Corynephorus canescens (L.) P. Beauv. (Grey Hair-grass) on the Sefton Coast, Merseyside (v.c. 59)

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ABSTRACT

This paper describes the history, current status and habitat of the nationally rare *Corynephorus canescens* on the Sefton Coast, some 250 km north-west of its nearest native localities in East Anglia. The grass is now largely confined to acidic fixed-dunes on the Southport & Ainsdale Golf Course where it has apparently increased over the past decade to a population comprising nearly 10,000 plants occupying c. 0·86 ha.

KEYWORDS: Climate, conservation, fixed-dunes, golf course, habitat, population.

INTRODUCTION

Corynephorus canescens (L.) P. Beauv. (Grey Hair-grass) is a nationally rare, perennial grass which occurs on consolidated sand-dunes, on sandy shingle and on open sand either in coastal locations or inland. The *New Atlas of the British & Irish Flora* (Leach 2002) shows its recent occurrence in 14 hectads as a British native and states that the plant's distribution has probably stabilised following losses in the 1930s

C. canescens occurs mainly on or near the coasts of East Anglia, specifically East Suffolk (v.c. 25) and East and West Norfolk (v.cc. 27, 28). It is also rare inland in West Suffolk (v.c. 26) and is present in two hectads in Jersey (v.c. S(113)). Its only other "native" populations are on the Sefton Coast, Merseyside, South Lancashire (v.c. 59), some 250 km north-west of the nearest East Anglian sites. There has been some debate about the origin of *C. canescens* on the Sefton Coast, far from its main centre of distribution in East Anglia. Savidge *et al.* (1963) regard it as native, as does Leach (2002), but Hubbard (1954) and Sell & Murrell (1996) treat it as probably introduced.

Occurrences in Glamorgan (v.c. 41), Worcestershire (v.c. 37), Staffordshire (v.c. 39), Moray (v.c. 95), Westerness (v.c. 97), and Co. Antrim (v.c. H39) are shown as "non-native" in the *New Atlas* (Leach 2002). However, Ryves *et al.* (1996) suggest that the plant's recent arrival in Scotland may be an expansion of its natural range, while Trist (1998) also argues that the Staffordshire and Worcestershire sites could be relicts of ancient heathlands and therefore also native localities. As it is known from only 27 localities, the plant's conservation status is described as "near threatened" by Cheffings & Farrell (2005) whilst, on the Sefton coast, concern for its correct management has resulted in the preparation of a "Species Action Plan" (Merseyside Biodiversity Group 2001).

According to Stace (1991) the main habitats of *C. canescens* are leached fixed-dunes and inland sandy heathlands on acid soils. Marshall (1967) reports that the plant can also grow in calcareous dunes but the substrate must be very low in mineral nutrients. Ellenberg Indicator Values for this species in Hill *et al.* (2004) are listed below:

- Light: 9 Full light.
- Moisture: 1 Extreme dryness; restricted to soils that often dry out for some time.
- Reaction: 3 Mainly on acid soils but exceptionally also on near-neutral ones.
- Nutrients: 1 Extremely infertile sites.
- Salinity: 0 Absent from saline sites.

Marshall (1965, 1967, 1968) states that individual plants are relatively short-lived (2–6 years), so the grass relies on high reproductive capacity and seed viability to maintain its populations, seed successfully re-sowing itself in stable sand for several years. *C. canescens* grows most vigorously where there is up to 10 cm of sand accumulation per year, and it is a potentially long-lived perennial providing sand accretion is taking place. This seems to be due, in part, to the fact that the efficiency of the root

system decreases with age, good growth being dependent on the production of new roots positioned higher on the morphological axis and which is stimulated by sand accumulation.

This is a particularly distinctive and attractive grass, densely-tufted with stiff, bristle-like blue-grey blades and purplish-pink sheaths. Trist (1998) describes how, in early July, plants can be seen at a distance of 30–40 metres when the panicles are spreading at anthesis and the colony is a mass of silver and pale pink. In autumn, the bleached inflorescences also stand out when seen from a considerable distance (personal observations).

OCCURRENCE ON THE SEFTON COAST

As earlier recorders did not have access to modern satellite positioning technology, details of localities are often imprecise. Travis (1928) states that the plant was thought to have been discovered in 1928 by Sir G. Talbot but was actually first recorded, though not identified, by F. W. Holder on 4 May 1919 "among the rough and high dunes west of the pine woods near the Formby golf links". This record is also included in Savidge *et al.* (1963) who state that it apparently became extinct at one of its two known sites in 1937. Roberts & Smith (2007) include a photograph taken on 1 August 1937 by Holder, showing J. N. Frankland and J. E. Lousley with *C. canescens* "on dunes near Ainsdale". This seems likely to have been Holder's original locality.

There are herbarium specimens of *C. canescens* in **LIV** collected by Holder, Frankland and J. D. Massey between 1929 and 1931 but, frustratingly, the localities given are extremely vague: "sandy slopes Formby dunes"; "Freshfield sandhills"; "dry dunes Formby"; "near Southport." Similarly, a specimen collected by V. Gordon on 16 September 1986 is simply labelled "Ainsdale".

The database of the *New Flora of South Lancashire Project* lists records made in 1982 by P. Doody, P. Field and T. C. G. Rich "on the edge of the golf links" (G.R. SD318128), while P. Lockwood recorded the plant at G.R. SD318127 on 22 August 1987. This location appears to lie in a transitional zone between an Ainsdale recreation ground and the Southport & Ainsdale Golf Course and is presumably the site described by Trist (1998) as "a recent find" (i.e. about 1980) at G.R. SD318127. He states that "...at Ainsdale, accretion is now active and rabbits are contributing to the sand accretion requirements of *Corynephorus canescens*. Here the site is c. 100 × 4 m where our grass is dominant on two fixed dunes and has only *Hypochaeris radicata* and *Ornithopus perpusillus* as constant species." However, Trist's description does not accord with the playing area of the golf course, where bare sand lying outside bunkers and rabbit (*Oryctolagus cuniculus*) activity are not tolerated by course managers.

The first National Vegetation Classification (NVC) survey of the Sefton Coast (Edmondson *et al.* 1988–1989) records extensive stands of *C. canescens* on Southport & Ainsdale Golf Course. It occurred in "a possible variant of SD13b", later reclassified as SD11a (*Carex arenaria – Cornicularia aculeata* dune, *Ammophila arenaria* sub-community), with much *Agrostis capillaris* and mosses, or as a co-dominant with *Festuca ovina*. Other associates included *Ammophila arenaria*, *Anthyllis vulneraria*, *Carex arenaria*, *Hypochaeris radicata*, *Sedum acre*, the hair-moss *Polytrichum juniperinum*, and lichens (*Cladonia*). This site is at least 2 km from its earliest known locations, being in an area of low dunes, rather than the high dune landscape where the grass was first reported. The plant was also found by D. A. Nissenbaum growing abundantly on railway track ballast near Ainsdale (Atkinson & Houston 1993).

In his survey of Sefton Coast dune-heath in 1993–1994, Gateley (1995) records *C. canescens* in two quadrats on Southport & Ainsdale Golf Course. He states that the *Polytrichum juniperinum*-dominated low dunes, with frequent *C. canescens*, found here are unique locally. Soils are generally acidic with pH 3·43–4·44 at the surface and 3·82–4·62 at 10 cm depth.

The Sefton Coast Life Project (co-financed by the European Commission through the community LIFE-Nature fund) mapped eight large and seven small colonies on Southport & Ainsdale Golf Course in 1996–1998. The surveyors also located two patches of the grass on the eastern edge of Hillside Golf Course, across the railway line from one of the Southport & Ainsdale sites. A second NVC survey of the dune system in the years 2003 and 2004 (Gateley & Michell 2004) again found large populations of *C. canescens* at Southport & Ainsdale Golf Course, on the low eastern dunes with a very short acid sward, rich in the moss *Polytrichum juniperinum.* The

TABLE 1. SUMMARY OF *CORYNEPHORUS CANESCENS* DATA FOR 23 GOLF COURSE, RAILWAY TRACK AND RECREATION GROUND SITES

Site no.	Grid References	Dimensions (m)	Area(m^2)	Aspect	Estimated no. of plants
1L	SD3164412837–SD318612849	187 × 21	3927	S	5000
2L*	SD3161912825–SD3164412780	45 × 15	675	-	600
3L	Not found				
4L	Not found				
5L	SD3155312758–SD3153512828	70 × 22	1540	W	500
6L	SD3156812798	15 × 6	90	-	60
7L	SD3168513255	9 × 3	47	W	80
	SD3170413247	10 × 2			
8L	SD3195613100–SD3199113130	60 × 22	1320	SE	1500
9L	Not found				
10L*	SD3177612970–SD3179312970	24 × 20	480	-	250
11L*	Not recorded	22 × 3	66	-	100
12L*	SD3182112848–SD3185412855	40 × 2	80	-	230
13L*	SD3187312855	15 × 9	135	W	300
14S	SD3177613411	5 × 3	15	S	20
15S	Not found				
16S	Not found				
17S	Not found				
18S*	SD3187212950	2 × 2	4	-	40
19S*	SD3180312914	5 × 5	25	W	15
20S	SD3183512883	5 × 3	15	W	10
21S	SD3170012787	-	-	-	1
22S	SD3162012745	18 × 5	90	W	200
23S*	SD3150012782	3 × 3	9	-	15
R	SD317132			-	20
Rec.	SD31911276–SD31931278	31 × 3	93	-	110
Total			8611		9951

* = new site not mapped in 1997; L = large; S = small; R = Railway track; Rec. = Ainsdale recreation ground

authors attribute the vegetation to U1 (*Festuca ovina – Agrostis capillaris – Rumex acetosella* grassland) which is characteristic of grazed swards on acid substrates in the pastoral upland fringe. The U1 community has similarities to SD12 (*Carex arenaria – Festuca ovina – Agrostis capillaris* dune grassland), and grades into it, but generally lacks typical coastal dune plants.

THE 2007 SURVEY – RATIONALE

The Species Action Plan for *C. canescens* recommends surveys of the golf course colonies at five-year intervals (Merseyside Biodiversity Group 2001). Therefore, ten years on from the Sefton Coast Life Project survey, it was thought desirable to revisit the main sites for the plant on Southport & Ainsdale Golf Course. Accordingly, permission for a survey was obtained in mid-September 2007, a time of year when the plants are particularly noticeable.

METHODS

All colonies mapped by the Sefton Coast Life Project and other sites recommended by the golf course manager were visited on 18 and 20 September 2007. The positions of the colonies were determined using a hand-held Garmin Etrex Global Positioning System and the areas occupied by *C. canescens* were estimated by pacing. The associated vascular plant taxa were also listed and an indication of their relative frequency was estimated using the DAFOR

FIGURE 1. Location of *Corynephorus canescens* colonies 1996–1998, Southport and Ainsdale golf course

scale. Notes were made on habitat characteristics, including aspect. In addition, visits were made to the Liverpool Road Cemetery, Ainsdale, the nearby Ainsdale recreation ground and the trackside for a distance of 1 km north of Ainsdale Station. Hillside Golf Course was not surveyed. Distribution maps were prepared by staff of the Technical Services Department of Sefton Metropolitan Borough Council, using the Sefton Coast Geographic Information System (Figs 1 & 2).

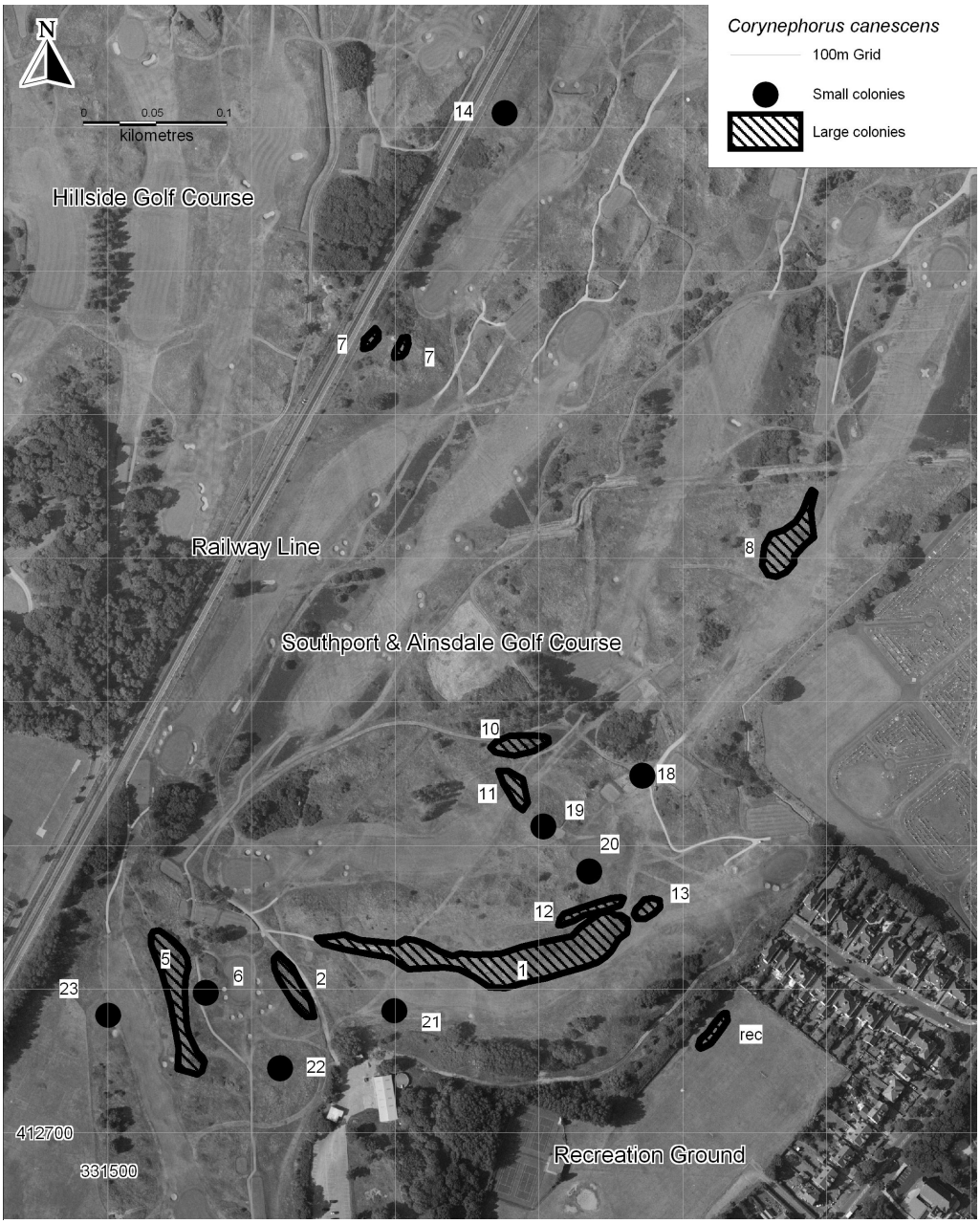

FIGURE 2. Locations of *Corynephorus canescens* colonies 2007, Southport and Ainsdale golf course and Ainsdale recreation ground

RESULTS

Although a large area of ostensibly suitable acidic fixed-dune habitat is present in Liverpool Road Cemetery, Ainsdale, no *C. canescens* was found, neither was a search of the railway north of Ainsdale Station successful. However, a population of 110 plants was discovered on a low ridge 31 m long × 3 m and c. 0·5 m high near the western boundary of the Ainsdale recreation ground at G.R. SD319128 (Table 1, Fig. 2). Vascular plant associates were *Agrostis*

capillaris, *Ammophila arenaria*, *Bellis perennis*, *Carex arenaria*, *Festuca ovina*, *Hypochaeris radicata*, *Plantago coronopus* and *Senecio jacobaea* which suggests a moderately acidic substrate. There is also a high frequency of mosses and some patchy bare ground caused by regular mowing. No evidence of rabbit-grazing could be seen.

Six of the golf course sites mapped by the Sefton Coast Life Project (three large and three small) could not be refound but eight new sites (five large and three small) were located and mapped (Figs 1 & 2). In all cases, the habitat of extant sites was described as a short, open, sparse community of grasses (mainly *Agrostis capillaris* and *Festuca ovina*) and mosses with frequent rosette-forming composites (especially *Hypochaeris radicata*) and often some *Rumex acetosella*. Many sites are on fixed-dune crests or on steep slopes, usually west- or south-facing, although some were found on relatively level or slightly undulating terrain; none occur on north-facing slopes. There was no sign of rabbit-grazing but many sites are affected by human activity, most of it light to moderate trampling by golfers. Some populations of *C. canescens* are situated on grassy footpaths and one turf-stripped area (site 18) has been recently colonised by the plant. A seven-metre diameter bunker at site 1, filled in three years ago, was planted up with *C. canescens* by course managers (M. Mercer pers. comm. 2007) and now supports a vigorous sward of the grass. Adjacent to site 7, c. 20 plants of *C. canescens* could be seen (through binoculars) within the railway fence on a disturbed, sandy strip next to track ballast. A small site mapped on the edge of Hillside Golf Course, opposite site 7, appears now to be too heavily vegetated to be suitable for *C. canescens*. The largest population (c. 5000 plants) was found at site 1, where densities of c. 20 tussocks per square metre occur on a south-facing fixed-dune ridge.

A list of associates of *C. canescens* is given in Table 2; only 35 vascular taxa (three non-native) were noted, most being characteristic of fixed-dunes with a somewhat acidic substrate. In nearly all cases, the vegetation of extinct sites (e.g. 3, 4, 7 and 9) was deemed to be now unsuitable for *C. canescens*, due to coarsening of the sward.

The total golf course population of *C. canescens* is estimated at nearly 10,000 plants, occupying an area of c. 8600 m^2 (0·86ha) (Table 1).

DISCUSSION

On the Sefton Coast, *C. canescens* was first recorded on high dunes near the sea between Formby and Freshfield. Although the exact localities were not specified, it is clear that the plant has been long extinct in this area, its recent distribution being confined to an area on, and adjacent to, the Southport & Ainsdale Golf Course, which is 2 km inland. While the 1996–1998 Sefton Coast Life Project survey did not estimate the area of the sites or the population sizes, it is reasonable to infer that *C. canescens* has consolidated its status on the golf course. It has disappeared from six sites, but eight new ones were found; these supported c. 1500 additional plants (Table 1). Also, two of the largest sites (1 and 8) now cover consider-ably larger areas than in 1997 (Figs 1 & 2). Losses are probably attributable to habitat change, specifically the development of taller and denser grass swards.

The recreation ground population is evidently a relict of that recorded by Doody, Field and Rich in 1982 and Lockwood in 1987, subsequently described by Trist (1998), although it seems now to be much smaller in area.

The vegetation of the golf course sites accords well with the Gateley (1995) and Gateley & Michell (2004) descriptions, though the latters' determination of the U1 grassland community may be unsatisfactory in view of the many fixed-dune plants recorded as associates of *C. canescens* (Table 2). Although no NVC samples were taken for analysis, the species composition seems closer to the rather similar SD12 *Carex arenaria – Festuca ovina – Agrostis capillaris* dune grassland than to U1. SD12 is characteristic of fixed, acidic sands around the coasts of Britain, especially towards the north and west, where calcareous wind-blown material has been leached over time (Rodwell 2000). However, in places, the vegetation may be closer to the SD11 (*Carex arenaria – Cornicularia aculeata* dune community), a lichen-rich type associated with *Corynephorus canescens* on the East Anglian coast (Rodwell 2000) and which Edmondson *et al.* (1988/89) considered best to represent the golf-course vegetation. Gateley & Michell (2004) mapped only 3·3 ha of SD11 on the Sefton Coast, mostly associated with pine plantations and the oldest, most leached, eastern soil of the dune system. However, the fixed-dune communities on Southport & Ainsdale Golf Course were poor statistical fits

TABLE 2. VASCULAR ASSOCIATES OF *CORYNEPHORUS CANESCENS* AT SOUTHPORT & AINSDALE GOLF COURSE

Taxon	English name	Frequency
Agrostis capillaris	Common Bent	f
Aira praecox	Early Hair-grass	o
Ammophila arenaria	Marram	o
Anthoxanthum odoratum	Sweet Vernal-grass	o
Anthyllis vulneraria	Kidney-vetch	r
Arenaria serpyllifolia	Thyme-leaved Sandwort	o
*Asparagus officinalis**	Garden Asparagus	r
Calluna vulgaris	Heather	r
Campanula rotundifolia	Hare-bell	o
Carex arenaria	Sand Sedge	o
Centaurium erythraea	Common Centaury	r
*Conyza canadensis**	Canadian Fleabane	r
Cytisus scoparius	Broom	r
Deschampsia flexuosa	Wavy Hair-grass	vlf
Equisetum arvense	Field Horsetail	lo
Festuca ovina	Sheep's-fescue	a
Festuca rubra	Red Fescue	o
Galium verum	Lady's Bedstraw	o
Hypochaeris radicata	Cat's-ear	f
Leontodon saxatilis	Lesser Hawkbit	f
Lotus corniculatus	Bird's-foot-trefoil	r
*Oenothera ×fallax**	Intermediate Evening-primrose	r
Ononis repens	Common Restharrow	r
Ornithopus perpusillus	Bird's-foot	r
Pilosella officinarum	Mouse-ear Hawkweed	r
Plantago coronopus	Buck's-horn Plantain	lo
Plantago lanceolata	Ribwort Plantain	o
Polypodium vulgare	Common Polypody	lo
Rubus caesius	Dewberry	lf
Rumex acetosa	Sheep's-sorrel	f
Salix repens	Creeping Willow	lo
Sedum acre	Biting Stonecrop	lo
Senecio jacobaea	Common Ragwort	r
Trifolium arvense	Hare's-foot Clover	o
Viola canina	Heath Dog-violet	r
Total 35 taxa (3 alien)		

* = non-native or introduced native taxon; a = abundant; f = frequent; o = occasional; r = rare; v = very; l = locally.

to known NVC communities (P.S. Gateley, pers. comm. 2007).

C. canescens was often found on fixed-dune crests as well as on quite steep south- or west-facing slopes. Such sites will be well-drained and susceptible to summer dryness, which presumably gives a competitive advantage to this relatively drought-tolerant species. Marshall's (1967) findings that the plant requires sand accretion for vigorous growth and a long life-span do not explain the plant's success at the golf course where there appears to be little sand movement. Although the grass has colonized a turf-stripped site and has grown well on an infilled bunker at site 1, management to create greater instability seems unnecessary at the golf course.

At the Ainsdale recreation ground, the *C. canescens* colony has persisted for at least 25 years, apparently assisted by regular mowing which creates bare ground for seedling establishment. Although small, this population

is of particular interest, being the only one readily accessible without special permission.

In Merseyside, *C. canescens* is near the northern limit of its European distribution, which closely matches the 15°C July isotherm. The climate in northern Britain is cold enough to have a cumulative effect on flowering date and seed germination, sufficient to postpone the emergence date of seedlings beyond the critical time for survival (Marshall 1968). Therefore, recent increases in summer temperatures may well have benefited reproduction and survival of the Sefton Coast populations.

Most of the existing populations on the golf course appear healthy with plenty of young plants. There also seem to be extensive areas of potentially suitable habitat in the golfers' roughs to allow for further spread. Although no evidence of rabbit-grazing was found and the grassy roughs are not mown (M. Mercer pers. comm. 2007), the extreme infertility of the old, heavily leached dune soils here, coupled with small-scale disturbance from course activity, seem capable of maintaining *C. canescens* populations at present. However, the long-term future of the plant may be threatened by nitrogen deposition from air pollution which is reaching critical levels in northwest England, perhaps sufficient to cause vegetation change (Gateley & Michell 2004). The Sefton Coast Life Project included objectives for *C. canescens* conservation in a Site Management Plan for Southport & Ainsdale Golf Course (1998). Since about 1999, the Southport & Ainsdale Club, with the support of Countryside Stewardship funding, has pursued a programme of "rough" management designed to restore and conserve the dune and dune heath character of the course (Gill 2004).

As this is a nationally rare plant, the abundance of *C. canescens* at Southport & Ainsdale Golf Course has great conservation significance. Indeed, based on Trist's (1998) data, this may be the largest population in Britain outside North Norfolk and the Channel Isles. The presence of this species is also listed as a reason for the notification of the Sefton Coast Site of Special Scientific Interest, which was extended in 2000 to include the Southport & Ainsdale Golf Course.

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