

Fungal survey of Doune Ponds Nature Reserve



Tilachlidium brachiatum on unidentified oyster fungus, Doune Ponds Oct 12 2020 (E.M. Holden)

Report to Doune Community Woodland Group

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SUMMARY OF MAIN FINDINGS

Doune continues to produce interesting and exciting species of fungi. The two visits in 2020 produced a total of 124 species, 40 of which had not previously been recorded at Doune. Of these 40 new species, 11 are known from fewer than 10 other sites in Scotland, three of those have not been previously recorded in Scotland (*Cortinarius diasemospermus* var. *leptospermus*, *C. helobius* and *Russula pseudo-olivascens*). As with all fungal records it is impossible to be sure whether the fungi are truly rare or just rare fruiters; it remains clear however, that Doune continues to be of mycological interest.

Including the above, the results of Holden (2009) and the records from three forays conducted in 2010, 2011 and 2012, the total number of recorded fungal species at Doune ponds is now 544 (Appendix 1).

Some of the interesting previously recorded fungi including *Guepinia helvelloides*, *Hebeloma hetieri* and *Melanoleuca turrita*, were not recorded during the two site visits in 2020. The fungi are quite probably still present, as the habitats remain mostly intact (with some minor concerns about trampling in the grassy area around the *Guepinia* site) but just not fruiting at the time of the visits. This unpredictable fruiting pattern is entirely in keeping with what is known of fungal fruiting and why multiple visits are required to begin to get a picture of the fungal communities.

Extensive path improvements have enabled the site to cope well with increased footfall enabling increased usage without excessive compaction or disturbance to the wider woodland habitats. The overall management has maintained the humidity and soil conditions that suit the continued diversity of both saprotrophic and mycorrhizal fungal communities.

INTRODUCTION

The management of Doune Ponds has passed from Stirling Council to the local community and a ten year management plan (Anon 2014) has been established to guide the overall management of the site. The management plan has been produced to complement a management agreement that exists between Doune Community Woodland Group and Moray Estates, the landowners.

Since 2015, and following the above mentioned management plan, a number of projects have been undertaken including the upgrade of 500 meters of existing path and the construction of 1400 meters of new all abilities paths to facilitate public access.

Whilst good access is a high priority to facilitate recreational and educational access by a growing residential population in the adjacent settlement, the management team are also committed to maintaining and enhancing the biodiversity of the site.

Doune hosted a series of visits by mycologists from the Royal Botanic Gardens Edinburgh, in the late 1980s and early 1990s, most notably with other members of the British Mycological Society in October 1990. A number of interesting macro species were recorded during these visits and a further fungal survey was commissioned in 2008. The 2008 survey noted that the natural processes of vegetation succession and development had moved the fungal interest away from the colonisers of bare sandy or clay soils and onto a community adapted to wet and humid woodland conditions,

including a large proportion of wood and litter recycling fungi with some interesting mycorrhizal species in the drier areas. A number of management recommendations were made.

During an interim review of the management plan, it was requested that the fungal survey undertaken in 2008 – 09 (Holden 2009), be revisited and updated. The current report presents an update of the earlier report.

METHODOLOGY

Two visits were made to the site in 2020 on Sept. 7th and October 12th. A proposed ‘family foray’, aimed particularly at the children, had to be postponed in response to Covid 19 restrictions. The author met briefly with Tony Farrant and Rory McLeod on Sept 7 and undertook the surveys alone. On each survey day as much of the site as possible was investigated, using existing information about the habitats and the surveyor’s own experience of habitats likely to be productive for fungi. The survey involved a random walk-over rather than a plot based methodology and it should be noted that it is not possible to objectively compare this information with past or future fungal survey work.

In addition, records from three forays that the author attended have been included in the species lists. Fungal taxonomy is, like many groups, currently very fluid and the scientific names in Appendix 1 have been updated and made consistent, as far as is possible. Historic records only to genus have been removed, slightly reducing the species list from the 1980s/90s.

It is important to stress that the fungal data presented in this report is seen as a snapshot of what was fruiting on the days of the survey, and not a full inventory of what is actually present at Doune. It should be noted that for the purposes of this survey myxomycetes (slime moulds) and dung samples have not been cultured and micro fungi have not been included apart from incidental records. The definition of a macro as opposed to a micro fungus varies from author to author but in this instance the delimitation of Eef Arnolds (1992) has been used thus:

‘Macro fungi are those fungi forming reproductive structures... which are individually visible with the naked eye, that is larger than about 1mm’.

The reasons for focusing on macro fungi are entirely pragmatic and have no taxonomic or ecological basis (Holden et al 2000). It should be recognised that a survey of macro fungi only, will probably exclude the greater part of the fungal diversity of an area (Cannon 1997). This note is particularly important with reference to this site as many of the early records were of micro fungi. The site species list contains 40 micro fungi, reported in the late 1980s and early 1990s, that are rarely recorded in Scotland. The micro fungi are undoubtedly an important component of the mycota at Doune. There are now very few mycologists studying micro fungi in the UK and thus it is difficult to estimate the rarity of the species found; micro fungi have been hugely overlooked.

It should also be noted that the survey was based entirely on the examination of fruit bodies and that no DNA work has been undertaken on the vegetative mycelial structures existing below or within the substrate.

All fungi located were recorded and where field identification was not possible, material was collected and taken back to the lab. for microscopic examination. Species of particular interest have

been dried and are either in the fungarium of the author or have been sent to the Royal Botanic Gardens Kew for critical determination. All the records will be forwarded to the Fungal Records Database of Britain and Ireland (FRDBI) managed by the British Mycological Society. Basidiomycete nomenclature is taken from the basidiomycete checklist and subsequent online updates (Legon & Henrici 2005).

RESULTS

A total of 124 species were recorded during the two visits of 2020: 40 of these species are new to the site, and together with records from Holden (2009) and three fungal forays which have been held at the site since the last survey (April 2010, August 2011 and September 2012), raises the total number of species for Doune Ponds from 492 to 544. Appendix 1 (presented as a separate excel spreadsheet) lists the species from the different collection periods as well as an updated list of species known to date.

The functional mode of the 124 species follows closely that outlined in the 2009 report (Table 1). Wood recycling species (lignicolous species) are the most numerous and together with the litter recyclers (humicolous saprotrophs) make up the largest percentage (2008/9 66%: 2020 62%). The large number of recycling fungi relative to other functional modes is likely to be a reflection of the humid nature and the healthy accumulation of dead wood on the site and reflects a habitat that is all too rarely encountered in modern woodlands. The low number of macro parasites is entirely as would be expected in any ecosystem. Whilst giving a good general impression of the character of the fungi at any site, this division of fungi into different functional modes is probably over-simplified and it must be acknowledged that science is only just beginning to understand the complexity of fungal ecology.

Table1: Functional mode of species recorded 2009 / 2020

Functional Mode	No. of Species 2008/9	% of species 2008/9	No. of Species 2020	% of species 2020
Humicolous saprotrophs	50	25	22	18
Lignicolous saprotrophs	82	41	54	44
Mycorrhizal	56	28	39	31
Parasite	7	5.5	9	7
Myxomycete (Slime Mould)	1	0.5		
Total number of species	200		124	

The fungi of interest associated with different habitats and their niches are presented below.

Birch and willow dominated, naturally regenerating wet woodland

Mycorrhizal fruiting species were dominated, as in 2008, by *Lactarius spinosulus*, a widespread, but not commonly recorded, associate of birch. *Inocybe aghardii*, a species rarely recorded in Scotland but fruiting across the site in 2008 was not found in 2020 (last known record from a foray in 2012).

Scattered through the areas of naturally regenerating willow and birch were several interesting mycorrhizal species, new to Doune, including *Russula pseudo-olivascens*, which is new to Scotland. This species has only been recognised since 2002 at species level but it does appear to be genuinely rarely recorded. A number of rarely recorded *Cortinarius* species apparently associating with willow were also fruiting in this habitat. *Cortinarius diasemospermus* var. *leptospermus* and *C. helobius*, both new to Scotland but both only recently recognised in the UK, *C. parvannulatus* and *C. saniosus* known from two and nine other Scottish sites respectively. *Inocybe flavella* appears to have a southern distribution being quite common in the south of the UK but only known from nine Scottish sites.

Interesting wood recycling species new to the site in this habitat include *Flammulaster limulatus*, widespread but rarely recorded, and only 12 known Scottish sites. A delightful pink, encrusting fungus, *Corticium roseum*, was found on a dead attached willow branch – another species that seems to be more commonly recorded in the south of the UK with only four other Scottish sites. Two smaller ascomycete species were found, both also on dead attached willow branches, *Hymenoscyphus salicellus*, with only one other known Scottish site, and *Hypocrea gelatinosa* with five other known Scottish sites.

Clumps of Male Fern (*Dryopteris felix-mas*) growing on the steep banking to the south and west of the West Pond are still supporting the tiny, pink edged, saprotrophic fungus *Mycena pterigena*, reported in 2008.



Mycena pterigena: found in very humid conditions on old fern fronds (E. M. Holden)

One further niche species of interest, *Tilachlidium brachiatum*, is a parasite on other fungi; it forms white, branching structures which cover the 'host'. There are more records known from the south of the UK with six other known Scottish sites. An image is featured on the front page of this report.

Grassy glades

The open grassy glade to the northeast of the site is maintained as open ground to encourage wild flowers and allow it to be used by the community for a range of activities including dog training classes. It is bounded on the eastern edge by a plantation of mixed native and non-native tree species; the water table is close to the surface, particularly at the northern end and the area is well colonised by low growing bryophytes.

No grassland associating species were recorded in this space during 2020. This same area is the site of *Guepinia helvelloides* (salmon salad). It has been found at one other Scottish site since the 2008 record here but remains a rarely recorded species. It was not seen during either of the two 2020 visits. This in itself is not a cause for concern as the stimulus for fruiting of this species is not fully understood and 2020 may just be a poor fruiting year. It would however, be worth somebody looking out for it in future autumns to see whether it is still fruiting. The edge of the rougher ground vegetation of the woodland edge seemed to be intact but increased trampling of the grassland might destroy young fruiting bodies and possibly damage the below ground structures (mycelium).



Location of Guepinia helvelloides in 2008 NN72523 02024



Guepinia helvelloides Doune 2008

INVASIVE NON-NATIVE SPECIES

The removal of rhododendron on the site was excellent to see.

For information, during the 2020 fungal survey, two Himalayan Balsam seedling plants were found and removed from NN7218101949.

RECOMMENDATIONS

Management recommendations remain, for the most part, unchanged from those of the 2009 report which appear to be in accord with the current management of Doune Ponds. In particular the path improvements have enabled an increase of footfall whilst maintaining core areas of woodland undamaged. The removal of rhododendron has been commented on above.

Particular attention should be paid to the *Guepinia* site and if at all possible, find somebody able to check the site regularly during the autumn months to see if it is fruiting.

- Encourage a mosaic of habitats with some areas allowed to develop with a minimum of management intervention whilst maintaining footpaths with verges to enable easy access to the site
 - Wet birch /willow woodland should be allowed to develop without management intervention wherever this does not interfere with amenity use
 - Mycorrhizal fungal fruiting could be assisted by maintaining broad verges alongside paths in woodland areas and by keeping the ground flora in check under some of the better-drained areas of woodland
 - No attempt should be made to drain areas that are seasonally inundated with water
 - Maintain the current grassland areas for the possible future colonisation of Waxcap fungi and to enhance suitable habitat for *Guepinia helvelloides*
 - Encourage monitoring of *G. helvelloides* on an annual basis possibly involving the community in this process.
 - It is important that any invasive management, for example involving soil disturbance, avoids the area where *G. helvelloides* fruits

- Consider maintaining a number of banks and ditches clear of young trees and vegetation to encourage those species that colonise bare sandy or clay soils. The building of the new ponds near the entrance has left areas of bare soil which will offer this niche before natural processes enable the vegetation to re-grow.
- Encourage dead standing and fallen wood in all woodland habitats
 - Wherever possible allow woodland to develop with a minimum of interference. Brushing and thinning are not a part of the natural process of woodland development and can interfere with the natural development of the fungal wood rotting succession
 - Where thinning is seen as desirable for amenity reasons, then as much of the wood should be left on site as is possible, particularly any larger girth trunks or branches
- Rhododendron, Himalayan Balsam and other garden escapes should not be allowed to become established on the site and every effort should be made to reduce the presence of any invasive non-native species. Non-native trees are also present on the site and their eventual replacement with suitable native trees should be considered, for example oak, hazel, aspen, hawthorn and even crabapple might be suitable, particularly on the site perimeter where the ground is drier with willow and alder where the water table is close to the surface.
- Encourage further fungal recording at the site.

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