

Information Sheet on Ramsar Wetlands

Categories approved by Recommendation 4.7 of the Conference of the Contracting Parties.

NOTE: It is important that you read the accompanying *Explanatory Note and Guidelines* document before completing this form.

1. Date this sheet was completed/updated:

26.10.98

For office use only.

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Designation date

Site Reference Number

2. Country:

Italy

3. Name of wetland:

Fogliano

4. Geographical coordinates:

41° 23' North; 12° 54' East

5. Altitude: (average and/or max. & min.) 0 m a.s.l.

6. Area: (in hectares) 395 ha

7. Overview: (general summary, in two or three sentences, of the wetland's principal characteristics)

It is the most northern of the lakes in the Circeo National Park and is connected to the sea by two outlets. On the western side there are recent coastal sand dunes whilst the other banks and the lake bed are composed of clayey limno-palustric sediments with peat soil, followed by inland dunes.

8. Wetland Type: (please circle the applicable codes for wetland types as listed in Annex I of the *Explanatory Note and Guidelines* document)

marine-coastal: A - B - C - D - E - F - G - H - I - J - K

inland: L - M - N - O - P - Q - R - Sp - Ss - Tp

Ts - U - Va - Vt - W - Xf - Xp - Y - Zg - Zk

man-made: 1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 - 9

Please now rank these wetland types by listing them from the most to the least dominant:

9. Ramsar Criteria: (please circle the applicable criteria; see point 12, next page.)

1a - lb - lc - 1d / 2a - 2b - 2c - 2d / 3a - 3b - 3c / 4a - 4b

Please specify the most significant criterion applicable to the site:

10. Map of site included? Please tick *yes* X- or - *no*

(Please refer to the *Explanatory Note and Guidelines* document for information regarding desirable map traits)

11. Name and address of the compiler of this form:

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Please provide additional information on each of the following categories by attaching extra pages (please limit extra pages to no more than 10):

12. Justification of the criteria selected under point 9, on previous page. (Please refer to Annex II in the *Explanatory Note and Guidelines* document)

Refer to attached publications.

13. General location: (include the nearest large town and its administrative region)

Coastal plain in the Lazio Region along the Tyrrhenian Sea and within the Province of Latina. The nearest towns are Latina (population 110,000) and Sabaudia (population 15,000).

14. Physical features: (e.g. geology, geomorphology; origins - natural or artificial; hydrology; soil type; water quality; water depth; water permanence; fluctuation in water level; tidal variations; catchment area; downstream area; climate)

Geology: The entire coastline is formed by a succession of clayey and clayey-sandy deposits with interbedding of peat soils and marshy deposits from the Quaternary era. The area is globally referred to by the term “red dunes” or old dunes, delimited to the west by a strip of recent dunes.

Geomorphology: The current situation has been influenced enormously by the major modifications which were performed during land reclamation works in the 1930’s. All the surface water has been collected in a network of channels by rectifying the routes of the water courses, pumping and filling depressions. This caused a complete transformation of the area, which was previously characterised by troughs and depressions (with differences in level of about 30 m) due to the contraposition of old lines of dunes. At present, the coastal strip is relatively flat with man-made embankments which define both the water courses and the lakes.

Hydrology: The lake waters are brackish, tending towards salty, and the level of salinity varies between the summer and winter months. The channels collect the surface waters, with ducite characteristics. Some of the channels have an invert level lower than that of the sea, which causes the ascent of sea water for quite a long distance and a partial interference with the more superficial aquifer. Contamination with brackish water can therefore occur.

Land Types: The land types can be defined as follows:

- a) Non-agricultural land on recent dunes: Sand deposits which are strongly affected by the actions of the wind and salt. This gives rise to soils which are not very “mature”, lacking in organic substances and generally devoid of vegetation.
- b) Non-agricultural land on recent dunes: Similar to the previous land type but with a slightly greater content of organic substances. However, the land is still not very “mature”.
- c) Agricultural and pasture land: Fine lacustrine deposits mixed with fill material taken from the coastal dunes, giving rise to acidic peat soils.

d) Agricultural land: Reddish-yellow soils. Sandy, subacid soils resulting from Quaternary dunes, with little organic substance and clear signs of leaching.

Water Quality: The water table lies at a shallow depth, appearing at the surface at some points. The surface waters are mostly chlorides and alkaline-earth sulphates, and occasionally bicarbonate alkaline-earth. In some cases there is salt water contamination. It should be noted that the surface waters are subject to sudden changes in the values of the various parameters.

Fluctuations in Water Level: During the period immediately following the dry summer months there is a slight lowering of the water table due to low rainfall coinciding with intense exploitation of the water for irrigation purposes in the neighbouring areas. The fluctuation follows a cyclical trend that appears to be in equilibrium. However, what is more noticeable is the difference between the current level of the water table and that of 15 to 20 years ago, which shows a general lowering of the piezometric level as a result of the reclamation for agricultural use and the increase in water consumption.

Tides: The tide changes approximately every 6-6½ hours, with a range of between 12cm and 14cm.

Watershed: The numerous studies carried out have shown that the area is formed of a layer of sandy-clayey lenticular sediments which run parallel to the coastline. The presence of the interface fresh water-sea water makes it difficult to prepare a hydrological balance.

Downstream: Tyrrhenian Sea.

Upstream: Lepini, Ausoni and Aurunci mountain ranges. Water table lying on fractured calcareous material, with high secondary permeability which supplies a series of springs at the foot of the mountain ranges.

Climate: Mild, Mediterranean type climate, with rainfall concentrated in the autumn/winter period and relatively high temperatures. The summer months are dry. The rainfall between October and February generally corresponds to approximately 60% of the annual total whilst the rainfall between June and August reaches about 10%.

The average annual rainfall is approximately 900 mm. The driest month is July. The difference between the minimum and maximum monthly temperatures is quite low (usually less than 10°C). The humidity of the area is particularly high.

15. Hydrological values: (groundwater recharge, flood control, sediment trapping, shoreline stabilisation etc.)

See above.

16. Ecological features: (main habitats and vegetation types)

Behind the dunes: The vegetation is mostly arboreal with mixed, perennial, xeric species, including: *Ulmus minor*, *Populus sp.*, *Fraxinus excelsior*, *Juniperus oxicedrus*, *Pistacia lentiscus*, *Smilax aspera*, *Phyllirea latifolia*, etc.

Halophyte shores: These are occupied mostly by *Fragmitetia* and *Tifetia* (with partially flooded soil) situated near the fresh water pools and channels.

Fresh water marshes: In general, these areas were previously pasture lands and are characterised by the presence of species which adapt well to temporary flooding (after

rainfall). Herbaceous and grass species prevail, with clumps of *Juncus acutus* sometimes covering the entire surface area, which is also subject to periodic flooding.

Hedges and scrub: Rows of Eucalyptus and Pine Trees which were introduced during the land reclamation works.

17. Noteworthy flora: (indicating, e.g., which species/communities are unique, rare, endangered or biogeographically important, etc.)

The bed of Lake Fogliano is often covered with aquatic macrophyte with a predominance of *Potamogeton pectinatus* and epiphyte algae.

Large groups of *Phragmites australis* can be found along the banks of the lake, channels and ditches, together with *Calamagrostis pseudophragmites*. Also widespread are reed beds in which the following species can most often be found: *Juncus effusus*, *J. acutus*, *J. compressus*, *Scirpus maritimus*, *S. holoschoenus*, *S. lacustris*, *Cyperus longus*, *Carex extensa*, *C. otrubae*, *C. vulpina*. Sporadic clumps of *Typha latifolia* can also be found.

The following groups can be found in the areas of greatest salinity: *Inula crithmoides*, *Atriplex hastata*, *Halimione portulacoides* and *Suaeda maritima*, and it is also possible to find *Limonium vulgare*. *Parapholis incurva*, *Eleocharis acicularis* and *Aster tripolium* can be found in the marshes. Large groups of *Salicornia europaea* can be found, as well as colonies of *Paspalum paspaloides*. The most important flora in the area are: *Carex extensa*, *Cymodocea nodosa*, *Cyperus fiavescens*, *Eichornia crassipes*, *Juncus acuriflorus*, *Junco gerardi*, *Juncus subulatus*, *Lysimachia nummularia*, *Ruppia cirrhosa*, *Spirodela polyrrhiza*, *Ruppia maritima*, *Callitriche brutia*, *Eleocharis acicularis*, *Eleocharis multicaulis*, *Hippuris vulgaris*, *Hydrocharis morsus-ranae*, *Lythrum borystenicum*.

18. Noteworthy fauna: (indicating, e.g., which species are unique, rare, endangered, abundant or biogeographically important; include count data, etc.)

Fish: A variety of fish life exists in the lake. The most common species are: *Anguilla anguilla*, *Atherina hepsetus* and *A. bojeri*, *Mugil cephalus*, *Dicentrarchus labrax*, *Diplodus sargus*, *Sparus auratus*, *Solea vulgaris vulgaris*. The following species of fresh water fish also thrive in the channels connecting the lagoon with the external area: *Tinca tinca*, *Carassius carassius*, *Cyprinus carpio*, *Gambusia holbrooki*, *Aphanius fasciatus*, *Knipowitschia panizzae* (*Padogobius panizzai*), *Rutilus rubilio*.

Amphibians: *Triturus carnifex*, *Rana italica*, *Bufo viridis*, *Hyla arborea*.

Reptiles: *Testudo hermanni*, *T. graeca*, *T. marginata*, *Emys orbicularis*, *Podarcis muralis*, *Elaphe quatorlineata*, *E. longissima*, *Coronella austriaca*, *Coluber viridiflavus*, *Natrix natrix*, *N. tessellata*.

Birds: The coastal lake of Fogliano and the surrounding areas represent a resting area for many species of birds during migration and the winter months, as well as an ideal breeding habitat. The following breeding species can be found: *Ixobrychus minutus*, *Gallinula chloropus*, *Cettia cetti*, *Cisticola juncidis*, *Acrocephalus arundinaceus*, *A. scirpaceus*, *Anas platyrhynchos*, *A. querquedula*, *Rallus aquaticus*, *Porzana parva*, *Alcedo atthis*.

During migration and in the winter months the following species can be seen: *Gavia arctica* (rarely), *Podiceps cristatus*, *P. nigricollis*, *Tachybaptus ruficollis*, *Phalacrocorax carbo* (the Circeo National Park represents one of the most important areas on mainland Italy for the wintering of this species), *Egretta garzetta*, *Ardeola ralloides*, *Ardea cinerea*, *A. purpurea*, *Nycticorax nycticorax*, *Ciconia ciconia* (irregular during migration), *Ciconia nigra*

(irregular), *Platalea leucorodia* (irregular during migration), *Phoenicopus ruber* (occasional presence), *Anser anser*, *Anas platyrhynchos*, *A. strepera*, *A. acuta*, *A. penelope*, *A. crecca*, *A. querquedula*, *A. clypeata*, *Tadorna tadorna*, *Tadorna ferruginea* (occasional presence), *Netta rufina* (rarely), *Aythya fuligula*, *A. marila*, *A. ferina*, *A. nyroca*, *Bucephala clangula*, *Somateria mollissima*, *Mergus serrator*, *Grus grus* (rarely), *Porzana parva*, *Gallinula chloropus*, *Fulica atra*, *Vanellus vanellus*, *Charadrius hiaticula*, *C. dubius*, *C. alexandrinus* (rarely), *Pluvialis apricaria*, *Arenaria interpres*, *Gallinago gallinago*, *G. media*, *Lymnocyptes minimus*, *Numenius arquata*, *N. phaeopus*, *Limosa limosa*, *Actitis hypoleucos*, *Tringa totanus*, *T. erythropus*, *T. nebularia*, *T. stagnatilis*, *Philomachus pugnax*, *Calidris alpina*, *C. ferruginea*, *C. minuta*, *C. temminckii*, *C. alba*, *Recurvirostra avosetta*, *Himantopus himantopus*, *Burthinus oedicephalus*, *Larus canus*, *L. genei*, *L. melanocephalus*, *Chlidonias niger*, *Sterna sandvicensis*, *S. hirundo*, *S. caspia*, *S. albifrons*, *Locustella luscinioides*, *Acrocephalus melanopogon*, *Emberiza schoenicus*. The following birds of prey are present: *Circus aeruginosus*, *Pandion haliaetus* as well as other species more typical of the National Park forests, such as: *Buteo buteo*, *Accipiter nisus*, *Pernis apivorus*, *Falco eleonora*, *F. subbuteo*, *F. tinnunculus*, *F. vespertinus*. There are also numerous *Strigidae* including *Asio flammeus*

Mammals: *Vulpes vulpes*, *Meles meles*, *Hystrix cristata* and numerous micro-mammals.

19. Social and cultural values: (e.g. fisheries production, forestry, religious importance, archaeological site etc.)

Social and recreational activities.

Fisheries.

Cheese products.

Archeological sites: numerous prehistoric finds have been made and there are significant, important Roman remains (villas, fountains, canals, statues).

20. Land tenure/ownership of: (a) site (b) surrounding area

(a) 70% Ministry of Agricultural Policies – ex ASFD management

30% Privately owned

(b) 100% Privately owned

21. Current land use: (a) site (b) surroundings/catchment

Extensive fishing industry.

Buffalo breeding.

Recreational, environmental education.

Bird-watching.

22. Factors (past, present or potential) adversely affecting the site's ecological character, including changes in land use and development projects: (a) at the site (b) around the site

The adverse factors have been greatly reduced following the inclusion of the area in the Circeo National Park. Previously, the zone was a hunting reserve and the lakes were exploited intensively for fishing and mussel farming. The greatest threat at present is the uncontrolled exploitation of the nearby areas for tourism which has caused a depletion of the plant cover of the coastal dunes (with consequent erosion phenomena) and the dumping of litter. The excessive human presence during the summer months has also caused pollution of the water table and the coastal waters.

23. Conservation measures taken: (national category and legal status of protected areas - including any boundary changes)

which have been made: management practices; whether an officially approved management plan exists and whether it has been implemented)

Inclusion in the Circeo National Park and successive expropriation order. The acquisition of the area has permitted a more precise conservation plan to be implemented, immediately eliminating the hunting (the area was previously a hunting reserve) and limiting human activities to ensure compatibility with conservation requirements.

Management plan: Islands are planned for bird life breeding, the restoration (at least partly) of the natural shoreline conditions, creation of small pools of freshwater (both permanent and temporary), control and revitalisation of the water system by dredging and possibly excavation of channels, pumping etc to avoid eutrophic phenomena.

Extensive fishing: Controlled fishing of bass, gilthead, eel, grey mullet, sole etc. is practised. Size of the catch is extremely variable depending on the season and the tides.

Animal breeding: One of the most widespread activities on the wetland pastures near the lakes is the breeding of buffalo, a species which has adapted perfectly well to the Pontine habitat. High quality dairy products are produced which are in great demand. With an extensive breeding it is possible to reconcile conservation and economic requirements.

Monitoring Units: Measurements are taken of temperature, humidity, wind speed and direction, rainfall, dissolved oxygen etc. enabling the state of “health” of the area to be evaluated.

Restoration and Opening of Botanical Gardens for the Blind.

Setting-up of a laboratory for natural biology and plant ecology in the Villa di Fogliano.

Setting-up of a conference centre in Borgo di Fogliano.

24. Conservation measures proposed but not yet implemented: (e.g. management plan in preparation; officially proposed as a protected area etc.)

Improvement of water circulation in the lake.

Dredging of tidal canals.

Restoration of the banks and canals.

Formation of freshwater pools.

Preparation of nature trails and observation points on the banks.

Construction of pipeline to carry sea water into the lake.

Construction of an aquarium in Borgo di Fogliano and a recovery centre for injured birds.

25. Current scientific research and facilities: (e.g. details of current projects; existence of field station etc.)

Laboratory of nature biology and plant ecology.

Laboratory of hydrobiology.

Conference centre.

Exhibition hall for environmental subjects.

Accommodation for researches and students.

Library and cinema.

26. Current conservation education: (e.g. visitors centre, hides, information booklet, facilities for school visits etc.)

Botanical gardens.

Conference centre.

Exhibition hall.

Nature trails.

27. Current recreation and tourism: (state if wetland is used for recreation/tourism; indicate type and frequency/intensity)

Tourist activities are concentrated mostly in the spring and summer. The guided visits are organised by co-operatives, trails have been set-up (one of which has information boards for the blind) and signposts installed to increase awareness of the area.

28. Jurisdiction: (territorial e.g. state/region and functional e.g. Dept of Agriculture/Dept. of Environment etc.)

State: Italy; Region: Lazio; Province: Latina; Local Councils: Sabaudia and Latina.

29. Management authority: (name and address of local body directly responsible for managing the wetland)

Ministry for Agricultural, Food and Forestry Policies, management by ex ASFD., Via Carducci 5, Rome.

30. Bibliographical references: (scientific/technical only)

- Izzo G. Creo C., Grosso M., Silvestri C. *Indagine biogeochimica sui laghi costieri di Fogliano e Caprolace* (Biogeochemical studies on the coastal lakes of Fogliano and Caprolace).
- Cignini I., Falcucci M., Hull V., Sisi R. *Rappresentazioni modellistiche della dinamica trofica delle comunità planctoniche delle lagune del Parco nazionale del Circeo* (Dynamic trophic model of the plankton community in the lagoons of Circeo National Park).
- La Mura V., Spezie G. *Caratteristiche idrodinamiche della Laguna di Sabaudia. Risultati preliminari* (Hydrodynamic characteristics of the lagoons of Sabaudia – Preliminary results).
- Focardi S., Fossi M.C., Leonzio C., Lari L., Casini S., Corsolini S. *Applicazione di indicatori biologici della qualità delle acque nello studio del sistema dei laghi pontini* (Application of biological water quality indicators in a study of the Pontine lakes).
- Perdicaro R. *Livelli di metalli nella vongola verace del Lago di Fogliano* (Level of metals in the clams in Lake Fogliano).
- Mancini L., Dal Cero C., Volterra L. *Qualità microbiologica del lago di Fogliano ai fini del suo sfruttamento idrico* (Microbiological quality of Lake Fogliano relative to its use as a water resource).
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- Giorgi U., Maccaroni A., Massa M., Ceccaroli C., Panella S. *Alcune considerazioni preliminari sulla comunità zooplanctonica dei Lago di Fogliano* (Preliminary observations on the plankton community of Lake Fogliano).
- Zerunian S. *Indagine faunistica sui pesci del Parco nazionale del Circeo (Osteichthyes, Teleostei)* (Studies on the fish in Circeo National Park).
- Gibertibi G., Zerunian S. *Studi sull'alimentazione del Cormorano nel P.N. del Circeo* (Study on cormorant feeding habits in Circeo National Park).
- Massa F., Maccaroni A., Mariani A., Della Seta G., Giorgi U., Brizzi G., Panella S. *Scelte alimentari dei giovani di Mugilidi all'intero del lago di Fogliano* (Feeding of young Mugilidi in Lake Fogliano).
- Minervini R. *Nuove forme produttive in vallicoltura: esperienze in corso presso l'Istituto Brunelli di Sabaudia* (New productive methods for lagoon fish breeding: experience of Brunelli Institute in Sabaudia).

- Corbi F. *Risultati dei censimenti invernali degli uccelli acquatici nei laghi del P.N. del Circeo (1981-1995). Elementi per la gestione* (Results of census of wintering waterbirds in the lakes of Circeo National Park 1981-1995).
 - Allavena S. *Le indicazioni della ricerca scientifica per la gestione del P.N. del Circeo* (Results of the scientific research for the management of Circeo National Park).
 - Anzalone B., Lattanzi E., Lucchese F., Padula M. *Flora vascolare del Parco nazionale del Circeo* (Vascular flora in Circeo National Park).
 - Biondi M., Pastorino A., Vigna Taglianti A. *L'avifauna nidificante del Parco nazionale dei Circeo* (Breeding birdlife in Circeo National Park).
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