6_3_3 Interpretation of the changing environment at Castelporziano before, during and after the period of Roman occupation

The results of the palaeoecological analysis of the cores taken from the Castelporziano Estate and the surrounding area provide insights into the changing environment before, during and after the period of roman occupation of this coastal site. Today the coastal fringe of the Estate is heavily forested with a mixture of deciduous and evergreen species with an understorey of broom, juniper and herbs. Several different palaeoenvironmental indicators were employed in the analysis and a summary of results for core material from one of the fishponds (D6), and the dune slacks at Pozzo Napoliello (PN) and Muraccioli (M) is provided in Table 1.

Table 1: Summary of results for D6 (Fishpond), Pozzo Napoliello and Muraccioli

	pre-Roman	Roman	post-Roman
LOI	D6: gradually increasing PN: Remains constant at 0.5% M: Low and constant (<1%)	D6: Increases and peaks at 25% at 134cm,then decreases to 5% at 122cm, and remains constant. PN: Gradually increasing throughout and peaking at 3% at 60cm M: Low and constant (<1%)	D6: Remains constant at 5% PN: Gradually increases from 2% to 5% at 20cm and remains constant M: Gradually increasing until 40cm, when it reaches 4%, and remains constant thereafter.
Plant Macrofossils	D6: Dominated by aquatic macrophytes and herbaceous PN: Potamageton and Poaceae with mosses	D6: Betula present until 134cm, few aquatics except for Apium, no herbaceous and gradual increase in grasses and sedges particularly Eleocharis PN: Herbaceous with some Alnus, mosses and the non-pollen palymorph Glomus cf. fasciculatum	D6: No herbaceous and few grasses or sedges; aboreals show presence and few aquatic species PN: Wet woodland of Alnus with some herbaceous species and mosses M: Wet woodland of Betula and Quercus with some herbaceous species and mosses
Macrocharcoal	D6: Gradually increases and peaks at 70 pieces/cm^2/year at 200BC, before decreasing PN: Gradually increases and peaks at 29 pieces/cm^2/year at 650-550 BC before decreasing M: Peaks at 18 pieces/cm^2/year 1050 AD to 1150 AD	D6: Gradually increases and peaks at 129 pieces/cm^2/year at 0-50 AD before decreasing PN: Gradually increases to 8 pieces/cm^2/year at about 50 AD and then decreases to 3 pieces/cm^2/year at about 450 AD.	D6: Remains constant at 12 pieces/cm^2/year until 950 AD PN: Gradually increases to 10 pieces per cm-1 1950 AD and then decreases
Stonewort Oospores	D6: Chara present from 162 cm PN: Generally absent	D6: Chara present but decline from 130-115 cm PN: Chara and Nitella present	D6: Chara present throughout PN: Chara and Nitella both present until 40 cm then Chara only M: Present at 65 cm, then absent until 30 cm
Bryozoan Statoblasts	D6: Plumatella repens only	D6: Plumatella repens (absent 136-113 cm), Cristatella mucedo and Lophopus crystallinus (present 129 to 114 cm and 141 to 114 cm respectively)	D6: Absent until 70cm, then Plumatella repens only M: Plumatella repens 50 and 10 cm only
Other Proxies	Pollen (D6): AP: NAP increases in favour of AP throughout period from 50:50 to 60:40 Ostracods (D6): Cyclocypris serena only Molluscs (D6 and PN): Absent	Pollen (D6): AP:NAP begins as pre-Roman (60:40), then increase in NAP at 120-110 cm to 30: 70, before becoming 60:40 at the end of settlement. Ostracods (D6): Absent Molluscs (D6 and PN): Absent	Pollen (D6): AP:NAP 80:20 throughout most of the period, although decreasing to 70:30 in top 10cm. Molluscs (D6 and NP): Wet woodland Ostracods (D6): Cyclocypris serena, Potamocypris villosa Ilyocypris inermis and Limnocythere inopinata

An indication of local vegetation history is provided by the plant macrofossil remains and is complemented by the pollen analysis results for the peat-rich core from D6. The predominantly alkaline environment of these dune slacks militated against the preservation of pollen, however the results from D6 present a picture of vegetation at the regional level and can be usefully contrasted with the macrofossil results since the latter indicate species actually growing in the local area.

The presence and concentrations of charcoal within the cores may provide an indication of the frequency of fires in the Castelporziano area. The stonewort oospores are complex green algae while the bryozoan statoblasts are freshwater species commonly found in lakes, ponds and streams.

Cores from D6, the roman fishpond, yielded the most palaeoenvironmental information. The history of D6 differs from that of the other dune slacks. It appears that a relatively narrow depression between two dune ridges was exploited during the early phase of roman occupation of the coastal zone. The sequence of sediments in the D6 core show a transition from beach to freshwater marsh ca. 600 BC and a further transition from marsh to a ponded environment with a marked increase in the accumulation of organic matter ca. 430 BC. This change from freshwater marsh to a ponded environment occurred several hundred years in advance of a phase of roman building which transformed the D6 and D5 dune slack ponds into artificial ponds with additional water supply. An interpretation of the composite D6 core is given in Table 2.

Table 2: Age-Depth Environmental Interpretation of D6 Fishpond

Depth (m)	Sedimentology	Interpretation	Age (AMS ^{14}C)
0-0.45	Peat	Pond	
0.45-1.34	Peat	Pond	@ 0.5m AD1410 @ 1.0m AD130
1.34-1.72	Organic-rich sand	Artificial Pond Interdune pond	@ 1.3m 30 BC @1.7m 420 BC
1.72-1.95	Laminated sandy-silts	Lake or freshwater marsh	@1.8m 440 BC
1.95-2.0m	Coarse sand	Beach	

If we compare the results for local (plant macrofossil) and regional (pollen) vegetation changes for D6, we can note the presence of few tree species in the pre-Roman period in the immediate vicinity of the site. However the pollen record indicates that a range of species were growing in the region. Therefore although we have no evidence that the area immediately around D6 was forested until after the period of roman occupation, the pollen record does indicate the presence of mixed woodland nearby (see Table 3).

Table 3: Evidence of presence of tree species before during and after the period of Roman occupation at Castelporziano: pollen and plant macrofossil data from D6 (Core 3)

	Plant Macrofossils	Pollen
Pre-Roman	Betula	Quercus, Betula, Pinus, Salix
Roman	Betula in early part of record only	Quercus, Betula, Pinus, Alnus
Post-Roman	Increase in arboreal macrofossils including Betula, Alnus, Quercus and Pinus	Quercus, Betula, Pinus, Alnus, Salix and Fagus

Although the archaeological evidence relating to D5 and D6 confirms the structural adaptation of a natural ponded environment in early Roman times we found no evidence *per se* that fish were present in the ponds. There is however evidence of increased nutrients and of eutrophication of the pond waters which may equate to use as holding or rearing tanks, but this use appears to have been shortlived. Unusually, in the context of other Roman *Piscinae* the structures at Castelporziano were freshwater rather than brackish or saline.

Conclusions

The spread of woodland species within the coastal strip of Castelporziano appears to have been mostly associated with the period following the abandonment of the area ca. 420 AD. Prior to this time, although the pollen record indicates a mixed oak and evergreen woodland nearby, the plant macrofossil record from fishpond D6 shows only Betula growing locally. A little further inland at Pozzo Napoliello the environmental reconstruction provides a picture of a (potentially) grazed marsh or fen with the presence of Alnus, herbs, grasses and sedges during Roman times developing into a wet woodland after abandonment.