

Some interesting salt-tolerant plants of roadsides in the Outer Hebrides

Paul A. Smith

S3RI, University of Southampton, Highfield, Southampton, SO17 1BJ, UK. p.a.smith@soton.ac.uk

Abstract

The occurrences of some plants acting as roadside halophytes in the Outer Hebrides are reviewed, and their distributions and ecologies are summarised. Some species which are frequent halophytes in mainland Britain are scarce in this habitat in the Outer Hebrides, and some more unusual species are reported. The occurrence of halophytes as currently known is not strongly related to the traffic flows on the major roads.

Introduction

The Outer Hebrides are well-known for some special plants, particularly those associated with machair habitats and places where the calcareous sands grade into the more acidic peaty moorland. But there are lots of other habitats which are less well recorded. Roadsides, however, tend to be easily accessible, and often the first place that recording starts on a visit, since that is where you park your car! Fieldwork for a new tetrad (2k x 2km square) flora of the Outer Hebrides has been underway since the early 2000's, and this has led to a considerable amount of recording in previously under-visited areas.

Tetrads away from the machair often have their most species-rich habitats along their roadsides. There are numerous factors affecting this richness, including

- nutrient deposition from exhausts;
- more nutrients from when the road was built;
- different habitats;
- road maintenance activities (eg salting)

Most of the existing research on the effect of traffic on roadside vegetation focuses on roads with high traffic flows. Fortunately, the low population density and relative isolation of the Outer Hebrides means that traffic volumes are low even on the busier roads. Therefore effects that are dependent on traffic volumes will tend to be reduced. Salting, however, is less dependent on volumes, although this may still affect risk-based decisions on whether to salt in marginal situations.

Truscott *et al.* (2005) suggest that the enriched part is typically greatest in the 1m nearest the carriageway on busy roads, although with smaller effects on vegetation further away, in extreme cases up to 20m. They also say "Species composition of road verges may be strongly influenced by the time since construction, the presence of a seed bank, propagule supply from adjacent habitats and the initial composition of any seed mix used." So the effects of traffic are often to influence the existing conditions, rather than determining them independently of the characteristics of the roadside.

This paper reviews the occurrences of expected and unexpected roadside species in the Outer Hebrides.

Wide-spread roadside halophytes

There are some common species which are frequent in roadside habitats, but also salt tolerant (Truscott *et al.* 2005, Table 2), so it is not easy to work out which factor is the greatest influence. Salt tolerance is measured using the Ellenberg S (salt) indicator (Hill, Preston & Roy 2004), which ranges from 0 for non-tolerant plants (most species) to 9; 1 is slightly tolerant, and 2 tolerant but not requiring salt. The common salt-tolerant species particularly include *Plantago maritima*, *Agrostis stolonifera*, *Elytrigia repens* and *Festuca rubra* in the Outer Hebrides. The species discussed below are more distinctive in this habitat because they are not widely found away from it.

Puccinellia distans (Reflexed salt-marsh grass)

This is perhaps the commonest species to have taken advantage of the salting of roads, and has spread widely on the road network in mainland Britain (Scott & Davison 1985) and central Europe (Schmidt 1989). But *Puccinellia distans* (Ellenberg S = 4) is not a common species in the Outer Hebrides, although there are scattered records from coastal sites – almost all of the northern ssp *borealis*, in which the lower panicle branches do not bend backwards (as they do in the nominate ssp). Therefore there would be limited opportunities for seed to be carried to the road network. Nonetheless there are two records, both of ssp *borealis*, from the A859 by Stornoway Castle Grounds (NB43B) and the A858 SW of Acha Mòr (NB32J). It will be interesting to see whether seeds of ssp *distans* are carried to the Outer Hebrides by visiting vehicles – it is known that seeds can be carried long distances in this way (Wace 1979, Schmidt 1989).

Spigularia marina and *S. media* (Lesser and Greater sea-spurrey)

Spigularia marina (Ellenberg S = 5) is another species that has seen an extensive spread as a roadside halophyte (eg Braithwaite 2010 documents its spread in Berwickshire). It is relatively inconspicuous, and cannot generally be spotted from a moving car. In the Outer Hebrides it has been recorded in several places along the A858 at Acha Mòr, along the Pentland Road, by the A857 N of Stornoway, in several places by the A859 as it passes through N Harris, and beside the A867 between Clachan and Loch nam Madaidh. It relies on the bare ground right at the road margin for sites for germination, and this is most usually found in the gutter. *S. media* (also Ellenberg S = 5) is a similar salt marsh plant, but with a different life-style – it can be a short-lived perennial, and has heavier seeds which are less easily distributed by passing traffic (Scott & Davison 1982). It has been recorded with *S. marina* on the A859 in N Harris (NB10T) and on the B887 at Bunavoneadar.

Sagina maritima (Sea pearlwort)

This species (Ellenberg S = 4) is a classical roadside halophyte (eg James 2010) – an annual species with small seeds which are easily distributed. It is a common (though under-recorded) species of bare places round coasts in the Outer Hebrides, so there is considerable potential for seeds to be spread by traffic from coastal habitats. Its roadside distribution is similar to that of *Spigularia marina*, though it is less frequently recorded – along the A858 at Acha Mòr, by the A857 N of Stornoway and beside the A867 between Clachan-a-Luib and Loch nam Madaidh.

Cochlearia danica (Danish scurvy-grass)

Cochlearia danica (Ellenberg S = 4) has become very widespread on roadsides in mainland Britain (Leach 2002), where it often forms continuous populations over many miles. But it has not been recorded in this habitat in the Outer Hebrides. This may be related to lower traffic flows, but possibly there is no suitable source of propagules. It will be interesting to see whether it spreads from seed carried by visiting vehicles

Some more unusual roadside plants

Carex maritima (Curved Sedge)

Carex maritima (Ellenberg S = 3) is an unexpected roadside species, but Alison Wilson has had the knack of coming across it regularly on roadsides in Lewis & Harris (Smith & Wilson 2013). The Outer Hebrides are a stronghold for this rare species in native habitats, and there are places in South Harris where these habitats are close to main roads. This seems a likely mechanism for its spread (a propagule supply, Truscott *et al.* 2005) and discussions with the roads department at Comhairle nan Eilean Siar did not suggest any alternative mechanisms. Therefore it does seem to operate as a true roadside halophyte. It is a rhizomatous perennial, but generally not very tolerant of competition, so it takes advantage of the barer places – either growing in the gutters very close to roads, or on gravelly substrates. It is found in N Harris where widening of the A859 to two lanes took place in 2005-6, on the verges which are as yet sparsely vegetated (Fig. A).

Along the A857 N of Stornoway there are two records, but it is noticeable that these are at the low points in the road, where the water drains. The combination of draining road salt at some times of the year and draining fresh (rain) water presumably mimic the characteristic habitat for *Carex maritima* of fresh water draining through coastal sand.

Juncus balticus (Baltic Rush)

J. balticus (Ellenberg S = 1) is one of the special species of damp areas in nice machair habitats. But it also, less frequently, occurs inland. It has escaped to roadside habitats in the Outer Hebrides along quite a number of roads, and its characteristic very dark green can easily be spotted from a moving car. It is a rhizomatous, spreading species, so forms extensive patches. It has been recorded alongside minor roads at Sgiogarstaigh (NB54806196) and Bornais



Fig. A: Close-up and habitat of *Carex maritima* (arrowed) +on the verge of the A859 through the N Harris hills.



Fig. B: *Juncus balticus* on the roadside at Bornais, S Uist.

(NF74422968) and along the A859 at Cnoc Torravig (NB41293754) and Tom Mor Eimasgro (NB39854162), A858 at Acha Mòr (NB33062843) and near Arnol (NB33144848), and A866 between Aiginis and Garrabost.

Triglochin palustre (Marsh arrow-grass)

Triglochin palustre is characteristically a plant of flushes in the Outer Hebrides, and in this habitat usually occurs as a few scattered plants in any given site. It is not a halophyte, but is salt-tolerant (Ellenberg S = 2). But along the verge of the A858 at Acha Mòr (NB3328) there are many stems growing together, in the gutter and extending away into the verge grasses (Fig. C). This species has been reported as a roadside halophyte in a few places in Scotland (Corner 2001, Green 2001), so its occurrence in such a habitat is not unprecedented, but it is still unusual. It probably indicates a modification of the roadside habitat in a way that suits *Triglochin palustre*; but it's not clear whether it is the salt, a reduction in competition, or some other factor which is important. Given that *T. palustre* is widespread, so that some seed should be distributed to roadsides, it is perhaps surprising that it is not more widely distributed if this is such a suitable habitat.

Relation to traffic flows

The Department for Transport produces annual average daily flow (AADF) estimates for the main roads in the Outer Hebrides. These are naturally much lower than in more densely populated parts of Scotland (some roads in Glasgow have AADF more than 80,000), but show considerable variability. The road segments with records of halophytic and other interesting roadside plants considered in this paper are shown in Table 1.

There is no apparent pattern of species richness by traffic flow. However, recording of roadside species is not sufficiently comprehensive for this to be reliable – further detailed recording may show that there is variation in which species occur. Of course, flow may only be an indicator for what is really important. The factors that govern the distributions of roadside species at a small scale would take considerable effort to work out.

Table 1: road segments, roadside records of species mentioned in this paper, and annual average daily flow (AADF) of motor vehicles in 2015, from www.dft.gov.uk/traffic-counts (accessed 2 October 2016).

Road	Segment	Species	AADF motor vehicles
A857	Newmarket to Barvas	<i>Carex maritima</i> <i>Juncus balticus</i> <i>Sagina maritima</i> <i>Spergularia marina</i>	2743
A858	Tom Mhic Leoid to Gearraidh na h-Aibhne (includes stretch at Acha Mòr)	<i>Juncus balticus</i> <i>Puccinellia distans</i> <i>Sagina maritima</i>	1124



Fig. C: *Triglochin palustre* on the verge on the SW side of the A858 at Acha Mòr, Lewis (NB3328).

		<i>Spergularia marina</i> <i>Triglochin palustre</i>	
A858	Carlabhagh to Barvas	<i>Juncus balticus</i>	1134
A859	N Harris (B887 Bun Abhain Eadarra turn to Balallan)	<i>Carex maritima</i> <i>Spergularia marina</i> <i>Spergularia media</i>	813
A859	Stornoway to Creed Park	<i>Puccinellia distans</i>	6964
Pentland Road		<i>Spergularia marina</i>	1124
A866	Aiginis to Port Mholair	<i>Juncus balticus</i>	2123
A867	Clachan-a-Luib to Loch nam Madaidh	<i>Sagina maritima</i> <i>Spergularia marina</i>	964
B887	Bun Abhain Eadarra	<i>Spergularia marina</i> <i>Spergularia media</i>	na
Minor road	Sgiogarstaigh	<i>Juncus balticus</i>	na
Minor road	Bornais	<i>Juncus balticus</i>	na
A859	Rodel to Tarbert	<i>Carex maritima</i>	616

Conclusions

The Outer Hebrides has an interesting roadside flora on the larger roads, assisted by modification of the habitats by salting, nutrient deposition and disturbance. Some species are in common with those spreading widely on roadsides in mainland Britain, but so far at lower densities, perhaps because of the generally lower traffic flows. Some species, however, are unusual, and *Carex maritima* seems to be unique as a roadside halophyte, perhaps assisted by the local availability of propagules. A few species have also found verges on smaller roads to their liking, and *Juncus balticus* seems to be particularly successful, forming large clonal colonies. There are likely to be many more roadside halophyte populations to be recorded.

Acknowledgements

Thanks to Colin MacIver and Mike Smith at CnES roads department for information on road construction and maintenance, and to Richard German at DfT for checking definitions of road segments.

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