. 2014).
Geographic information: Italy, Umbria, Perugia, Pian Piccolo (Castelluccio di Norcia), 1332 m a.s.l., coordinates in Tab. 8 (Rels 1 to 8), and Pian Grande (Castelluccio di Norcia), 1274 m a.s.l., coordinates 42.783461 N, 13.200544 E (Tab. 8, Rels 9 and 10).
Cell ID in the EEA reference grid: 10KmE458N219 (Fig. 11)
Natura 2000 Site Code: IT5210071 "Monti Sibillini (versante umbro)".
Phytosociological table: Tab. 8; taxonomic nomenclature according to Pignatti et al. (2017–2019) and Aleffi et al. (2020).
Notes: Two residual monospecific populations of *Sphagnum*, probably relict of the late glacial period (Brugiapaglia 2007), are found in wet karst sink-hole environment, in the Sibillini Mountains (Central Italy) at an altitudinal range from 1274 m a.s.l. on Pian Grande, to 1332 m a.s.l. on Pian Piccolo (Aleffi and Cortini Pedrotti 1998). Here, they represent the southern limit of the peat-bog vegetation of the continental and boreo-alpine European vegetation, and therefore have a great value from a biogeographical point of view. Since this Habitat is located outside its optimum range, it shows a strong impoverishment of the floristic composition and a loss in characteristic/diagnostic species: in fact, it is represented here by small and fragmented plant communities, allowing only a weak formal syntaxonomic classification.

Figure 10. Distribution in Italy of the Habitat 6410: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013–2018; Eionet 2019).

Table 7. Habitat 6410.

Relevé number	1	2	
Cell ID	10kmE413N233	10kmE413N233	
Latitude	44.098970	44.099039	
Longitude	7.728850	7.729067	
Date	8/7/2020	8/7/2020	
Area (m²)	16	16	
Altitude (m a.s.l.)	1621	1615	
Exposition	NE	NE	
Slope (°)	22	19	
Cover Total (%)	100	100	
Cover arboreal layer (%)	0	0	
Cover shrubby layer (%)	0	0	
Cover herbaceous layer (%)	100	100	
Cover bryophytic layer (%)	50	50	Presence
Molinion caeruleae, Molinietalia caeruleae, Molinio-Arrhenatheretea			
^*Molinia caerulea* (L.) Moench	3	3	2
^*Potentilla erecta* (L.) Raeusch.	2	2	2
Geum rivale L.	2	2	2
^*Succisa pratensis* Moench	+	1	2
Caltha palustris L.	1	1	2
^*Crepis paludosa* (L.) Moench	+	+	2
Lathyrus pratensis L. subsp. *pratensis*	+	1	2
^*Deschampsia cespitosa* (L.) P. Beauv. subsp. *cespitosa*	+	.	1
Briza media L.	+	.	1
Plagiomnium elatum (Bruch & Schimp.) T.J.Kop.	.	3	1
Plagiomnium rostratum (Schrad.) T.J.Kop.	3	.	1
Calliergonella cuspidata (Hedw.) Loeske	1	.	1
Climacium dendroides (Hedw.) F.Weber & D.Mohr	.	1	1
Other species			
Carex paniculata L. subsp. *paniculata*	3	4	2
Agrostis stolonifera L. subsp. *stolonifera*	2	+	2
Vicia cracca L.	1	1	1
Alchemilla connivens Buser	1	1	2
Equisetum arvense L.	+	1	2
Epilobium palustre L.	+	+	2
Mentha longifolia (L.) L.	2	.	1
Blysmus compressus (L.) Panz. ex Link	1	.	1
^*Viola palustris* L.	+	.	1
^*Swertia perennis* L.	.	1	1
Carex lepidocarpa Tausch subsp. *lepidocarpa*	.	+	1

^ Reference plant species of the Habitat 6410, from Biondi et al. (2009).

Figure 11. Distribution in Italy of the Habitat 7140: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013–2018; Eionet 2019).

Table 8. Habitat 7140.

Relevé number	1	2	3	4	5	6	7	8	9	10	
Cell ID	10Km E458N219	10Km E458N219	10Km E458N219	10Km E458N219	10Km E458N219	10Km E458N219	10Km E458N219	10Km E458N219	10Km E458N219	10Km E458N219	
Latitude	42.771444	42.771444	42.771248	42.769612	42.769768	42.769612	42.769612	42.769768	42.783461	42.783461	
Longitude	13.209061	13.209061	13.208714	13.206654	13.206705	13.206654	13.206654	13.206705	13.200544	13.200544	
Date	Jul-20	Jul-20	Jul-20	Jul-20	Jul-20	Jul-20	Jul-20	Jul-20	Jul-20	Jul-20	
Area (m^2)	1.2	1	4	1	1	1	1	1	1	1	
Altitude (m a.s.l.)	1332	1332	1332	1332	1332	1332	1332	1332	1274	1274	
Cover (%)	100	100	90	90	100	100	90	100	100	100	Presence
Diagnostic species											
^*Sphagnum subsecundum* Nees ex Sturm	5	5	4	4	5	5	4	5	.	.	7
^*Sphagnum platyphyllum* (Lindb. ex. Braithw.)	.	.	.	.	.	.	.	.	5	5	2
Aulacomnium palustre (Hedw.) Schwägr.	.	2	1	.	.	.	.	.	.	.	2
Caricetalia nigrae											
Veronica scutellata L.	2	.	.	+	1	1	2	1	3	3	7
Agrostis canina L.	4	2	1	.	1	.	3	.	.	+	5
Ranunculus flammula L.	2	.	.	.	+	+	.	+	+	+	5
Carex echinata Murray	.	.	.	.	+	.	.	+	.	.	2
Luzula multiflora (Ehrh.) Lej.	.	.	.	+	.	.	.	.	.	.	1
Magnocaricetalia elatae											
Carex acuta L.	3	2	1	1	2	3	2	3	4	4	9
Carex vesicaria L.	1	.	.	1	1	4	2	1	+	+	7
Carex buxbaumii Wahlenb.	.	.	.	.	+	.	.	.	.	.	1
Galium debile Desv.	.	.	.	.	.	.	.	.	2	2	2
Nardo-Callunetea											
Potentilla erecta (L.) Raeusch.	.	3	4	+	1	.	.	.	.	.	4
Nardus stricta L.	.	5	5	3	1	.	.	.	.	.	4
Danthonia decumbens (L.) DC.	.	+	1	.	+	.	.	.	.	.	3
Other species											
Deschampsia cespitosa (L.) P. Beauv.	.	.	.	+	2	.	2	2	.	.	4
Scorzoneroides autumnalis (L.) Moench	1	.	3	+	+	.	.	+	.	.	4
Sanguisorba officinalis L.	.	+	+	.	1	.	.	.	.	.	3
Festuca rubra L.	.	.	.	+	.	.	.	.	.	.	1
Narcissus poëticus L.	.	.	+	.	.	.	.	.	.	.	1
Polytrichum commune Hedw.	.	.	1	.	.	.	.	.	.	.	1

^ Reference plant species of the Habitat 7140, from Biondi et al. (2009).

Ten original relevés (Tab. 8) were made according to Braun-Blanquet's (1979) method and the Handbook for monitoring species and habitats of community interest in Italy (Angelini et al. 2016). Relevés 1–8 (Tab. 8), located on Pian Piccolo, can be attributed to vegetation of the *Caricion nigrae* alliance and interpreted as an assemblage of Aulacomium palustre and *Sphagnum subsecundum* (according to Biondi et al. 2009), while the relevés 9-10 (Tab. 8), located on Pian Grande, can be attributed to the *Caricetum gracilis*, within which the carpet of *Sphagnum platyphyllum* develops (Pedrotti et al. 2004; Venanzoni and Gigante 2007; Aleffi et al. 2016). The bog, in the most flooded core areas, is also characterized by species of *Magnocaricetalia elatae*, while in the drier external areas is characterized by species of *Nardo-Callunetea.* The environmental conditions, in which such vegetation develops, involve not only meteoric waters, but also those of groundwater and surface flow, as in minerotrophic fens; moreover, for macroclimatic reasons (i.e. reduction of rainfall), high levels of water stress are reached during the summer period, in which *Sphagnum* dries completely (Aleffi et al. 2016). The critical issues for this Habitat are mainly attributable to the anthropogenic influence (mowing, grazing and transit of livestock).

#35. Annex I Habitat: 7220* Petrifying springs with tufa formation (Cratoneurion) (Poponessi S, Gigante D)

EUNIS Classification system: C2.121 Petrifying springs with tufa or travertine formations
Biogeographical Region: Continental
National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).
Phytosociological reference: *Cratoneurion commutati* Koch 1928, *Montio-Cardaminetalia* Pawłowski et al. 1928, *Montio-Cardaminetea* Br.-Bl. et Tx. ex Klika et Hadac 1944; the syntaxonomic frame is in accordance with Mucina et al. (2016).
Geographic information: Italy, Marche, Macerata, Fiuminata, W side of Mount Finiglia, 749 m a.s.l., Coordinates: 43.127817 N, 12.885968 E (Tab. 9, Rels 1 to 5).
Cell ID in the EEA reference grid: 10kmE455N222 (Fig. 12).
Nature 2000 Site Code: SAC IT5330020 "Monte Pennino-Scurosa".
Phytosociological table: Tab. 9; taxonomic nomenclature for vascular species in accordance with Portale della Flora d'Italia (2021), for bryophytes with Aleffi et al. (2020).
Notes: the 7220* stand reported here covers an area of about 50 m² and is located in a cool and shady gully, below a tree layer dominated by *Ostrya carpinifolia* Scop. (Fig. 13). Water is permanently dripping also in summer (Fig. 14).

#36. Annex I Habitat: 9320 Olea and Ceratonia forests (Gianguzzi L, Bazan G)

EUNIS Classification system: T24 (formerly: G2.4) *Olea europaea-Ceratonia siliqua* forest (Chytrý et al. 2020).
Biogeographical Region: Mediterranean
National Habitat Checklist of reference: Manuale Italiano di interpretazione degli habitat della Direttiva 92/43/CEE (Biondi et al. 2009).

Figure 12. Distribution in Italy of the Habitat 7220*: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013-2018; Eionet 2019).

Table 9. Habitat 7220*.

Relevé number	1	2	3	4	5	
Cell ID	10kmE455N222	10kmE455N222	10kmE455N222	10kmE455N222	10kmE455N222	
Latitude	43.127817	43.127817	43.127817	43.127817	43.127817	
Longitude	12.885968	12.885968	12.885968	12.885968	12.885968	
Date	7/21/2021	7/21/2021	7/21/2021	7/21/2021	7/21/2021	
Area (cm²)	20x20	20x20	20x20	20x20	20x20	
Altitude (m a.s.l.)	749	749	749	749	749	
Exposition (°)	15	15	20	30	15	
Slope (°)	70	80	90	90	75	
Cover Total (%)	95	95	85	85	90	
Cover moss layer (%)	95	95	85	84	90	
Cover herb layer (%)	95	95	0.1	1	0.1	
Calcareous concretion (%)	20	30	5	15	15	Presence
Typical species of *Cratoneurion commutati*, *Montio-Cardaminetalia*, *Montio-Cardaminetea*						
^*Palustriella commutata* (Hedw.) Ochyra	5	5	5	5	5	5
^*Pellia epiphylla* (L.) Corda subsp. *epiphylla*	.	.	+	1	.	2
Other bryophyte species						
Eucladium verticillatum (With.) Bruch & Schimp.	2a	2b	1	1	2b	5
Aneura pinguis (L.) Dumort.	1	1	.	.	.	2
Other vascular species						
Fraxinus ornus L. subsp. *ornus* (*plantulae*)	.	.	+	+	+	3
Lonicera caprifolium L.	.	.	.	1	.	1
Teucrium chamaedrys L. subsp. chamaedrys	.	.	.	+	.	1
Brachypodium sylvaticum (Huds.) P.Beauv. subsp. *sylvaticum*	.	.	.	+	.	1

^ Reference plant species of the Habitat 7220*, from Biondi et al. (2009).

Phytosociological reference: *Chamaeropo humilis-Oleetum sylvestris* Gianguzzi et Bazan 2019, *acanthetosum mollis* Gianguzzi et Bazan 2019, O*leo sylvestris-Ceratonion siliquae* Br.-Bl. ex Guinochet et Drouineau 1944, *Pistacio lentisci-Rhamnetalia alaterni* Rivas-Martínez 1975, *Quercetea ilicis* Br.-Bl. in Br.-Bl., Roussine et Nègre 1952 (Biondi and Blasi 2015).

Geographic information: Italy, Sicilia, Sciacca, Monte S. Calogero, 230 m a.s.l., Coordinates: 37.524238 N, 13.131250 E (Tab. 10, Rel. 1) and 37.523987 N, 13.130899 E (Tab.10, Rel. 2).

Cell ID in the EEA reference grid: 10kmE459N161 (Fig. 15).

Figure 13. Overview of the habitat 7220* in the reported stand (Fiuminata, MC); the dominance of *Palustriella commutata* is evident.

Natura 2000 Site Code: SAC ITA040009 "Monte San Calogero (Sciacca)".

Phytosociological table: Tab. 10; taxonomic nomenclature according to Bartolucci et al. (2018).

Notes: The forest communities in *Olea europaea* L. var. *sylvestris* (Mill.) Lehr. in Sicily and in the Mediterranean area in recent years have been the subject of phytosociological studies (Gianguzzi and Bazan 2019, 2020), which dealt with the syntaxonomic characterization of these cenoses and their respective distribution. In particular, the wild olive forests of Sicily have been attributed to three distinct associations and referred to two distinct alliances of the *Quercetea ilicis* class. In fact, two of them (*Ruto chalepensis-Oleetum sylvestris* Gianguzzi & Bazan 2019 and *Chamaeropo humilis-Oleetum sylvestris* Gianguzzi & Bazan 2019) denote a thermophilous character (infra- and thermomediterranean bioclimatic belts) and has been ascribed to the *Oleo-Ceratonion* alliance (order *Pistacio lentisci-Rhamnetalia alaterni*, both linked to basyphilous substrates; the third association (*Calicotomo infestae-Oleetum sylvestris* Gianguzzi & Bazan 2019), more mesophilous (mesoomediterranean bioclimatic belt), is instead ascribed to *Erico-Quercion ilicis* alliance (order *Quercetalia ilicis*), typical of acidophilous substrates (metamorphites, quartzarenites, etc.). This led to a subsequent update of the distribution of the habitat 9320 in Sicily (Gianguzzi et al. 2020; Rivieccio et al. 2020; Bazan et al. 2021), in the same way as other scrub formations reported for the western part of Sicily and the small islands (e.g., Caldarella et al. 2011; Gianguzzi et al. 2011, 2012, 2014a, 2014b, 2015, 2018; Gianguzzi and La Mantia 2009;

La Rosa et al. 2021; Romano et al. 2006; etc.), leading to an implementation of the 4th Italian Report of Habitats. The reported station is located along the coastal belt of the southern Sicily, falling within the Natural Reserve of Monte San Calogero (Monte Kronio) and the SAC ITA040009 "Monte San Calogero (Sciacca)" (Fig. 16), on carbonate substrates located in the dry thermo-Mediterranean bioclimatic belt (Bazan et al. 2015).

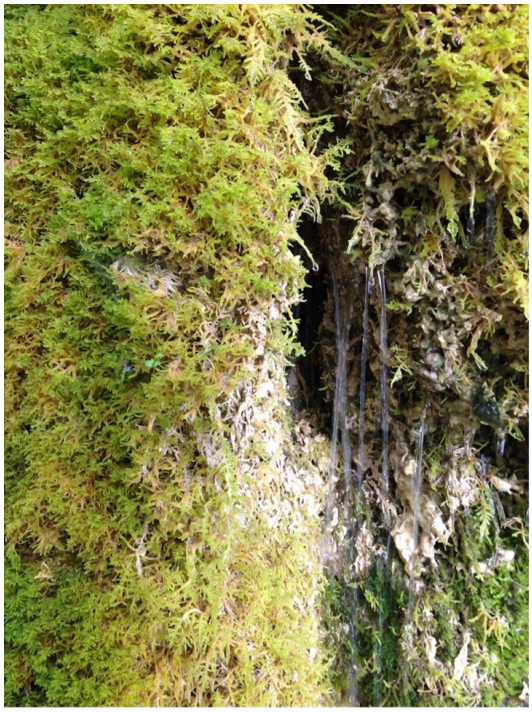

Figure 14. Detail of the habitat 7220* in the reported stand (Fiuminata, MC); dripping water occurs also in summer.

Figure 15. Distribution in Italy of the Habitat 9320: in black the new cell, in grey the cells officially reported in the 4th Habitat report ex-Art. 17 (period 2013–2018; Eionet 2019), in white (black outline) the cells later reported by Gianguzzi et al. (2020) and Bazan et al. (2021).

Table 10. Habitat 9320.

Relevé number	1	2	
Cell ID	10kmE459N161	10kmE459N161	
Latitude	37.524238	37.523987	
Longitude	13.131250	13.130899	
Date	4/28/2021	4/28/2021	
Area (m²)	150	150	
Altitude (m a.s.l.)	220	230	
Exposition	SE	SE	
Slope (°)	30	40	
Cover (%)	100	95	
Average vegetation height (m)	6	6.5	Presences
^*Olea europaea* L. var. *sylvestris* (Mill.) Lehr.	5	5	2
Charact. and diff. of *Chamaeropo humilis-Oleetum sylvestris acanthetosum mollidis*			
^*Chamaerops humilis* L.	1	2	2
Charact. and diff. of *Ruto chalepensis-Oleetum sylvestris oleetosum sylvestris*			
Ruta chalepensis L.	1	1	2
^*Pistacia terebinthus* L. subsp. *terebinthus*	1	.	1
Charact. of *Pistacio lentisci-Rhamnetalia alaterni* and *Oleo sylvestris-Ceratonion siliquae*			
Euphorbia dendroides L.	2	3	2
Teucrium fruticans L. subsp. *fruticans*	2	3	2
^*Stachys major* (L.) Bartolucci & Peruzzi	2	1	2
^*Asparagus albus* L	2	2	2
Pistacia lentiscus L.	1	2	2
Charact. of *Quercetea ilicis*			
Arisarum vulgare O.Targ.Tozz. subsp. *vulgare*	3	2	2
Rubia peregrina L.	2	1	2
Allium subhirsutum L. subsp. *subhirsutum*	2	1	2
Osyris alba L.	1	2	2
Ampelodesmos mauritanicus (Poir.) T.Durand & Schinz	+	+	2
Calicotome infesta (C.Presl) Guss. subsp. *infesta*	1	.	1
Other species			
Arum italicum Mill. subsp. *italicum*	2	1	2
Hyparrhenia hirta (L.) Stapf subsp. *hirta*	1	+	2
Phagnalon saxatile (L.) Cass.	1	+	2
Oxalis pes-caprae L.	+	1	2
Brachypodium distachyon (L.) P. Beauv.	+	1	2
Asphodelus ramosus L. subsp. *ramosus*	+	1	2
Micromeria graeca (L.) Rchb. subsp. *graeca*	+	1	2
Charybdis maritima (L.) Speta	+	1	2
Andropogon distachyos L.	+	+	2
Bituminaria bituminosa (L.) E.H.Stirt.	1	.	1
Petrosedum sediforme (Jacq.) Grulich	+	.	1
Capparis spinosa L.	+	.	1

^ Reference plant species of the Habitat 9320, from Biondi et al. (2009).

Figure 16. Habitat 9320, *Olea europaea* L. var. *sylvestris* formation at Monte San Calogero (Sciacca, SW-Sicily, Italy).

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