

The Flora of Stodmarsh National Nature Reserve

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Summary

Stodmarsh NNR is a large nature reserve (by English standards) in the valley of the Stour below Canterbury. It is a river floodplain filled with swamps, grazing marshes, ditches and pools, and is about a square mile in extent. At the western end of the reserve is a huge heap of coal mining waste, around which there are large, shallow lakes which formed when the land subsided into the pits below.

The purpose of the current survey was to document the flora and vegetation of the Stodmarsh NNR as fully as possible in order to identify its features of interest and to inform the management. I have visited the reserve many times over 3 years and identified as many species as possible. I have also included many records by others, both recent surveys and older data from literature, herbaria etc. Over 450 species of vascular plants have now been recorded on the reserve, and they are listed here in some detail to inform future surveys of this site.

There are various features for which Stodmarsh is considered to be important. For decades it has been known as a bird watching reserve, particularly for attracting migratory species to the subsidence lakes. Another aspect that is often mentioned is the reedbed, which again has a primarily ornithological interest, most notably, perhaps, for a breeding pair of bitterns. Looking back at previous monitoring exercises, the orchids on the spoil heap and some calcicolous plants along the Lampen Wall have attracted much of the botanical attention in the past, although one feature of particular importance is the nationally rare pondweed *Potamogeton acutifolius*, which occurs in some of the ditches, and had been known here since the 19th century.

However, the studies presented here suggest that the real value of this site has been somewhat overlooked. It turns out that the fields of grassland are agriculturally unimproved and, as they have apparently never been ploughed or reseeded, they preserve some elements of the vegetation that arose when they were first drained and grazed. What is perhaps surprising is that this vegetation is characteristic of coastal grazing marshes, and has similarities with that in places like Graveney and Minster Marshes. These marshes are derived from earlier saltmarshes which were drained and isolated from the sea many years ago. At Stodmarsh we can trace the origin of the fields to the silting-up of the Wantsum Channel some 1,000 years ago, which suggests that these fields are some of the oldest unimproved grasslands in Britain.

The vegetation is certainly exceptional. There are communities such as the *Hordeum secalinum* grassland which is not described in the National Vegetation Classification, and others such as the species-rich *Eleocharis palustris* swamp which deserves greater recognition. Rare and uncommon plants occur in large numbers and the reserve certainly ranks as a nationally important site for its vegetation at least as much as for its fauna.

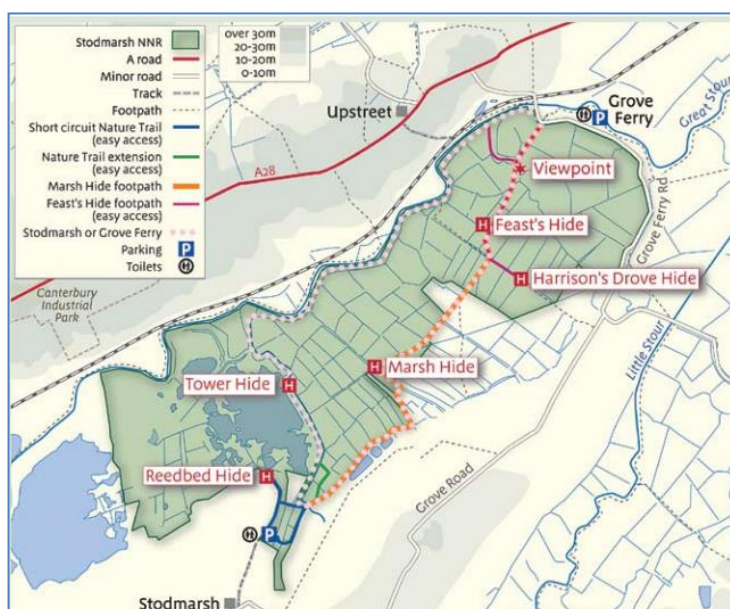
There are no obvious threats to Stodmarsh and little evidence that it is deteriorating. Some characteristic species have been lost to reedswamp and scrub, but the previously unexplored areas have turned up more new species than have been lost. The appropriate management of this site is straightforward: maintain the damp, species-rich meadows and ditches through grazing, mowing and careful water level maintenance, in precisely the way it was probably done before the Domesday Book.

Stodmarsh turns out to be a rare and invaluable remnant of an ancient, saline coastal grazing marsh of a quality possibly not equalled elsewhere in Britain, and I hope it will continue to be protected, managed and appreciated for its magnificent wildlife and unique vegetation.

Introduction

A Site Flora is a rather neglected product of botanical recording, being a compilation of everything that is known about the site, with analysis of the features of most importance and any changes that can be detected from the records. In this report I have also included an analysis of the vegetation communities, which turn out to be particularly significant. Site Floras were popular in the 1970s, but owing to the difficulty of handling so much data they have become uncommon, which is unfortunate because they often produce surprising and valuable knowledge about a site and its management, and they provide an evidence-based approach to conservation and monitoring. One might criticise a Flora for not including the animals and fungi, but to extend it to all taxa is a much larger task and one that would require the involvement of many contributors to have much chance of being done well.

The current version follows on from my draft reports over the last three years. In previous editions I ignored the colliery tip on the grounds that it was not typical of the rest of the reserve, which is reed bed and grazing marsh; but some people's lists do not distinguish the tip from the reserve, and there are many interesting plants on the tip, so I have here produced a combined list for the whole reserve.



The Flora that follows is based on these historical records plus numerous surveys by me with various friends and colleagues since 2013, most of which produced only a few incidental records each time. I have looked for all the species previously recorded and tried to make as full a list for the site as possible. Anything that I cannot find or that has not been seen by someone reliable in recent years is marked with a dagger (†) in the species list section. All recorders, both historical and living, are credited for their records and precise details are given of anything that I have seen, in order to make this report as useful as possible to other researchers and to anyone visiting the site.

There is a database on which this report is based. It often contains more details than could be given here. It is available on request from the author.

History of recording

Botanical records can be extracted from a variety of places, including herbaria, published reports and Floras, magazine articles and scientific reports. There is currently no database of historical records for Kent, and it appears that no-one has attempted to compile information on the history of botany in the county since 1899, so it is not easy to find records relating to Stodmarsh specifically. This is what I have managed to compile so far.

The earliest records traced are from M.H. Cowell's Floral Guide to East Kent of 1839, where he gives several short lists for the Stodmarsh area, supplied by correspondents. Rev T.H.M. Bartlett produced a list of plants at Sturry, 'in the marshes.' This might well have been west of the current NNR (although still within the SSSI) but, in those days, before the coal mine, there was no difference in the habitat. Bartlett recorded *Alisma plantago-aquatica*, *Hydrocharis morsus-ranae*, *Lycopus europaeus*, *Nymphaea alba* and *Valeriana officinalis*. These are all characteristic species of the site now.

In the same publication a Miss Kenrick is credited with records of *Symphytum officinale* and *Utricularia vulgaris*, 'in ditches near Sturry;' William Masters found *Butomus umbellatus*, *Lysimachia nummularia*, *Malva moschata*, *Myosotis scorpioides* and *Ranunculus lingua*; and Miss Sankey recorded *Papaver argemone* and *Symphytum officinale*.

These lists between them are remarkable in that they include many of the characteristic species of the site and three of the nationally scarce species, showing that the vegetation is largely unchanged since the early 19th century, and few species that are not there now. The most curious one is the Comfrey, *Symphytum officinale*. This species is now virtually absent from the lower reaches of the Stour and has been replaced by Russian Comfrey, *Symphytum xuplandicum*, but we know Kenrick and Sankey did not confuse them because the latter was not introduced to Britain until 1870. There is no obvious reason why common comfrey should have disappeared from the easternmost parts of Kent. The other plant on these lists not currently recorded in the reserve is Prickly Poppy, *Papaver argemone*. This is an arable weed that would probably have been much commoner then, as a casual scattered around and about.

Some of the records in Cowell's Floral Guide are also reproduced in Hanbury & Marshall's 1899 Flora of Kent, but that publication also contains many original records by the authors and other contributors. Frederick Hanbury started recording for the Flora in about 1875, and most of his records and specimens of this from this part of the county are dated 1875. For this reason I have used that year for all his records, although they could have been made at any time before about 1890. Most of his records are very precisely localised to the NNR, with descriptions such as 'Trenches between Stodmarsh and Grove Ferry.' His records give a very good sense of the character of the site, and most of the species are still present (the most interesting exceptions being *Menyanthes trifoliata*, *Triglochin palustris* and *Wolffia arrhiza*).

➤ Records for Stodmarsh by F.J. Hanbury, ca. 1875

<i>Chara vulgaris</i>	<i>Lysimachia nummularia</i>	<i>Lemna gibba</i>
<i>Nymphaea alba</i>	<i>Callitriche obtusangula</i>	<i>Wolffia arrhiza</i>
<i>Ceratophyllum demersum</i>	<i>Scutellaria galericulata</i>	<i>Baldellia ranunculoides</i>
<i>Ranunculus sardous</i>	<i>Utricularia vulgaris</i>	<i>Triglochin palustris</i>
<i>Ranunculus lingua</i>	<i>Menyanthes trifoliata</i>	<i>Potamogeton perfoliatus</i>
<i>Ranunculus circinatus</i>	<i>Oenanthe fistulosa</i>	<i>Potamogeton pusillus</i>
<i>Myriophyllum spicatum</i>	<i>Oenanthe fluviatilis</i>	<i>Potamogeton pectinatus</i>
<i>Epilobium tetragonum</i>	<i>Oenanthe aquatica</i>	<i>Zannichellia palustris</i>
<i>Rorippa sylvestris</i>	<i>Spirodela polyrhiza</i>	

Other contributors to the 1899 Flora were less prolific. The most significant addition was *Potamogeton acutifolius*, found by George Dowker in the 1890s at 'Withamdrew, west of the Little Stour-Newnham Valley,' which is a pretty good description of Stodmarsh. Edward Marshall added just one species: *Schoenoplectus tabernaemontani*.

After this major work, there appear to be no records at all until the 1970s. This is an incredibly long period for such inactivity, and there was undoubtedly recording occurring. The Nature Conservancy Council designated Stodmarsh an NNR during this period, and Francis Rose was active collecting materials for a county Flora. But secretiveness, carelessness in record keeping, and later destruction of paper archives have all contributed to the loss of much material. It is quite likely that some records and reports will yet emerge.

On 2nd August 1958 Eric Philp visited Stodmarsh and collected two specimens of pondweeds. Presumably he also recorded other species, but no record remains of that. The two specimens were requested by J.E. Dandy at the Natural History Museum for inspection, and he confirmed them as *Potamogeton friesii* and *P. pectinatus* – the latter was collected from the River Stour. These two are both still common at Stodmarsh. In 1974 Philp visited

again and collected *P. friesii* and *P. acutifolius*. It is quite likely that he was looking for the latter, as he would have known about it from Dowker's record. There is no dot for it at Stodmarsh in Perring & Walters's 1962 *Atlas of the British Flora* and in Philp's subsequent Atlas Stodmarsh is listed as the only place where it was known to occur in Kent.



Photograph of Stodmarsh by Ian Castle c. 1980 in Philp's Atlas. Note the low vegetation in the meadows and the sparsity of tree cover in the landscape, leaving the ditches in full sunlight.

In 1977 Derek Ratcliffe's *Nature Conservation Review* was published. This summarises the ecology of all the most important sites in Britain, and Stodmarsh is assigned the status of a Grade 1 site. The intention was to focus attention on the most important sites and make sure that they were adequately protected, although since then nature conservation has taken the opposite direction of designating as many sites as possible and generally not being particularly concerned with their ecological attributes. In the *Nature Conservation Review* (often referred to as NCR) there is a list of characteristic species of the site. This is a compiled list, probably taken partly from Hanbury & Marshall's *Flora* and partly from records held by the NCC. The most intriguing species on this list is *Ceratophyllum submersum*, which I suspect is a mistake as *C. demersum* had already been recorded; but it is possible. *Juncus subnodulosus* is another species on this list that appears not to have been recorded by anyone else.

➤ Characteristic species of Stodmarsh listed in the *Nature Conservation Review*

<i>Ceratophyllum submersum</i>	<i>Phragmites australis</i>	<i>Thalictrum flavum</i>
<i>Comarum palustre</i>	<i>Ranunculus lingua</i>	<i>Triglochin palustris</i>
<i>Glyceria maxima</i>	<i>Ranunculus sardous</i>	<i>Utricularia vulgaris</i>
<i>Hydrocharis morsus-ranae</i>	<i>Rorippa palustris</i>	<i>Veronica catenata</i>
<i>Juncus subnodulosus</i>	<i>Rumex hydrolapathum</i>	<i>Wolffia arrhiza</i>
<i>Menyanthes trifoliata</i>	<i>Schoenoplectus tabernaemontani</i>	
<i>Oenanthe fistulosa</i>	<i>Stellaria palustris</i>	

In 1982 Eric Philp published his first *Atlas of the Kent Flora*. This contains tetrad maps of species in the county, but unfortunately for us no further details of even the rarest plants. As there is no tetrad (2 km x 2 km square) that falls entirely within the NNR, it is not possible to be certain that any species was actually recorded in the reserve, but it seems a reasonable conclusion that many of them were, especially the more characteristic species of the site. Philp's Atlas was based on records collected between 1971 and 1980, so here I have assigned them the date of 1979, to put them clearly into the correct decade while not exaggerating their antiquity. The recorders' names are given only in a list at the front of the Atlas, so the records here are all assigned to Philp personally (and the preface to the Flora suggests that this is not an entirely unreasonable assumption).

By including every possible record from the tetrads overlapping the site, we can produce a list of c. 203 species for Stodmarsh from the Atlas, which is about 45% of the current total. Philp claimed in his introduction that the Atlas contained a 'very high proportion of the vascular plants to be found in every tetrad' but in the case of Stodmarsh they probably managed no better than about half of what was actually there.

Natural England has scientific files on all SSSIs and NNRs, inherited from its predecessors the NCC and English Nature. These scientific files often go back to the 1960s and '70s, or even earlier, but in the case of Stodmarsh there is nothing dated earlier than the 1980s. The files are now available only in digitised form. One of the earliest documents in the file is a 'check list of flowering plants and ferns,' which starts on page 59, suggesting that it comes from a longer report that I have not seen. The check list is undated and anonymous but was presumably drawn from records and surveys by NCC staff in the period since the site was notified (1951). Here I have assigned the records to the year 1985, which I suspect is roughly when the report was written.

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CHECK LIST OF FLOWERING PLANTS AND FERNS

Scientific nomenclature and sequence follow "Flora Europaea", Tutin, T.G., et al, Eds. Vol 1-5, 1964-80. English names follow Dony, J.G., Rob, C.M., and Perring, F.E., 1974, "English Names of Wild Flowers".

<u>Scientific Name</u>	<u>English Name</u>	<u>Notes</u>
<u>Equisetum fluviatile</u>	Water Horsetail	
<u>E. arvense</u>	Field Horsetail	
<u>E. palustre</u>	Marsh Horsetail	
* <u>Pinus sylvestris</u>	Scots Pine	
* <u>P. nigra</u>	Corsican Pine	
<u>Salix fragilis</u>	Crack Willow	

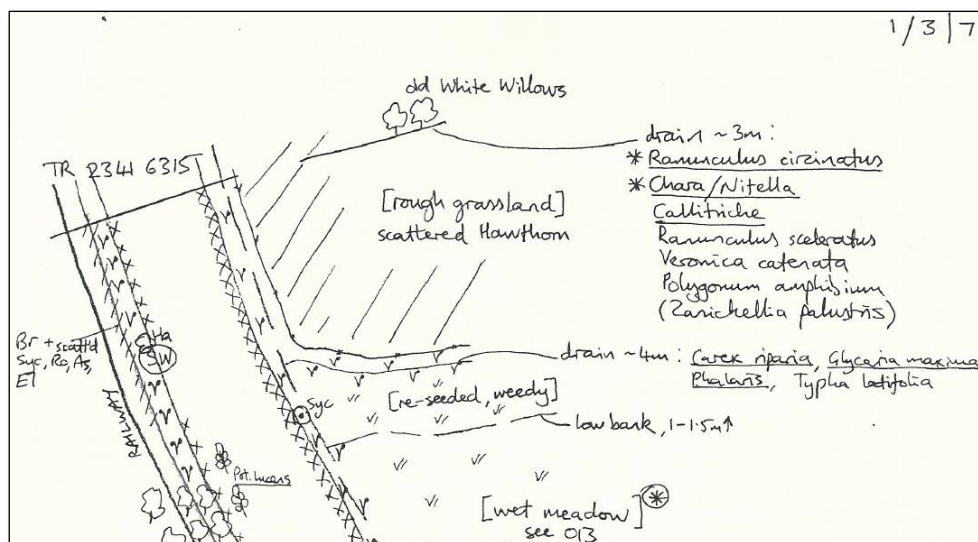
The 1985 NCC checklist includes some 254 species, of which 174 are in common with Philp's Atlas, 80 are not on Philp's list, and 29 of those on Philp's list are missing from the NCC list. The additions on the NCC list are notable for including many rare and interesting plants, such as *Myriophyllum verticillatum* and *Samolus valerandi*. Overall, the NCC list is rather more thorough than the Atlas one.

Over the next decade or two, the NCC appears to have vacillated over what they considered important about Stodmarsh. There are several rare plant monitoring reports, where people have counted plants considered important and drawn detailed maps of where they were. These often focused on rather strange things, such as a plant of *Atropa belladonna* and a patch of *Spergularia marina* on the Lampen Wall. These were probably introductions of little consequence, ecologically. A lot of effort went into recording the orchids on the spoil heap, but they were common species (the *Spiranthes spiralis* had not appeared yet). In all other ways the spoil heap appears to have been ignored in surveys until the last few years. Other species that were 'monitored' included *Lepidium latifolium*, *Ranunculus lingua* and *Stellaria palustris*, which were more sensible choices, but no particular attempt ever seems to have been made to protect their habitat.

Apart from counting orchids, the focus of attention from the NCC and, later, English Nature, was the ditches. Several surveys were undertaken, including one by Paul Glading in 1989 and then a much more thorough one by Phil Williams and several colleagues in 1996. The Williams survey is of very good quality and detail: there are no suspect identifications and it is possible to work out almost precisely where everything was found. They sampled well over 100 ditches and identified everything (except charophytes) to species level. The problem with the Williams survey is that it was never analysed or used for any purpose. Again, important features were recorded but not conserved, as ditch after ditch has disappeared under reedbeds, and quite a few species have been lost in the twenty years since then.

In theory it should be possible to characterise ditches according to their flora, using statistical methods similar to those used for the National Vegetation Classification. In practice, however, such analyses tend to be unsatisfactory. There is no widely accepted or practically useful classification of ditch vegetation, possibly because the plants are too mobile and the species lists tend to be too short. So in the end the Williams survey, superb though it was in its execution, has rather limited value to us. I have extracted the rare plant records from it in full detail, in the hope that they might be informative, but even in the case of *Potamogeton acutifolius* there appears to be little correlation between where it was then and where it can be found now, so precise grid references may not turn out to be particularly useful.

In 1991 a River Corridor Survey was carried out by C. Dyson, for the National Rivers Authority. A copy is held by the Kent Biological Records Centre. These surveys were undertaken on most of the rivers in Britain at around that time, and in general they have a reputation for being rather badly done. The process was abandoned in the late 1990s and replaced with the much less informative River Habitat Survey. Fortunately, in the case of Stodmarsh, the Dyson survey seems to be of perfectly good quality. It provides a map of the river and its environs, with notes on the vegetation, and it is a valuable addition to our knowledge (again, possibly, more for the precise locations of rare plants than anything else).



Part of a river corridor survey diagram by C. Dyson, 1991

In 2010 Eric Philp published a second Atlas, called the *New Atlas of the Kent Flora*. It is a truly remarkable achievement, partly because very few people ever manage a second survey of a county, but more because he did the whole thing on his own. The *New Atlas* contains hardly any records by anyone else, and nothing that Philp had not personally seen.

Unfortunately, the second Atlas is even less helpful for our purposes than the first one. Again it has only tetrad records, so we cannot be confident about the location (or date) of anything, but using the same process as before to extract probable Stodmarsh records reveals only about 140 species for the site. As subsequent recording has shown, this is only about 30% of what was actually there. One of Philp's objectives in recording on his own was to avoid errors, but I am fairly confident that he misidentified *Myriophyllum verticillatum* as *M. spicatum*, for instance, and there are other probable errors. So it turns out that including other people's records could have – in the case of Stodmarsh – more than doubled the number of species recorded and possibly have helped avoid some errors. Nevertheless, Philp's surveys do add to our overall knowledge of the site: assigning the date of 1999 for all these records, the *New Atlas* adds five or six new species to the site list, including *Sonchus palustris*, one of its Nationally Scarce plants.

Between 2000 and 2010 there were several visits to Stodmarsh by members of the Kent Field Club and others, resulting in short lists of species. Some of these are quite interesting, such as *Polypogon monspeliensis* by Joyce Pitt in 2002 and *Hesperis matronalis* by Daphne Mills in 2004. I have not found either of those again.

Since 2010 botanical recording in Kent has been transformed by the formation of the Kent Botany Group, led by Geoffrey Kitchener and Sue Buckingham. The KGB has many very competent botanists and they collect full lists by monad (1 km square), enormously increasing the detail of the surveys and the number of records collected. The Botany Group has made quite a few records so far, most particularly a list of 128 species made on a single day in 2014. In the same year Alfred Gay made a list of 79 species on the colliery tip – the first full list for this part of the site. It was added to by a KGB visit the following year.

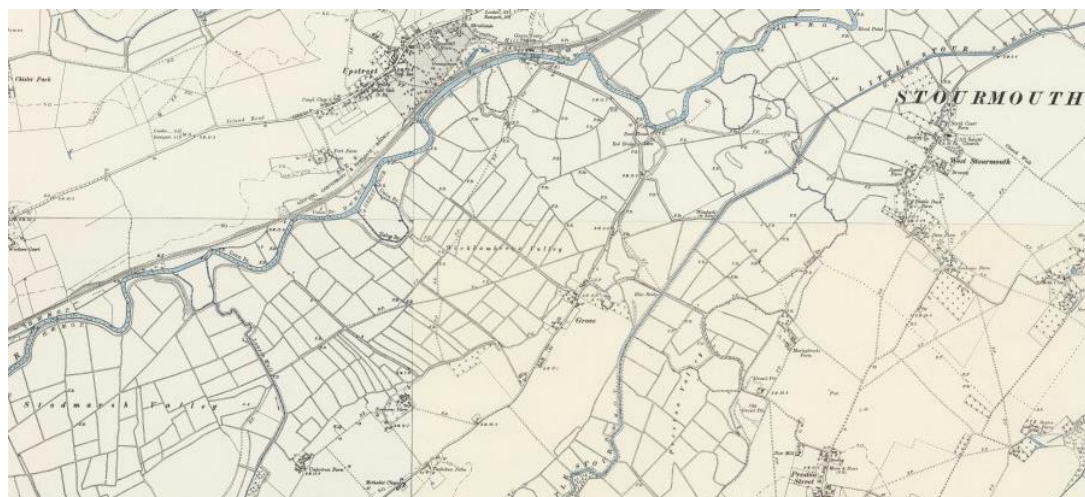
My own surveys have taken place since 2013. I have visited the site many times and at all seasons, making detailed records of interesting plants, recording quadrats and looking for plants that have been found previously. Specimens and photographs have been collected to ensure that identifications are correct, and often the evidence is presented here so that the reader can also be confident of them. In the first three years I have (often with other people) visited 63 times and recorded 403 species within the NNR. This is 89% of the 453 species that have been found here in total, and rather more than the 368 species that have been found by all other recorders put together. There are bound to be some errors in these lists, but I have taken a cautious approach and it is likely that there are few false positives. There is no way of knowing what omissions we have made, except that certain groups (dandelions, roses and brambles in particular) have not really been tackled by anyone yet. The more thoroughly we record, the less likely it is that all these species will be found again, because some of the recent additions are casuals that were very rare, many of them introduced when the embankment was strengthened following a flood in 2015.

Ecology and vegetation

Tracing the origins of the vegetation at Stodmarsh, one can start with the end of the last Ice Age, about 10,000 years ago. At that time the area was well above sea level, about 100 m, and it would have evolved from tundra to forest over a period of a few hundred or thousand years. It would presumably have been willow, birch, aspen and pine forest, but these species disappeared as the climate warmed until about 5,000 years ago, when it was warmer than now, and broadleaf forest would have dominated the area. The River Stour may have been a bigger river than it is now, and of course it would have been well above the tides, so at Stodmarsh there would have been freshwater vegetation, quite likely boggy, even peaty, despite the calcareous influence of the chalk downs above. There would probably have been Oak woodland on the dry ground and possibly peaty alder woodland along the river valley.

By Roman times things would have changed significantly. The sea had risen to its modern level as a result of the ice melting and the tilting of the landmass, and the Wantsum Channel between Kent and Thanet had opened up. This was an arm of the sea at least a mile wide, which came as far inland as Stourmouth. Therefore Stodmarsh would have been on the coast and almost certainly saltmarsh. The fields at Stodmarsh are only 2 m above mean sea level and they would have been regularly flooded by high tides. However, by about 1,000 years ago the Wantsum Channel had silted up and Stodmarsh was left miles inland, protected by sea defences at Reculver and along the river. It was therefore fed only by rainwater and occasionally by the calcareous freshwater of the Great Stour during winter floods. Although the Stour is still tidal at Stodmarsh, and can be seen flowing backwards at high tide, there is still only fresh water in the river: the sea never reaches this far inland, except in the 1953 flood.

It was the period when Stodmarsh was saltmarsh or saline grazing meadow that was the main determinant of the habitat there now, and it has probably never been wooded since then. Old Ordnance Survey maps show precisely the same field boundaries as now, and it is quite possible that these have been in place for at least a thousand years. It is reasonable to assume that the vegetation gradually changed from salt marsh to coastal grazing meadow as the Wantsum Channel silted up, and the drains were then dug to improve the fields for agriculture. A similar sequence took place in other coastal plains, as at the nearby Minster Marshes and Ash Level, and further afield at Reculver and Seasalter. There are many similarities between the vegetation at all of these sites, and many relics in the form of salt-tolerant or predominantly coastal species. It is likely that these will slowly disappear as the freshwater influence displaces the salt, but that can be a slow process, and some of the species there now have presumably persisted for more than a millennium.



Ordnance Survey six inch map (1896) of the Stodmarsh area (from National Library of Scotland web site). Note the field boundaries in the same places as they are now, except where mining subsidence has created lakes.

There is an alternative explanation for the presence of salt-tolerant plants at Stodmarsh, which is that they arrived in the 1953 flood or otherwise recently through some other recent process, but I think this can be discounted. Although there are few historical records of these species at Stodmarsh specifically, they were generally recorded from nearby sites such as Stourmouth, Preston and Sturry, and so the absence of records of some species from Stodmarsh is simply because the area was not particularly distinctive at that time, compared with the surrounding marshes. A single flooding event could hardly have modified the soil so much that the vegetation communities were permanently changed.

We can assume, then, that most of Stodmarsh was turf fields at the time of the Domesday Book. The only exception is the woodland along the Lampen stream at the Stodmarsh end, which might well have developed a long time ago. It seems unlikely that reedbeds would have been a prominent feature of Stodmarsh. Reeds are more likely to have been confined to the ditches, and the creation of large stands of reedbed is a 20th century event.

Another major change in recent history is the coal mining and the subsequent subsidence. This created entirely new habitat in the form of freshwater (polluted) lakes and the spoil heap. These habitats are therefore very recent in origin, just 100 years old or so.

Vegetation Communities

The grassland at Stodmarsh is primarily coastal grazing marsh, a freshwater habitat with a distinctive element of slightly salt-tolerant species that make it quite different to inland flood meadows. The main component is *Hordeum secalinum*, Meadow Barley, generally with *Agrostis stolonifera* and a suite of coastal species such as *Ranunculus sardous*, *Lotus tenuis*, *Trifolium fragiferum* and *Carex divisa*. Curiously there is no NVC classification of this community as far as I can make out. In principle I do not like to claim 'new' NVC communities – too many people do that, often based on too little data, but in this case I cannot find anything that describes it even vaguely. In this report I have called it simply *Hordeum secalinum* grassland. Similar swards are found in pastures that were once saltmarsh in many places in North Kent.

As the *H. secalinum* grassland dries out it turns slowly into MG6 *Cynosurus cristatus* grassland or, less commonly, to MG5 *Festuca rubra* grassland, and this process can be seen in various stages of succession in a few places at Stodmarsh.

Towards the wetter areas, the proportion of *Agrostis stolonifera*, Creeping Bent, in the sward increases, sometimes until this species almost forms a monoculture. There is a small proportion of *Alopecurus pratensis* in these swards but it is not an *A. pratensis* grassland. I suggest that this is just the wetter end of the *Hordeum secalinum* – *Alopecurus stolonifera* grassland community, and if it were an NVC type, that would be a good name for it.

In places there are wet hollows in grazed fields filled with *Alopecurus geniculatus*, Marsh Foxtail. This is a clear example of MG13 *A. geniculatus* grassland in its characteristic form, typically in small patches in fields. Patches of MG13 often dry up in the summer, and this plus cattle trampling are possibly key to the formation of this community. It is of limited interest ecologically.

In places where the fields are more permanently damp and possibly less heavily grazed *Eleocharis palustris*, Common Spike-rush, makes an appearance (often with *Crassula helmsii*). Sometimes there is a rather surprising sward of *Agrostis stolonifera* and *Eleocharis palustris*, which is a transition to S19 *Eleocharis palustris* swamp community. There is a particular S19c *Eleocharis palustris* – *Agrostis stolonifera* subcommunity mentioned in the NVC which is described as being mainly coastal. It was woefully under-sampled in the NVC survey, with just 11 quadrats in total, and possibly none from southern England.

The S19 at Stodmarsh is quite unlike the dreary, species-poor community described in the NVC, or that I have seen in freshwater lakes and pools elsewhere. It is a community of the highest importance, ecologically, with an array of rare species. The best stands have abundant *Baldellia ranunculoides*, *Alisma lanceolatum*, *Veronica scutellata* and even *Potamogeton coloratus*, and this is the characteristic habitat for those species.

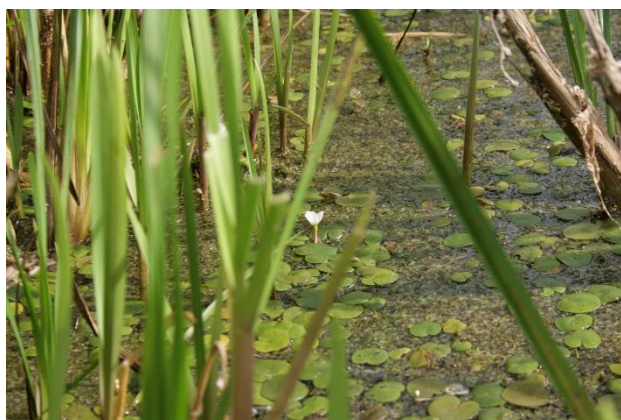


Also in wetter parts of fields there is succession to a number of other swamp communities, most commonly S6 *Carex riparia* swamp, but also S5 *Glyceria maxima* and possibly S18 *Carex otrubae* swamp. These are not particularly noteworthy, but the S14 *Sparganium erectum* swamp near the marsh hide is notable for its abundance of *Butomus umbellatus*, Flowering Rush. In places the *Butomus* replaces the *Sparganium* entirely, and if this community was commoner it might have received its own description in the NVC. However, I think this is just an unusual example of what would normally be a river margin (or canal) vegetation type, occurring in fragmentary patches, spreading onto suitable habitat in a larger area.

Where the fields have been flooded and left ungrazed, the main community that develops is S4 *Phragmites australis* swamp. This is the most species-poor variety of reedbed, and one of the least species-rich of all vegetation communities, being dominated almost 100% by common reed. It has its value in water quality management and for certain species of birds, but it is almost entirely devoid of botanical interest, except in two regards. Firstly, it seems to have become a suitable habitat for *Sonchus palustris*, Marsh Sow-thistle, which is a nationally scarce plant that has become quite abundant at Stodmarsh since it appeared in the 1990s. Secondly, when these reedbeds are cut, there arises a very diverse and interesting community of low-growing swamp species such as *Hippuris vulgaris* and *Oenanthe aquatica*. I believe there is considerable scope for creating high quality habitat at Stodmarsh by regular cutting of areas of reedbed, if an economical way can be found to do this.

Wherever the reedbeds are slightly drier, or eutrophicated by river water or other nutrient inputs, the reed swamp is S26 *Phragmites australis-Urtica dioica* fen, which is a more species-rich community that tends to be full of stinging nettle and, often, bramble. There are some more welcome additions, however, such as *Lythrum salicaria*, *Epilobium hirsutum* and *Eupatorium cannabinum*, but no axiophytes.

Most of the ditches at Stodmarsh contain A3 *Hydrocharis morsus-ranae* community, which is quite a rare vegetation type, found in coastal marshes and fenland in southern England. A3 is not considered to be a particularly interesting community: apart from the *Hydrocharis*, which is a nationally scarce plant, its only interesting constituent is *Wolffia arrhiza*, which doesn't occur at Stodmarsh (although there is some possibility that it might have in the past). However, the difference between A3 and the more species-rich A4 is very small. A4 is *Hydrocharis morsus-ranae-Stratiotes aloides* community, and it is based entirely on samples recorded in the Norfolk Broads. This seems a fairly obvious example of over-sampling in a small area, which has caused a spurious division of the *Hydrocharis* vegetation into two contrasting communities. It makes more sense to have a broader concept of the H3 *Hydrocharis morsus-ranae* vegetation, which allows the presence of species such as *Myriophyllum verticillatum* and *Utricularia vulgaris*, and to relegate A4 to subcommunity status. Rodwell also suggests that this might be the case, in his book *Aquatic communities* (1995). For our purposes, however, we can consider the ditches to be A3 community, and note that it is far more species-rich and ecologically important than expected. Other aquatic communities could possibly be described, based on species such as water lilies or hornwort.



➤ A3 *Hydrocharis morsus-ranae* community

Also in the ditches, and on the edges of lakes, there are tall swamps of S13 *Typha angustifolia* and small areas of S20 *Schoenoplectus tabernaemontani* swamp. I am not sure whether there is enough Greater Reedmace to constitute any S12 *T. latifolia* swamp, but it is a possibility.

Finally, along the rivers there is some woodland. On the banks of the Gt Stour is W6 *Salix xfragilis* woodland, the typical community of eutrophic lowland rivers in England. Characteristic species include several willows, alder and poplar. Between the stands of woodland, the river bank has OV26 *Epilobium hirsutum* tall herb, which can contain some uncommon species such as *Rorippa amphibia*. Along the Lampen Stream, however, the woodland is closer to W5 *Alnus glutinosa*, which is typical of peaty soils along mesotrophic rivers and in old peat bogs. It is not the best example of W5 in Britain, but it does contain some characteristic species such as *Urtica galeopsifolia* and *Lysimachia vulgaris*, and it is of high conservation value.



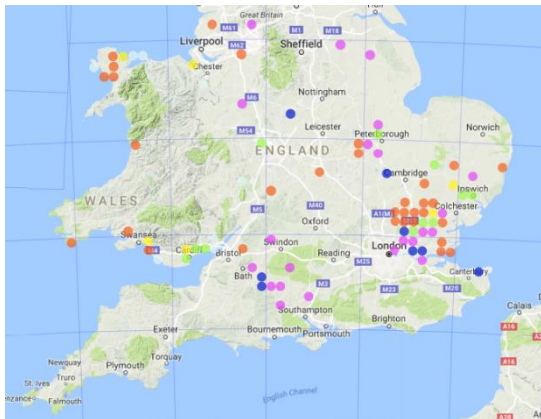
➤ W5 *Alnus glutinosa* woodland

Species list

Chara globularis, Fragile Stonewort: rare, in ditch 99, in the middle of the reserve at TR232623 in 2015 (det. T. Pankhurst). There appear to be just three previous records of this species in Kent, with only sketchy details.

C. vulgaris, Common Stonewort: occasional in ditches and pools, most abundantly in ditches around compartments 41, 42 and 47 in 2016. Most plants seem to be var. *vulgaris*, which is a plant with few obvious features; var. *longibracteata* is occasional, and has curved, downward pointing spine cells on the stems (visible in the picture below); while var. *papillata* is rare (I have only found it in ditch 152) and has similar spine cells as well as two rows of well-developed stipulodes.

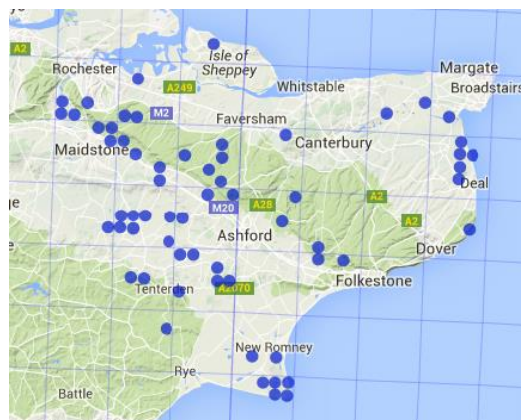
Charophytes are typical of clear water in recently-dredged ponds and ditches and are often considered indicative of good water quality.



Close-up of *Chara vulgaris* var. *longibracteata*

Ophioglossum vulgatum, Adder's-tongue: in field 39 at TR23196220 (Daphne Mills, 18/5/2014). I cannot find it there but have no reason to doubt the record, although to judge from the grid reference there is a possibility that it may have been buried under spoil when ditch 99 was dredged in the winter of 2014. This is an axiophyte of species-rich grassland, which is rare in this part of the county.

➤ *Ophioglossum vulgatum*



Equisetum fluviatile, Water Horsetail: occasional in ditches and pools. This is an axiophyte of clean water habitats, found in S5 *Glyceria maxima*, S6 *Carex riparia* and S22 *G. fluitans* vegetation. It was listed in the first checklist of Stodmarsh by Natural England in 1985, but was missed from this location in both of Philp's Floras.

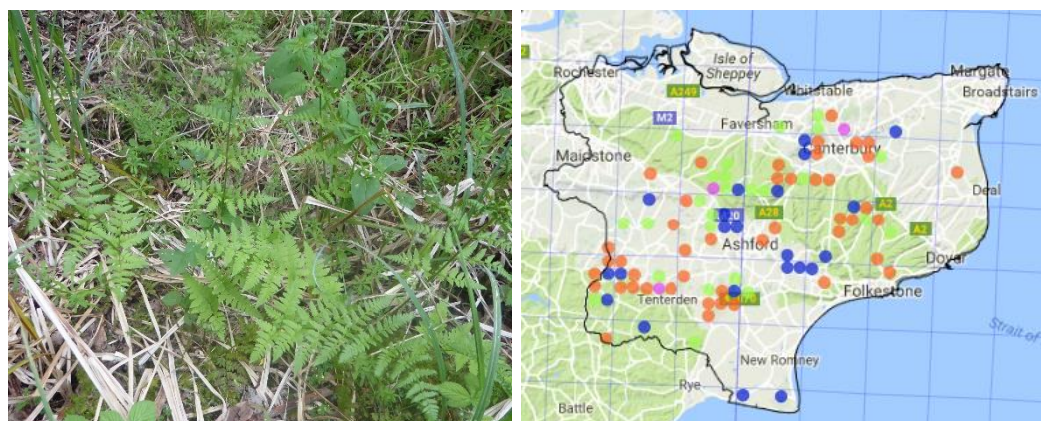
E. arvense, Field Horsetail: occasional throughout, in grassland and hedge bottoms, and often extending into the edges of swamps and ditches.

E. palustre, Marsh Horsetail: occasional in the open swamp along the boardwalk in compartment 14H, TR22406120 and in a ditch at the northern end, at TR23336304 (compartment 62). This is an axiophyte of clean water habitats; recorded in S6 *Carex riparia* swamp.

†*Azolla filiculoides*, Water Fern: listed by P. Glading in 1989 as part of the dyke flora, but no locations given. This is an invasive non-native species that sometimes forms dense and fast-growing mats over waterbodies (it was abundant in the Little Stour in 2015) but it often disappears entirely in cold winters, so it is not worth attempting to control it if it does turn up again.

Dryopteris filix-mas, Common Male Fern: a few plants in scrub and woodland around TR220618 and TR220620. Curiously, it was not recorded here before 2013, which could be an indication that the areas of dry woodland are maturing. It is a common plant in Kent but almost absent from Thanet.

Dryopteris carthusiana, Narrow Buckler-fern: one plant seen (in May 2016) in W5 *Alnus glutinosa* woodland at TR22416120 (compartment 14H). This is an axiophyte of acid, peaty soils.



Dryopteris carthusiana

Dryopteris dilatata, Broad Buckler-fern: rare in woodland at TR220620. First noted here by Philp in 2000; this is probably another sign of the increase in scrub and woodland, but neither of these ferns is an ancient woodland indicator – they are effective colonisers of secondary woodland sites.

Pinus sylvestris, Scots Pine: planted on the colliery heap (NCC 1985 & A. Gay, 2014).

†*Pinus nigra*, Austrian Pine: on the NCC list of 1985.

Taxus baccata, Yew: only on the colliery heap (A. Gay, 2014).

Nymphaea alba, White Water-lily: scattered throughout, in ditches and pools. This is a native species of lakes and ditches in oligotrophic conditions and, as such, would be a useful axiophyte if it were easier to distinguish native from introduced populations. It has been known at Stodmarsh since 1839 (T.H.M. Bartlett, 'in ditches near Sturry') and is undoubtedly native here.

Nuphar lutea, Yellow Water-lily: scattered throughout, in ditches and pools. This is more of a river plant than white water-lily, being found in Kent mainly along the Beult, Medway and Stour (Philp, 2010). In rivers it often occurs in a non-flowering, submerged state. It is tolerant of fairly eutrophic conditions and is therefore not generally considered an axiophyte, although it is of value to many species of invertebrates.

Ceratophyllum demersum, Rigid Hornwort: fairly frequent in ditches. First recorded here by F.J. Hanbury c. 1875 (Hanbury & Marshall, 1899) and recorded many times since. It is often abundant in waterbodies and is tolerant of quite eutrophic conditions, but it is not common in Kent. (The records of *C. submersum*, Soft Hornwort, in the Nature Conservation Review (Ratcliffe, 1977) and the NCC List of c. 1985 may have been errors, as that species is found in more coastal sites, but given that there is a maritime element to the Stodmarsh flora it is not impossible that it did occur here.)

Papaver somniferum, Opium Poppy: one clump by the river path, TR225623, in 2016.

Papaver rhoeas, Common Poppy: a few plants along the newly-laid river path, TR223622. A casual, dependent on soil disturbance.

Papaver dubium, Long-headed Poppy: a few plants by the path near Grove Ferry, TR234629, in 2016.

†*Papaver argemone*, Prickly Poppy: at Grove Ferry (Miss Sankey, 1839). As with the previous three species, this was probably a casual.

Fumaria officinalis, Common Fumitory: several clumps along the newly-laid path, TR234628 & TR231629 in 2015. A casual of waste ground; not previously recorded here, but it is also present in the hedges along the lanes to Fordwich and at Grove Ferry.

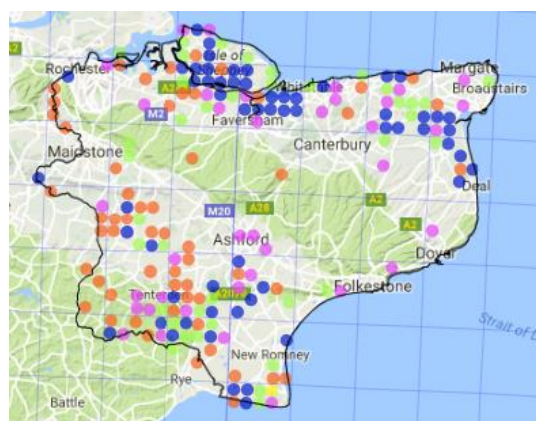
Caltha palustris, Marsh Marigold: rare, in wet grassland by Lampen Stream near the Stodmarsh car park (TR221609, compartment 2). It has previously been recorded several times, including by Williams *et al.* in 1996 along several ditches, and it may be decreasing due to the succession of grassland to reedswamp and scrub. It could be considered an axiophyte in Kent, but Philp (2010) notes that it is often planted in restoration areas, which masks the native distribution.

Clematis vitalba, Traveller's Joy: a large patch on the embankment by the river at TR231629. This is an uncharacteristic species for the site, being found on calcareous soils. Presumably the bank was built up at some point using material brought in from elsewhere.

Ranunculus acris, Meadow Buttercup: occasional in grassland throughout.

Ranunculus repens, Creeping Buttercup: occasional along paths and in grassland throughout.

Ranunculus sardous, Hairy Buttercup: frequent in grassland. First recorded here by F.J. Hanbury in about 1875 (Hanbury & Marshall, 1899). It is characteristic of coastal grazing marshes in north Kent, typically in *Hordeum secalinum* grassland, and it could be a useful axiophyte except that it can also be found on disturbed ground, along paths and even on arable field margins.



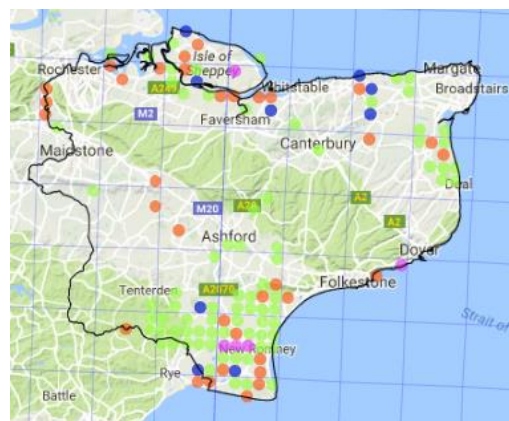
Ranunculus sardous

Ranunculus sceleratus, Celery-leaved Buttercup: occasional in rills and muddy areas in grazed fields. It also springs up quickly in areas of cut S4 *Phragmites australis* fen. This is a common plant of muddy places that can tolerate low to high levels of fertility.

† *Ranunculus lingua*, Greater Spearwort: first recorded by William Masters in 1839 ('Banks of the Stour, Grove Ferry') and subsequently by numerous surveyors until 1987 (Natural England) when it was in compartments 6 and 7 (TR218611 & TR216610). This is generally considered to be a plant of freshwater ponds, ditches and wet woodland, but in Kent I suspect that it is more characteristic of ditches in coastal grazing meadows. If correct, then this could be a previously unrecognised native habitat for it. It is (or was) found in similar habitat at Whitstable, Sandwich Bay and Dungeness.

Ranunculus flammula, Lesser Spearwort: occasional in ditches, pools and marshy grassland in 2014. It is indicative of reasonably good habitat, but it may not qualify as an axiophyte. The only previous record of it here was on the NCC 1985 list.

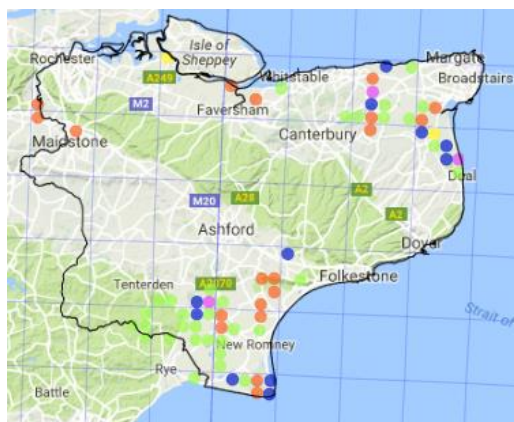
Ranunculus trichophyllus, Thread-leaved Water-crowfoot: in ditches at TR234630 (compartment 62) and TR232622 (ditch 99); an axiophyte of ponds and ditches. These plants have small flowers (petals 5 mm) with a semi-circular or lunate nectar pit and no laminar leaves. New to the site in 2015.



Ranunculus trichophyllus

Ranunculus aquatilis, Common Water-crowfoot: rare, in the pond at Harrison's Drove, TR23436229, in 2014. These plants had larger flowers (7 mm petals) and a circular nectar pit. This species was also new to the site. It is a fairly common plant of ponds and ditches.

Ranunculus circinatus, Fan-leaved Water-crowfoot: a few patches in the pool in front of Harrison's Drove Hide (TR23436229, compartment 44) in 2016. It has previously been recorded by F.J. Hanbury at Grove Ferry in about 1875; in a ditch at TR23386309 (compartment 62) by Chris Dyson in 1991; and in ditches 28 (TR223620), 73 (TR230622), 83 (TR231624) and 127 (TR234619) by P. Williams and colleagues in 1996. This is an axiophyte of low-nutrient open water which appears to be declining in Kent.



Ranunculus circinatus

Ficaria verna, Lesser Celandine: abundant along the river and in hedges around the Stodmarsh car park; a common plant of damp soils everywhere.

Thalictrum flavum, Meadow-rue: a sizeable patch in the field margin at Stodmarsh Court Farm (TR21846114) which is within the NNR, and further west at Higham Farm (within the SSSI, TR19876022). This is an axiophyte of riparian grassland and woodland. At Court Farm the margin is cut but ungrazed, whereas at Higham it is around a pool next to a farm track, where cattle frequently drink. The only other current site for it in East Kent is also by the Gt. Stour, near Wye (L. Rooney, 2011).

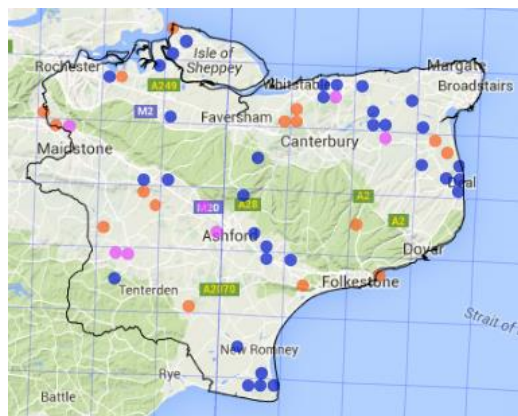


Thalictrum flavum

Ribes rubrum, Red Currant: occasional in the woodland around TR222610.

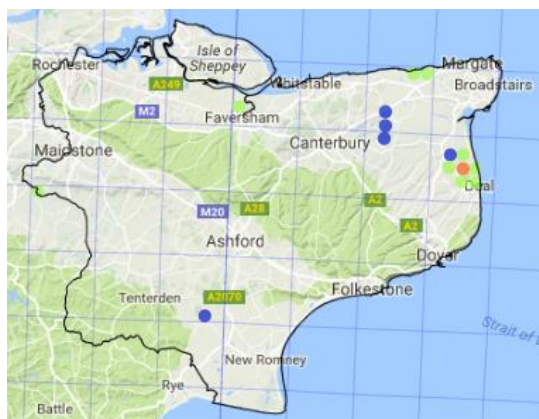
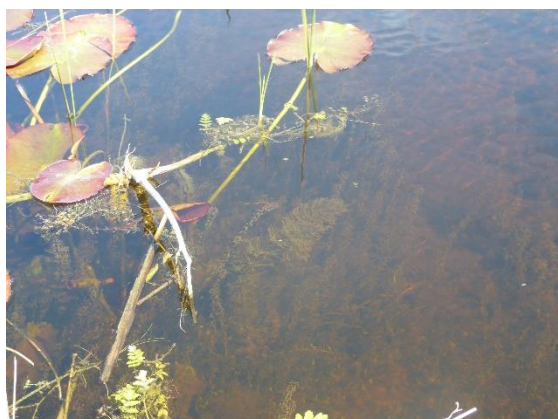
Ribes nigrum, Black Currant: in open, wet woodland at TR221608. This is arguably a native species of W6 *Salix fragilis* woodland in Britain, and it could be counted as an axiophyte in this habitat if this is true; but there is a counter argument that it is an ancient introduction and it has spread to these woods (as has Red Currant).

Crassula helmsii, New Zealand Pigmyweed: occasional patches in pools, rills and marshy grassland throughout. First recorded here by L. Warman in 1991. There is a widespread suspicion of non-native plants amongst conservationists, but – surprisingly, perhaps – there is no evidence demonstrating any actual harm. At Stodmarsh it occurs in a range of habitats and in association with a number of rare species, which do not seem to be adversely affected. It would be inadvisable to attempt to eradicate it, as more vulnerable species would surely be damaged. It is recorded in S4 *Phragmites australis* and S19 *Eleocharis palustris* vegetation.



Crassula helmsii

Myriophyllum verticillatum, Whorled Water-milfoil: occasional in ditches and pools. I have seen it in ditches 56 (TR228620) and 99 (TR232622) as well as a numberless ditch in compartment 17E (TR229620) and the lake in front of Feast's Hide, TR232626. This is a nationally scarce plant and an axiophyte of base-rich still water. It was recorded by Williams *et al.* (1996) in eight ditches (42, 43, 56, 59, 62, 65, 87 & 133) so it may have declined over the last 20 years, but I have not searched everywhere to check.

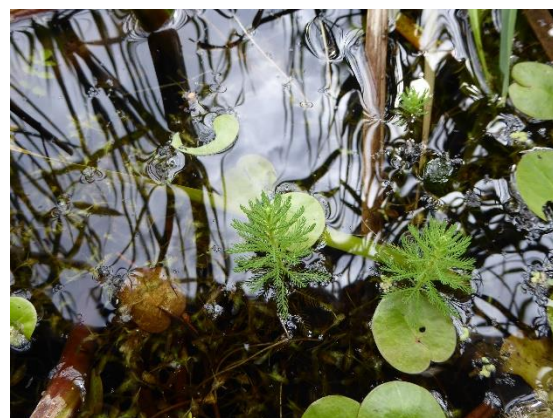


Myriophyllum verticillatum

Myriophyllum aquaticum, Parrot's Feather: a few plants near the dipping platform at the Grove Ferry end, TR23416277, in 2016. It was not here previously; presumably someone has emptied their aquarium here. This non-native species is apparently spreading rapidly in southern England.

➤ *Myriophyllum aquaticum*

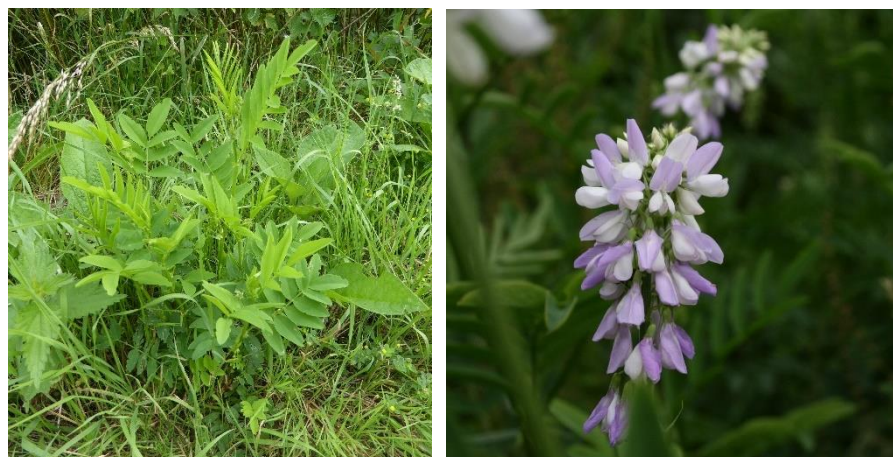
Myriophyllum spicatum, Spiked Water-milfoil: in the Gt. Stour at Grove Ferry (TR2363, C. Osborne, 2014). This species was previously recorded by F.J. Hanbury in c. 1875 'between Stodmarsh and Grove Ferry,' and by Philp in this tetrad in his 1980 Atlas. I have assumed that all the records relate to the river, although it is perfectly possible to find this species in ditches. A record by Philp at TR2362 in



2000 seems likely to have been from a ditch (although there is a small stretch of the river in this square) but, as he did not record the *M. verticillatum* in this area, I suspect that it may have been an error.

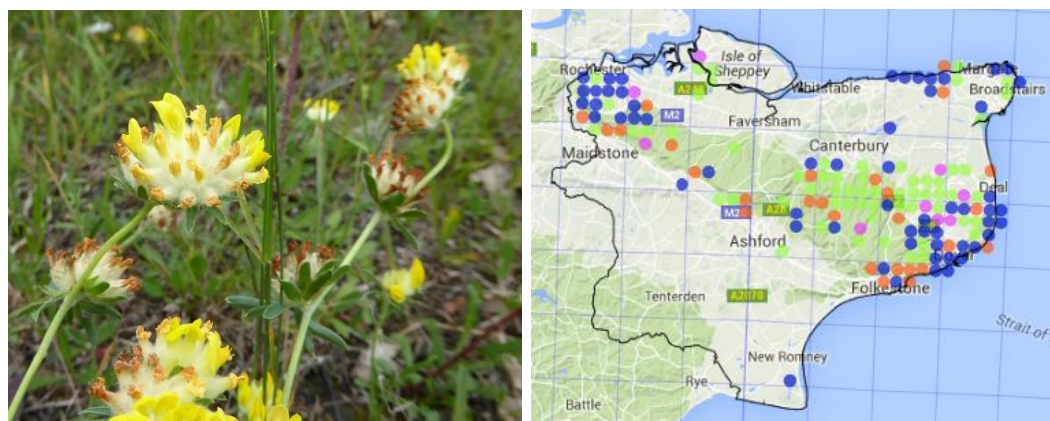
Vitis vinifera, Grape-vine: on the colliery tip, recorded there on the NCC List (1985) and by Kitchener *et al.* in 2015, which suggests that it is quite well naturalised. Grape is a rather rare escape from cultivation, known in only a few sites in Kent.

Galega officinalis, Goat's-rue: a couple of clumps by the river path, TR23146300 and TR22616233, in 2016. This new addition to the species list is a garden escape that is widely established and increasing in the county. It is typical of track sides in areas of neutral to acid soils, such as the Blean. Some site managers make a point of eradicating it, but it does not seem to spread into semi-natural habitats and it is better considered a welcome addition to the flora.



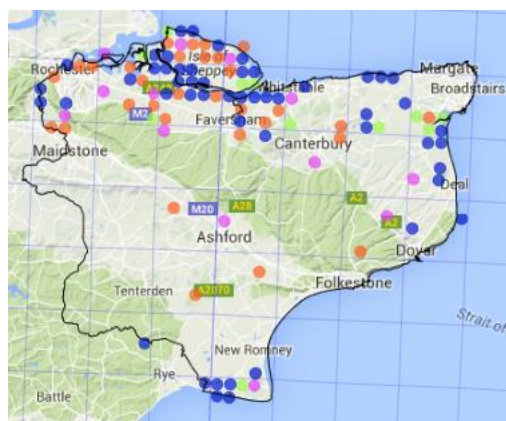
One of the new *Galega officinalis* plants on the riverside path (left) and illustration of the flowers (right)

Anthyllis vulneraria, Kidney Vetch: abundant in one part of the colliery tip, TR212615. This is an axiophyte of calcareous grassland. The Stodmarsh population is a rather isolated one, as the soils in this part of the county are not generally suitable (it occurs on chalk or sand).



Anthyllis vulneraria

Lotus tenuis, Narrow-leaved Bird's-foot-trefoil: frequent in grassland. An axiophyte of neutral grassland and grazing marsh; it occurs in *Hordeum secalinum* and MG12 *Festuca arundinacea* grassland. This is one of the plants of the coastal element in the Stodmarsh flora, possibly a relic of earlier conditions or brought here during a flood. It was noted in the 1985 NCC checklist but not otherwise recorded until 2012, when it was found by Colin Osborne. It seems unlikely, however, that it is a new arrival or has increased recently.



Lotus tenuis

Lotus corniculatus, Common Bird's-foot-trefoil: occasional in grassland.

Lotus pedunculatus, Large Bird's-foot-trefoil: in wet grassland and fen by the Lampen Stream near the Stodmarsh car park, at TR221609.

Vicia cracca, Tufted Vetch: occasional in fen by the paths, at TR221609 & TR221612. Also recorded on the colliery tip (Kitchener *et al.*, 2015).

Vicia hirsuta, Hairy Tare: on the colliery tip (NCC, 1985 and A. Gay, 2014).

Vicia tetrasperma, Smooth Tare: a large patch by a path at TR23416285, and on the colliery tip (A. Gay, 2014).

Vicia sativa, Common Vetch: occasional in grassland.

Lathyrus pratensis, Meadow Vetchling: occasional in grassland and hedges.

Lathyrus nissolia, Grass Vetchling: occasional in grassland.

†*Melilotus officinalis*, Ribbed Melilot: on the Natural England list of 1985; possibly on the colliery tip.

Medicago lupulina, Black Medick: occasional in grassland and on paths.

Medicago arabica, Spotted Medick: occasional, a casual weed along paths.

Trifolium repens, White Clover: frequent in grassland and on paths.

Trifolium fragiferum, Strawberry Clover: frequent in meadows and occasional along paths. This is an axiophyte of neutral grassland and coastal grazing marshes; it occurs in MG12 *Festuca arundinacea*, MG13 *Alopecurus geniculatus* and *Hordeum secalinum* grassland.



Trifolium fragiferum

Trifolium campestre, Hop Trefoil: abundant on the colliery tip. There are also a few plants in the car park at the Stodmarsh end and some scattered patches along paths.

Trifolium dubium, Lesser Trefoil: occasional in grassland.

Trifolium micranthum, Slender Trefoil: rare, along a path at TR23466296.

Trifolium pratense, Red Clover: frequent in grassland. There is a robust agricultural strain (var. *sativa*) with hollow stems that occurs along the river path, having been sown there in 2015/16 as part of a seed mix.

Trifolium scabrum, Rough Clover: abundant on the colliery tip.

Trifolium arvense, Hare's-foot Clover: abundant on the colliery tip.

Prunus cerasifera, Cherry Plum: although not recorded before 2014, this tree is quite widespread along paths, in the Stodmarsh car park, and along the river path.

Prunus spinosa, Blackthorn: occasional in hedges and scrub.

Prunus domestica, Wild Plum: I have only seen one tree, along the path at Harrison's Drove, TR234622.

Prunus avium, Wild Cherry: rare, in coppiced hazel woodland at the western end, TR222610.

Pyrus communis, Pear: one tree by a path at TR22366143 and on the colliery tip at TR21506104.

Malus pumila, Apple: a few scattered trees, in a hedge near the car park (TR22116097), on the river bank at TR23026284 and in the lane to Parsonage Farm (TR230620).

Malus ^{}purpurea*, Purple Crab: a couple of shrubs in compartment 62, undoubtedly planted.

Sorbus aucuparia, Rowan: in a hedge by the Stodmarsh car park and on the colliery tip (A. Gay, 2014).

Pyracantha rogersiana, Asian Firethorn: numerous shrubs on the colliery tip.

Crataegus persimilis, Broad-leaved Cockspur-thorn: one tree by the road in compartment 62 (TR23516310), presumably planted but long-established now in otherwise native scrub.

Crataegus monogyna, Hawthorn: occasional in hedges and scrub. The hawthorns at Stodmarsh are rather curious. There are both the five-lobed leaves of *C. monogyna* and the three-lobed leaves of *C. laevigata*, Midland Hawthorn, on just about every branch of every tree. Normally, this would be characteristic of the hybrid, but none of the flowers I have seen have two styles, and none of the fruits has two stones. It could be that backcrossing has left these trees intermediate between the two. Both species and the hybrid are common in Kent.

➤ *Crataegus monogyna* or *C. x media*



Filipendula ulmaria, Meadowsweet: scattered throughout, in ditches and swamps.

Rubus fruticosus, Bramble: occasional throughout; the variety *laciniatus* was recorded by Buckingham *et al.* by a footpath at TR22546128 on 18/5/2014.

Rubus caesius, Dewberry: occasional on the colliery tip.

Potentilla anserina, Silverweed: locally abundant in grassland and swamp.

Potentilla reptans, Creeping Cinquefoil: frequent along paths and occasional in grassland.

†*Comarum palustre*, Marsh Cinquefoil: listed by Ratcliffe (1977) but not recorded by anyone else at Stodmarsh. Although Philp (1980, 2010) reports that this species only occurs at Dungeness it was more widespread in the past, and it was recorded at Minster Marshes, a short distance further along the Stour, in the 19th century (R.E. Hunter, c. 1847). So it is not inconceivable that it was once at Stodmarsh, but there do not seem to be any actual records. This is an axiophyte of acid, boggy ground.

Geum urbanum, Wood Avens: occasional in hedges and scrub.

Agrimonia eupatoria, Agrimony: occasional in grassland.

Rosa arvensis, Field Rose: in woodland at the western end, TR222610.

Rosa canina, Dog Rose: occasional in hedges and scrub throughout.

Hippophae rhamnoides, Sea-buckthorn: a few bushes on the colliery tip, TR210614. This is just outside the NNR boundary.

Ulmus procera, English Elm: occasional in hedges and scrub around the edges.

Ulmus minor, Small-leaved Elm: rare, in the hedge leading to the Stodmarsh car park.

Humulus lupulus, Hop: in hedges and wet woodland at the Stodmarsh end.

Urtica dioica, Stinging Nettle: frequent in woodland and around bird hides; scattered throughout.

Urtica galeopsifolia, Fen Nettle: abundant in W5 *Alnus glutinosa* woodland along the Lampen Stream at the west end of the reserve, compartments 2 & 14 (conf. M.F. Godfrey) and in W6 *Salix fragilis* by the Gt Stour (G.D. Kitchener) This is an axiophyte of low nutrient conditions in wet woods. Some plants are very tall, up to about 8ft in height. It is recognisable by its narrow leaves and it has less sting than common nettle. There are no old records of this in Kent because it was not widely recognised as a British species until recently.



Urtica galeopsifolia

Castanea sativa, Sweet Chestnut: only on the colliery tip.

Quercus ilex, Holm Oak: only on the colliery tip (J. Pitt, 2002 and A. Gay, 2014).

Quercus robur, Pedunculate Oak: rare, scattered throughout.

Juglans regia, Walnut: a couple of saplings, about 5 ft. high, by paths at TR22316120 and TR23066273; presumably planted.

Betula pendula, Silver Birch: surprisingly rare - a few trees in a hedge in the middle of the reserve at TR229619, and one sapling in a hedge by a ditch at TR22506124, but otherwise only on the colliery tip.

Betula pubescens, Downy Birch: only on the colliery tip.

Alnus glutinosa, Alder: frequent in woodland and by the river. This is the most characteristic plant of W5 *A. glutinosa* woodland which occurs along the Lampen Stream at the western end of the reserve. W5 woodland typically develops on peat – sometimes on riverine sedge peat, as here, but more characteristically on moss peats in the north of Britain. It is also the main canopy species in some types of W6 *Salix fragilis* woodland.

Some of the alders are dying of ‘alder pox’ (*Phytophthora alni*). In the picture below the tree on the left is dead, the one in the middle is diseased and has a thin crown, while a third tree on the right is healthy. This is quite normal in cases of alder pox, which rarely wipes out a population, but it often weakens trees sufficiently that they are eventually replaced by willows.



Alnus glutinosa with *Phytophthora alni* infestation

Corylus avellana, Hazel: in hedges and scrub at the western and eastern ends.

Bryonia dioica, White Bryony: rare, on paths, on the colliery tip and in hedges along the lane to Stodmarsh village.

Mercurialis annua, Annual Mercury: as a casual along a newly laid track at TR234629 in 2015.

Euphorbia helioscopia, Sun Spurge: several clumps along the newly-laid path at TR234628, following flood defence works. It also occurs on the colliery tip.

Euphorbia lathyris, Caper Spurge: one plant in 2016 by the newly-laid path at TR234628, following flood defence works.

Euphorbia peplus, Petty Spurge: a few plants as casuals along the river path, TR2362.

Populus ^x*canadensis* 'Robusta', Hybrid Black Poplar: a few large trees in wet woodland by the Lampen Stream in compartment 14H (TR222610) and at the western end of the reserve (7I and 6F, TR212610). This is a commonly-planted tree that is suited to river floodplains. One might consider that the species which is native to Britain (*P. nigra* ssp. *betulifolia*) would be a more suitable alternative in these areas if it came to replanting, but that is not considered native in Kent (although the BSBI's *New Atlas* does, incorrectly, show it as native) so there would be little advantage.

Salix ^x*fragilis*, Crack-willow: occasional in woodland and by the river. This is one of the characteristic species of W6 riparian woodland, of which there are some good stands by the Stour and in compartment 14 (and, to a lesser extent, compartments 6 and 7). It is considered to be a hybrid because it does not produce viable seed, but it reproduces freely from broken-off branches. In some parts of the country it is traditionally pollarded, but seemingly not here.

Salix alba, White Willow: in wet woodland in compartment 14 and a few scattered trees in hedgerows elsewhere. It is planted wherever it occurs, and is considered an archaeophyte in Britain, but it is a suitable tree for W6 *Salix* ^x*fragilis* woodland and mature specimens are a valuable part of the habitat.

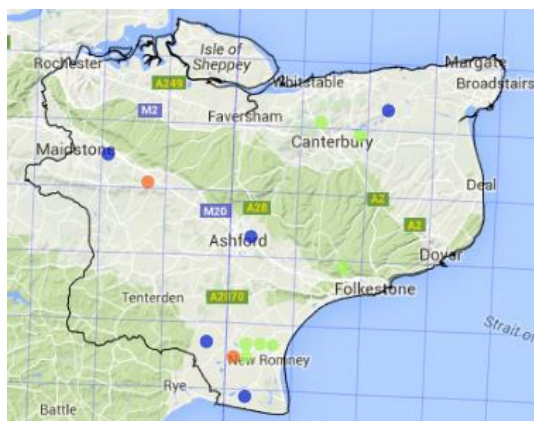
Salix triandra, Almond Willow: a sizeable stand by the Gt Stour at TR22726241 and planted as cover around some hides. This is considered to be an archaeophyte (ancient introduction) in Britain, although it is well naturalised in some places. In Kent it is generally not so well naturalised, and the stands at Stodmarsh appear planted.

Salix ^x*mollissima* (*triandra* x *viminalis*): a patch of scrub near the Stour at TR220619 (13th July 2016, conf. I.V. Belyaeva). This appears to be a spontaneous hybrid, not previously recorded in Kent.

Salix purpurea, Purple Willow: several trees on the banks of the Stour, TR22796254. This looks like an old withybed; the trees were obviously planted, originally, but are thriving here. *Salix purpurea* is not native in Kent.



Salix purpurea



Salix viminalis, Osier: occasional along the Stour and by a pond at TR232626; also planted around some of the hides.

Salix ^x*holosericea* (*viminalis* x *atrocinerea*), Silky-leaved Osier: a couple of shrubs near the river, at TR22766249 (conf. I.V. Belyaeva).

Salix caprea, Goat Willow: a few shrubs along the edge of the swamp by the path to the reedbed hide (TR221612) and on the colliery tip.

Salix ^x*reichardtii*, Grey Goat-willow: one shrub at TR22166182.

Salix atrocinerea, Grey Willow: occasional throughout. This can be a very invasive species, sometimes filling shallow ponds or coming to dominate wetlands. A grey willow wood can be very species-poor, and generally it is advisable to prevent it from becoming too widespread.

Linum catharticum, Fairy Flax: frequent on the colliery tip.

Hypericum perforatum, Perforate St John's-wort: occasional on the colliery tip.

Hypericum tetrapterum, Square-stalked St John's-wort: on the edge of a field at TR23086210.

Geranium rotundifolium, Round-leaved Crane's-bill: along the river path, TR230629, in 2016.

Geranium dissectum, Cut-leaved Crane's-bill: occasional in disturbed areas.

Geranium pusillum, Small-flowered Crane's-bill: in a field gateway at TR23226219.

Geranium molle, Dove's-foot Crane's-bill: occasional in grassland.

Geranium lucidum, Shining Crane's-bill: a few plants along the river path at TR23086294.

Geranium robertianum, Herb-robert: occasional in scrub, mainly along the river bank.

Erodium cicutarium, Common Stork's-bill: two plants along the side of a newly-laid path, TR234629.

Lythrum salicaria, Purple-loosestrife: occasional throughout.

Epilobium hirsutum, Great Willowherb: frequent throughout.

Epilobium parviflorum, Hoary Willowherb: occasional.

† *Epilobium montanum*, Broad-leaved Willowherb: listed in the NCC checklist of c. 1985, but not recorded otherwise.

Epilobium lanceolatum, Spear-leaved Willowherb: only on the colliery tip (Kitchener, 2015).

Epilobium tetragonum, Square-stalked Willowherb: rare in grassland at TR233622 (conf. G.D. Kitchener). Previously recorded by F.J. Hanbury c. 1875 (Hanbury & Marshall, 1899).]

Epilobium ciliatum, American Willowherb: frequent in a recently cut area by the boardwalk, TR224612.

Chamerion angustifolium, Rosebay Willowherb: a few plants in reedbeds by the path, TR220618.

Circaea lutetiana, Enchanter's-nightshade: a good patch on the edge of the reedswamp by a hide, TR234628.

Acer campestre, Field Maple: in the hedge of the lane into the reserve from the Stodmarsh car park.

Acer pseudoplatanus, Sycamore: rare, but scattered throughout.

Malva moschata, Musk Mallow: one plant on the river path at TR22976267 in 2016. Previously recorded (at 'Sturry, in the marshes') only by W. Masters in 1839. This is more of a calcicole than would be expected at Stodmarsh, and it prefers dry ground, so it is only a casual, probably introduced accidentally with a seed mix.

Malva sylvestris, Common Mallow: occasional along paths.

Malva neglecta, Dwarf Mallow: rare, on the river path at TR22976267 in 2016. Not previously recorded. This is a plant of waste ground and arable field margins, presumably brought in with spoil to build up the flood defences.

Reseda luteola, Weld: rare, on disturbed ground in a few places.

Arabidopsis thaliana, Thale Cress: a rare casual along paths.

Camelina sativa, Gold-of-pleasure: 'one plant on the Lampen Wall, where repairs have recently been made, TR22276161' (S. Buckingham, 2015).

Capsella bursa-pastoris, Shepherd's-purse: occasional in field gateways and along paths.

† *Barbarea vulgaris*, Winter-cress: in the NCC checklist, 1985.

Rorippa palustris, Marsh Yellow-cress: a few plants in scattered locations, as on the path at TR23126216 and by the lake near the Tower Hide at TR221617.

† *Rorippa sylvestris*, Creeping Yellow-cress: recorded by F.J. Hanbury c. 1875 (Hanbury & Marshall, 1899) (as *Nasturtium sylvestre*) 'by the river near Grove Ferry.'

Rorippa amphibia, Great Yellow-cress: one patch in tall herb by the river at TR23026284 in 2015 (det. T.C.G. Rich). This is an axiophyte of riverbanks; it occurs in S26d *Epilobium hirsutum* vegetation. At present this is its only known location in East Kent.



Rorippa amphibia

Nasturtium officinale, Water-cress: occasional, in ditches.

† *Nasturtium microphyllum*, Narrow-fruited Water-cress: in the NCC checklist c. 1985 (which curiously does not list *N. officinale*. The plants I have seen in fruit were definitely common water-cress).

Armoracia rusticana, Horse-radish: several plants on the river bank at TR23366312.

Cardamine pratensis, Cuckoo-flower: occasional throughout.

Cardamine flexuosa, Wavy Bitter-cress: occasional in wet woodland at the Stodmarsh end.

Cardamine hirsuta, Hairy Bitter-cress: only on the colliery tip (J. Pitt, 2002).

Lepidium latifolium, Dittander: large stands in three places close to the river and scattered elsewhere. This is normally a coastal plant, growing on shingle beaches and in rough grassland near the sea. It is also found along the River Stour as far inland as Canterbury. It is a nationally scarce plant and in its natural habitat could arguably be an axiophyte but it is also widely established outside its natural range. At Stodmarsh it is thriving and noticeably increasing, forming some large stands.



Lepidium latifolium

Lepidium draba, Hoary Cress: rare, along paths and around Harrison's Drove hide.

Lepidium coronopus, Swine-cress: rare, in field gateways and path edges.

Lepidium didymum, Lesser Swine-cress: rare, along the river path and on the colliery tip (Kitchener *et al.*, 2015).

† *Erophila verna*, Common Whitlowgrass: recorded only on the colliery tip (J. Pitt, 2002).

Diploxys muralis, Annual Wall-rocket: a few plants by the river path at TR23146301.

Brassica napus, Rape: a few plants in a disused cattle pen, TR23026206.

Brassica rapa, Wild Turnip: a couple of plants by the path, TR234629.

Brassica nigra, Black Mustard: on the bank by the lake at TR22256163.

Hirschfeldia incana, Hoary Mustard: occasional on the Lampen Wall and the colliery tip.

†*Raphanus raphanistrum*, Wild Radish: listed in the NCC checklist of 1985.

Sisymbrium officinale, Hedge Mustard: on disturbed ground at Harrison's Drove hide and in the car park at the Stodmarsh end.

Alliaria petiolata, Garlic Mustard: occasional in hedges and by paths.

Thlaspi arvense, Field Penny-cress: rare, in a field at TR234623.

Hesperis matronalis, Dame's Violet: recorded by D. Mills in 2004 at TR231622, near the middle of the reserve.

Persicaria amphibia, Amphibious Bistort: frequent in pools, ditches and marshy grassland.

Persicaria maculosa, Redshank: occasional in disturbed areas and along paths.

Persicaria lapathifolia, Pale Persicaria: several clumps along a newly-laid path at TR234628.

Persicaria hydropiper, Water-pepper: rare, in a swamp at TR23266260.

Polygonum arenastrum, Equal-leaved Knotgrass: occasional along paths.

Polygonum aviculare, Knotgrass: occasional along paths and in trampled fields.

Fallopia convolvulus, Black Bindweed: in woodland by the Gt Stour and by paths.

†*Rumex acetosella*, Sheep's Sorrel: on the NCC list of 1985.

Rumex acetosa, Common Sorrel: rare, in grassland by paths.

Rumex hydrolapathum, Water Dock: frequent in ditches. This is an axiophyte of rivers and wetlands; it occurs in A3 *Hydrocharis morsus-ranae*, S5 *Glyceria maxima* and S6 *Carex riparia* vegetation.

Rumex crispus, Curled Dock: occasional in fields.

Rumex conglomeratus, Clustered Dock: occasional in ditches and swamps.

Rumex sanguineus, Wood Dock: occasional in woodland.

Rumex obtusifolius, Broad-leaved Dock: occasional on the edges of paths.

Arenaria serpyllifolia, Thyme-leaved Sandwort: occasional on the colliery tip.

Stellaria media, Chickweed: rare, on paths and bare patches in grassland.

Stellaria holostea, Greater Stitchwort: along the lane from the Stodmarsh car park.

† *Stellaria palustris*, Marsh Stitchwort: found by Natural England surveyors by a ditch at TR226623 ('two plants') in 1987 and apparently recorded previously, although no details are known. It has not been recorded since then. This is an axiophyte of fens.

† *Stellaria graminea*, Lesser Stitchwort: on the NCC checklist c. 1985.

Cerastium fontanum, Common Mouse-ear: occasional in car parks and along paths.

Myosoton aquaticum, Water Chickweed: rare, in wet woodland near the Lampen Stream at TR222610. Previously recorded on the banks of the Stour by C. Dyson in 1991. This is an axiophyte of river banks and wet woodland; it occurs in W6 *Salix* ^x*fragilis* woodland.

†*Spergularia marina*, Lesser Sea-spurrey: formerly known along the Lampen Wall at TR220620, where it was recorded by NCC surveyors in 1985 and 1987. It was presumably a casual here, brought in with spoil.

Spergularia rubra, Sand Spurrey: only on the colliery tip (A. Gay, 2014).

†*Silene vulgaris*, Bladder Campion: on the NCC checklist, c. 1985.

Silene latifolia, White Campion: rare, on the river path at TR229626 in 2016; previously recorded only on the NCC checklist of 1985.

Silene ^x*hampeana*, Hybrid Campion: a few plants near the marsh hide at TR22196172.

Silene dioica, Red Campion: occasional in woodland and hedges.

Silene flos-cuculi, Ragged Robin: occasional in ditches and swamps.

Chenopodium rubrum, Red Goosefoot: occasional, in dried-up pools and rills.

Chenopodium polyspermum, Many-seeded Goosefoot: a few plants on the side of a path at TR23356290, in 2015.

Chenopodium album, Fat-hen: rare, along the newly-laid path from Grove Ferry in 2015.

Atriplex prostrata, Spear-leaved Orache: scattered, in field gateways and on trampled ground.

Atriplex patula, Common Orache: scattered, in field gateways and on trampled ground.

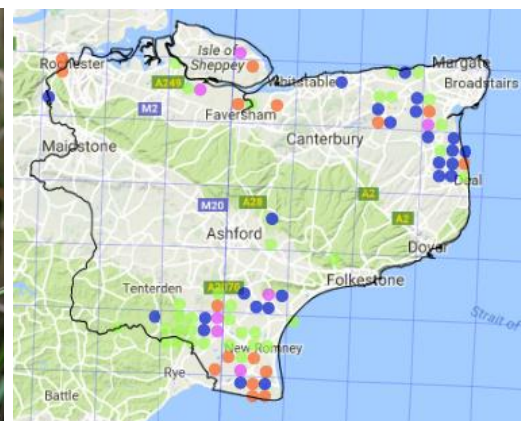
Cornus sanguinea, Dogwood: a few shrubs in hedges and planted around hides.

Lysimachia nummularia, Creeping-Jenny: occasional along the sides of ditches and in wet woodland at the western end. This is highly characteristic of the site, and has been recorded since at least 1839 ('between Grove Ferry and Stodmarsh,' William Masters).

Lysimachia vulgaris, Yellow Loosestrife: in the woodland at the western end and by a ditch at TR23266216. This is an axiophyte of river banks and wet woodland; it is primarily in W5 *Alnus glutinosa* woodland.

Anagallis arvensis, Scarlet Pimpernel: rare, along paths, and on the colliery tip.

Samolus valerandi, Brookweed: occasional in ditches throughout, but especially at the Grove Ferry end (TR237630) where the ditches in cattle-grazed fields are lined with it. This is a scarce and declining plant in Kent, and an axiophyte of unimproved grazing marshes. It has been recorded in this area since at least the 1950s. It occurs on the edges of reed-filled ditches, and in Q58 it was in S26 *Phragmites australis* swamp, but it needs to be in full sunlight.



Samolus valerandi

Galium palustre, Common Marsh-bedstraw: frequent.

Galium album, Hedge Bedstraw: on track sides and by the river.

Galium aparine, Cleavers: rare, in hedges.

Centaureum erythraea, Common Centaury: occasional on the colliery tip.

Vinca minor, Lesser Periwinkle: a well-established patch by the river path, TR22016207.

Echium vulgare, Viper's Bugloss: frequent on the colliery tip.

†*Symphytum officinale*, Common Comfrey: recorded in Cowell's 1839 Floral Guide for East Kent by Miss Sankey and Miss Kenrick (independently). It is described by Hanbury & Marshall (1899) as common in all districts of the county, but it is now virtually absent from the NE part of Kent.

Symphytum xuplandicum, Russian Comfrey: abundant along the path by the Gt Stour, TR231629 - TR234628.

Symphytum orientale, White Comfrey: a planted patch just outside the Feast hide.

Myosotis scorpioides, Water Forget-me-not: occasional in ditches and swamps.

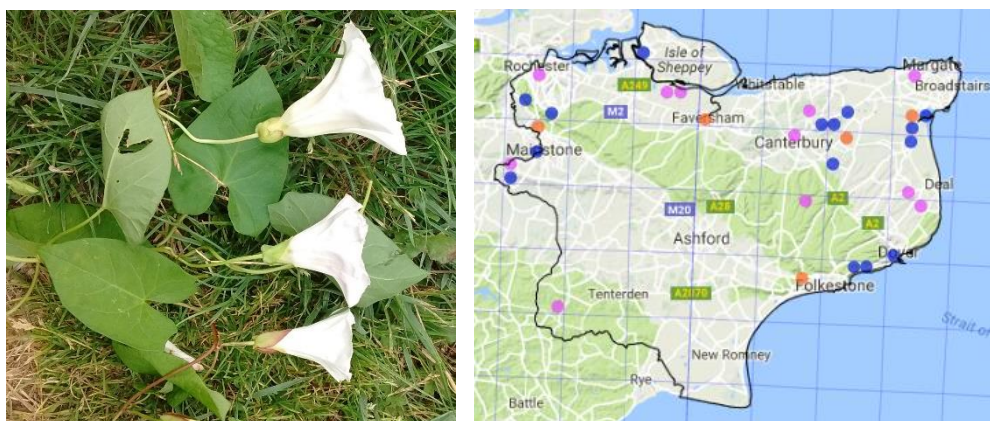
Myosotis laxa, Tufted Forget-me-not: frequent in ditches, woodland and swamps.

Myosotis arvensis, Field Forget-me-not: on paths at the western end.

Convolvulus arvensis, Field Bindweed: occasional along paths and on the colliery tip.

Calystegia sepium, Hedge Bindweed: frequent in sedge swamps, reedswamp and woodland. This is the native species of bindweed that is typical of wetlands and relatively infertile soils. It is by far the more common species on the reserve, except around the edges.

Calystegia ^{}lucana* (*sepium* x *silvatica*), Hybrid Bindweed: abundant along the river bank, and a few scattered plants elsewhere, where the parents meet, as on the edge of a reedswamp at the base of the colliery tip, TR212613. This is a fairly common hybrid in Kent, and it is interesting to see how it grows on the boundaries of the parents' habitats.



Calystegia silvatica (top), *^{*}lucana* (middle) and *sepium* (bottom), and the distribution of *^{*}lucana* in Kent

Calystegia silvatica, Large Bindweed: rare, in field hedges around the edges, at TR23426290 and TR23336232, and on the colliery tip. This is the non-native species that is typical of gardens and arable field hedges, not necessarily on damp soils.

†*Atropa belladonna*, Deadly Nightshade: recorded along the Lampen Wall, around TR223614, by NCC surveyors in 1987 (2 plants). This is an axiophyte of base-rich grassland and woodland; it is most likely to have been only casual in this site, having been introduced with spoil.

Solanum nigrum, Black Nightshade: several clumps along the newly-laid path at TR230627 and TR234628, and on the colliery tip.

Solanum dulcamara, Bittersweet: frequent in ditches and swamps.

Solanum tuberosum, Potato: on the colliery tip (Kitchener *et al.*, 2015) where there are some plants growing from agricultural discards.

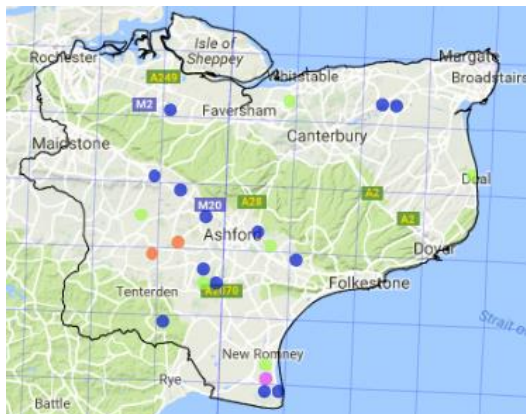
Solanum lycopersicum, Tomato: one plant on the path side in 2015, at TR234629.

Fraxinus excelsior, Ash: a few trees by the river and numerous saplings in wet woodland.

Ligustrum vulgare, Wild Privet: planted by a viewing platform, TR234628, and on the Lampen Wall at TR222616.

Digitalis purpurea, Foxglove: a few plants on the Lampen Wall at TR22056185.

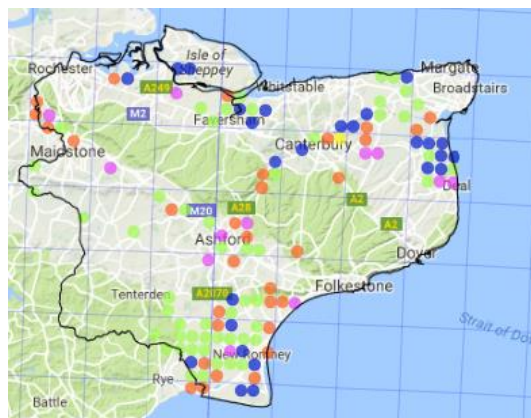
Veronica scutellata, Marsh Speedwell: rare, in an S19 *Eleocharis palustris* swamp in compartment 59 (TR24026260) on drying mud in a pool in compartment 15A (TR22446208). In 1996 it was found by Williams *et al.* in ditches 54 & 73 (TR228625 & TR229624). This is an axiophyte of wetlands which is quite rare in Kent. The plants found were *V. scutellata* var. *scutellata*.



Veronica scutellata

† *Veronica anagallis-aquatica*, Blue Water-speedwell: recorded by P. Glading in 1989 and by Williams *et al.* in 1996 in ditch 46 (TR227618). It has also been recorded recently in nearby stretches of the Great and Little Stour.

Veronica catenata, Pink Water-speedwell: occasional in ditches and pools. This is an axiophyte of species-rich wetlands. It was exceptionally abundant on drying mud in a pool in compartment 15A (TR22446208) in 2016, where it was infested by what I believe are the prominent purplish galls of the weevil *Gymnetron villosulum* Gyllenhal.



Veronica catenata

Veronica persica, Common Field-speedwell: rare, on disturbed ground in fields.

Veronica chamaedrys, Germander Speedwell: rare, in grassland.

Veronica arvensis, Wall Speedwell: a few plants by the path, TR222610.

Plantago coronopus, Buck's-horn Plantain: occasional on paths and frequent on the colliery tip.

Plantago major, Greater Plantain: locally abundant on paths and in field gateways.

Plantago lanceolata, Ribwort Plantain: frequent in grassland.

Hippuris vulgaris, Mare's-tail: scattered, in ditches, pools and marshy grassland. It has been known here since at least the 1950s, and was recorded in Hanbury & Marshall (1899) at Sturry. This is an axiophyte, and Stodmarsh is an exceptionally good site for it, with large populations in some areas. Among the communities it occurs in are S19 *Eleocharis palustris* (Q55) and S14 *Sparganium erectum* swamps (Q59), and it was one of the plants that came up immediately when a patch of species-poor S4 *Phragmites australis* swamp was cut in 2015.



Hippuris vulgaris

Callitriche platycarpa, Various-leaved Water-starwort: abundant in a ditch at the Grove Ferry end, TR234630. Identified by R.V. Lansdown from leaves (no fruits present). This is probably the main *Callitriche* in the ditches (some people have recorded *C. stagnalis*, but that was probably intended as an aggregate).

Callitriche obtusangula, Blunt-fruited Water-starwort: abundant in the Lampen Stream at TR22196090.

†*Scrophularia nodosa*, Common Figwort: on the NCC list of c. 1985.

Scrophularia auriculata, Water Figwort: occasional in ditches.

Buddleja davidii, Butterfly-bush: a well-established patch on the bank by the river, TR231629; also on the colliery tip.

Stachys sylvatica, Hedge Woundwort: rare, in hedges at the Stodmarsh end.

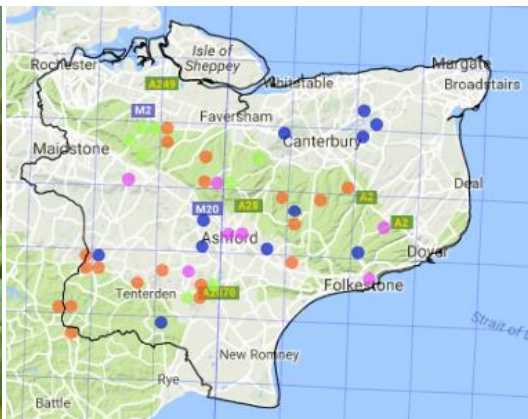
Stachys palustris, Marsh Woundwort: occasional along the river bank, TR231629, and along the edge of the lake by the Lampen Wall (TR2261, C. Osborne, 2013). This is an axiophyte of rivers and wetlands; it occurs in W6 *Fraxinus excelsior* woodland.

Ballota nigra, Black Horehound: a patch on the river bank (TR232630) and on the colliery tip.

Lamium album, White Dead-nettle: rare, on path sides.

Lamium purpureum, Red Dead-nettle: rare, on path sides.

Galeopsis bifida, Bifid Hemp-nettle: rare, in reed swamp by the Lampen Stream, TR221609. (*Galeopsis tetrahit* is included on the NCC list of 1985, but this could be the aggregate rather than the species.)



Galeopsis bifida

Scutellaria galericulata, Skullcap: occasional in woodland and swamp at the western end.

Glechoma hederacea, Ground-ivy: occasional in hedges; rare on ditch-banks.

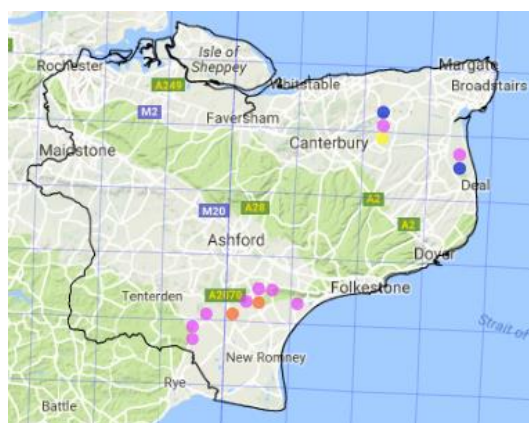
Prunella vulgaris, Selfheal: rare, along paths and in grassland.

†*Thymus polytrichus*, Wild Thyme: on the NCC list of 1985, probably having been on the colliery tip.

Lycopus europaeus, Gipsywort: occasional in ditches and reedswamp; recorded here since 1839 (T.H.M. Bartlett).

Mentha aquatica, Water Mint: frequent throughout.

Utricularia vulgaris, Greater Bladderwort: abundant in some of the pools and ditches (confirmed F.J. Rumsey, **BM**), particularly in the lake in front of the Marsh Hide. It has been recorded here since at least 1839 (Miss Kenrick) and Stodmarsh is one of the key areas for it in East Kent. It has flowered prolifically for the last few years, despite its reputation as a shy flowerer. Axiophyte of base-rich waters. Several people have also recorded *U. australis* here, but so far I have been unable to find it.



Utricularia vulgaris

Ilex aquifolium, Holly: only on the colliery tip (Kitchener *et al.*, 2015).

†*Menyanthes trifoliata*, Bogbean: recorded by F.J. Hanbury c. 1875 (Hanbury & Marshall, 1899) ‘between Stodmarsh and Grove Ferry’ and included in the NCC checklist of c. 1985.

Arctium lappa, Greater Burdock: occasional throughout.

Cirsium vulgare, Spear Thistle: occasional on disturbed ground.

Cirsium arvense, Creeping Thistle: occasional in grassland.

Onopordum acanthium, Cotton Thistle: one plant on disturbed ground by the path at the Grove Ferry end (TR23426291) in 2016.

Centaurea nigra, Common Knapweed: occasional in grassland and along paths.

Cichorium intybus, Chicory: one plant on disturbed ground by the path at the Grove Ferry end (TR23426291) in 2016.

Lapsana communis, Nipplewort: occasional on paths and disturbed ground throughout.

Hypochaeris radicata, Cat's-ear: rare, in grassland and on the colliery tip.

Scorzoneroides autumnalis, Autumnal Hawkbit: occasional in grassland.

Leontodon saxatilis, Lesser Hawkbit: frequent in the meadows.

Picris hieracioides, Hawkweed Oxtongue: a small clump by the river path at TR226623 in 2016.

Helminthotheca echioides, Bristly Oxtongue: scattered throughout.

Tragopogon pratensis, Goat's-beard: a few plants along path sides, towards the NE end.

Sonchus palustris, Marsh Sow-thistle: occasional clumps the reedbeds, most abundantly at the Grove Ferry end, at TR234627. It is a Nationally Scarce species, thought to be declining, but it first turned up at Stodmarsh in the 1990s. Axiophyte of reedswamp, found in S26 *Phragmites australis* by the path near the Marsh Hide and further out in S4 *P. australis* reedbeds.



Sonchus palustris

Sonchus arvensis, Perennial Sow-thistle: occasional along paths and around fields.

Sonchus oleraceus, Smooth Sow-thistle: rare, but scattered throughout.

Sonchus asper, Prickly Sow-thistle: rare, but scattered throughout.

Lactuca serriola, Prickly Lettuce: only on the colliery tip.

Lactuca virosa, Greater Lettuce: occasional along the Lampen Wall at TR22326156, by the path near Marsh Hide (C. Osborne, 2016), and on the colliery tip (A. Gay, 2014).

Taraxacum officinale agg., Dandelion: occasional in grassland and along paths. The following varieties have been recorded:

- *hygrophilum* occurs in grazing marshes at Higham Farm, west of the NNR but within the SSSI. This is its only known site in Britain, where it was discovered by Francis Rose in 1949.
- *pseudohamatum* is a common ruderal plant that is found along paths (TR228615, T.C.G. Rich, 2016).
- *pulchrifolium* is also a common ruderal of path sides (TR222610, Rich, 2016).

Crepis capillaris, Smooth Hawk's-beard: on disturbed ground by the river path and on the colliery tip.

Crepis vesicaria, Beaked Hawk's-beard: frequent along paths.

Pilosella officinarum, Mouse-ear-hawkweed: locally abundant in grassland on an embankment at TR22076184; and abundant on the colliery tip.

Filago vulgaris, Common Cudweed: occasional on the colliery tip.

Gnaphalium uliginosum, Marsh Cudweed: rare, on mud at TR233622 in 2014, and on the colliery tip.

Inula conyzae, Ploughman's-spikenard: recorded only on the colliery tip (NCC 1985 & Kitchener *et al.* 2015).

Pulicaria dysenterica, Common Fleabane: frequent along paths and occasional in meadows.

Solidago virgaurea, Goldenrod: occasional in woodland on the colliery tip.

† *Solidago canadensis*, Canadian Goldenrod: on the NCC list, c. 1985; possibly on the colliery tip.

Aster novae-angliae, Hairy Michaelmas-daisy: on the muddy margins of the Gt Stour at TR23006284, in W6 *Salix fragilis* woodland. The plants are an unusual white-flowered form. This is an uncommon non-native from North America; it has only one other site in East Kent.

➤ *Aster novae-angliae*

† *Aster tripolium*, Sea Aster: on the NCC list, 1985.

Erigeron acris, Blue Fleabane: only on the colliery tip (NCC 1985 & Kitchener *et al.*, 2015).

Conyza sumatrensis, Guernsey Fleabane: a casual on the Lampen Wall, TR222616, in 2015.

Bellis perennis, Daisy: occasional, on paths and in meadows.

Artemisia vulgaris, Mugwort: occasional on paths, especially by the river, and on the colliery tip.

Achillea millefolium, Yarrow: occasional in grassland and by paths.

Leucanthemum vulgare, Oxeye Daisy: occasional by paths and on the colliery tip.

Matricaria chamomilla, Scented Mayweed: in field gateways.

M. discoidea, Pineapple Weed: in field gateways and along paths.

Tripleurospermum inodorum, Scentless Mayweed: frequent on disturbed ground.

Senecio jacobaea, Common Ragwort: occasional throughout.

Senecio aquaticus, Marsh Ragwort: rare by the river near the colliery (TR211617, 2015). It is abundant in grassland at Higham Farm (in the SSSI but not in the NNR). This is a rare plant in Kent and is an axiophyte of wetlands.

Senecio erucifolius, Hoary Ragwort: occasional in grassland and by paths.

Senecio squalidus, Oxford Ragwort: rare, in field gateways and by paths.

Senecio vulgaris, Groundsel: occasional on paths.

† *Senecio viscosus*, Sticky Groundsel: on the NCC list of 1985, possibly from the colliery tip.

Tussilago farfara, Colt's-foot: a few patches, scattered throughout.

Bidens cernua, Nodding Bur-marigold: abundant on drying mud in a shallow, ephemeral pool in compartment 15A (TR224621) and in ditches nearby in 2016. *Bidens cernua* is rather rare in East Kent, and considered to be declining, so this is an important site for it. It is an axiophyte of wetlands, including ponds and ditches.



Bidens cernua



Bidens tripartita, Trifid Bur-marigold: occasional on the edges of pools and ditches, and by the river. This is an axiophyte of wetlands by rivers; it occurs in S26 *Phragmites australis* vegetation and W6 *Salix fragilis* woodland. It is also quite rare in Kent, where it is considered to be primarily a plant of eutrophic rivers (Philp, 2010).



Bidens tripartita

Eupatorium cannabinum, Hemp-agrimony: occasional along the edges of swamps and abundant by the lake at TR221617.

Adoxa moschatellina, Moschatel: in the hedge of the lane at Stodmarsh (TR221610).

Sambucus nigra, Elder: occasional throughout.

Viburnum opulus, Guelder-rose: in wet woodland at the western end, and planted around hides elsewhere.

Lonicera periclymenum, Honeysuckle: in hedges around the edges of the reserve.

Valeriana officinalis, Common Valerian: in swamps at the western end. A characteristic species of the wetland habitat, recorded here since 1839 (T.H.M. Bartlett).

Dipsacus fullonum, Wild Teasel: occasional, scattered throughout.

Hedera helix, Ivy: frequent in woodland, hedges and scrub.

Hydrocotyle vulgaris, Marsh Pennywort: in S5 *Glyceria maxima* swamp (Q46) by a ditch at TR22966230.

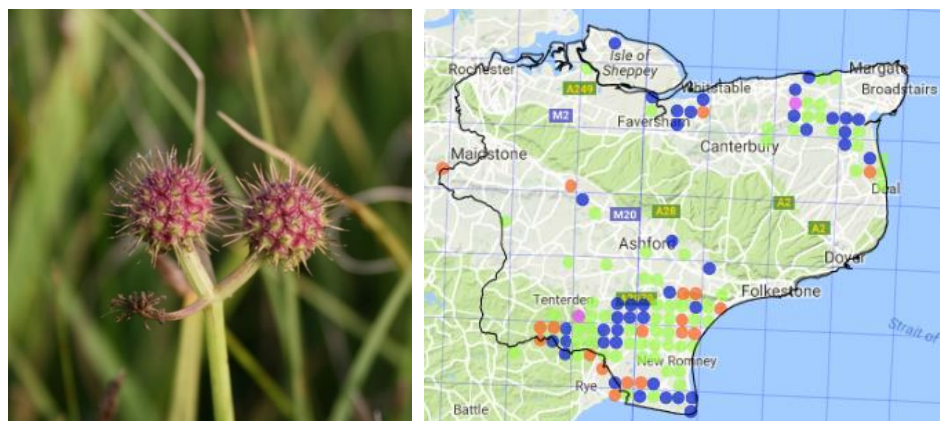
Chaerophyllum temulum, Rough Chervil: only on the colliery tip (NCC, 1985 & Kitchener *et al.*, 2015).

Anthriscus sylvestris, Cow Parsley: occasional throughout.

Smyrniolum olusatrum, Alexanders: occasional along path sides and on the colliery tip.

Berula erecta, Lesser Water-parsnip: abundant in ditches. This is an axiophyte of wetlands; it is recorded in A3 *Hydrocharis morsus-ranae*, S6 *Carex riparia* and W6 *Salix fragilis* vegetation.

Oenanthe fistulosa, Tubular Water-dropwort: frequent in ditches and swamps. Axiophyte. Known here since the 1870s (F.J. Hanbury), it is often abundant in A3 *Hydrocharis morsus-ranae* ditches, MG13 *Alopecurus geniculatus* grassland, and S5 *G. maxima*, S6 *C. riparia*, S13 *Typha angustifolia* and S22 *Glyceria fluitans* swamps.

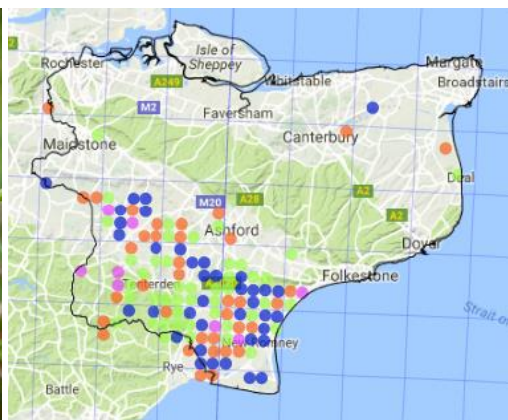


Oenanthe fistulosa

Oenanthe crocata, Hemlock Water-dropwort: frequent by the river and in wet woodland.

† *Oenanthe fluviatilis*, River Water-dropwort: recorded by F.J. Hanbury c. 1875 (Hanbury & Marshall, 1899) 'between Stodmarsh and Grove Ferry.' This was presumably in the river, and it is still present upstream at Canterbury.

Oenanthe aquatica, Fine-leaved Water-dropwort: rare, in a patch of cut reedswamp at TR23246251 and in a ditch at TR222618. Previously recorded (as *O. phellandrium*) by F.J. Hanbury, c. 1875 and by P. Glading in 1989. This is an axiophyte of peaty wetlands. It was growing in S4 *Phragmites australis* vegetation but only after cutting.



Oenanthe aquatica

Aethusa cynapium, Fool's Parsley: on the colliery tip (Kitchener *et al.*, 2015).

Silaum silaus, Pepper-saxifrage: a few patches by paths, TR23066210 and TR23076201.

Conium maculatum, Hemlock: occasional, by paths and on ditch banks.

Bupleurum tenuissimum, Slender Hare's-ear: on the colliery tip (A. Gay, 2014). This species normally occurs in disturbed habitats near the coast, and the Stodmarsh site is the only inland one known in Kent.

Apium nodiflorum, Fool's Water-cress: occasional in ditches.

Petroselinum segetum, Corn Parsley: a couple of dozen plants sprang up on the river bank path in 2016 (TR230626), following flood defence works. It was previously recorded on the NCC checklist of 1985.

Sison amomum, Stone Parsley: occasional on the edges of paths.

Angelica sylvestris, Wild Angelica: in woodland at the western end and along the Stour.

† *Pastinaca sativa*, Wild Parsnip: on the NCC list of 1985; possibly recorded on the colliery tip.

Heracleum sphondylium, Hogweed: occasional in grassland and woodland.

Torilis japonica, Upright Hedge-parsley: occasional in grassland and hedges.

Daucus carota, Wild Carrot: rare, along paths and on the colliery tip.

Arum maculatum, Lords-and-ladies: in scrub around the edges of the reserve.

Spirodela polyrhiza, Greater Duckweed: in ditches throughout. Known here since the 1870s (F.J. Hanbury).

Lemna gibba, Fat Duckweed: in ditches throughout. Known here since the 1870s (F.J. Hanbury).

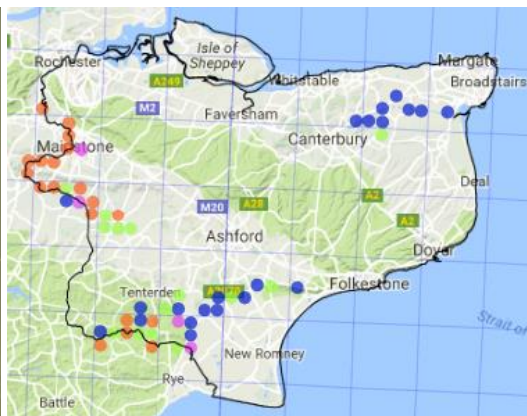
Lemna minor, Common Duckweed: abundant in ditches throughout.

Lemna minuta, Least Duckweed: locally abundant in ditches. First recorded here by Williams *et al.* in 1996.

Lemna trisulca, Ivy-leaved Duckweed: abundant in ditches and pools.

† *Wolffia arrhiza*, Rootless Duckweed: recorded here ('trenches between Stodmarsh and Grove Ferry') by F.J. Hanbury in c. 1875 and listed by Ratcliffe (1977) and in the NCC Flora of 1985 (but the later records could be based on the original one). It is a Nationally Scarce plant and axiophyte of grazing marshes, and has been recorded recently in this part of Kent, but not at Stodmarsh.

Sagittaria sagittifolia, Arrowhead: occasional in the river. There are several species which form streamers in the river, most commonly *Sparganium emersum* and *Butomus umbellatus*, but in the summer the characteristic leaves of this species can be seen. It is found mainly in lowland rivers.



Sagittaria sagittifolia

Baldellia ranunculoides, Lesser Water-plantain: scattered populations on the sides of ditches and in rills. In 2014 it was reasonably abundant at TR23286218, TR23296217, TR23406232, TR22946215 & TR22996210 but in the dry summer in 2015 there were no plants to be seen. This habitat is typically on the boundary between two communities such as the edges of *Phragmites australis* or *Typha angustifolia* swamps bordering mesotrophic grassland.

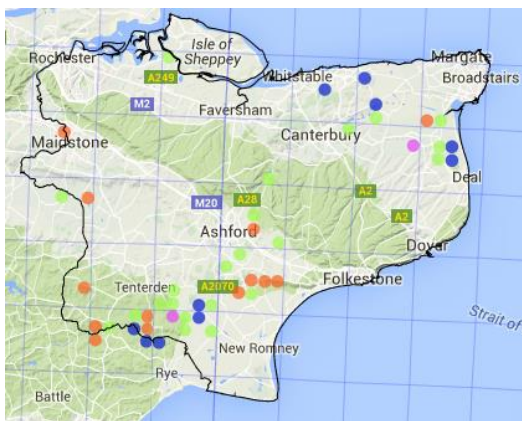
A vast population of hundreds of plants occurs in compartments 57 (TR240626) and 59 (TR239624) in S19 *Eleocharis palustris* swamp. It is an axiophyte of seasonally inundated muddy (or sandy/gravelly) places and oligotrophic conditions, in full sunlight and it has declined dramatically in England in recent decades.



Baldellia ranunculoides

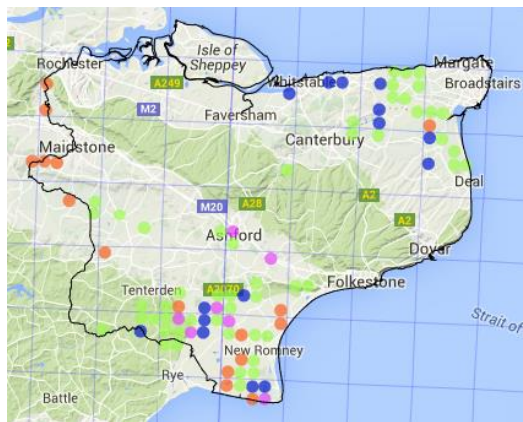
Alisma plantago-aquatica, Water-plantain: occasional throughout, in shallow ditches, and sometimes abundant in ephemeral pools. Recorded since at least 1839 (T.H.M. Bartlett).

Alisma lanceolatum, Narrow-leaved Water-plantain: scattered throughout, as by the lake at Harrison's Drove, at TR23446232, in a rill at TR23296217 and in a ditch at TR23126222. It is an axiophyte of rivers and canals, and is uncommon in East Kent. The photo below shoes a plant on the margin of the lake in front of Harrison's Drove Hide.



Alisma lanceolatum

Butomus umbellatus, Flowering Rush: abundant in the pond in front of the Marsh Hide, at TR226618; scattered elsewhere. It is an axiophyte of rivers and canals. First recorded by W. Masters in 1839.



Butomus umbellatus

Hydrocharis morsus-ranae, Frogbit: abundant in water bodies throughout. This is an axiophyte of ditches and ponds; it is characteristic of A3 *H. morsus-ranae* community and extends into the more open fens such as T13 *Typha angustifolia* vegetation and cut stands of S4 *Phragmites australis*. First recorded in 1839 by T.H.M. Bartlett.

Elodea canadensis, Canadian Waterweed: occasional in ditches and pools.

Elodea nuttallii, Nuttall's Water-weed: abundant in ditches and pools.

†*Triglochin palustris*, Marsh Arrowgrass: recorded by F.J. Hanbury c. 1875 and listed by Ratcliffe (1977) and in the NCC Flora of 1985, but these may be repeats of the original record. This is an axiophyte of marshy grassland.

Potamogeton natans, Broad-leaved Pondweed: in a rill in compartment 20 (TR23286218) and in several ditches.

Potamogeton coloratus, Fen Pondweed: a sizeable patch in S19 *Eleocharis palustris* swamp in compartment 57 (TR23956242) in 2016; not previously recorded in the reserve. This is a nationally scarce plant (i.e. in fewer than 100 sites in Britain) and an axiophyte of calcareous ditches with low fertility. It was previously recorded at nearby Newnham Valley in 1997, but in Kent it is otherwise only known around Ham.



Potamogeton coloratus

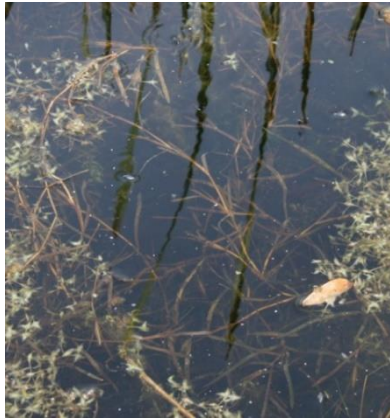
Potamogeton lucens, Shining Pondweed: in the Gt Stour and the Lampen Stream and in a ditches at TR22366200 and TR23116216 (ditch 77). It was also recorded in ditches 31 and 51 by Williams *et al.* in 1996. This species is typical of rivers, ditches and ponds where calcareous water drains off chalk hills.



Potamogeton lucens

† *Potamogeton perfoliatus*, Perfoliate Pondweed: recorded by F.J. Hanbury c. 1875, ‘between Stodmarsh and Grove Ferry.’

Potamogeton friesii, Flat-stalked Pondweed: locally abundant in ditches and pools. This species was first recorded here by E.G. Philp in 1958 (det. J.E. Dandy & G. Taylor, MNE) and has been seen often since. It is the more abundant pondweed at this site and, owing to its pointed leaves, it could easily be mistaken for *P. acutifolius*, so recording must be done with care. I have seen it in ditches 36, 56, 65, 77, 86, 103, 108, 117 and un-numbered ditches at TR22966200, TR22366200 and TR22346194. It was previously recorded by Williams *et al.* (1996) in ditches 36, 76, 83, 103, 118, 120 & 139. The only place it is found in East Kent is in the lower parts of the catchment of the Stour.



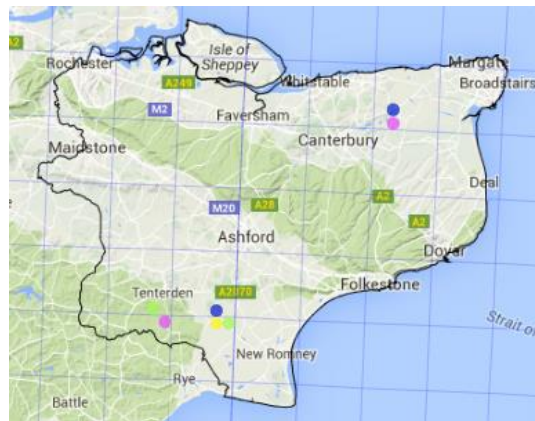
Potamogeton friesii

Potamogeton pusillus, Lesser Pondweed: in the lake in front of Harrison's Drove Hide, TR23436229. First recorded here by F.J. Hanbury c. 1875, although a voucher specimen would normally be required for a record as old as this. It was also found by E.G. Philp & J. Bevan in 2000.

Potamogeton berchtoldii, Small Pondweed: occasional in the lake in front of Harrison's Drove hide; also recorded in this vicinity by E.G. Philp in 2000 and on the NCC list of c. 1985.

† *Potamogeton trichoides*, Hairlike Pondweed: recorded by N.F. Stewart in 1993, 'not far from the car park'. This is a nationally scarce axiophyte of ditches and pools.

Potamogeton acutifolius, Sharp-leaved Pondweed: rare, in the lake in front of Harrison's Drove Hide, TR23436229 (conf. C.D. Preston), in ditch 99 (TR232622) and in some un-numbered ditches at TR222618. This is a nationally rare pondweed (fewer than 15 sites in Britain), first found at Stodmarsh by G. Dowker ('Withamdrewe, west of the Little Stour-Newnham Valley') in the 19th century (Hanbury & Marshall, 1899). Its habitat is calcareous, mesotrophic water in Norfolk and the south-east of England.



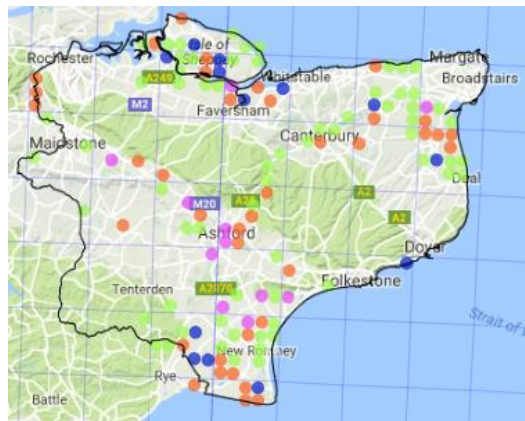
Potamogeton acutifolius

† *Potamogeton crispus*, Curled Pondweed: recorded by Williams *et al.* in several ditches in 1996 and previously listed in the NCC Flora of 1985.

Potamogeton pectinatus, Fennel Pondweed: frequent in the Gt Stour, rare in the pond at Harrison's Drove (TR234622) and in ditch 169 (TR24076257). Previously recorded here by F.J. Hanbury in c. 1875 and by E.G. Philp in 1958 (MNE). It was found to be widespread in the ditch survey of 1996 (Williams *et al.*), who recorded it in ditches 59, 131, 145, 147, 159, 162 and 166. *Potamogeton pectinatus* is typical of sluggish lowland rivers and brackish ditches around the coast.

➤ *Potamogeton pectinatus*

Zannichellia palustris, Horned Pondweed: I have found this species only in ditch 152, at the Grove Ferry end of the site (TR23716303, 2016). It has previously been recorded at 'Grove Ferry' by F.J. Hanbury in c. 1875, in a ditch near Grove Ferry (c. TR233630) by C. Dyson in 1991, and in several ditches (nos. 54, 84, 125, 130, 147 & 162) by Williams *et al.* in 1996. It was also found by E.G. Philp in 2000. It prefers sites in full sunlight, and so its continued presence in a ditch in a grazed field might be significant. It is a species that seems to have declined dramatically in East Kent recently.



Zannichellia palustris

Spiranthes spiralis, Autumn Lady's-tresses: some 200 spikes on the colliery tip, where it has been known for about ten years. They are scattered throughout the woodland fringes. This orchid is quite widespread in Kent, in calcareous grassland and on coastal dunes. It could be considered an axiophyte, but its main habitat requirement is disturbed ground, so that is debatable.



Spiranthes spiralis

Dactylorhiza fuchsii, Common Spotted-orchid: frequent on the colliery tip.

Dactylorhiza ^x*grandis* (*fuchsii* x *praetermissa*), Tall Marsh-orchid: occasional on the colliery tip, where it has been known since at least 1987.

Dactylorhiza praetermissa, Southern Marsh-orchid: in a damp grassy sward on the margin of a potato field at Stodmarsh Court Farm (TR217610), which is just within the NNR at its western end. Also on the colliery tip, where it has been known since at least 1987.

Iris pseudacorus, Yellow Iris: occasional throughout.

Hyacinthoides non-scripta, Bluebell: at the base of the hedge along the lane from the Stodmarsh car park.

Asparagus officinalis, Asparagus: a patch by the footpath at TR22336215.

Sparganium erectum, Branched Bur-reed: occasional throughout.

Sparganium emersum, Unbranched Bur-reed: frequent in the river, and recorded in ditches by P. Glading (1989) and S. Buckingham (TR231621, 2014).

Typha latifolia, Great Reedmace: occasional in swamps.

Typha x glauca (*latifolia* x *angustifolia*), Hybrid Reedmace: rare, in reedswamp at the base of the colliery tip (TR212613) and along the edge of ditch 28 in compartment 15A (TR22366208).

Typha angustifolia, Lesser Bulrush: abundant in pools and occasional in swamps and ditches. Axiophyte of pools and ditches, in A3 *Hydrocharis morsus-ranae*, S22 *Glyceria fluitans* and S13 *Typha angustifolia* vegetation.

†*Juncus subnodulosus*, Blunt-flowered Rush: this species is listed on the NCC list of c. 1985 and given as a characteristic plant of the NNR in the *Nature Conservation Review* (Ratcliffe, 1977). There appear to be no localised, dated records, but it is recorded in this area and it is not inconceivable that it might still be present.

Juncus articulatus, Jointed Rush: frequent throughout, on the sides of ditches and in marshy grassland. It is recorded in *Hordeum secalinum* grassland, S6 *Carex riparia* and S13 *Typha angustifolia* swamps, and S26 *Phragmites australis* fen

Juncus gerardii, Saltmarsh Rush: occasional in marshy grassland. This is an axiophyte of salt marshes and coastal grazing meadows.

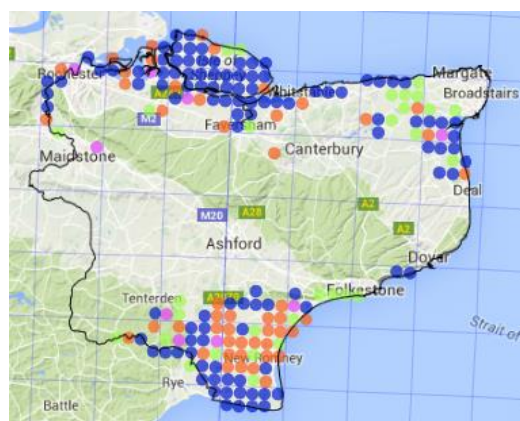
Juncus bufonius, Toad Rush: occasional along paths and in wet hollows, including on the colliery tip.

Juncus inflexus, Hard Rush: frequent to abundant throughout.

Juncus effusus, Soft-rush: occasional in ditches and fields; the var. *subglomeratus* occurs in a field at TR23306223.

Juncus conglomeratus, Compact Rush: rare, seen only in a field at TR23156243.

Bolboschoenus maritimus, Sea Club-rush: occasional in ditches, in sedge swamps around pools and ditches. Axiophyte of coastal grazing marshes. Stodmarsh is one of its most inland sites in the county, reflecting the coastal element in the vegetation.



Bolboschoenus maritimus

Schoenoplectus tabernaemontani, Grey Club-rush: occasional in ditches and swamps. First recorded here by E.S. Marshall in the late 19th century (Hanbury & Marshall, 1899) 'ditches near Grove Ferry, in profusion.' This is an axiophyte of coastal wetlands. Several records of *S. lacustris* by Natural England surveyors in the 1980s and '90s can be included here, as this was considered a subspecies in some Floras.

Eleocharis palustris, Common Spike-rush: locally abundant in wet grassland and pools.

Carex otrubae, False Fox-sedge: occasional throughout.

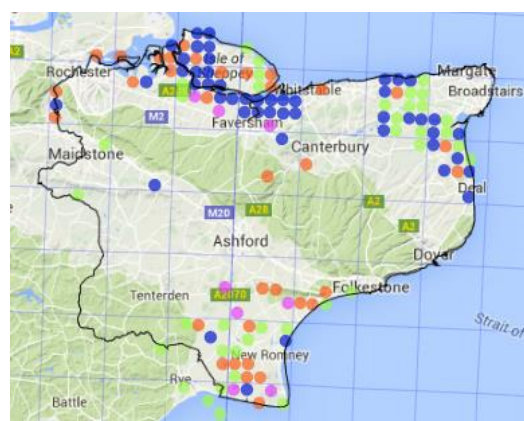
Carex divulsa ssp. *leersii*, Grey Sedge: one large clump by the path near Grove Ferry, TR23496301 (conf. M.S. Porter).

Carex disticha, Brown Sedge: occasional in swamps throughout. It occurs in S5 *Glyceria maxima* and S26 *Phragmites australis* vegetation and is an axiophyte of swamps and fens.



Carex disticha

Carex divisa, Divided Sedge: locally abundant along paths and in some of the grassland; this is an axiophyte of coastal grazing marshes, and Stodmarsh is about as far inland as it reaches. Its presence here demonstrates the maritime influence on the vegetation, which possibly dates from the time when the Wantsum Channel was saline.



Carex divisa

Carex remota, Remote Sedge: occasional in the woods.

Carex hirta, Hairy Sedge: a few patches by paths.

Carex acutiformis, Lesser Pond-sedge: locally abundant in a few places – by the Lampen Stream at TR221608 and along a ditch at TR229619.

Carex riparia, Greater Pond-sedge: abundant throughout.

†*Carex pendula*, Pendulous Sedge: recorded by Williams *et al.* in one place at the Grove Ferry end, TR233628 in 1996.

Carex flacca, Glaucous Sedge: rare, in grassland at TR23206227.

†*Carex distans*, Distant Sedge: recorded by Williams *et al.* in ditches 71, 89 and 102 (TR229622, TR231628 & TR232627) in 1996. This is an axiophyte of coastal grazing marshes.

Carex acuta, Slender Tufted-sedge: a few clumps in swamp along a ditch at TR22966230 (det. A.O. Chater). This is a new tetrad for the species, which is scarce in East Kent. It also occurs by ditches at Stodmarsh Court Farm and Higham Farm (the latter outside the NNR but within the SSSI). *Carex acuta* is an axiophyte of lowland river valleys, growing either along the side of rivers or in sedge swamps in the floodplain. At Stodmarsh it occurs in S5 *Glyceria maxima* swamp by what appears to be a former meander of the river.



Carex acuta

Schedonorus arundinaceus, Tall Fescue: only abundant along the path in front of the Marsh hide, but there are scattered clumps in grassland elsewhere. The plants here have uncharacteristically glabrous auricles, but the identification has been confirmed by C.A. Stace.

Schedonorus giganteus, Giant Fescue: only on the colliery tip (Kitchener *et al.*, 2015); a woodland grass.

Lolium perenne, Perennial Rye-grass: frequent along paths and in meadows.

Lolium ^xboucheanum (*perenne* x *multiflorum*), Hybrid Rye-grass: a few clumps in field gateways and on paths at the eastern end (conf. C.A. Stace). It has also been sown in abundance along the river path after regrading in 2015. This is a widely sown agricultural grass.

Festuca rubra, Red Fescue: occasional on drier ground, scattered throughout. There is surprisingly little red fescue at Stodmarsh, considering that it is one of the most common grasses of unimproved meadows in England.

Festuca ovina, Sheep's-fescue: a few patches on the Lampen Wall and scattered on the colliery tip.

Festuca brevipila, Hard Fescue: rare, on the colliery tip in 2015, as a casual with agricultural waste. This is a widely sown amenity grass, used on golf courses, roadsides, etc.

Vulpia bromoides, Squirrel-tail Fescue: frequent along the Lampen Wall and on the colliery tip.

Vulpia myuros, Rat's-tail Fescue: occasional along the Lampen Wall and abundant on the colliery tip.

Cynosurus cristatus, Crested Dog's-tail: locally frequent in grassland at the Grove Ferry end, and on the colliery tip. It is one of the most characteristic species of unimproved meadows in England, but it is typically absent from coastal grazing marshes, possibly because it cannot tolerate brackish conditions.

Poa infirma, Early Meadow-grass: recorded by S. Buckingham in 2011 and L. Rooney in 2014, along paths. This is a non-native species that has been spreading on Britain in recent years and is now quite widespread. It is generally not found in semi-natural conditions.

Poa annua, Annual Meadow-grass: occasional on paths and in grassland.

Poa trivialis, Rough Meadow-grass: occasional throughout.

Poa humilis, Spreading Meadow-grass: rare, in dry grassland on the colliery tip.

Poa pratensis, Smooth Meadow-grass: occasional in meadows.

Poa nemoralis, Wood Meadow-grass: rare, on the Lampen Wall at TR22376129. This is a woodland grass, typically found on dry banks.

Dactylis glomerata, Cock's-foot: occasional throughout.

Catapodium rigidum, Fern-grass: frequent on the colliery tip.

Arrhenatherum elatius, False Oat-grass: frequent along paths.

Avena fatua, Wild Oat: rare, as a casual on waste ground by the path to Grove Ferry.

Trisetum flavescens, Yellow Oat-grass: occasional along the path to Grove Ferry.

Deschampsia flexuosa, Wavy Hair-grass: occasional on the colliery tip.

Holcus lanatus, Yorkshire-fog: occasional.

Aira praecox, Early Hair-grass: abundant on the colliery tip.

Anthoxanthum odoratum, Sweet Vernal Grass: only on the colliery tip (A. Gay, 2014).

Phalaris arundinacea, Reed Canary-grass: frequent throughout.

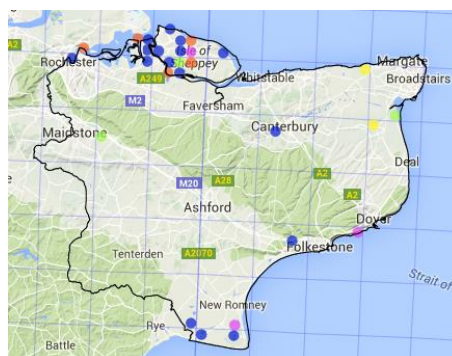
Phalaris canariensis, Canary-grass: numerous plants on disturbed ground at the Grove Ferry end (TR23426291) in 2016.

Agrostis capillaris, Common Bent: occasional in dry grassland, especially on the colliery tip.

Agrostis stolonifera, Creeping Bent: frequent in swamps and marshy grassland, and on the colliery tip.

†*Polypogon monspeliensis*, Annual Beard-grass: recorded on the colliery tip by Joyce Pitt in 2002, 'in damp marshy ground by the river.' This is an interesting record of a scarce native species that normally occurs on bare ground by the sea, usually in salt marshes. There is only one other record of it inland in East Kent, from the Canterbury area (presumably also on the Stour) in 2011.

➤ *Polypogon monspeliensis*



Alopecurus pratensis, Meadow Foxtail: occasional in marshy grassland and swamps.

Alopecurus geniculatus, Marsh Foxtail: frequent in marshy grassland and swamps.

Phleum pratense, Timothy: occasional in grassland.

Phleum bertolonii, Smaller Cat's-tail: occasional in grassland.

Glyceria maxima, Reed Sweet-grass: frequent throughout, in swamps and ditches, and along the edge of the river.

Glyceria fluitans, Floating Sweet-grass: occasional in ditches and rills.

Glyceria declinata, Small Sweet-grass: in a ditch at TR23036205.

† *Glyceria notata*, Plicate Sweet-grass: recorded by Williams *et al.* in several ditches (nos. 73, 83 & 107) in 1996.

Bromus racemosus, Smooth Brome: a few plants by a path towards the Grove Ferry end in 2016.

Bromus hordeaceus, Soft-brome: occasional in grassland and by paths.

Anisantha sterilis, Barren Brome: occasional by paths.

Brachypodium sylvaticum, False-brome: occasional in the woods and hedges.

Elytrigia repens, Common Couch: occasional in swamps and by paths throughout.

Hordeum secalinum, Meadow Barley: abundant in meadows. This is the most characteristic and abundant species of the old, unimproved fields. It is a plant of coastal marshes and it is particularly abundant on the London Clay where salt marshes have been drained and improved for agriculture.

Triticum aestivum, Bread Wheat: on a pile of sand by the path at TR234629 in 2016.

Phragmites australis, Common Reed: abundant throughout. Where the path had been re-laid in 2015 it colonised over bare ground with long runners ('legehalme') of 6 m or more in length. This is an unusual growth form that is rarely observed and is considered to be more common in saltmarshes; but here it is probably a response to the plants being moved onto dry ground during reconstruction of the paths. Common Reed is also widespread on the colliery tip, on very dry, light soils. It does not grow well and rarely flowers. It is curious that it grows there;

possibly it was present in topsoil spread across the heap at some point, or possibly it arrives from the surrounding swamps.

Echinochloa crus-galli, Cockspur: a casual in the car park and on new paths, following the flood defence works in 2015. Largely gone again by 2016.



Horizontal runners (legehalme) of *Phragmites australis* crossing dry ground.

Species recorded by date class

Date classes:

1 = 1800-1900	38 species
2 = 1950-1979	212 species
3 = 1980-1989	268 species
4 = 1990-1999	194 species
5 = 2000-2009	89 species
6 = 2010-2017	411 species

	1	2	3	4	5	6							
Acer campestre	-	-	1	-	-	1	Buddleja davidii	-	-	1	1	-	1
Acer pseudoplatanus	-	1	1	1	-	1	Bupleurum tenuissimum	-	-	-	-	-	1
Achillea millefolium	-	1	1	1	-	1	Butomus umbellatus	1	1	1	1	-	1
Adoxa moschatellina	-	-	-	-	1	1	Callitriche obtusangula	1	1	1	1	1	1
Aethusa cynapium	-	-	-	-	-	1	Callitriche platycarpa	-	-	-	-	-	1
Agrimonia eupatoria	-	-	1	-	-	1	Callitriche sp.	-	-	-	1	-	-
Agrostis capillaris	-	1	-	1	-	1	Caltha palustris	-	-	1	1	1	1
Agrostis stolonifera	-	1	1	1	-	1	Calystegia sepium	-	1	1	1	-	1
Aira praecox	-	-	-	-	-	1	Calystegia silvatica	-	-	-	-	-	1
Alisma lanceolatum	-	1	1	1	1	1	Calystegia x lucana	-	-	-	-	-	1
Alisma plantago-aquatica	1	1	1	1	1	1	Camelina sativa	-	-	-	-	-	1
Alliaria petiolata	-	1	1	1	-	1	Capsella bursa-pastoris	-	1	1	1	-	1
Alnus glutinosa	-	1	1	1	1	1	Cardamine flexuosa	-	-	-	-	-	1
Alopecurus geniculatus	-	1	1	-	1	1	Cardamine hirsuta	-	-	-	-	1	-
Alopecurus pratensis	-	1	1	1	-	1	Cardamine pratensis	-	-	1	1	1	1
Anagallis arvensis	-	-	-	1	-	1	Carex acuta	-	-	-	-	-	1
Angelica sylvestris	-	1	1	1	-	1	Carex acutiformis	-	-	1	-	1	1
Anisantha sterilis	-	1	1	1	-	1	Carex distans	-	-	-	1	-	-
Anthoxanthum odoratum	-	-	-	-	-	1	Carex disticha	-	1	1	-	-	1
Anthriscus sylvestris	-	1	1	1	-	1	Carex divisa	-	-	-	1	-	1
Anthyllis vulneraria	-	-	-	-	-	1	Carex divulsa	-	-	-	-	-	1
Apium nodiflorum	-	1	1	1	-	1	Carex flacca	-	-	-	-	-	1
Arabidopsis thaliana	-	-	-	-	-	1	Carex hirta	-	1	1	1	-	1
Arctium lappa	-	1	1	1	-	1	Carex otrubae	-	1	1	1	1	1
Arenaria serpyllifolia	-	-	-	-	-	1	Carex pendula	-	-	-	1	-	-
Armoracia rusticana	-	1	-	1	-	1	Carex remota	-	-	-	-	-	1
Arrhenatherum elatius	-	1	1	1	-	1	Carex riparia	-	1	1	1	1	1
Artemisia vulgaris	-	1	1	1	-	1	Castanea sativa	-	-	-	-	-	1
Arum maculatum	-	1	1	-	1	1	Catapodium rigidum	-	-	-	-	-	1
Asparagus officinalis	-	-	-	1	-	1	Centaurea nigra	-	1	1	1	-	1
Aster novae-angliae	-	-	-	-	-	1	Centaureum erythraea	-	-	1	-	-	1
Aster tripolium	-	-	1	-	-	-	Cerastium fontanum	-	1	1	1	-	1
Atriplex patula	-	-	-	1	-	1	Ceratophyllum demersum	1	1	1	1	1	1
Atriplex prostrata	-	1	1	1	-	1	Chaerophyllum temulum	-	-	1	-	-	1
Atropa belladonna	-	-	1	-	-	-	Chamerion angustifolium	-	1	1	-	-	1
Avena fatua	-	-	1	-	1	1	Chara globularis	-	-	-	-	-	1
Azolla filiculoides	-	-	1	-	-	-	Chara sp.	-	-	-	1	-	-
Baldellia ranunculoides	1	1	-	1	-	1	Chara vulgaris	1	-	-	-	-	1
Ballota nigra	-	1	1	1	-	1	Chenopodium album	-	1	-	1	-	1
Barbarea vulgaris	-	-	1	-	-	-	Chenopodium polyspermum	-	-	-	-	-	1
Bellis perennis	-	1	1	1	1	1	Chenopodium rubrum	-	-	1	-	-	1
Betula erecta	-	1	1	1	1	1	Cichorium intybus	-	-	-	-	-	1
Betula pendula	-	-	1	-	1	1	Circaea lutetiana	-	-	-	-	-	1
Betula pubescens	-	-	-	-	-	1	Cirsium arvense	-	1	1	1	-	1
Bidens cernua	-	-	-	-	-	1	Cirsium vulgare	-	1	1	1	-	1
Bidens tripartita	-	1	1	-	-	1	Clematis vitalba	-	1	1	1	-	1
Bolboschoenus maritimus	-	1	1	1	-	1	Comarum palustre	-	1	-	-	-	-
Brachypodium sylvaticum	-	1	1	-	-	1	Conium maculatum	-	1	1	1	-	1
Brassica napus	-	-	-	-	1	1	Convolvulus arvensis	-	1	1	1	-	1
Brassica nigra	-	1	1	-	-	1	Conyza sumatrensis	-	-	-	-	-	1
Brassica rapa	-	-	1	-	-	1	Cornus sanguinea	-	1	-	1	1	1
Bromus hordeaceus	-	1	1	-	1	1	Corylus avellana	-	-	1	-	-	1
Bromus racemosus	-	-	-	-	-	1	Crassula helmsii	-	-	-	1	-	1
Bryonia dioica	-	-	1	-	-	1	Crataegus monogyna	-	1	1	1	1	1
							Crataegus persimilis	-	-	-	-	-	1

Crepis capillaris	-	-	-	-	-	1	Hesperis matronalis	-	-	-	-	1	-
Crepis vesicaria	-	1	1	-	-	1	Hippophae rhamnoides	-	-	-	-	-	1
Cynosurus cristatus	-	1	1	1	-	1	Hippuris vulgaris	-	-	1	1	-	1
Dactylis glomerata	-	1	1	1	-	1	Hirschfeldia incana	-	1	1	-	-	1
Dactylorhiza fuchsii	-	-	1	-	-	1	Holcus lanatus	-	1	1	-	1	1
Dactylorhiza praetermissa	-	-	1	-	-	1	Hordeum secalinum	-	1	1	1	-	1
Dactylorhiza x grandis	-	-	1	-	-	1	Humulus lupulus	-	1	1	1	-	1
Daucus carota	-	-	-	-	-	1	Hyacinthoides non-scripta	-	-	1	-	1	1
Deschampsia flexuosa	-	-	-	-	-	1	Hydrocharis morsus-ranae	1	1	1	1	1	1
Digitalis purpurea	-	-	-	-	-	1	Hydrocotyle vulgaris	1	-	1	1	-	1
Diploxys muralis	-	-	-	-	-	1	Hypericum perforatum	-	-	1	-	-	1
Dipsacus fullonum	-	1	1	1	-	1	Hypericum tetrapterum	-	-	-	1	-	1
Dryopteris carthusiana	-	-	-	-	-	1	Hypochaeris radicata	-	1	1	1	-	1
Dryopteris dilatata	-	-	-	-	1	1	Ilex aquifolium	-	-	-	-	-	1
Dryopteris filix-mas	-	-	-	-	-	1	Inula conyzae	-	-	1	-	-	1
Echinochloa crus-galli	-	-	-	-	-	1	Iris pseudacorus	-	1	1	1	-	1
Echium vulgare	-	-	1	-	-	1	Juglans regia	-	-	-	-	-	1
Eleocharis palustris	-	1	1	1	-	1	Juncus articulatus	-	1	1	1	-	1
Elodea canadensis	-	1	1	-	1	1	Juncus bufonius	-	-	1	-	1	1
Elodea nuttallii	-	1	1	1	1	1	Juncus conglomeratus	-	-	1	-	-	1
Elytrigia repens	-	1	1	1	-	1	Juncus effusus	-	1	1	1	-	1
Epilobium ciliatum	-	-	-	-	-	1	Juncus gerardii	-	-	1	1	-	1
Epilobium hirsutum	-	1	1	1	-	1	Juncus inflexus	-	1	1	1	1	1
Epilobium lanceolatum	-	-	-	-	-	1	Juncus subnodulosus	-	1	1	-	-	-
Epilobium montanum	-	-	1	-	-	-	Lactuca serriola	-	-	-	-	-	1
Epilobium parviflorum	-	-	-	-	-	1	Lactuca virosa	-	-	1	-	-	1
Epilobium tetragonum	1	-	-	-	-	1	Lamium album	-	1	1	-	1	1
Equisetum arvense	-	1	1	1	-	1	Lamium purpureum	-	1	-	1	-	1
Equisetum fluviatile	-	-	1	1	-	1	Lapsana communis	-	-	1	-	-	1
Equisetum palustre	-	1	1	1	-	1	Lathyrus nissolia	-	1	1	-	1	1
Erigeron acris	-	-	1	-	-	1	Lathyrus pratensis	-	1	1	1	-	1
Erodium cicutarium	-	-	-	-	-	1	Lemna gibba	1	1	1	1	-	1
Erophila verna	-	-	-	-	1	-	Lemna minor	-	1	1	1	1	1
Eupatorium cannabinum	-	-	1	1	-	1	Lemna minuta	-	-	-	1	-	1
Euphorbia helioscopia	-	-	-	-	-	1	Lemna trisulca	-	1	1	1	1	1
Euphorbia lathyris	-	-	-	-	-	1	Leontodon saxatilis	-	-	1	-	-	1
Euphorbia peplus	-	-	-	-	-	1	Lepidium coronopus	-	1	-	1	-	1
Fallopia convolvulus	-	1	-	-	1	1	Lepidium didymum	-	-	-	-	-	1
Festuca brevipila	-	-	-	-	-	1	Lepidium draba	-	1	1	1	-	1
Festuca ovina	-	-	-	-	-	1	Lepidium latifolium	-	1	1	1	-	1
Festuca rubra	-	1	1	-	1	1	Leucanthemum vulgare	-	1	1	-	1	1
Ficaria verna	-	1	1	1	1	1	Ligustrum vulgare	-	-	1	-	-	1
Filago vulgaris	-	-	-	-	-	1	Linum catharticum	-	-	-	-	-	1
Filipendula ulmaria	-	1	1	1	-	1	Lolium perenne	-	1	1	1	-	1
Fraxinus excelsior	-	1	1	1	-	1	Lolium x boucheanum	-	-	-	-	-	1
Fumaria officinalis	-	-	-	-	-	1	Lonicera periclymenum	-	-	1	-	-	1
Galega officinalis	-	-	-	-	-	1	Lotus corniculatus	-	1	1	1	1	1
Galeopsis bifida	-	-	-	-	-	1	Lotus pedunculatus	-	-	1	-	-	1
Galium album	-	1	1	-	-	1	Lotus tenuis	-	-	1	-	-	1
Galium aparine	-	1	1	1	-	1	Lycopus europaeus	1	1	1	1	-	1
Galium palustre	-	1	1	1	-	1	Lysimachia nummularia	1	1	1	1	1	1
Geranium dissectum	-	1	1	-	1	1	Lysimachia vulgaris	-	-	1	-	-	1
Geranium lucidum	-	-	-	-	-	1	Lythrum salicaria	-	1	1	1	1	1
Geranium molle	-	1	-	-	-	1	Malus pumila	-	1	-	-	-	1
Geranium pusillum	-	-	-	-	1	1	Malus x purpurea	-	-	-	-	-	1
Geranium robertianum	-	-	-	-	-	1	Malva moschata	1	-	-	-	-	1
Geranium rotundifolium	-	-	-	-	-	1	Malva neglecta	-	-	-	-	-	1
Geum urbanum	-	-	1	1	-	1	Malva sylvestris	-	-	-	1	-	1
Glechoma hederacea	-	1	1	1	1	1	Matricaria chamomilla	-	1	1	1	-	1
Glyceria declinata	-	-	-	-	-	1	Matricaria discoidea	-	1	1	1	-	1
Glyceria fluitans	-	1	1	-	-	1	Medicago arabica	-	1	1	1	-	1
Glyceria maxima	-	1	1	1	-	1	Medicago lupulina	-	1	1	1	-	1
Glyceria notata	-	-	-	1	-	-	Melilotus officinalis	-	-	1	-	-	-
Gnaphalium uliginosum	-	-	-	-	-	1	Mentha aquatica	-	1	1	1	1	1
Hedera helix	-	1	1	1	-	1	Menyanthes trifoliata	1	1	1	-	-	-
Helminthotheca echioides	-	1	1	1	-	1	Mercurialis annua	-	-	-	-	-	1
Heracleum sphondylium	-	1	1	1	-	1	Moenchia erecta	-	-	-	-	-	1

Myosotis arvensis	-	-	-	-	-	1	Pulicaria dysenterica	-	1	1	1	-	1
Myosotis laxa	-	1	1	1	-	1	Pyracantha rogersiana	-	-	-	-	-	1
Myosotis scorpioides	1	1	1	1	1	1	Pyrus communis	-	-	-	-	-	1
Myosoton aquaticum	-	-	-	1	-	1	Quercus ilex	-	-	-	-	1	1
Myriophyllum aquaticum	-	-	-	-	-	1	Quercus robur	-	1	1	1	1	1
Myriophyllum spicatum	1	1	-	-	-	1	Ranunculus acris	-	1	1	1	-	1
Myriophyllum verticillatum	-	-	1	1	-	1	Ranunculus aquatilis	-	-	-	-	-	1
Nasturtium microphyllum	-	-	1	-	-	-	Ranunculus circinatus	1	1	1	1	-	1
Nasturtium officinale	-	1	-	1	1	1	Ranunculus flammula	-	-	1	-	-	1
Nuphar lutea	-	-	1	1	-	1	Ranunculus lingua	1	1	1	-	-	-
Nymphaea alba	1	-	1	1	-	1	Ranunculus repens	-	1	1	1	-	1
Oenanthe aquatica	1	-	1	-	-	1	Ranunculus sardous	1	1	1	-	1	1
Oenanthe crocata	-	1	1	1	-	1	Ranunculus sceleratus	-	1	1	1	-	1
Oenanthe fistulosa	1	1	1	1	-	1	Ranunculus trichophyllus	-	-	-	-	-	1
Oenanthe fluviatilis	1	-	-	-	-	-	Raphanus raphanistrum	-	-	1	-	-	-
Onopordum acanthium	-	-	-	-	-	1	Reseda luteola	-	-	1	-	-	1
Ophioglossum vulgatum	-	-	-	-	-	1	Ribes nigrum	-	-	1	-	-	1
Papaver argemone	1	-	-	-	-	-	Ribes rubrum	-	1	-	-	-	1
Papaver dubium	-	-	-	-	-	1	Rorippa amphibia	-	-	-	-	-	1
Papaver rhoeas	-	1	-	-	1	1	Rorippa palustris	-	1	1	-	-	1
Papaver somniferum	-	-	-	-	-	1	Rorippa sylvestris	1	-	-	-	-	-
Pastinaca sativa	-	-	1	-	-	-	Rosa arvensis	-	-	-	-	-	1
Persicaria amphibia	-	1	1	1	1	1	Rosa canina	-	-	-	-	-	1
Persicaria hydropiper	-	1	1	-	1	1	Rosa canina agg.	-	1	1	1	1	1
Persicaria lapathifolia	-	1	1	-	-	1	Rubus caesius	-	-	-	-	-	1
Persicaria maculosa	-	1	1	1	1	1	Rubus fruticosus agg.	-	1	1	1	-	1
Petroselinum segetum	-	-	1	-	-	1	Rubus laciniatus	-	-	-	-	-	1
Phalaris arundinacea	-	1	1	1	-	1	Rumex acetosa	-	1	1	1	-	1
Phalaris canariensis	-	-	-	-	-	1	Rumex acetosella	-	-	1	-	-	-
Phleum bertolonii	-	-	-	-	1	1	Rumex conglomeratus	-	1	1	1	-	1
Phleum pratense	-	1	1	-	-	1	Rumex crispus	-	1	1	1	-	1
Phragmites australis	-	1	1	1	1	1	Rumex hydrolapathum	-	1	1	1	1	1
Picris hieracioides	-	-	-	-	-	1	Rumex obtusifolius	-	1	1	1	-	1
Pilosella officinarum	-	1	-	1	1	1	Rumex sanguineus	-	1	1	1	-	1
Pinus nigra	-	-	1	-	-	-	Sagittaria sagittifolia	-	-	-	-	1	1
Pinus sylvestris	-	-	1	-	-	1	Salix alba	-	1	1	1	-	1
Plantago coronopus	-	-	-	-	-	1	Salix atrocinerea	-	1	1	1	-	1
Plantago lanceolata	-	1	1	1	-	1	Salix caprea	-	-	1	-	1	1
Plantago major	-	1	1	1	-	1	Salix purpurea	-	-	-	1	-	1
Poa annua	-	1	1	1	-	1	Salix triandra	-	-	-	-	-	1
Poa humilis	-	-	-	-	-	1	Salix viminalis	-	1	-	1	1	1
Poa infirma	-	-	-	-	-	1	Salix x fragilis	-	1	1	1	-	1
Poa nemoralis	-	-	-	-	-	1	Salix x holosericea	-	-	-	-	-	1
Poa pratensis	-	1	-	-	-	1	Salix x mollissima	-	-	-	-	-	1
Poa trivialis	-	1	1	1	-	1	Salix x reichardtii	-	-	-	-	-	1
Polygonum arenastrum	-	1	-	1	-	1	Sambucus nigra	-	1	1	1	-	1
Polygonum aviculare	-	1	1	-	1	1	Samolus valerandi	-	-	1	1	1	1
Polypogon monspeliensis	-	-	-	-	1	-	Schedonorus arundinaceus	-	1	-	1	-	1
Populus x canadensis	-	-	1	-	-	1	Schedonorus giganteus	-	-	-	-	-	1
Potamogeton acutifolius	1	1	1	1	-	1	Schoenoplectus tabernaemontani	1	1	1	1	-	1
Potamogeton berchtoldii	-	-	1	-	1	1	Scorzoneroideis autumnalis	-	1	-	1	-	1
Potamogeton coloratus	-	-	-	-	-	1	Scrophularia auriculata	-	1	1	1	-	1
Potamogeton crispus	-	-	1	1	-	-	Scrophularia nodosa	-	-	1	-	-	-
Potamogeton friesii	-	1	1	1	-	1	Scutellaria galericulata	1	1	1	-	-	1
Potamogeton lucens	-	1	1	1	1	1	Senecio aquaticus	-	-	1	-	-	1
Potamogeton natans	-	1	1	1	-	1	Senecio erucifolius	-	1	1	1	-	1
Potamogeton pectinatus	1	1	1	1	-	1	Senecio jacobaea	-	1	1	1	-	1
Potamogeton perfoliatus	1	-	-	-	-	-	Senecio squalidus	-	1	1	-	-	1
Potamogeton pusillus	1	-	-	1	1	1	Senecio viscosus	-	-	1	-	-	-
Potamogeton trichoides	-	-	-	1	-	-	Senecio vulgaris	-	-	1	-	-	1
Potentilla anserina	-	1	1	-	-	1	Silaum silaus	-	-	-	-	-	1
Potentilla reptans	-	1	1	1	-	1	Silene dioica	-	1	1	-	1	1
Prunella vulgaris	-	1	1	-	-	1	Silene flos-cuculi	-	1	1	1	-	1
Prunus avium	-	-	-	-	-	1	Silene latifolia	-	-	1	-	-	1
Prunus cerasifera	-	-	-	-	-	1	Silene vulgaris	-	-	1	-	-	-
Prunus domestica	-	-	-	-	-	1	Silene x hampeana	-	-	-	-	-	1
Prunus spinosa	-	1	1	1	-	1	Sison amomum	-	1	-	-	1	1

Sisymbrium officinale	-	1	-	1	-	1
Smyrnum olusatrum	-	-	-	-	1	1
Solanum dulcamara	-	1	1	1	-	1
Solanum lycopersicum	-	-	-	-	-	1
Solanum nigrum	-	-	-	-	-	1
Solanum tuberosum	-	-	-	-	-	1
Solidago canadensis	-	-	1	-	-	-
Solidago virgaurea	-	-	1	-	-	1
Sonchus arvensis	-	1	1	1	-	1
Sonchus asper	-	1	1	1	-	1
Sonchus oleraceus	-	1	1	1	-	1
Sonchus palustris	-	-	-	1	-	1
Sorbus aucuparia	-	-	-	-	-	1
Sparganium emersum	-	-	1	1	1	1
Sparganium erectum	-	1	1	1	1	1
Spergularia marina	-	-	1	-	-	-
Spergularia rubra	-	-	-	-	-	1
Spiranthes spiralis	-	-	-	-	-	1
Spirodela polyrhiza	1	1	-	1	-	1
Stachys palustris	-	1	1	-	-	1
Stachys sylvatica	-	-	1	-	-	1
Stellaria graminea	-	-	1	-	-	-
Stellaria holostea	-	1	1	1	1	1
Stellaria media	-	1	1	1	1	1
Stellaria palustris	-	1	1	-	-	-
Symphytum officinale	1	-	-	-	-	-
Symphytum orientale	-	-	-	-	-	1
Symphytum x uplandicum	-	-	-	1	-	1
Taraxacum officinale agg.	-	-	1	1	1	1
Taraxacum pseudohamatum	-	-	-	-	-	1
Taraxacum pulchrifolium	-	-	-	-	-	1
Taxus baccata	-	-	-	-	-	1
Thalictrum flavum	-	1	1	-	-	1
Thlaspi arvense	-	-	-	1	-	1
Thymus polytrichus	-	-	1	-	-	-
Torilis japonica	-	1	1	1	-	1
Tragopogon pratensis	-	1	1	-	1	1
Trifolium arvense	-	-	1	-	-	1

Trifolium campestre	-	-	-	-	-	1
Trifolium dubium	-	1	1	1	-	1
Trifolium fragiferum	-	-	1	-	1	1
Trifolium micranthum	-	1	-	-	1	1
Trifolium pratense	-	1	1	1	-	1
Trifolium repens	-	1	1	1	-	1
Trifolium scabrum	-	-	-	-	-	1
Triglochin palustris	1	1	1	-	-	-
Tripleurospermum inodorum	-	1	1	1	-	1
Trisetum flavescens	-	1	1	-	1	1
Triticum aestivum	-	-	-	-	-	1
Tussilago farfara	-	1	1	1	-	1
Typha angustifolia	-	1	1	1	-	1
Typha latifolia	-	1	1	1	-	1
Typha x glauca	-	-	-	-	-	1
Ulmus minor	-	1	1	1	-	1
Ulmus procera	-	-	-	-	-	1
Urtica dioica	-	1	1	1	-	1
Urtica galeopsifolia	-	-	-	-	-	1
Utricularia vulgaris	1	1	1	1	1	1
Valeriana officinalis	1	1	1	-	-	1
Veronica anagallis-aquatica	-	-	1	1	-	-
Veronica arvensis	-	-	-	-	-	1
Veronica catenata	-	1	1	1	-	1
Veronica chamaedrys	-	1	1	-	-	1
Veronica persica	-	1	1	-	1	1
Veronica scutellata	-	-	-	1	-	1
Viburnum opulus	-	-	1	-	-	1
Vicia cracca	-	1	1	-	1	1
Vicia hirsuta	-	-	1	-	-	1
Vicia sativa	-	1	1	-	1	1
Vicia tetrasperma	-	-	-	-	1	1
Vinca minor	-	-	-	-	-	1
Vitis vinifera	-	-	1	-	-	1
Vulpia bromoides	-	1	-	-	1	1
Vulpia myuros	-	1	-	-	-	1
Wolffia arrhiza	1	1	1	-	-	-
Zannichellia palustris	1	-	-	1	1	1

Analysis of change

Some 40 species appear to have been lost from Stodmarsh since recording began, about 200 years ago. They can be grouped into various habitat types.

Four species of coastal and maritime habitats appear to have been lost: *Aster tripolium* and *Polypogon monspeliensis* were probably casuals along the river bank, possibly brought in by a flood or by birds. *Spergularia marina* was on the Lampen Wall, and possibly it arrived with spoil. *Carex distans*, however, was on the edge of ditches in an area that has now been converted to reedbed, and it is likely that a long-established native was lost here.

Two calcicoles were also recorded on the Lampen Wall: *Atropa belladonna* and *Thymus polytrichus*. These were probably both casuals, essentially, and have little ecological importance, even though these species are important in their own habitat.

Ten species are perhaps best described as casuals and weeds: *Azolla filiculoides* is an alien plant of ponds and rivers. It is not very tolerant of cold weather, so this might be why it has gone. The others are all plants of bare or disturbed ground: *Cardamine hirsuta*, *Erophila verna*, *Hesperis matronalis*, *Melilotus officinalis*, *Pastinaca sativa*, *Raphanus raphanistrum*, *Senecio viscosus*, *Silene vulgaris* and *Solidago canadensis*. Some of these might still be present, or might reappear.

Two riverine plants seem to have gone. *Barbarea vulgaris* is typical of muddy river margins and I would not be at all surprised if it turned up again. *Oenanthe fluviatilis* is a bigger loss: it has probably gone because of excessive dredging of the Gt Stour, but it could return if a more natural profile to the river could be restored.

A few woodland plants have been recorded in the past but do not appear to be still present. The loss of *Carex pendula* is a relief, as it can be very invasive in habitats that suit it. *Epilobium montanum* and *Scrophularia nodosa* are common woodland plants, which would seem somewhat out of place at Stodmarsh, although they could turn up on the colliery tip.

A very interesting group of lost plants are those which are most typical of acid wetlands. *Comarum palustre*, *Menyanthes trifoliata* and *Triglochin palustris* are not plants that anyone would record casually. The records might well all date back to the 19th century, though, and the precise location of these plants is unknown. It is difficult to draw any conclusions about them unless further information emerges.

Only one calcareous wetland plant appears to have been lost: *Juncus subnodulosus*, and there are no properly localized records of it. It does, however, occur along a ditch at the nearby Preston Marshes so I believe it might have been present. If it was only along one ditch, it might be another species that has been lost to reedbeds.

Miscellaneous (neutral) wetland plants make up possibly the largest group of losses. It is quite likely that identification and recording effort play a part in this list. *Glyceria notata*, *Nasturtium microphyllum*, *Potamogeton trichoides* and *Rorippa sylvestris* are not easy to spot and can be misidentified. The others hint at losses due to under-management. I have searched for *Stellaria palustris* and *Ranunculus lingua* in the places they were last recorded and both locations are very overgrown. *Veronica anagallis-aquatica* still occurs along the Little Stour, where conventional farming maintains a very open riverbank. *Potamogeton crispus*, *P. perfoliatus* and *Wolffia arrhiza* are also plants that we might find in places with full sunlight. All of these therefore might have been lost as a result of succession to reedbed and scrub.

Pinus nigra was doubtless planted. *Rumex acetosella* is an acid grassland plant that could easily turn up on dry patches in fields, or on the Lampen Wall. *Stellaria graminea* is a plant of neutral grassland which I have not found yet, but could easily have been overlooked.

Overall, the main losses at Stodmarsh are wetland plants of high light levels, lost largely because of the succession to reedbed. However, the apparent gains enormously outnumber them, so it is difficult to conclude that the site is deteriorating. Perhaps the best conclusion is that there should be no more conversion of fields to reedbed, and that grazing levels should be kept reasonably high, especially along the ditches. If these fields and ditches are over a thousand years old, and retain species that could probably not be replaced, this would seem a sensible approach.

Assessment of conservation status

There are various ways of assessing the conservation status of a site, but there is no one method that is widely accepted or particularly convincing. The Ratcliffe Criteria (Ratcliffe, 1977) provide a philosophical basis for site selection but not a practical process. The key elements of the Criteria are rarity, diversity, naturalness and age, and these concepts are widely accepted as fundamental parts of any conservation assessment, although they can be difficult to evaluate empirically.

Rarity

In the past rarity was the most widely used criterion for the selection of important sites. This is obviously useful if a species or habitat is globally restricted, but that rarely applies in Britain. Being rare within the British Isles often means simply that the species is on the edge of its range, and it might be common elsewhere and of no real consequence. Because of this one needs to take a wider view than simply counting rare species.

Stodmarsh has one plant that is nationally rare, *Potamogeton acutifolius*, and this is actually a species with a well-deserved status. Pondweeds are well represented in the British flora, and they are of some importance. Four more species are nationally scarce: *Lepidium latifolium*, *Myriophyllum verticillatum*, *Potamogeton coloratus*, and *Sonchus palustris*, and there are four more that have apparently been lost: *Carex divisa*, *Polypogon monspeliensis*, *Potamogeton trichoides* and *Wolffia arrhiza*. These are all wetland plants, typical of ditches, swamps, reedbeds and saltmarsh.

The vegetation at Stodmarsh also has a claim to rarity. There is no information on the distribution of *Hordeum secalinum* swards, but it seems reasonable to assume that they are not widespread. The S19 *Eleocharis palustris* vegetation and A3 *Hydrocharis morsus-ranae* ditches are also uncommon, but again difficult to quantify, owing to the lack of a national register.

Diversity and Naturalness

Diversity alone is clearly a pointless measure of conservation value. However good a site is, one could always increase its diversity by planting something inappropriate in it, and this shows that diversity itself is not the important issue. However, the diversity of a natural community can be important, and the best way of measuring that is by counting axiophytes. These are the species that tend to be restricted to habitats that have been deemed valuable for conservation purposes. Assuming that the habitats and species have been chosen well, a reasonable approximation of the value of site can be obtained simply by counting the number of axiophytes present. Losses and gains can then be used to assess change.

A total of 82 species of axiophytes have been recorded at Stodmarsh, which is well over the recommended minimum of 30 for a SSSI. This large total would make it one of the top sites in any county. Some 13 or 14 of these species appear to have been lost, leaving 69 still present. Owing to the varying levels of recording, it is difficult to assess which species may have arrived. It seems likely that a few axiophytes have only turned up recently, but the great majority must have been there for centuries.

Therefore there is some indication of deterioration at Stodmarsh. Dredging of the river has eliminated *Oenanthe fluviatilis*, but that is not within the NNR. The rest (and there is some uncertainty about whether they really were all present within the NNR) can be treated as genuine losses: *Carex distans*, *Comarum palustre*, *Juncus subnodulosus*, *Menyanthes trifoliata*, *Potamogeton perfoliatus*, *Potamogeton trichoides*, *Ranunculus lingua*, *Stellaria palustris*, *Triglochin palustris*, *Veronica anagallis-aquatica*, *Wolffia arrhiza* and possibly *Ceratophyllum submersum*.

These are all wetland plants, some of which are distinctly coastal ones (*Carex distans*, *Ranunculus lingua*, *Wolffia arrhiza* and *Ceratophyllum submersum*). The rest are from a variety of wetland habitats, from acid to calcareous and from grassland to reedbed to open ditches. There is no obvious trend to discern from these losses, except that some open, wet habitat has been lost, either to drainage or to shade from scrub or reeds.

It is therefore reasonable to conclude that the wetlands are the important feature of Stodmarsh, notably ditches, grazing marsh and swamps. For these features it is a nationally important site and, in a local context, one of the highest-ranking SSSIs in the county. There is some evidence of the loss of wetland species over the last few decades, but possibly not more than would be expected with a normal rate of turnover of species.

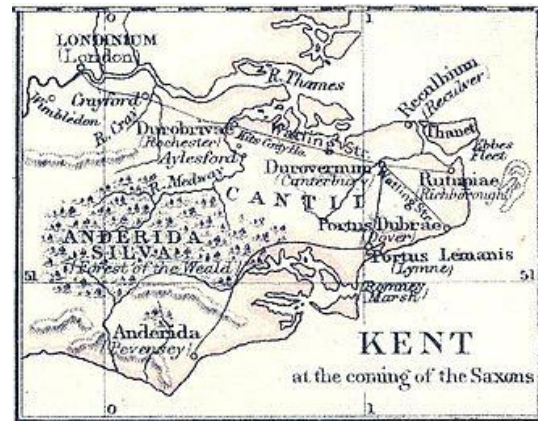
Age

The origin of the vegetation at Stodmarsh can only be surmised from the records, which date back no more than 200 years, and from its current appearance. In many parts of England, for example, an ancient meadow might be

characterised by a ridge-and-furrow pattern, which indicates that it was actually an arable field in the Middle Ages, and it can therefore be seen that as a grassland it is no more than 500 or so years old.

At Stodmarsh, the best clue to the age of the habitat is the coastal nature of the vegetation. The fields resemble those in coastal areas such as those at Graveney Marshes. It is possible that the saline influence at Stodmarsh is relatively recent – for example, introduced during the 1953 flood. But this seems unlikely. The saline element was clearly recorded well before this time, both at Stodmarsh specifically and in nearby sites such as Preston Marshes, Stourmouth and Minster Marshes. Other sites in the area tend to be agriculturally improved, as the reclaimed saltmarshes make for good farmland.

So, assuming an ancient origin of the grazing marshes at Stodmarsh, the most likely time for their establishment is about the time when the Wantsum Channel silted up. In Roman times, this was a deep channel of the sea, and ships would use it in preference to sailing around the Isle of Thanet. In places it was over a mile wide. At this time Stodmarsh was on the shore and it is reasonable to conclude that it could have been intertidal saltmarsh.



Eventually the Wantsum Channel silted up. Despite a small amount of sea level rise since that time, the silt brought down by the rivers filled the channel and raised the level to the point where it could be protected from flooding. This apparently happened around 1,000 years ago. Stodmarsh, at the highest point of the channel, would have been one of the first areas that could have been protected from the sea. This dates the vegetation to about 1,000 – 1,300 years ago, which is interesting because that would make these fields some of the oldest in the country, assuming that they have not been ploughed or significantly changed in the interim.

- Maps showing the silting up of the Wantsum Channel. The top one is a projection of what the coastline is thought to have been like at the end of the Roman era (c. 400 AD). The lower map, from the British Library, dates from about 1548 and shows the Stour as a river rather than an estuary (note that on this map north is to the bottom). Stodmarsh would have changed from a coastal site to an inland one at some time between these dates.



Summary

In the past there have been various different assessments of the value of the NNR. In the 1980s a lot of attention was paid to the orchids on the spoil heap, and surveyors used to count them each year. There was also a perception that the lakes were the most important feature because migratory birds would be seen there. This is understandable if you see many birdwatchers rushing to a site to see some rarity, but in reality that is not something that could or should be the focus of the management. Finally, there are descriptions of Stodmarsh as the most extensive reedbed in the south-east, and the reedbed does have some rarities such as bitterns. But reedbed is a relatively simple habitat that can be created almost anywhere. It seems a shame to destroy meadows and ditches that contain hundreds of other species, and which are many hundreds of years old, in order to get a habitat that can be created in any flooded field or gravel pit.

Overall, therefore, it seems that Stodmarsh is primarily of importance for its unimproved grazing marshes, consisting of wet fields of *Hordeum secalinum* grassland and *Eleocharis palustris* swamp, and the drainage ditches between them. This is the habitat of greatest value, although it is difficult to put in context because there is no data on the extent of it elsewhere. Hopefully the current report can help to draw attention to these interesting vegetation communities, and we can find out just how rare they are.

Acknowledgements

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The maps in this report were drawn using the BSBI's Distribution Database, <http://bsbidb.org.uk/>.

The following people have made records at Stodmarsh and generously made them available:

Recorder	No. of records				
Armishaw, J.	1	Grant, D.	1	Osborne, Mr C.	26
Banks, Mr B.	282	Hanbury, Mr F.J.	26	Philp, Mr E.G.	400
Bartlett, Rev T.H.M.	5	Heathcote, Mr P.	3	Pitt, Mrs J.	17
Bevan, Mr J.	45	Kenrick, Miss	2	Reeves, Mr W.W.	1
Booth, Mr F.	12	Kileen, Mr I.J.	36	Rich, Dr T.C.G.	4
Buckingham, Mrs S.	313	Kitchener, Mr G.D.	148	Rooney, Mr L.	210
Dowker, Mr G.	1	Lemon, Mr S.	142	Sankey, Miss	2
Dyson, Mr C.	36	Lockton, Mr A.J.	1725	Stewart, Mr N.F.	1
Elder, Ms V.	282	Marshall, Rev E.S.	1	Stewart, R.J.	1
Gay, Mr A.	82	Masters, Mr W.	6	Strange, Mr W.	6
Glading, Dr P.	89	Mills, Ms D.	13	Warman, L.	1
		Mobarak, Miss J.	1385	Williams, Mr P.	282

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Appendix 1: phytosociological data

Hordeum secalinum grassland

Table 1 lists the quadrats recorded in *Hordeum secalinum* vegetation.

- Q1053 compartment 23 TR23266214, 9th August 2014: typical but rather species-poor grassland.
- Q1054 compartment 22 TR23216234, 9th August 2014: very fine, wet *Hordeum* grassland.
- Q1071 compartment 22 TR23206231, 28th July 2016: typical grassland.
- Q1074 compartment 15D TR22686209, 4th August 2016: this is close to MG6 *Cynosurus cristatus* grassland, but retaining some features of *H. secalinum* grassland.
- Q1075 compartment 49 TR24066267, 13th August 2016: this is an example of a sward that is turning into MG5a *Festuca rubra* grassland, although it is still intermediate.
- Q1077 compartment 23 TR23336224, 31st July 2015: species-poor but typical grassland.

Table 1: *Hordeum secalinum*-*Agrostis stolonifera* grassland quadrats

	Q1053	Q1054	Q1071	Q1074	Q1075	Q1077
<i>Hordeum secalinum</i>	7	4	9	5	6	5
<i>Agrostis stolonifera</i>	5	8	6	7	8	8
<i>Lotus corniculatus</i>	8	-	-	-	2	-
<i>Cynosurus cristatus</i>	-	-	-	6	3	-
<i>Lolium perenne</i>	6	-	-	2	6	3
<i>Ranunculus acris</i>	6	1	1	-	2	-
<i>Juncus inflexus</i>	-	4	4	1	5	4
<i>Lotus tenuis</i>	-	2	5	5	5	4
<i>Medicago lupulina</i>	5	-	-	-	3	-
<i>Potentilla anserina</i>	-	5	-	4	-	-
<i>Ranunculus sardous</i>	-	5	-	-	-	4
<i>Trifolium fragiferum</i>	5	4	5	5	3	5
<i>Alopecurus geniculatus</i>	-	4	-	-	-	-
<i>Alopecurus pratensis</i>	-	4	4	-	-	-
<i>Carex disticha</i>	-	4	-	-	-	-
<i>Juncus effusus</i>	-	1	4	-	-	-
<i>Leontodon saxatilis</i>	-	-	1	-	3	4
<i>Phragmites australis</i>	-	4	-	-	-	-
<i>Trifolium pratense</i>	4	-	-	2	4	-
<i>Trifolium repens</i>	4	1	4	-	-	2
<i>Cerastium fontanum</i>	-	-	-	-	3	-
<i>Dactylis glomerata</i>	-	-	-	3	-	-
<i>Eleocharis palustris</i>	-	3	-	-	-	-
<i>Elytrigia repens</i>	-	3	2	1	-	3
<i>Festuca rubra</i>	-	-	2	-	3	-
<i>Holcus lanatus</i>	-	-	-	-	3	-
<i>Phleum bertolonii</i>	-	-	-	-	3	-
<i>Phleum pratense</i>	-	-	-	3	-	-
<i>Poa pratensis</i>	-	-	3	-	-	-
<i>Carex flacca</i>	-	-	-	-	2	-
<i>Cirsium arvense</i>	2	-	-	1	2	-
<i>Crataegus monogyna</i>	-	-	-	-	2	-
<i>Helminthotheca echioides</i>	-	-	-	-	2	-
<i>Juncus articulatus</i>	-	2	-	-	-	-
<i>Persicaria amphibia</i>	2	-	-	-	-	-
<i>Plantago lanceolata</i>	-	-	-	1	2	-
<i>Poa trivialis</i>	2	-	-	-	-	-
<i>Prunella vulgaris</i>	1	-	-	2	2	-
<i>Pulicaria dysenterica</i>	-	2	2	1	1	-
<i>Ranunculus repens</i>	-	-	-	-	2	-
<i>Rumex crispus</i>	-	2	-	-	-	-
<i>Senecio erucifolius</i>	-	-	-	-	2	-
<i>Agrimonia eupatoria</i>	-	-	-	-	1	-
<i>Bellis perennis</i>	1	-	-	-	-	-

Carex otrubae	-	1	-	1	1	-
Plantago major	-	-	-	1	-	-
Rumex acetosa	-	-	-	1	-	-
Rumex conglomeratus	-	-	-	1	-	-
Taraxacum officinale agg.	-	-	-	-	1	-

S19 *Eleocharis palustris* swamps

Table 2 lists the quadrats in the S19 *Eleocharis palustris* vegetation:

- Q1055 compartment 18a, TR22876235, 12th August 2014: a wet hollow with a typical, rather species-poor *Eleocharis* swamp.
- Q1072 compartment 15a, TR22386209, 5th August 2016: on the edge of a shallow depression of hard, dry mud at the time of survey. This area looked like grassland rather than swamp but, although some people think there should be an *Agrostis-Eleocharis* grassland, to me it seems to fit well within the S19c *Agrostis stolonifera* subcommunity.
- Q1073, compartment 59, TR24026260, 13th August 2016: a wet hollow in a wet field of sedge swamp and marshy grassland. This is a fine example of the community with rare plants like *Baldellia* and *Alisma lanceolatum*.
- Q1076, compartment 57, TR23956242, 13th August 2016: the best example I have found of this community. Note the presence of brackish plants such as *Carex divisa* and the rarity *Potamogeton coloratus*.
- Q1078, compartment 45, TR23476278, 4th September 2016: a rather plain example of this community in the heavily goose-grazed margin of a shallow lake.
- Q1079, compartment 15E, TR22606196, 4th September 2016: a swamp filled with flowering-rush in a muddy hollow in a drying field. This quadrat hints at a relationship between the *Eleocharis* swamps and the *Butomus* swamp, if it counts as distinctive.

Table 2: S19 *Eleocharis palustris* quadrats

	Q1055	Q1072	Q1073	Q1076	Q1078	Q1079
<i>Eleocharis palustris</i>	9	6	10	10	9	8
<i>Agrostis stolonifera</i>	3	10	2	3	-	3
<i>Crassula helmsii</i>	4	3	4	-	8	-
<i>Juncus articulatus</i>	-	5	3	7	4	-
<i>Chara vulgaris</i>	-	-	-	4	5	-
<i>Mentha aquatica</i>	5	4	-	-	-	-
<i>Veronica catenata</i>	-	-	4	-	-	5
<i>Juncus inflexus</i>	-	4	-	4	-	-
<i>Butomus umbellatus</i>	-	-	-	-	-	7
<i>Galium palustre</i>	3	-	1	3	-	-
<i>Hippuris vulgaris</i>	1	3	-	-	3	-
<i>Baldellia ranunculoides</i>	-	-	2	4	-	-
<i>Carex divisa</i>	-	-	-	6	-	-
<i>Chenopodium rubrum</i>	-	-	-	-	-	6
<i>Alisma plantago-aquatica</i>	-	-	-	-	4	1
<i>Hydrocharis morsus-ranae</i>	-	-	-	-	5	-
<i>Elodea nuttallii</i>	-	-	-	-	4	-
<i>Glyceria maxima</i>	4	-	-	-	-	-
<i>Pericaria amphibia</i>	4	-	-	-	-	-
<i>Phragmites australis</i>	-	-	-	-	4	-
<i>Potamogeton coloratus</i>	-	-	-	4	-	-
<i>Ranunculus sardous</i>	-	-	1	2	-	-
<i>Rumex conglomeratus</i>	-	2	-	1	-	-
<i>Alisma lanceolatum</i>	-	-	2	-	-	-
<i>Atriplex patula</i>	-	-	-	-	-	2
<i>Bolboschoenus maritimus</i>	-	-	-	-	-	2
<i>Carex hirta</i>	-	-	-	2	-	-
<i>Carex otrubae</i>	-	1	-	1	-	-
<i>Pericaria maculosa</i>	-	-	-	-	-	2
<i>Potentilla anserina</i>	2	-	-	-	-	-

<i>Typha angustifolia</i>	-	-	-	-	-	2
<i>Epilobium hirsutum</i>	-	1	-	-	-	-
<i>Epilobium parviflorum</i>	-	1	-	-	-	-
<i>Juncus bufonius</i>	-	-	-	-	-	1
<i>Persicaria lapathifolia</i>	-	-	-	-	-	1
<i>Ranunculus sceleratus</i>	-	-	-	-	-	1
<i>Rumex crispus</i>	1	-	-	-	-	-
<i>Veronica scutellata</i>	-	-	1	-	-	-

W5 *Alnus glutinosa* and W6 *Salix x fragilis* woodland

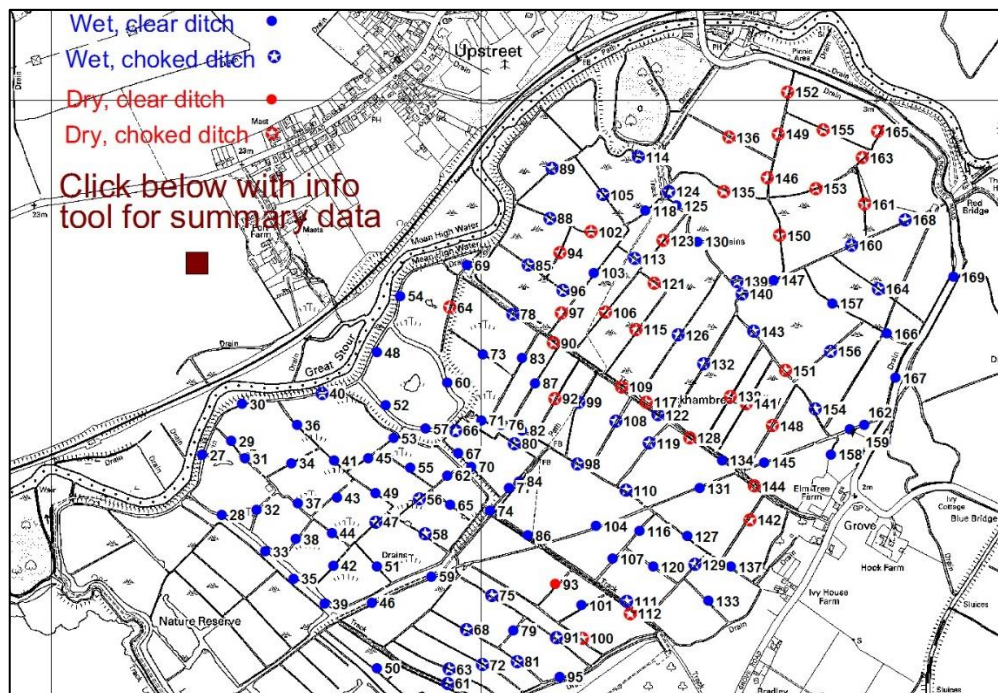
- Q1033 compartment 2, TR22216088, 25th July 2013. This is an example of where the woodland is closer to W6 than to W5. The willows, nettles and willowherbs particularly point to this, although the yellow loosestrife in particular is more a W5 plant.
- Q1044, riverbank by compartment 32, TR23056279, 23rd May 2014. Typical W6 woodland by the river, with only *Lepidium latifolium* to give it a regional difference.
- Q1062, close to Q1044, TR23026289, 11th August 2015. The abundance of nettle tends to increase in the summer, and this is an extreme example of eutrophic woodland.
- Q1064, compartment 2, TR22246102, 20th May 2016. Alder and willow carr with an understorey of sedges. Closer to W5 than to W6, but hardly typical.
- Q1065, similar to Q1064, TR22246102, 20th May 2016. Similar to the above, but with white willow in the canopy.
- Q1066, compartment 14G, TR22356117, 20th May 2016. This is grey willow woodland with an understorey of reed sweetgrass. Rather like W1 woodland, but arguably within the range of variability of the W5/W6 continuum.
- Q1067, compartment 14G, TR22346113, 20th May 2016. This is the closest stand to good W5, with characteristic species such as fen nettle.
- Q1080, riverbank by compartment 32, TR23026283, 20th April 2016. W6 woodland by the river.

	Q1033	Q1044	Q1062	Q1064	Q1065	Q1066	Q1067	Q1080
<i>Salix x fragilis</i>	7	7	9	5	4	-	4	5
<i>Urtica dioica</i>	4	4	10	2	3	-	2	6
<i>Alnus glutinosa</i>	6	-	-	5	6	1	9	-
<i>Carex riparia</i>	7	-	-	4	2	-	9	-
<i>Iris pseudacorus</i>	4	-	-	4	4	3	5	2
<i>Salix atrocinerea</i>	4	-	-	4	4	9	-	-
<i>Crataegus monogyna</i>	-	4	1	4	5	-	1	4
<i>Glyceria maxima</i>	-	4	-	-	-	8	4	-
<i>Solanum dulcamara</i>	3	3	-	3	1	3	3	-
<i>Oenanthe crocata</i>	-	5	4	-	-	-	1	5
<i>Filipendula ulmaria</i>	5	-	-	2	5	-	-	2
<i>Epilobium hirsutum</i>	4	4	-	2	-	-	2	-
<i>Salix alba</i>	5	-	-	-	7	-	-	-
<i>Phalaris arundinacea</i>	7	-	-	-	3	-	-	-
<i>Phragmites australis</i>	-	7	3	-	-	-	-	-
<i>Lemna minuta</i>	-	-	-	-	-	6	3	-
<i>Populus x canadensis</i>	-	-	-	4	5	-	-	-
<i>Buddleja davidii</i>	-	-	4	-	-	-	-	4
<i>Carex acutiformis</i>	-	-	-	8	-	-	-	-
<i>Fraxinus excelsior</i>	-	1	-	1	4	-	1	1
<i>Hedera helix</i>	-	-	5	-	-	-	-	3
<i>Ribes nigrum</i>	-	-	-	4	4	-	-	-
<i>Viburnum opulus</i>	-	-	-	4	4	-	-	-
<i>Galium palustre</i>	3	-	-	1	3	-	-	-
<i>Angelica sylvestris</i>	1	-	2	-	-	-	-	2
<i>Equisetum fluviatile</i>	-	-	-	-	-	5	-	-
<i>Lysimachia vulgaris</i>	4	-	-	-	1	-	-	-
<i>Lythrum salicaria</i>	-	-	2	2	-	-	1	-
<i>Poa trivialis</i>	2	-	-	2	1	-	-	-

Quercus robur	-	-	-	-	5	-	-	-
Rosa arvensis	-	-	-	-	4	-	-	1
Acer pseudoplatanus	-	-	4	-	-	-	-	-
Calystegia sepium	-	2	-	-	-	-	2	-
Corylus avellana	-	-	-	-	4	-	-	-
Ficaria verna	-	-	-	-	-	-	-	4
Humulus lupulus	-	-	-	2	1	-	-	1
Lepidium latifolium	-	4	-	-	-	-	-	-
Lysimachia nummularia	-	-	-	-	4	-	-	-
Ribes rubrum	-	-	-	-	2	-	-	2
Sambucus nigra	-	-	4	-	-	-	-	-
Scutellaria galericulata	1	-	-	-	1	-	2	-
Urtica galeopsifolia	-	-	-	-	2	-	2	-
Cardamine pratensis	-	-	-	1	-	-	-	2
Galium aparine	-	-	-	-	-	-	3	-
Juncus effusus	-	-	-	2	-	-	1	-
Ranunculus sceleratus	-	-	-	2	-	-	1	-
Cardamine flexuosa	-	-	-	-	-	-	2	-
Carex remota	-	-	-	-	2	-	-	-
Dipsacus fullonum	-	2	-	-	-	-	-	-
Epilobium parviflorum	-	-	-	-	-	-	2	-
Lycopus europaeus	-	-	-	2	-	-	-	-
Mentha aquatica	-	-	-	-	-	-	2	-
Myosotis scorpioides	1	-	-	1	-	-	-	-
Rumex conglomeratus	-	-	-	2	-	-	-	-
Rumex hydrolapathum	-	-	-	-	-	2	-	-
Stachys palustris	-	-	2	-	-	-	-	-
Berula erecta	1	-	-	-	-	-	-	-
Caltha palustris	-	-	-	-	1	-	-	-
Dryopteris dilatata	-	-	-	-	-	-	1	-
Myosotis laxa	1	-	-	-	-	-	-	-
Ranunculus repens	-	-	-	1	-	-	-	-
Rosa canina agg.	-	-	-	-	-	-	-	1

Appendix 2: compartment and ditch numbers

1: Ditch numbers



2: Compartment numbers

