Current and historical diversity and new records of wetland plants in Crete, Greece

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Current and historical diversity and new records of wetland plants in Crete, Greece

Abstract

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A list of uncommon plants of wet or seasonally moist habitats of Crete is presented (72 vascular plants, 10 bryophytes, 5 charophytes), based on a survey of 50 localities, most of them in western Crete. For each species new records are compiled and precise locality data are given. For most plant occurrences frequency estimates are provided. Recorded here as new to Crete are *Anagallis minima, Callitriche brutia, Myosotis sicula, Chiloscyphus polyanthus, Philonotis calcarea, Chara galioides* and *Nitella tenuissima*. Several records are the first of a taxon in one of the four Cretan prefectures. Continuity and change in the species composition of wetlands are discussed based on comparisons with historical records. Cretan wetlands are currently under threat due to over-exploitation of water resources from springs and streams. Especially coastal marshes are critically endangered as a result of the expansion of urban settlements and tourist resorts, through neglect of traditional grazing and cutting, and due to administrative mismanagement and detrimental agricultural practice.

Additional key words: *Bryophyta, Charophyta,* vascular plants, floristic inventory, hydrophytes, Mediterranean wetlands

Introduction

The Ramsar Convention on Wetlands of International Importance defines wetlands as “areas of marsh, fen, peat land or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, …” (Britton & Crivelli 1993). Wetland plants, as adopted here, comprise a wide range of species of both aquatic and terrestrial habitats, the latter include wet to at least seasonally moist grounds. In Crete, wetland plants can be found in meadows, lagoons, reed swamps, at springs and rivulets, in an artificial (Agia) and a natural lake (Kournas), on seasonally wet ground, in riparian forests and in humid valleys.

Mediterranean wetlands are threatened by drainage for agricultural purposes and urban development, including tourist facilities, by ground-water pumping and diversion of surface and spring waters for irrigation (Pearce & Crivelli 1994). Agricultural fertilisers and pesticides con-

tribute to the pollution and eutrophication of lagoons, streams and lakes. In Crete, apart from all these impacts, wetlands suffer moreover from successive degradation as a result of the decline of traditional forms of cutting and grazing, through management failures, lack of control, misuse of subsidies and construction of greenhouses. Many spring-fed small wetlands are affected by water diversion through hose-pipes for the irrigation of young olive and other plantations. In the most important agricultural area in Crete, Mesara, the ground-water level dropped by 20 m in 10 years due to the increased irrigation pumping in conjunction with drought years (Croke & al. 2000). The administrative and economic background problems behind falling ground-water tables and the excessive exploitation of water resources are outlined by Grove & Rackham (2001: 360).

For the purpose of preserving the evidence of wetland change or loss, it is essential to assess the impacts on wetland plants by means of reliable baseline data on site-specific species composition and habitat quality. In Crete, no specific documentation of wetlands and their plants exists, and only few scientific publications devoted to the plants (Yannitsaros & Koumpli-Sovantzi 1991) and vegetation of wetlands (Gradstein & Smittenberg 1977). There is also no monitoring programme that might provide relevant data for future comparison. In order to improve the data basis and to provide substantial background for future monitoring strategies, we inventoried numerous wetland sites in Crete. The objectives of our study are to provide a survey of uncommon wetland species in selected localities, find such species in sites that went unrecorded to date, and to compare the species composition in those few localities which were previously studied in a sufficient manner.

Material and methods

The list of wetland plant taxa provided here is subjective and non-exhaustive, and so is the selection of wetland sites underlying the present survey. Strictly marine hydrophytes and localities were not included. In this paper, we contribute to the knowledge of rare or infrequent or local taxa on Crete. Common ones were disregarded, as well as rare species of which we cannot provide new data in addition to what can be gathered elsewhere in literature. Distributional data are given for 72 vascular plant taxa, 10 bryophytes and 5 algae. Of the vascular plants, 11 are aquatic, 7 semi-aquatic, 25 indicators of wet sites and 14 of (mesic to) moist sites. The assignment of the taxa to these moisture indicator categories follows Böhling & al. (2002). Another 8 species treated here were not assigned by Böhling & al. (2002) due to their ecological behaviour being ill-defined yet and further 8 remained unregarded as newly described taxa or as new records to the South Aegean area. A total of 155 Cretan taxa were classified by Böhling & al. (2002) as indicators of wet or aquatic habitats, of which we included 43 (= 28 %) in our present survey. An attempt was made, whenever possible, to provide rough estimates on the frequency of a plant species in a given site, using the following scale which combines abundance and local area size:
1: one or few plants
2: infrequent, small area (< 0.25 ha, or 100 m along a linear habitat structure)
3: numerous plants in a small area, or scattered in a wider area
4: abundant in a small area, or numerous in a wider area

The field investigations were carried out in 2005 for most locations but data from previous studies in 1999-2000 and a few more recent ones were also included. For comparison we used the study of Gradstein & Smittenberg (1977) who provided the first, and only to date, thorough botanical study on wetland sites in W Crete. It communicates full plant lists investigated in 1967.

The list of localities hereafter includes: locality code; name or brief description; Greek administrative divisional levels nomos (prefecture), eparchia (province) and dimos (municipality); altitude; latitude and longitude coordinates; brief habitat characteristics; date of collecting and field research. For each record in the floristic catalogue we provide information on the locality (coded), frequency and whether this is based on a herbarium specimen or a field observation (obs.). The cited herbarium specimens are, unless otherwise given, deposited in the private her-

baria of Erwin Bergmeier (EB) and Stefan Abrahamczyk (SA). Standard literature sources in the catalogue are abbreviated as follows: Rechinger (1943a): FAe; Turland & al. (1993): FCA; Chilton & Turland (1997): FCS I; Turland & Chilton (2007): FCS II. Plant name authors are given only in the headings of the taxa recorded, not for associated species.

List of localities

1. Chania, Kissamos, Kissamos; coastal plain near Falasarna
   a. 1 m, 35°28'55"N, 23°34'47"E, seasonal pool next to the road, 5-10 cm water depth, alluvial sand, 15.5.2005.
   b. 5 m, 35°28'44"N, 23°34'38"E, seasonally wet meadow, alluvium, 15.5.2005.
   c. 3 m, 35°28'57"N, 23°34'52"E, small pond in a dune depression, 5-100 cm water depth, sand, 22.5.2005.
   d. 1 m, 35°28'58"N, 23°34'50"E, dry seasonal pool next to the road, alluvial sand, 12.6.2005.
   e. 1 m, 35°28'45"N, 23°34'40"E, wet meadow and reeds, 19.4.2005.
2. Chania, Kissamos, Kissamos; between Kalathenes and Micheliana
   520 m, 35°24'39"N, 23°39'11"E, wet slope, phyllite, 15.6.2005.
3. Chania, Kissamos, Kissamos; between Sirikari and Kostogianides (NNW of Elos)
   a. 480 m, 35°24'18"N, 23°37'31"E, lower slope in *Castanea* woodland, phyllite, 25.5.2000.
   b. 565 m, 35°24'01"N, 23°37'39"E, mesic *Castanea* woodland, phyllite, 18.5.2005.
   c. 575 m, 35°24'00"N, 23°37'41"E, small spring in *Castanea* forest, phyllite, 18.5.2005.
   d. 670 m, 35°24'07"N, 23°38'06"E, wet meadow, phyllite, 18.5.2005.
4. Chania, Kissamos, Inachori; Berpathiana
   295 m, 35°23'10"N, 23°35'14"E, open riparian *Platanus* forest, phyllite, 15.5.2005.
5. Chania, Kissamos, Inachori (?); between Kostogianides and Berpathiana
   a. 780 m, 35°23'10"N, 23°37'10"E, *Platanus* forest in damp ravine, phyllite, 25.5.2000.
   b. 630 m, 35°23'36"N, 23°37'18"E, permanently wet site in *Arbutus* maquis, phyllite, 25.5. 2000.
6. Chania, Kissamos, Inachori; Elos
   a. 500 m, 35°21'50"N, 23°48'17"E, wet meadow, phyllite, 15.6.2005.
   b. 485 m, 35°21'56"N, 23°38'14"E, riparian *Apium* swamp, phyllite, 15.6.2005.
   c. lower edge of Elos, 470 m, 35°21'54"N, 23°38'14"E, edge of a *Platanus* forest, 28.5.2000.
   d. upper edge of Elos, 530 m, 35°21'36"N, 23°38'08"E, permanently wet site, phyllite, 28.5. 2000.
   e. 625 m, 35°21'21"N, 23°38'44"E, meadow with seepage water, peaty soil, phyllite, 8.6. 2000.
   f. 500 m, 35°21'50"N, 23°38'14"E, permanently wet site, seepage water, phyllite, 8.6.2000.
7. Chania, Kissamos, Inachori; W of Aligi
   495 m, 35°21'25"N, 23°41'04"E swampy *Juncus-Typha* reed, phyllite, 12.6.2005.
8. Chania, Kissamos, Inachori; Kambos
   310 m, 35°23'16"N, 23°34'33"E, wet slope in a small valley, phyllite, 15.5.2005.
9. Chania, borderline area between the municipalities Inachori (Kissamos) and Pelekanos (Selino); between Strovles and Archondiko
   a. 585 m, 35°21'07"N, 23°40'35"E, wet meadow, phyllite, 20.6.2005.
   b. 720 m, 35°19'25"N, 23°39'23"E, wet slope next to the road, phyllite, 20.5.2005.
10. Chania, Kissamos, Inachori; Vlatos
    350 m, 35°23'16"N, 23°39'57"E, riparian *Platanus* forest, phyllite, 20.6.2005.
11. Chania, Kissamos, Inachori; SSW of Ano Milia, N of Vlatos
    600 m, 35°24'37"N, 23°39'47"E, slope with spring and seepage water, 24.5.2000.
12. Chania, Kissamos, Mythimna; Koutsoumatados (S of Topolia)
    a. 305 m, 35°24'13"N, 23°41'21"E, riparian *Platanus* forest, phyllite, 12.6.2005.
    b. 280 m, 35°24'14"N, 23°41'14"E, wet slope, phyllite, 12.6.2005.

c. between Sasalos and Koutsoumatados, 480 m, 35°24'13"N, 23°41'52"E, open patches in *Sarcopoterium* phrygana, phyllite, 26.5.2000.

13. Chania, Kissamos, Mythimna; Milonou (between Sasalos and Aligi)
    a. between Milonou and Sasalos, 380 m, 35°23'08"N, 23°42'27"E, permanently damp site, phyllite, 28.5.2000.
    b. 450 m, 35°22'10"N, 23°42'28"E, wet site close to a rivulet, phyllite, 27.5.2000.
    c. 570 m, 35°22'13"N, 23°42'50"E, annual-rich vegetation, shallow soil, phyllite, 28.5.2000.
    d. 560 m, 35°22'11"N, 23°42'49"E, permanently wet site, seepage, phyllite, 28.5.2000.
    e. 450 m, 35°22'04"N, 23°42'18"E, seepage mire and *Juncus* reeds, phyllite, 27.5.2000.
14. Chania, Selino, Pelekanos; Sarakina
    475 m, 35°19'21"N, 23°41'17"E, slope next to the road, phyllite, 20.6.2005.
15. Chania, Selino, Pelekanos; between Voutas and Kontokynigi
    290 m, 35°17'44"N, 23°38'36"E, ditch next to the road, phyllite, 20.6.2005.
16. Chania, Selino, Anatoliko Selino; Agia Irini
    a. 800 m, 35°21'44"N, 23°49'07"E, shaded wet slope, phyllite, 8.6.2005.
    b. 790 m, 35°20'46"N, 23°49'28"E, shaded wet rocks, phyllite, 8.6.2005.
    c. 750 m, 35°20'32"N, 23°49'50"E, open *Castanea* forest, phyllite, 8.6.2005.
17. Chania, Kydonia, Platanias; between Deres and Nea Roumata
    a. 340 m, 35°24'10"N, 23°51'06"E, waterfall next to the road, phyllite, 19.5.2005.
    b. 310 m, 35°24'32"N, 23°51'03"E, wet slope next to the road, phyllite, 19.6.2005.
    c. 310 m, 35°24'32"N, 23°51'03"E, riparian *Platanus* forest, phyllite, 19.6.2005.
18. Chania, Kydonia, Platanias; N of Deres
    a. 180 m, 35°27'38"N, 23°50'35"E, water basin, 80 cm water depth, 19.6.2005.
    b. 180 m, 35°27'38"N, 23°50'35"E, wet slope, phyllite, 19.6.2005.
    c. 180 m, 35°27'38"N, 23°50'36"E, wet meadow, phyllite, 19.6.2005.
19. Chania, Kydonia, Mousouri; Fasas valley between, Langos and Nea Roumata
    a. 315 m, 35°24'14"N, 23°53'32"E, small artificial pond next to the road in maquis, phyllite, 17.5.2005.
    b. 300 m, 35°24'14"N, 23°53'31"E, riparian *Platanus* forest, phyllite, 17.5.2005.
    c. 250 m, 35°24'28"N, 23°52'24"E, riparian *Platanus* forest, phyllite, 17.5.2005.
    d. 315 m, 35°24'00"N, 23°52'27"E, wet slope next to the road, phyllite, 17.5.2005.
    e. 330 m, 35°23'58"N, 23°52'23"E, open riparian *Platanus* forest, phyllite, 17.5.2005.
    f. 310 m, 35°24'13"N, 23°52'26"E, riparian *Platanus* forest, phyllite, 8.6.2005.
    g. 220 m, 35°25'29"N, 23°53'26"E, riparian *Platanus* forest, phyllite, 10.5.2004.
    h. 370 m, 35°24'N, 23°53'E, *Platanus* forest, phyllite, 17.4.2000.
    i. 200-230 m, 35°25'15-20"N, 23°53'10-35"E, wet places and rivulets in maquis, phyllite, 22.6. and 24.6.1999.
    k. 260-270 m, 35°25'22-24"N, 23°52'55-57"E, humid valley with *Quercus ilex* forest, 30.5. 2000.
    l. 210-215 m, 35°25'27"N, 23°53'03-06"E, wet *Juncus effusus* meadow patches in maquis, 30.5.2000.
    m. 200 m, 35°24'18"N, 23°52'47"E, wet phyllite rock near stream, 22.4.1999.
20. Chania, Kydonia, Mousouri; between Nea Roumata and Prases
    405 m, 35°23'19"N, 23°51'15"E, riparian *Platanus* forest, phyllite, 19.6.2005.
21. Chania, Kydonia, Mousouri; N of Chosti
    435 m, 35°23'20"N, 23°52'05"E, wet slope next to the road, phyllite, 8.6.2005.
22. Chania, Kydonia, Mousouri; Omalos plateau
    a. 1050 m, 35°19'26"N, 23°53'37"E, seasonal pond and its banks, alluvium, 29.5.2005.
    b. ibid., 17.4. and 21.4.2000.
    c. 1050 m, 35°19'33"N, 23°53'27"E, wet meadow, alluvium, 29.5.2005.
    d. 1050 m, 35°19'35"N, 23°53'28"E, seasonally wet meadow, alluvium, 29.5.2005.
    e. 1050 m, 35°19'35"N, 23°53'28"E, dried seasonal pool, alluvium, 29.5.2005.

23. Chania, Kydonia, Mousouri; Prases
    a. 510 m, 35°22'42"N, 23°50'51"E, wet meadow, phyllite, 24.5.2005.
    b. 515 m, 35°22'42"N, 23°50'51"E, waterfall, phyllite, 24.5.2005.
24. Chania, Kydonia, Mousouri; between Skonizo and Deres
    a. 300 m, 35°26'32"N, 23°51'51"E, little brook between fields and gardens, phyllite, 19.5. 2005.
    b. 345 m, 35°26'22"N, 23°51'39"E, small waterfall, phyllite, 19.5.2005.
    c. 325 m, 35°26'25"N, 23°51'38"E, damp wayside and small artificial pond next to the road, phyllite, 19.5.2005.
25. Chania, Kydonia, Mousouri; between Sembronas and Ano Kefala
    a. 570 m, 35°23'17"N, 23°49'00"E, wet slope next to the road, phyllite, 19.5.2005.
    b. 555 m, 35°23'19"N, 23°49'00"E, flat ditch next to the road, phyllite, 19.5.2005.
    c. 515 m, 35°23'55"N, 23°46'52"E, wet slope next to the road, phyllite, 19.5.2005.
    d. 535 m, 35°23'25"N, 23°49'00"E, riparian *Platanus* forest, phyllite, 24.5.2005.
    e. 550 m, 35°24'14"N, 23°49'13"E, wet slope next to the road. phyllite, 24.5.2005
    f. 515 m, 35°23'55"N, 23°48'53"E, ditch next to the road, phyllite, 19.5.2005.
26. Chania, Kydonia, Therissos; Agia lake
    a. 45 m, 35°28'32"N, 23°56'24"E, in a ditch next to the road, alluvium, 31.5.2005.
    b. 50 m, 35°28'28"N, 23°56'04"E, wet reed on the shore, alluvium, 31.5.2005.
    c. 55 m, 35°28'26"N, 23°56'03"E, little brook in a ruderal area, alluvium, 31.5.2005.
    d. 55 m, 35°28'25"N, 23°56'00"E, seasonally wet meadow, alluvium, 31.5.2005.
    e. 50 m, 35°28'28"N, 23°56'03"E, shaded backwater in a *Platanus* forest, alluvium, 31.5.2005.
    f. 50 m, 35°28'38"N, 23°56'03"E, lake shore, 50 cm water depth. alluvium, 4.6.2005.
    g. 45 m, 35°28'31"N, 23°56'00"E, sandbank in a brook, alluvium, 4.6.2005.
    h. 50 m, 35°28'40"N, 23°56'06"E, lake shore, 1 m water depth, alluvium, 4.6.2005.
    i. 45 m, 35°28.5'N, 23°56'E, *Phragmites-Cladium* reeds, 5.6.1999.
27. Chania, Kydonia, Souda; Souda
    a. 1 m, 35°29'15"N, 24°04'04"E, ditch next to the road, alluvium, 21.5.2005.
    b. 1 m, 35°29'15"N, 24°04'05"E, wet meadow, alluvium, 21.5.2005.
28. Chania, Sfakia, Sfakia; Samaria gorge
    a. 690 m, 35°18'31"N, 23°56'13"E, waterfall, limestone, 5.6.2005.
    b. 700 m, 35°18'41"N, 23°56'21"E, wet slope, limestone, 5.6.2005.
    c. 680 m, 35°18'23"N, 23°56'20"E, wet meadow, limestone, 5.6.2005.
29. Chania, Sfakia, Sfakia; Frangokastello
    a. 3 m, 35°11'05"N, 24°13'43"E, *Phragmites* reeds, 16.4. and 18.5.2000.
    b. 4 m, 35°11'12"N, 24°13'30"E, brackish marsh landward from coastal dunes, 18.5.2000.
    c. 4 m, 35°11'14"N, 24°13'29"E, *Schoenoplectus* and *Typha* reeds, 18.5.2000.
30. Chania, Apokoronou, Armeni; NE of Stylos
    4 m, 35°26'57"N, 24°08'27"E, ditch next to the road, marl, 28.5.2005.
31. Chania, Apokoronou, Georgioupoli; W of Georgioupoli
    a. 5 m, 35°21'36"N, 24°15'15"E, strong karstic springs, 5 cm water depth, limestone, 16.5. 2005.
    b. 5 m, 35°21'37"N, 24°15'17"E, *Juncus* reed at a pond, limestone, 16.5.2005.
    c. 5 m, 35°21'37"N, 24°15'14"E, pond of 1 m water depth, with islet, limestone, 16.5. and 25.5.2005.
32. Chania, Apokoronou, Georgioupoli; lake of Kournas
    a. 15 m, 35°20'11"N, 24°16'36"E, seasonally wet meadow, marl, 16.5.2005.
    b. 15 m, 35°19'57"N, 24°16'52"E, seasonally flooded lake shore, marl, 25.5.2005.
    c. 30 m, 35°19'35"N, 24°16'52"E, small seasonally wet meadow, marl, 25.5.2005.
    d. 10 m, 35°20'09"N, 24°16'41"E, lake at 1 m water depth, 3.6.2005.
33. Chania, Apokoronou, Georgioupoli; E of Georgioupoli
    a. 1 m, 35°21'50"N, 24°15'42"E, wet coastal meadow, limestone, 25.5.2005.

b. 5 m, 35°21'39"N, 24°15'35"E, seasonally damp meadow, alluvium, 20.5.2005.
c. 3 m, 35°21'17"N, 24°16'46"E, reeds next to a drain, alluvium, 20.5.2005.
d. 4 m, 35°21'00"N, 24°18'24"E, seasonally damp meadow, alluvium, 20.5.2005.
e. 2 m, 35°21'16"N, 24°17'08"E, temporarily wet sandy soils, 31.3.2008.

34. Rethymno, Rethymno, Rethymno; SE of Prasies, close to the upper end of the gorge
a. 140 m, 35°18'31"N, 24°32'34"E, seasonally damp shallow soil, phyllite, 13.5.2000.
b. 120 m, 35°18'50"N, 24°32'40"E, grassy slope in riparian *Platanus* forest, 13.5.2000.

35. Rethymno, Rethymno, Rethymno; between Prasies and Apostoli
240 m, 35°16'35"N, 24°33'41"E, annual-rich vegetation on seasonally damp shallow soil, phyllite, 14.5.2000.

36. Rethymno, Rethymno, Rethymno; above Maroulas
a. 390 m, 35°20'11"N, 24°33'08"E, edge of a barley field, 12.5.2005.
b. 390 m, 35°20'12"N, 24°33'08"E, seasonally wet depression within arable field, 12.5.2005

37. Rethymno, Rethymno, Rethymno; SW of Geni
280 m, 35°15'28"N, 24°29'26"E, seasonally damp site in *Quercus pubescens* woodland, 9.5.2000.

38. Rethymno, Agios Vassilios, Finikas; base of Mt Korifi E of Preveli
120 m, 35°10'13"N, 24°28'36"E, open patches in phrygana, phyllite, 26.4.2000.

39. Rethymno, Agios Vassilios, Lambi; plateau called “Gious Kambos" between Spili and Gerakari
835 m, 35°13'17"N, 24°35'01"E, seasonally wet grassy pasture, 14.5.2005.

40. Rethymno, Amari, Syvrito; N of Apostoli
a. 360 m, 35°16'10"N, 24°37'34"E, annual-rich seasonally damp meadow between maquis, 16.5.2000.
b. 370 m, 35°16'08"N, 24°37'36"E, reeds on seasonally wet soil, 16.5.2000.

41. Iraklio, Malevizio, Gazi; NW of Gazi
10 m, 35°20'00"N, 25°03'07"E, stream bank with reeds and *Phoenix*, 11.5.2005.

42. Iraklio, Monofatsio, Asteroussii; S of Mournia (SE of Pyrgos), towards Tris Ekklisies
470 m, 34°58'05"N, 25°09'52"E, seasonally damp clayey soil on the banks of a dry streambed, 17.4.2005.

43. Gouves, next to car parks of “CretAquarium"; Iraklio, Pediada, Gouves
5 m, 35°20'00"N, 25°16'58" E, stagnant eutrophic water in a ditch, 5.9.2007.

44. Lasithi, Lasithi, Oropedio Lasithiou; Lasithi plateau
a. 840 m, 35°09'40"N, 25°28'39"E, edge of a barley field, gravelly soil, damp until early spring, 14.4.2005.
b. 850 m, 35°09'45"N, 25°29'17"E, barley and oats fields, soil damp until early spring, 15.4.2005.
c. 840 m, 35°09'N, 25°28'E, fallow field, loamy soil, damp until early spring, 14.4.2005.

45. Lasithi, Mirambelou, Neapoli; Polje between Nikithianos and Fourni
a. 280 m, 35°15'20"N, 25°38'16"E, seasonally wet meadow, 10.4.2005.
b. 280 m, 35°15'21"N, 25°38'14"E, seasonally aquatic drain ditch, 10.4.2005.
c. 280 m, 35°15'20"N, 25°38'14"E, cistern overflow, 10.4.2005.
d. 280 m, 35°15'22"N, 25°38'15"E, seasonally flooded, reed, calcareous alluvium, 10.4.2005, 20.8.2006.

46. Lasithi, Mirambelou, Neapoli; W Fourni
a. 315 m, 35°15'28"N, 25°39'38"E, damp meadows, alluvium, 9.4.2005.
b. 310 m, 35°15'29"N, 25°39'33"E, drain, alluvium, 9.4.2005.

47. Lasithi, Mirambelou, Agios Nikolaos; Katharo plateau
a. 1110 m, 35°08'35"N, 25°33'57"E, wayside, dense loamy soil, 15.4.2005.
b. 1150 m, 35°08'19"N, 25°34'36"E, ploughed field, dense terra fusca soil, 15.4.2005.

48. Lasithi, Ierapetra, Ierapetra; Sarakinas flood plain NE of Mythi
140 m, 35°02'50"N, 25°34'55"E, coarse gravel in dry stream bed (below pump), 16.4. 2005.

49. Lasithi, Ierapetra, Ierapetra; between Gra-Lygia and Stomio
1 m, 35°00'49"N, 25°40'38"E, muddy stream bank, 16.4.2005.
50. Lasithi, Sitia, Itanos; N of Chiona, Kouremenos beach
0 m, 35°12'23"N, 26°16'09"E, lagoon, 12.5.2000.

Results

A. Vascular plants

Alisma lanceolatum With. – 26a, 2, *SA obs.;* 27a+b, 2, *SA obs*.

Records from the lake of Agia in 1967 (Gradstein & Smittenberg 1968, 1977) and 1985 (Yannitsaros & Koumpli-Sovantzi 1991: 582) confirmed. In FCA: 368, three more localities further east, based on Rechinger (1943b), were mapped.

Alisma plantago-aquatica L. – 24a, 1, *SA obs*.

Third post-1930 record for Crete. In 1995 observed by L. Chilton near Georgioupoli (FCS I: 90), and on 19.4.2000 by K. Šumberová in Souda, near the road junction Rethimno/Akrotiri, in a much disturbed fen meadow (unpubl.).

Alopecurus rendlei Eig – 12a, 1, *SA obs.;* 16c, 1, *SA obs.;* 26d, 1, *SA obs.;* 32c, 2, *SA 270*.

First record for the Nomos of Chania, previously known from the Nomi of Rethymno and Iraklio (Jahn & Schönfelder 1995: 399; Böhling & Scholz 2003: 19)

Anagallis minima (L.) E. H. L. Krause (*Centunculus minimus* L.) – 34a, 2, *EB 00-350.*

New to Crete and the Aegean. Found together with *Bellis annua, Briza minor, Isoetes durieui, Juncus capitatus, J. minutulus, Lotus parviflorus, Solenopsis minuta* and other species of seasonally moist soils.

Anagallis tenella (L.) L. – 5b, *EB obs.;* 6e, *EB obs.;* 7, 2, *SA 405;* 9a, 3, *SA 409;* 19i+l, *W. Wolf obs.;* 25c, 2, *SA obs.*

Found in several new localities in the phyllite area of W Crete but the old records from the Fasas valley and the lake of Agia (Gradstein & Smittenberg 1977) could not be confirmed. Further records: Eparchia of Selinos, Road Omalos to road Alikambos-Soujia, 2.5 km E of junction SW of Prases, very wet schistose gravel slope above the road and low macchia further up, 35°21'00"N, 23°50'40"E, 960 m, 13.7.1994, *Bergmeier & Matthäs 4091* (B); Eparchia of Mylopotamos: M. Ida, Abstieg vom Gipfel zur Nida-Ebene (35°12'N, 24°48'E), 7.1817, *Sieber obs.* (Sieber 1823: 436); Eparchia of Monofatsi: M. Kophina bei Loukia, 34°59'N, 25°01'E, 20.-27.5.1846, *Heldreich* (var. *albiflora*) (FAe: 437); Kofinas Oros, Straße Pirgos-Prinias, Quellsumpf unterhalb der Straße, 34°59'30"N, 25°09'E, 500 m, 22.6.1983, *Risse 1169* (B); Eparchia of Hierapetra: M. Aphendi Kavusi, 35°05'N, 25°52'E, 27.4.1846, *Heldreich* (FAe: 437).

Antinoria insularis Parl. – 22a, 3, *SA 281.*

Confirmed in its single locality in Crete (Omalos plain of the Lefka Ori) where it was found by Heldreich in 1846 (FAe: 795) and collected again in the 1990s, among others, by Bergmeier & Matthäs (1995: 92) and repeatedly by Böhling (Böhling & Scholz 2003: 24).

Apium graveolens L. – 31b, 1, *EB & SA obs.;* 41, 1, *EB 05-167.*

Scattered in W and rare in C and E Crete (Gradstein & Smittenberg 1977; Yannitsaros & Koumpli-Sovantzi 1991: 582; FCA: 355; *Runemark & al. 17554* (LD), 1 km S Agios Nikolaos, Kärnefelt 2005-). We found two very small populations.

Arundo collina Ten. – 48, 3, *EB 05-106.*

Very scattered but recorded from all Cretan prefectures (Danin & al. 2002; Böhling & Scholz 2003: 26). Our record from a streambed represents a natural habitat, which indicates the native

status of this recently recognized taxon in Crete (see also FCS II). Nomenclature follows Danin (2004) while Valdés & Scholz (2006: 663) prefer to separate the Italian and the Greek (and Cretan) populations, coining for the latter the name *Arundo collina* subsp. *hellenica* (Danin & al.) H. Scholz.

Blechnum spicant (L.) Roth – 9b, 1, *SA obs.;* 19d, 2, *SA obs.;* 19k, *W. Wolf obs.;* 25a+e, 2, *SA obs.*

Known from the Eparchia of Kissamos since 160 years (*Heldreich,* cited in FAe: 77) and repeatedly observed in the Fasas valley and others nearby (Fielding & Turland 2005: 584)

Bolboschoenus glaucus (Lam.) S. G. Smith – 45d, 4, *EB 05-47+06-351.*

Apparently third record for Crete. Previous collections in 1962 by *H. Runemark & al. 17933* (LD) from the shore and the river valley S of the town of Sitia (Kärnefelt 2005-); in 1981 from Gortys (Eparchia of Kainourgio, Nomos of Iraklio), by *H. Kalheber 80413*(M) (Hroudová & al. 2007: 97). Another species of *Bolboschoenus* in Crete is *B. maritimus* (L.) Palla (s.str.), which was collected in 1983 by H. Risse in the Nomos of Chania (Ep. Kidonia, coast near Kato Stalos W of Chania) (Hroudová & al. 2007: 100, and pers. comm.). As ripe fruits are essential for identification, flowering plants of *Bolboschoenus* such as our collection *EB 07-537* from location 43, as well as unsubstantiated literature records such as of Gradstein & Smittenberg (1968, 1977) at the lake of Agia, near Georgioupoli, and at the mouth of the river Keritis, cannot be assigned with certainty to any of the two species.

Bromus japonicus Thunb. – 33a, 2, *SA 275.*

First recorded in the Nomi of Rethymno and Iraklio by Damanakis & Economou (1986) based on two collections from 1982 and 1984 (Böhling & Scholz 2003). Recently six localities of cultivated fields including four from the Nomos of Chania were added (Turland & al. 2004).

Bromus racemosus L. – 33b+d, 3, *EB 05-246;* 41, 2, *EB 05-169.*

New to the Nomos of Iraklio. The record for Georgioupoli from 1967 (Gradstein & Smittenberg 1977: 81; Greuter 1973: 72) is confirmed by our collection.

Callitriche brutia Petagna – 45b, 2, *EB 05-44.*

New to Crete and the southern Aegean. The species occurs scattered in the Aegean, with several records from Lesvos, and is very rare on the Greek mainland. Bazos & Yannitsaros (2004: 56) present a distribution map for Greece. In the Cretan locality it occurs together with the aquatic herbs *Ranunculus aquatilis* and *R. peltatus* subsp. *saniculifolius* in a drain likely to become dried out during the course of June.

Carex cretica Gradst. & J. Kern – 3c, 2, *SA obs.;* 4, 2, *EB 05-207;* 5b, *EB obs.;* 10, 2, *SA 482;* 16b, 2, *SA obs.;* 19g, 2, *SA 63;* 19e, 2, *SA 164, EB 05-225;* 19f, 2, *SA 381;* 21, 2, *SA obs.;* 23a, 3, *SA 262 & SA 256;* 24c, 1, *SA obs.;* 25c, 3, *SA obs.;* 25e, 2, *SA 285;* 28b, 2, *SA 352.*

The species was described from W Crete (Gradstein & Kern 1968) and was found since on the island of Ikaria. A distribution map for Crete is presented by Bergmeier & Abrahamczyk (2007) together with a detailed account on its habitats and species composition.

Carex punctata Gaudin – 31c, 2, *EB 05-220.*

Greuter (1973: 72) collected this species in the Fasas valley from "along a brook in the maquis region". Our record from a reed bed complex at a pond near Georgioupoli differs slightly in ecology.

Carex remota L. – 19b, 1, *SA obs.;* 19f, 1, *SA 382;* 19i+k+l, *W. Wolf obs.*

Given for the Eparchia of Kissamos in FAe: 755, and found by Gradstein & Smittenberg (1977) in 1967 in the Fasas valley. Our findings confirm this occurrence in several sites.

Carex troodi Turrill – 5b, *EB obs.;* 6d+e, *EB obs.;* 11, 2, *EB 00-422;* 13d, *EB obs.;* 16a, 3, *SA 383;* 19a, 2, *EB 05-226;* 19e, *EB obs.,* 19h, 2, *EB 00-162;* 28c, 2, *SA 347.*

Confirmed after 160 years for the Nomos of Chania. Prior to this known in Crete from the southern slopes of Psiloritis in two wet calcareous places above Kamares (Greuter & al. 1985: 25ff, as *Carex idaea*) and near the Ideon Andron on the other side of the mountain (Turland 1992: 355). Collections from the Dikti mountains (from Heldreich in 1846 and Zaffran in 1966) were cited by Luceño (1992: 222), who cites also Raulin's record from 1845 ('prairies des Roumata-Kissamos'), which refers to the same wider area as our records. A photo of the plant from the locus classicus of *C. idaea* is presented in Fielding & Turland (2005: 482). The following records were kindly communicated by R. Jahn: Eparchia Kissamou, Taleinschnitt am Vigla-N-Hang W Sembronas, Bachufer, Phyllit-Quarzit, 35°22'N, 23°47'E, 880 m, 3.6.1993, *R. Jahn,* herb. Jahn; Eparchía Mirambellou, Katharo-Ebene, Hang Platidi-Pigadi, Quellhang mit Phrygana, 35°07'5"N, 25°34'11"E, 1150 m, 24.6.1994, *R. Jahn,* herb. Jahn. The species is now known to be endemic to Crete and Cyprus. Our several new records from wet places in the phyllite area W of the Lefka Ori extend its distributional and ecological range in Crete considerably. It grows together with *C. cretica* and more rarely with *C. distans* and *C. divulsa* (see Bergmeier & Abrahamczyk 2007).

Ceratophyllum demersum L. – 26e, 1, *SA 327;* 26f, 3, *SA obs.*

Found (1) in the lake of Agia since 1967 (*Gradstein & Smittenberg* cited by Greuter 1973: 35, and collected again in 1985 by Yannitsaros), (2) in 1984 in the lake of Kournas (Yannitsaros & Koumpli-Sovantzi 1991: 580) and (3) by Hansen in a "water-course near Dhramia" (Greuter 1973). It is confirmed here for the first locality.

Cladium mariscus (L.) Pohl – 26i, *W. Wolf obs.;* 40b, 3, *EB 00-366.*

A few small populations had become known from four Cretan localities (FCA: 372). The occurrence at the lake of Agia previously found in 1985 (Yannitsaros & Koumpli-Sovantzi 1991) could be confirmed in 1999 by W. Wolf but not the other records in W Crete from 1967 (W of Platanias, and W of the harbour of Georgioupoli; Gradstein & Smittenberg 1977). N. Turland saw *Cladium* in the river flowing into Georgioupoli from the west, and in marshes S of Georgioupoli beach, on 4.4.1989, and in a marshy place on the SW side of the Rethymno-Amari road, a short way S of Myrthios, 23.4.1991 (pers. comm.). Another *Cladium* stand known since 1942 (Rechinger 1951: 188) still exists, although threatened with extinction due to earth infillings, near Zaros at the foot of Psiloritis (35°08'21"N, 24°54'37"E; Kainourgio, Nomos of Iraklio) (*EB obs.*, 3.9.2006).

Cornucopiae cucullatum L. – 44c, 3, *EB 05-78.*

Second record for Crete. First found by W. Lohmeyer in 1976 and A. Hansen in 1980 "W of Agios Nikolaos … in a ditch along the road" (Greuter & al. 1985: 32). In the new locality on the plain of Lasithi the annual grass occurs gregarious in the springtime vegetation of a fallow field. Doubts remain, as before, as to the status of this species in Crete, which we would like to specify as naturalized, not native.

Elatine alsinastrum L. – 22a, 3, *SA 284.*

Found in its single locality in Crete, on the Omalos plain of the Lefka Ori, already 160 years ago (FAe: 257, based on collections of Heldreich in 1846, and Raulin). The plants grow in a seasonal pool. The occurrence was confirmed, among others, in the 1980s by Egli (1993: 190) and Yannitsaros (Yannitsaros & Koumpli-Sovantzi 1991: 580), and in the 1990s by Bergmeier & Matthäs (1995: 87) and Deschâtres & al. (1998). It was photographed by N. Turland also in 1994 (Fielding & Turland 2005: 202). A distribution map for Greece is presented by Bazos & Yannitsaros (2004: 75).

Eleocharis caduca (Delile) Schult. – 32b, 4, *SA 486.*

Found by Yannitsaros & Koumpli-Sovantzi (1991) in the 1980s and now known from two localities in Crete (Greuter & al. 2002). We confirm the record at the lake of Kournas where this chiefly tropically distributed species occurs abundantly on the shore. As it seems rather unlikely that it

might have been overlooked by K. H. Rechinger, who visited the lake on 22 June 1942, not mentioning an *Eleocharis* on the lake shore (Rechinger 1951: 190), we would regard it as a naturalized introduction, probably by migratory birds, and not as native.

Eleocharis multicaulis (Sm.) Desv. – 6c, 1, *EB obs.;* 6e+f, *EB obs.;* 9a, 4, *SA 481;* 13e, 3, *EB 00-447;* 18a, 4, *SA 439.*

Recorded here from several new localities. The species is restricted in Crete to the phyllite area in the west. Previous records from 1967 by Gradstein & Smittenberg (1968) (see also Greuter 1973) in the Fasas valley and around the lake of Agia could not be confirmed.

Eleocharis palustris (L.) Roem. & Schult. subsp. ***palustris*** – 22a, 4, *SA 286;* 22b, 3, *K. Šumberová s.n.,* BRNU.

This subspecies has been recorded for Crete by Bureš & al. (2004: 254) but many, if not all, records of the species sensu lato may refer to this diploid taxon. Specimens collected on 21 April 2000, by K. Šumberová, during a students' excursion guided by EB, were identified by P. Bureš, Brno, Czech Republic, who performed a chromosome count. The material turned out to represent an aneuploid ($2n = 15$) form. Based on the same collection, Böhling & al. (2002: 64) list this subspecies as the relevant southern Aegean taxon. The following field observations, including the collection, as well as previous literature records such as by Gradstein & Smittenberg (1977) from the lake of Agia and W of Platanias refer to the species sensu lato: 1b, 1, *SA obs.;* 1e, 3, *EB obs.;* 27b, 2, *SA 214;* 45a+b, 4, *EB obs.*

Eleocharis uniglumis (Link) Schult. – 29b, *EB 00-372.*

Known from two localities in W Crete (FCA: 373; Greuter 1973; Gradstein & Smittenberg 1977). A collection of *"Eleocharis palustris"* by Dörfler in 1904 from Frangokastello (FAe: 752) may belong here and would, in that case, be confirmed by the present record.

Euphorbia hirsuta L. – 29a, 2, *EB 00-159+374;* 31c, 1, *EB 05-222;* 49, *EB 05-100.*

Very scattered in Crete (FCA: 277). Our collections confirm its occurrence near Georgioupoli where it was found in 1967 by Gradstein & Smittenberg (1968, 1977) but not the record in the same year from the lake of Agia.

Euphorbia pterococca Brot. – 1e, 1, *EB 05-145.*

Third record for Crete. Collections from 1985 and 1996 from the Nomos of Chania (Eparchia of Kydonia, *Lassen 85060* (LD): a few km S of Nerokouros and W of Malaxa, rocks facing north, 35°27'N, 24°02'E, 21.4.1985; *Lassen 96087* (LD): at Sternes, *Pinus* forest rich in annuals, 35°30'N, 24°08'E, 150 m, 9.5.1996, see Kärnefelt 2005-) were communicated by P. Lassen (in Greuter & Raus 1999: 55). FCS II lists this chiefly Macaronesian and W Mediterranean species with uncertain status. In view of our collection from a natural, though recently disturbed and endangered, wet meadow near Falasarna it should be regarded as almost certainly native in Crete.

Festuca pratensis subsp. ***pluriflora*** (Schult.) Zangheri – 6e+f, *EB obs.;* 13e, *EB obs.;* 33b+d, 3, *EB 05-247;* 34b, 2, *EB 00-352;* 37, 2, *EB 00-285;* 39, 2, *EB 05-206;* 40a, 2, *EB 00-365.*

Reported as new to the southern Aegean by Böhling & Scholz (2003: 75) based on 3 of the above collections of EB in 2000, and one from R. Deschâtres in 1996. All known localities of this rare taxon of seasonally moist grassy habitats are from the Nomi of Chania and Rethymno.

Fraxinus ornus L. – 17c, 3, *SA obs.;* 25d, 2, *SA obs.*

This tree species of sub-Mediterranean bioclimatic preference was apparently found as late as 1990 in the Fasas valley by L. Chilton (Turland 1992) and since in three other valleys in W Crete (Fielding & Turland 2005: 310), including our recorded localities.

Fuirena pubescens (Poir.) Kunth – 18c, 3, *SA 450;* 19i, *W. Wolf obs.*

Recorded here (18c) in what is perhaps the third locality in Crete. Found in 1967 at the lake of Agia and in the Fasas valley (Gradstein & Smittenberg 1968: 83; Greuter 1973). W. Wolf's field record is close to the latter locality. The former could not be confirmed.

Gagea villosa (M. Bieb.) Duby – 47b, 2, *EB 05-88.*

Recorded here as new to the Nomos of Lasithi. The single previous collection is from N. Turland on Mount Kedros, in 1993 (FCS I: 109). The present record is from a field margin on the plain of Katharo.

Galium divaricatum Pourr. – 34a, 3, *EB 00-343;* 35, 4, *EB obs.;* 36a, 3, *EB 05-182;* 38, 4, *EB obs.*

While there is only one record in FCA: 138 (Omalos plain of the Lefka Ori), the species is apparently not rare in annual-rich habitats on nutrient-poor acidic soils, at least in the western two Cretan Nomi. From the Nomos of Rethymno alone, there are 3 early records from Gandoger (Arkadi, Amnatos, Platania; FAe: 578), and R. Jahn reports no less than 16 findings from the 1990s (pers. comm.).

Galium rotundifolium L. – 20, 2, *SA obs.;* 25d, 2, *SA 265.*

Recorded from "Enneachoria" (municipality of Inachori) by Heldreich in 1846 ("in castanetis", FAe: 580; Greuter in 1977, cited by Schönbeck-Temesy & Ehrendorfer in Strid & Tan 1991: 303) Our records are from shady habitats in two humid valleys in the eastern adjacent eparchia.

Hydrocotyle vulgaris L. – 5b, *EB obs.;* 6e, *EB obs.;* 9a, 2, *SA obs.;* 10, 2, *SA obs.;* 13b+e, *EB obs.;* 16a, 3, *SA obs.;* 19b+g, 2, *SA obs.;* 19i+l, *W. Wolf obs.;* 23a, 2, *SA obs.;* 24a, 3, *SA obs.;* 24c, 1 *SA obs.*

Recorded in several localities in W Crete (e.g., Gradstein & Smittenberg 1977). The oldest *Hydrocotyle* record (apart from an unlocalized Cretan record by Sibthorp), and the only one from the south coast, is based on a Dörfler collection in 1904 from Frangokastello (FAe: 398) where N. Turland, in 1989-91 (pers. comm.), and EB observed it again almost a century later.

Iris pseudacorus L. – 33c, 2, *EB obs.*

There are three known localities in W Crete (Yannitsaros & Koumpli-Sovantzi 1991: 583; FCA: 395) of which we confirm here the one near Georgioupoli. The photo of the species in Fielding & Turland (2005: 47) was also taken from near Georgioupoli (Turland, pers.comm.).

Isoëtes durieui Bory – 34a, 2, *EB 00-351.*

Second record for Crete and first for the Nomos of Rethymno. First collected in 1999 near Viannos (Böhling & Raus in Greuter & Raus 2000: 229).

Isoëtes histrix Bory – 1a, 2, *SA obs.;* 22a, 3, *SA 36;* 22b, 3, *EB 00-164.*

Recorded already by Heldreich in 1846 from W Crete, Eparchia Kissamos (FAe: 74). Our record confirms the well-known occurrence in the seasonal pool on the Omalos plain of the Lefka Ori from where it is mapped in 1993 (FCA) and found in 1994 by Bergmeier & Matthäs (1995). The other locality (Falasarna) given here is close to where Heldreich collected the species. Two previous records from 1967, in the Fasas valley and near the lake of Agia, by Gradstein & Smittenberg (1968, 1977), could not be confirmed.

Juncus capitatus Weigel – 22e, 2, *SA 306;* 34a, 3, *EB 00-347;* 35, *EB obs.;* 36a, 3, *EB obs.* (Bergmeier 2005).

Confirmed here for the Nomos of Rethymno (FAe: 745). Previous records from the Fasas valley and around the lake of Agia in W Crete, both in 1967 (Gradstein & Smittenberg 1968, 1977), could not be confirmed by us. The record from the Omalos plateau of the Lefka Ori is higher situated than all others known in Crete.

Juncus minutulus Kreč. & Gonč. – 13c, *EB obs.;* 34a, 3, *EB 00-349;* 35, *EB obs.;* 36a, 2, *EB obs.;* 42, *EB 05-126.*

New to the Nomi of Chania and Iraklio. Previously found in 1982 in the Nomos of Rethymno (Greuter & al. 1985: 43). Our findings from that Nomos refer to other localities.

Laphangium luteoalbum (L.) Tzvelev (*Pseudognaphalium luteoalbum* (L.) Hilliard & Burtt) – 24c, 1, *EB 05-236.*

Previously known from a few localities in W Crete (FAe: 612; FCA: 70), more recently only from the Fasas valley. Although ephemeral in a particular site, our record confirms its lasting occurrence in the area. Nomenclature follows Greuter (2003), see also FCS II.

Lathyrus neurolobus Boiss. & Heldr. – 3d, 2, *SA obs.;* 5b, *EB obs.;* 6a, 3, *SA obs.;* 6d+e+f, *EB obs.;* 9a, 3, *SA obs.;* 11, *EB obs.;* 12b, 2, *SA obs.;* 13a+d+e, *EB obs.;* 14, 3, *SA obs.;* 16a, 2, *SA obs.;* 18c, 2, *SA obs.;* 19a, 1, *SA 161;* 19i+l, *W. Wolf obs.;* 23a, 3, *SA obs.;* 25c, 3, *SA obs.;* 25d, 1, *SA obs.*

This Cretan wetland endemic was found in several localities in W Crete (distribution map in Bergmeier & Abrahamczyk 2007) but the record around the lake of Agia in 1967 (Gradstein & Smittenberg 1977) could not be confirmed. The easternmost hitherto documented occurrence (but see Barbéro & Quézel 1980: région d'Armeni, région de Prines) between Kallikratis and Asi Gonia, found in 1994, is probably extinct as a result of habitat destruction (Fielding & Turland 2005: 49).

Lepidium coronopus (L.) Al-Shehbaz (*Coronopus squamatus* (Forssk.) Asch.) – 32a, 3, *SA 143;* 32c, 1, *SA obs.;* 45c, 2, *EB 05-52.*

This infrequent species of seasonally moist and disturbed habitats is known from W and E Crete (FCS I: 40). A few records are added here from the Nomi of Chania and Lasithi. Nomenclature follows Al-Shehbaz & al. (2002).

Lemna minor L. – 15, 3, *SA obs.;* 26a, 4, *SA obs.;* 27a, 4, *SA obs.;* 43, 3, *EB 07-538.*

Recorded here as new for the Nomos of Iraklio. Previously found in Georgioupoli (W Crete) in 1967 (Gradstein & Smittenberg 1977). Records in water storage tanks in E Crete from 1999 by L. Chilton were perhaps recent introductions (FCS II). Our findings are new locality records.

Listera ovata (L.) R. Br. – 3d, 1, *SA obs.;* 5b, *EB obs.;* 16a, 1, *SA obs.;* 19b, 1, *SA obs.;* 19f, 2, *SA obs.;* 19k+l, *W. Wolf obs.;* 20, 1, *SA obs.;* 23a, 2, *SA obs.*

Apart from a recent record from the mountains of Dikti about 30 records were mapped in Crete W of the Lefka Ori (Kretzschmar & al. 2002: 108). Our records correspond to some of these. The habitat of the single occurrence in the eastern part of the Lefka Ori, in the Eparchia of Sfakia between Asi Gonia and Kallikratis, where *Listera* was last seen in 1998 by N. Turland, is probably ruined due to the disturbance and over-exploitation of the water resources (FCS II; Fielding & Turland 2005).

Lotus tenuis Waldst. & Kit. (*L. glaber* Mill., nom. rej.) – 33d, 2, *EB 05-241.*

Known from W of Chania where it was already collected by Heldreich in 1846 (FAe: 373). Our lowland record E of Georgioupoli seems to represent the only recent one.

Lythrum borysthenicum (Schrank) Litv. – 36b, 3, *EB 05-187.*

Third record for Crete. Known before from the same Nomos (Rethymno) but at 620 m (FCA: 117), and from the Omalos pond (FCS I: 24, 65; N. Turland's specimens at BM have been verified, pers. comm.).

Molineriella minuta (L.) Rouy – 47a, 2, *EB 05-92.*

Second record for Crete, and not far from the first, which was at the pass towards the Katharo plain (G. Hügin in Greuter & Raus 1995).

Myosotis sicula Guss. – 45a+d, 4, *EB 05-46.*

New to Crete and the southern Aegean. This wetland annual is rare in mainland Greece and the Aegean. Recently found again on Lesvos (Bazos & Yannitsaros 2004: 55).

Myriophyllum spicatum L. – 26f, 3, *SA obs.;* 32d, 4, *SA 489.*

There is a previous record from the spring of Almyros by Heldreich in 1846 (FAe: 397), and the solid (post-1929) dot in the map in FCA: 284 refers to the artificial lake at the Almyros spring S of Linoperamata, where N. Turland saw it in October 1989 (pers. comm.). Records from the lakes of Agia (1967, Gradstein & Smittenberg 1977; also in 1976 and 1985, Yannitsaros & Koumpli-Sovantzi 1991: 580, 582) and Kournas (1984, Yannitsaros & Koumpli-Sovantzi 1991: 580, 582) are confirmed here, but not from Platanias where it was observed in 1967 by Gradstein & Smittenberg (1977).

Najas marina L. – 32d, 1, *SA 490.*

Our collection confirms the previous record from the lake of Kournas, in 1984-85 (Yannitsaros & Koumpli-Sovantzi 1991: 583), the only locality of this species in Crete.

Osmunda regalis L. – 4, 1, *SA obs.;* 6c, 3, *EB 00-448;* 9b, 1, *SA obs.;* 10, 1, *SA obs.;* 18b, 1, *SA obs.;* 19b,d,g, 2, *SA obs.;* 19c,e, 1, *SA obs.;* 19g, 2, *SA 57;* 19i+k+l+m, *W. Wolf obs.;* 20, 1, *SA obs.;* 25a, 2, *SA obs*.

Believed to be restricted to a few humid valleys in the west (Gradstein & Smittenberg 1968, 1977; Fielding & Turland 2005). Most of our records represent new localities in the phyllite area of W Crete. The more remarkable are three observation from much further east: *R. Jahn:* Eparchia of Malevizio, "Agapia Lakkos" 1 km W Rogdia, 35°21'N, 25°00'E, 450 m, 14.6.1994; *L. Chilton:* Kapediana SE of Rethymno, 35°19'23"N, 24°29'50"E, April 2002 and October 2007, confirming an old record by Baldacci (FAe: 75), and c. 1 km SSE of Kournas village, October 2007 (N. Turland, pers. comm.)

Poa trivialis L. cf. subsp. ***trivialis*** – 1e, 2, *EB 05-144.*

While *Poa trivialis* subsp. *sylvicola* is not uncommon in Crete, the type subspecies has not yet been recorded. The plants of our collection lack segmented swollen stolons, a characteristic feature of subsp. *sylvicola* but the identification remains as yet provisional.

Potamogeton pusillus L. – 26f, 3, *SA obs.;* 32d, 3, *SA 487.*

As explained by Uotila & Greuter (in Greuter & Raus 2001), both *P. pusillus* and *P. trichoides* occur in the lake of Agia, and the former was collected there by Yannitsaros already in 1976 (Yannitsaros & Koumpli-Sovantzi 1991: 582). Our record from the lake of Kournas is apparently new.

Potamogeton trichoides Cham. & Schltdl. – 32d, 3, *SA 488.*

Potamogeton trichoides was observed in the lake of Agia by Gradstein & Smittenberg (1977: 69f.; see also Greuter 1973) but was regarded as misidentification by Yannitsaros & Koumpli-Sovantzi (1991: 583). However, Uotila & Greuter (in Greuter & Raus 2001) pointed out that both *P. trichoides* and *P. pusillus* occur in the lake. Our records prove that this is also true for the lake of Kournas.

Radiola linoides Roth – 12c, 3, *EB obs.;* 38, 3, *EB 00-193.*

Our record from the Nomos of Rethymno is preceded by one from Baumann & Baumann (1999, Panormo) as well as by two collections from R. Jahn (pers. comm.). Also recorded here for W Crete while a record near the lake of Agia in 1967 (Gradstein & Smittenberg 1977: 83) could not be confirmed.

Ranunculus aquatilis L. – 45b, 1, *EB 05-45.*

Second record for, if not new to, Crete and the Aegean. The species is not treated in G. Dahlgren's account for Flora Hellenica (in Strid & Tan 2003: 67), although mentioned in FCS I: 75 based on a

specimen from Kourounes (N of our locality) in L. Chilton's private herbarium (N. Turland, pers. comm.). EB found the species together with two other hydrophytes *(Callitriche brutia, Ranunculus peltatus* subsp. *saniculifolius)* in a small seasonal pool in a drainage ditch.

Ranunculus lateriflorus DC. – 22a, 3, *SA 35;* 22b, *EB 00-166;* 22c, 3, *SA obs*.

The occurrence of this species at the seasonal pond on the Omalos plain of the Lefka Ori is known since Reverchon collected it there in 1883-84 (Halácsy 1908; FAe: 191). Later reports from, e.g., Gradstein & Smittenberg (1977: 69), Egli (1993: 190), Bergmeier & Matthäs (1995) and N. Turland (photo from 1994 in Fielding & Turland 2005), and our present records refer to the same locality, with a separate one (22c) nearby.

Ranunculus ophioglossifolius Vill. – 1e, 1, *EB 05-142;* 13b, 2, *EB 00-446.*

Uncommon and only few plants found in each locality. The two records add to the four scattered ones in W Crete mapped in Strid & Tan (2003).

Ranunculus peltatus subsp. ***saniculifolius*** (Viv.) C. D. K. Cook – 22a, 4, *SA 34;* 22b, 4, *EB 00-165;* 45b, 3, *EB 05-51;* 46b, 3, *EB 05-27.*

This is the most widespread subspecies of *Ranunculus peltatus* in the Aegean (G. Dahlgren in Strid & Tan 2003: 66) although the map shows only W Cretan localities, including the Omalos plain in the Lefka Ori. The taxon is mentioned from the seasonal pond in that location by Gradstein & Smittenberg (1977: 69, as *R. peltatus*) and Bergmeier & Matthäs (1995: 88, as *R. peltatus* subsp. *fucoides*). In the Nomos of Lasithi (E Crete) hitherto known only from the Omalos plain in the Dikti mountains (Egli 1993: 189, as *R. peltatus*).

Ruppia maritima L. – 1a, 3, *EB 05-214;* 50, 4, *EB 00-339.*

Confirming previous records from the Nomi of Chania (H.-I. Akrotiri: Bucht von Kalathas südl. Chorafakia, *Greuter 2631* (LD), 25.4.1960) and Lasithi (Sandstrand von Vai, *Greuter 4444* (LD), 11.5.1962; Kärnefelt 2005-). Known from the island of Gavdos S of Crete (Bergmeier & al. 1997: 350) and from the main island since F. Wettstein collected it at the south coast near Timbaki (FAe: 707, as *Ruppia maritima* subsp. *rostellata*). The new records are from wet coastal sands in the northwest (growing together with *Chara galioides*) and northeast, respectively. Not far from our locality 50 Dörfler collected a *Ruppia* identified as *R. maritima* subsp. *spiralis* (FAe: 707), hence *R. cirrhosa*. This species still occurs near Vai, where it was seen in 2000 (*EB 00-329*).

Salix pedicellata Desf. – 26b, 1, *SA 322.*

Second record for Crete. Found in 1994-96 by R. Jahn (in Greuter & Raus 2000: 240) in a tributary valley of the Fasas valley between Langos and Nea Roumata.

Schoenoplectus tabernaemontani (C. C. Gmel.) Palla – 26b, 4, *SA 329*; 26h, 4, *SA obs.;* 29c, 3, *EB 00-370.*

Our finding confirms a record from 1985 from the lake of Agia (Yannitsaros & Koumpli-Sovantzi 1991: 585), and adds a new one, apparently the first from the south coast.

Scilla cydonia Speta – 5a, 2, *EB 00-430.*

Described by Speta (1998) based on material from W Crete and Karpathos. The three Cretan collections from 1995 and 1996 by Vašek and Jahn & al. originate from the Fasas valley, the valley between Papadiana and Nea Roumata, and near the village of Limni (NW of Elos or N of Deres?) (Speta 1998). It occurs also in the valley between Sembronas and Ano Kefala, 35°24'17"N, 23°49'04"E, 470 m, 2.5.2003, *Karakitsos & Turland s.n.* (living material at UPA, N. Turland, pers. comm.). The species seems to be restricted in Crete to shady humid valleys in the western phyllite area.

Scrophularia lyrata Willd. – 33c, 2, *EB 05-253*.

Scattered in W Crete, with three post-1930 records mapped in FCA: 349 (as *Scrophularia auriculata*). Further records include: *Karlén 457* (LD), Nomos and Eparchia of Rethymno, damp meadow along the Petres river c. 300 m S of the estuary, 1.5.1977 (Kärnefelt 2005-); *Sauer 12546* (M), Ep. Apokoronou, an der Straße 2 km NE Armeni bzw. 1 km S Kalythmi (Grau 1976). Our new record represents a small population in the coastal plain endangered by ground water manipulation.

Sibthorpia europaea L. – 5b, *EB obs.;* 6d+e, *EB obs.;* 11, 3, *EB 00-421;* 12b, 1, *SA obs.;* 13a, *EB obs.;* 16b, 2, *SA obs.;* 17a+c, 2, *SA obs.;* 19e, 1, *SA 165;* 19f, 2, *SA obs.;* 24b, 2, *SA obs.;* 25a+c+d, 2, *SA obs*.

Scattered in W Crete; our records are from wet places in the phyllite area chiefly of the Eparchies Kissamos and Kydonia. There are historical records from Mt Vrisinas (Eparchia of Rethymno) by Sieber (1823: 188, in einer Schlucht an feuchten Stellen, 20.-26.4.1817) and Raulin (in 1869, FAe). The occurrence there was confirmed very recently by N. Turland's photo (http://www.flickr.com/ photos/nturland/2638221000/in/set-72157605980745458/). Fielding & Turland (2005: 408) describe the fate of the perhaps only recent *Sibthorpia* population in a mire of the eastern part of the Lefka Ori after the habitat was destroyed by excessive use of the water resources. It was last seen in the mire in April 2003, in a roadside drainage ditch, but not found in June 2007 (N. Turland, pers comm.).

Sparganium erectum subsp. ***neglectum*** (Beeby) Schinz & Thell. – 26g, 2, *SA obs.;* 30, 3, *SA obs.;* 33c, 2, *EB 05-242*.

Scattered in Crete, with three localities based on Rechinger (1943b) and mapped in FCA: 415. The occurrence at the lake of Agia, confirmed here, was first observed in 1967 (Gradstein & Smittenberg 1977). The one from the river Xydas, Kalyves, recorded in 1972 and 1983 (Yannitsaros & Koumpli-Sovantzi 1991: 583) is close to our location 30, while location 33 represents a new record.

Trifolium micranthum Viv. (*T. filiforme* L., nom. rej.) – 22a, 2, *SA 317;* 22c, 2, *SA obs.;* 22d, 1, *SA obs*.

This confirms the previous records around the seasonal pond on the Omalos plain of the Lefka Ori in the 1980s and 90s (Egli 1993: 187; Bergmeier & Matthäs 1995: 89). Egli (1993: 185) found and mapped *T. filiforme* in six mountain dolines in Crete.

Trifolium ligusticum Balbis – 3a, *EB 00-426;* 3b, 2, *EB 05-234;* 12b, 2, *SA obs.;* 13b, *EB obs.;* 14, 2, *SA 480;* 13a, *EB 00-445;* 16c, 2, *SA obs.;* 25b, 1, *SA obs*.

Apparently restricted to shady and at least seasonally moist places in the phyllite area of W Crete where we found it in several places in the Eparchies of Kissamos and Kydonia. Previously recorded from the same wider area by K. H. Rechinger (Rechinger 1943b: 96; Greuter 1973: 44), Deschâtres & al. 1998 (entre Koutsamatados et Mili; à 3 km au sud de Nea Roumata); *Lassen 96012* (LD): 2 km (along the road) N of Nea Roumata (Kärnefelt 2005-); Böhling (in Greuter & Raus 2000: 242), associated with *Isolepis setacea*.

Trifolium patens Schreb. – 33e, *EB 08-6*.

First post-1930 record for Crete according to FCS II but see Kärnefelt (2005-) for collections from the lake of Agia, *Karlén 493* (LD) & *Snogerup 2420* (LD), 3.5.1977. The three 19th century records cited in FAe: 359 are also referable to NW Crete. In our site near Georgioupoli it occurs on seasonally wet sandy soils near the beach.

Trifolium squamosum L. – 33b, 3, *EB 05-248;* 46a, 2, *EB 05-22*.

Confirmed for the Nomos of Lasithi and after 120 years from the Nomos of Chania. Previously known from C Crete (FCS I: 63) and from an unconfirmed record from the Eparchia of Kissamos

(W Crete) based on the collection *Reverchon 239* cited in FAe: 365. Records from the eastern Nomos (Eparchia of Mirambelou) include *Lassen 95053* (LD), doline just NW of Kastelli, 11.5.1995; and *Runemark & al. 17533* (LD), 1 km S of Ag. Nikolaos, 14.5.1962 (Kärnefelt 2005-). The species is also mentioned in an unpublished list of records by Düll & al. from the Eparchia of Apokoronou, observed "zwischen Kavros und Küste; Feuchtgebietsreste mit *Phragmites*", 35°21'N, 24°17'E, 0-5m, 4.5.1995.

Veronica acinifolia L. – 44a+b, 3, *EB 05-79;* 47a, 2, *EB 05-90.*

The collections are from the Lasithi and Katharo plains. The plants grow on open mineral soil that is moist until spring, at margins of arable fields and waysides. Gandoger collected it in the Lasithi area (M. Lazaro, FAe: 482) probably in 1914 (R. Jahn, pers. comm.). According to FCS II not recorded since 1930 but recent findings by N. Böhling in the Nomos of Rethymno, Eparchia of Agios Vassilios, Gious Kambos, wet fallow field on loamy sand, 35°12'36"N, 24°33'42"E, 770 m, 14.4.1998 (Böhling & Scholz 2003); by R. Jahn (pers. comm.) in the Nomos of Iraklio, Eparchia of Kainourgio, Kapelle Agios Ioannis im Rouvas-Wald, Quellflur, 35°10'N, 24°54'E, 980 m, 15.4.1995, *Jahn s.n.* (herb. Jahn); in the Nomos of Lasithi, Eparchia Mirambelou, the plain S Avdeliakos, 35°08'N, 25°34'E, 28.4.1977, *Snogerup 2342* (LD), and Eparchia of Lasithi, W of Mesa Lasithiou, 35°10'N, 25°29'E, 900 m, 30.4.1975, *Landström 2323* (LD) (Kärnefelt 2005-).

Woodwardia radicans (L.) Sm. – 17a, 2, *SA obs.;* 19d, 2, *SA obs.;* 19i+m, *W. Wolf obs.;* 23b, 2, *SA obs.;* 17b, 1, *SA obs*.

Known from dripping wet phyllite rocks near streams in W Crete. The populations are small and endangered by drought through water removal and road construction works. Our records refer to locations close to, or identical with, previously known ones (R. Jahn in Phitos & al., 1995: 524).

B. Bryophtes

Calliergonella cuspidata (Hedw.) Loeske – 25c, 3, *SA 201;* 23a, 3, *SA 251.*

Previously recorded by Gradstein (1971) from the Fasas valley between Langos and Nea Roumata and from hills E of Koutsoumatados, both in 1967, and by Düll (1995: 44). Apparently not uncommon in wet places W and NW of the Lefka Ori.

Chiloscyphus polyanthos (L.) Corda – 10, 3, *SA 474.*

Recorded here as new to Crete. This liverwort is infrequent in the Mediterranean, found chiefly in the west but is known from the Ionian Islands and the Greek mainland (Düll 1995: 19; Bischler 2004: 104). Other unpublished records from the Nomos of Chania: *Gradstein 9855,* road from Koutsoumatados to Kandanos 5 km in a rivulet, c. 250 m, 10.4.1995; *Gradstein 9854,* Elos, in a rivulet, c. 250 m, on rock and on wood in running water, 6.4.1995; *Gradstein 9858,* near Vlatos, in a rivulet, c. 250 m, 6.4.1995; all in GOET.

Cratoneuron filicinum (Hedw.) Spruce – 31c, 4, *SA 268.*

Previously recorded from the Nomos of Chania, W of Platanias at the mouth of the Keritis river and around the lake of Agia, both in 1967 (Gradstein 1971); and from the Nomos of Iraklio, Zeus cave at Mount Ida, in 1966 (Düll & Düll-Hermanns 1973).

Palustriella commutata (Hedw.) Ochyra – 3d, 4, *SA 169;* 6b, 3, *SA 429; 8, 4, SA 113;* 16a, 3, *SA 391;* 28a, 4, *SA 341;* 28b, 2, *SA 340*.

Previously recorded in the Samaria gorge, Nomos Chania, in 1967 (Gradstein 1971), and at the waterfalls 2.5 km SW of Krasi, Nomos Iraklio, in 1972 (Düll & Düll-Hermanns 1973). These and our collections match var. *commutata*.

Philonotis calcarea (Bruch & Schimp.) Schimp. – 25e, 3, *SA 244.*

Recorded here as new to Crete. In Greece otherwise known from the N and W Aegean and the mainland (Düll 1995: 87).

Philonotis fontana (Hedw.) Brid. – 2a, 3, *SA obs.;* 14, 3, *SA obs.;*17b, 3, *SA 457;* 25c, 3, *SA 458*.

Several previous records from 1967 in W Crete by Düll & Düll-Hermanns (1973) around the lake of Agia, the Fasas valley, Meskla, and the plain of Omalos.

Philonotis rigida Brid. – 16a, 3, *SA 385;* 2a, 3, *SA 425;* 17b, 3, *SA 460;* 25c, 3, *SA 169;* 25f, 3, *SA 460.*

Several records from 1972 in W Crete by Düll & Düll-Hermanns (1973) which were accepted by Raeymaekers (1983): Fasas valley, 2 km S of Ag. Joannis; between Gerolakkos and Platyvola.

Riccardia chamedryfolia (With.) Grolle – 31a, 4, *SA 131.*

Second record for Crete. The species is not mapped for the island by Bischler (2004) although previously recorded in W Crete, S of Perivolia, in 1972 (Düll & Düll-Hermanns 1973).

Riella notarisii (Mont.) Mont.

This European-Mediterranean liverwort was recorded from the lake of Kournas in 1967 (Gradstein 1971) and confirmed there by the collections *Gradstein 9859* and *9860* (GOET) from 11.4.1995. There is no recent collection.

Thamnobryum alopecurum (Hedw.) Gang. – 8, 2, *SA 253.*

Several records from the mountains of Crete by Düll & Düll-Hermanns (1973) in 1966. Our record seems to be the first from low altitudes.

C. *Charophyta*

Chara braunii C. C. Gmel. – 22a, 4, *SA 280.*

Our record confirms a previous one from 1985 of the seasonal pond on the Omalos plain of the Lefka Ori by Koumpli-Sovantzi (1997: 175).

Chara fibrosa Agardh – 32b, 3, *SA 330;* 32d, 4, *SA obs.*

Collected in the lake of Kournas by J. Bruinsma in 1997 (Raam 2005 and in litt.). *Chara fibrosa* is a species of tropical and subtropical distribution recorded in Europe only once before in a rice field in N Italy in the 19th century (Krause & al. 1997).

Chara galioides DC. – 1a, 4, *SA 229a;* 1d, 4, *SA 229b.*

Recorded here as new to Crete. It grows together with *Ruppia maritima* on seasonally flooded sands near the beach.

Chara vulgaris L. – 1c, 4, *SA 228*; 26c, 1, *SA 493.*

Known from seasonal rock pools on the island of Gavdos (Bergmeier 2001) and collected in a few unpublished Cretan localities (Raam, in litt.).

Nitella tenuissima (Desv.) Kützing – 22d, 2, *SA 330.*

Recorded here as new to Crete but the published record of *Nitella hyalina* from the lake of Kournas (Koumpli-Sovantzi 1997: 176) refers almost certainly to *N. tenuissima* (Raam, in litt.).

Dicussion

Many new findings demonstrate that the flora of Crete, though comparatively well known, is still insufficiently documented as to provide a basis for monitoring of wetland species occurrences on a local scale, let alone of population size and conservation status of plant species and their habitats. Regrettably, monitoring programmes have not even been implemented for the protected sites of the Natura 2000 network (Dimopoulos & al. 2005).

Numerous confirmations of rare and ecologically sensitive wetland species in previously investigated locations seem to reflect remarkable stability of wetland habitats. The seasonal pond

on the Omalos plain of the Lefka Ori, for instance, still harbours species such as *Antinoria insularis, Elatine alsinastrum, Isoetes histrix* and *Ranunculus lateriflorus,* which had been recorded almost certainly in the same locality already in the 19th century (Rechinger 1943a). At that time, according to Rechinger (1951: 190), Sibthorp and Heldreich found stagnant waters on the Omalos plain, and *Alopecurus creticus,* now missing on the plateau, was described from there. Out of 12 species found by K. H. Rechinger in 1942 in the coastal wetland of Frangokastello (Rechinger 1951: 190), EB found 8 still extant in 2000.

On the other hand, our survey reveals considerable loss of wetland species in those sites that had been thoroughly investigated four decades ago. Out of 72 vascular plant species treated here, a total of 27 species were found in 1967 by Gradstein & Smittenberg (1968, 1977) in four different locations that we investigated again in 1999-2000 and/or 2005. The locations are: (1) Fasas valley, (2) lake of Agia, (3) coastal plain of Georgioupoli, and (4) the mouth of the stream Keritis W of Platanias. Around the lake of Agia, Gradstein & Smittenberg (1968, 1977) found 18 such species of which we confirmed merely 7. The respective figures for the Fasas valley are 13 vs. 8; Georgioupoli, 7 vs. 4; and W of Platanias, 5 vs. 0. Except for the latter location that has sunk to insignificance as wetland habitat since, the other three are still among the most important wetland sites found in W Crete. Understandably, we cannot exclude that we overlooked the one or other species relevant for our comparison but it is evident that particularly species of nutrient-poor and open habitats were not observed again, such as *Anagallis tenella, Eleocharis multicaulis, Fuirena pubescens* and *Lathyrus neurolobus* near the lake of Agia; and *Isoetes histrix, Juncus capitatus* and *Radiola linoides* near the lake of Agia and in the Fasas valley. Apparently species sensitive to the invasion of highly competitive species such as *Arundo donax* and *Phragmites australis* are declining, or have disappeared, at least in the lowlands.

Two wetland species are listed by Turland & Chilton (2007) of which apparently no post-1930 records are known from Crete and which have perhaps become extinct already: *Alopecurus creticus* and *Holcus lanatus*. *Glinus lotoides,* recorded in the 19th century from near Aradena (Eparchia of Sfakia) and Kladiso (Chania) (*Heldreich, Sieber;* FAe: 126), seems to be missing as well. Another one would be *Nymphaea alba,* which Baldacci saw in 1893 (Greuter 1973: 35; Fielding & Turland 2005: 309). The only Cretan *Sphagnum* species, *S. auriculatum,* discovered in 1994 (Turland & Wilson 1995), is to be added to this list, as the small bog in which it grew over centuries is dry now because the water that used to seep through the site is piped away (Fielding & Turland 2005: 49). To our knowledge no other wetland species have disappeared from Crete yet (disregarding *Poa palustris* and *P. jubata* which are doubtfully present on Crete, Böhling & Scholz 2003) but local losses are possibly much more frequent than the available data indicate. For instance, the lush vegetation of mosses and liverworts on dripping wet schist walls sprinkled by seepage water along the road in the Fasas valley between Skines and Nea Roumata near Langos, a habitat of the rare bryophytes *Rhamphidium purpuratum, Trematodon longicollis* and *Jungermannia handelii* (Rechinger 1951: 141; the latter two found again by R. Gradstein in 1967: Gradstein 1971), became recently a victim of construction works for the new oversized road, and it was only thanks to the engagement of S. Kyriakakis from the Forest Services of Chania that the famous *Woodwardia* stand further up the road could be spared from the impacts.

As it is now, losses are likely to go unnoticed. In other cases, new findings of rare wetland species seem to outweigh the losses (Bergmeier & Abrahamczyk 2007). Nevertheless, there can be no argument about there being a clear trend of loss of wetlands both in surface area and in habitat quality, especially concerning the coastal wetlands but increasingly so also in the mountainous parts. Clearly, a monitoring and protection programme of Cretan wetlands is urgently needed as present-day “by-chance floristics" is unsuitable to detect local changes in plant cover with the necessary accuracy in resolution of location and time.

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