The seagrass *Halophila minor* newly recorded from Moreton Bay

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ABSTRACT

The seagrass *Halophila minor* (Zoll.) Hartog is recorded for the first time from Moreton Bay on the subtropical east Australian coast. *H. minor* (under the name *Halophila ovata* Gaud.) has previously been widely reported from tropical Australia, but this record marks a significant southward range extension. The establishment of *H. minor* in southern Moreton Bay may be a recent event, with its southerly dispersal mediated by the effects of climate change, and a more strongly flowing East Australian Current. However it is also probable that *H. minor* had simply been overlooked or misidentified in the past because of its superficial resemblance to a small morph of the morphologically-variable and very common *Halophila ovalis* (R. Br.) Hook f. ❑ *biogeography, first record, Halophila minor, Halophila ovalis, Halophila ovata, southern Moreton Bay, seagrass, Southport Broadwater.*

As with many semi-enclosed coastal marine environments on the Australian east coast, the Southport Broadwater supports extensive seagrass communities on predominantly sandy substrata. As part of a survey in this area conducted from May to July 2006 by the environmental consultant company GHD Pty Ltd for the Queensland Department of Natural Resources, collections were made of a small seagrass species that we later identified as *Halophila minor* (Zoll.) Hartog. Three *Halophila* species have been previously recorded from Moreton Bay: *Halophila ovalis* (R. Br.) Hook f. and *Halophila spinulosa* (R. Br.) Asch. are widely distributed throughout the Bay, while *Halophila decipiens* Ostenf. inhabits turbid southern Bay waters, and mainland coastal localities such as Raby Bay, Waterloo Bay, Deception Bay and Pumicestone Passage (Young & Kirkman 1975; Hyland *et al.* 1989). The present note serves as the first formal record of the occurrence of *H. minor* on the subtropical east Australian coast.

Voucher specimens of Southport *H. minor* have been lodged in the Queensland Herbarium. First collections of *H. minor* were made from the Labrador foreshore between Loders and Biggera Creeks (27°56′34.3″ S 153°24′57.7″ E) where it grew in a 9.4 ha upper-subtidal seagrass community dominated by *Z. capricorni*, with *H. ovalis* and *Halolude uninervis* subdominant (Fig. 1).

A second upper-subtidal seagrass community dominated by *H. minor* and *Z. capricorni* grew on the northwestern shoreline of a large sandbank south of Wavebreak Island. Together with a *Z. capricorni*/*H. ovalis* community on the southwestern part of this sandbank, the seagrasses covered an area of 27 ha. This sandbank is

FIG. 1. Habitat map of seagrass communities in the Southport Broadwater. (Image courtesy of GHD Pty Ltd and the Queensland Department of Natural Resources).

relatively close to the Gold Coast Seaway, a coastal engineering modification to the Southport Bar, and would be flushed with relatively clean oceanic seawater. Considerable sand movement has occurred over the last two decades with the sandbank attaining its greatest areal extent in 2006 (this study), although also being greater in extent in 1987 (Hyland *et al.* 1989) than in 1997 (McLennan & Sumpton 2005). In addition to natural disturbance (tidal movements, storms), sand movements would also be increased in the shallow waters by recreational boat traffic and jet skis. Abundance of *H. minor* in Broadwater localities with mobile sands is consistent with the observation (as *H. ovata*) that it occurred as the dominant pioneer species following destruction of seagrass communities on Magnetic Island by Cyclone Althea in 1971 (Birch & Birch 1984). *H. ovata* is a high stress/high disturbance species, tolerant of variations in sediment depth and degree of emersion, but intolerant of competition from other seagrass species (Birch & Birch 1984).

TAXONOMIC HISTORY

The genus *Halophila* comprises 5 sections and 15 species, with 10 species assigned to the section *Halophila* (den Hartog & Kuo 2006). Species in the section *Halophila* have short erect shoots bearing a pair of leaves, and are taxonomically separated from each other by differences in leaf size, shape, and pattern of venation. These characters may be variable and consequently species delimitation, particularly for *Halophila ovalis* (R. Br.) Hook. f., remains problematical. Den Hartog (1970) considered *H. ovalis* to be a species complex, but recognised *Halophila ovata* Gaudichaud (1826) as a separate entity, and reduced *Halophila minor* (Zoll.) Hartog, described in 1854, to a synonym of *H. ovata*. The name '*H. minor*' was later resurrected by Sachet & Fosberg (1973) who reported that Gaudichaud (1826) considered *H. ovata* to be the same species as *H. ovalis*, described in 1810. Sachet & Fosberg (1973) pointed out that under the rules of the International Code of Botanical Nomenclature (Article, 63), *H. ovata* is a superfluous name, therefore illegitimate, and a synonym of *H. ovalis*. Most seagrass ecologists have been unaware of this nomenclatural clarification, and have continued to use the name, *H. ovata* (Birch & Birch 1984; Lanyon 1986; Walker & Prince 1987; Coles *et al.* 1987, 1989; Poiner *et al.* 1987, 1989; Lee Long *et al.* 1993), although some authors have referred to it correctly as *H. minor* (McMillan 1986; Kuo & McComb 1989).

In a more recent study of herbarium specimens, including type material and new collections, Kuo (2000) concluded that *H. minor* and *H. ovata* are separate species, distinguished by differences in the number of lateral veins and in the distances between adjacent veins and between the intra-marginal vein and the leaf margin. *Halophila ovata* has been renamed *Halophila gaudichaudii* J. Kuo (Kuo *et al.* 2006) and has a known geographical distribution restricted to the north western Pacific Ocean localities of Saipan, Guam, Yap (Micronesia), Manila Bay (Philippines) (Kuo 2000; den Hartog & Kuo 2006) and Okinawa (Kuo *et al.* 2006).

DISTRIBUTION OF *HALOPHILA MINOR*

Halophila minor is widely distributed in the tropical Indian (Kenya, India, Malaysia, Western Australia) and the western Pacific Oceans (den Hartog & Kuo 2006: 13). As *H. ovata* it has been previously recorded in tropical northeastern Australia (den Hartog 1970; Birch & Birch 1984; Lanyon 1986; Coles *et al.* 1987, 1989; Poiner *et al.* 1987, 1989), as far south as Townsville (den Hartog 1970). The present new record extends the geographical range about 1000 km south to the Southport Broadwater.

Previous records of *H. minor* at several localities from Townsville south to Hervey Bay (Lee Long *et al.* 1993) require confirmation, particularly as the species (as *H. ovata*) received little attention in that publication (listed in Table 2), and the significant putative range extension was not discussed with the geographical distribution of other seagrass species. Furthermore, other studies in Hervey Bay (Preen *et al.* 1995) or in nearby waters (Dredge *et al.* 1977), have not reported *H. minor*. If *Halophila minor* occurred in Hervey Bay, it should have flourished, colonising as the pioneer species to form monospecific communities in denuded areas (Birch & Birch 1984), following the bay-wide destruction of seagrass communities after the floods and cyclone of 1992 (Preen *et al.* 1995). It is also

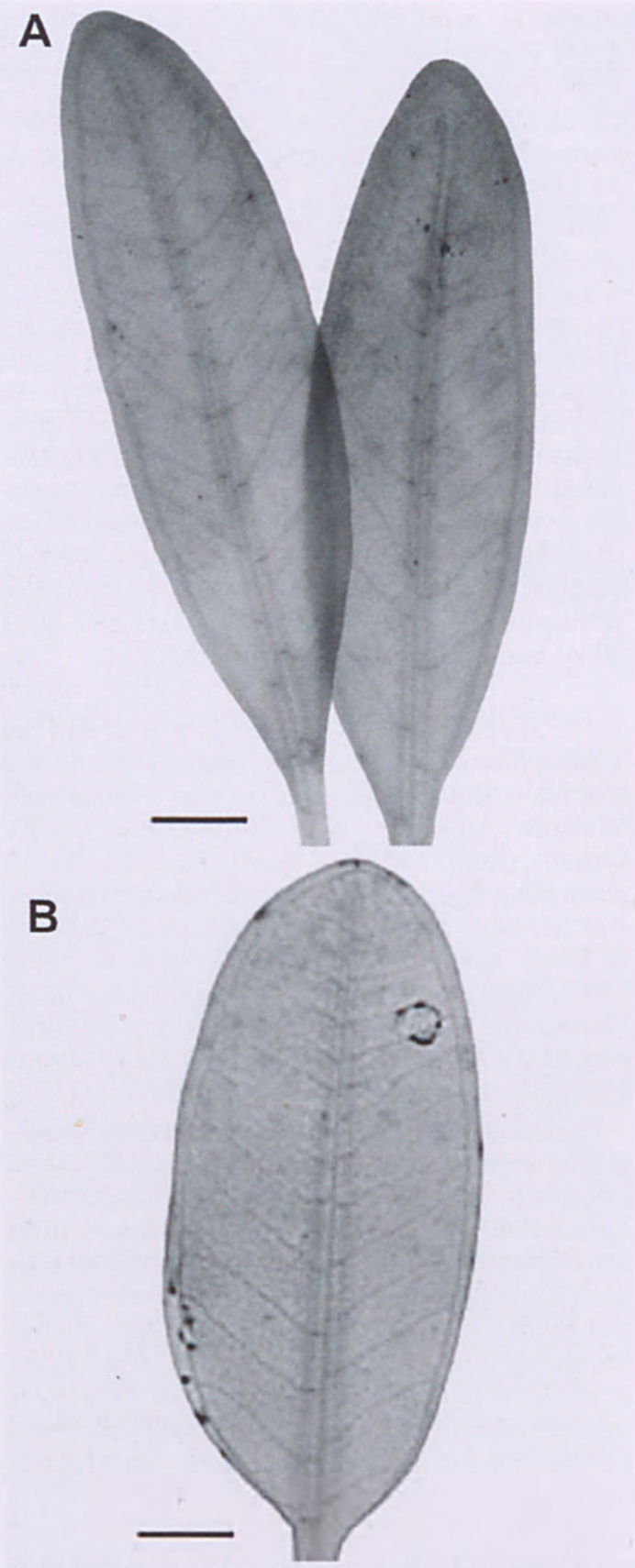

FIG. 2. **A**, leaf of *Halophila minor* showing 8–9 largely unpaired veins arising from the mid vein. Scale = 0.8 mm. **B**, Leaf of *Halophila ovalis* with 13 pairs of lateral veins. Scale = 2 mm.

possible that *H. minor* has a similar disjunct geographical distribution to the tropical seagrasses *Syringodium isoetifolium* (Asch.) Dandy and *Cymodocea serrulata* (R.Br.) Asch. & Magnus which have southern outlier populations in Moreton Bay, approximately 500 km from the nearest populations of these species in Shoalwater Bay (Lee Long *et al.* 1993).

IDENTIFICATION

Southern Moreton Bay specimens agree with the recent revision of the species concept of *H. minor*, with the exception of the linear to oblanceolate leaf blades for the local material compared to the ovate blades of other populations of *H. minor* (Kuo, 2000; Kuo & den Hartog, 2001) (Table 1). The Broadwater plants were mature, evident from the long petioles (1–1.5 cm in length). Macroscopically, the narrow leaf blades of *H. minor* superficially resemble those of the small morph of *H. ovalis* but are easily differentiated from the broader (> 5mm broad) elliptic to obovate to ovate blades of the large morph of *H. ovalis* (den Hartog 1970; Kuo & McComb 1989). However, 10 to 25 pairs of lateral veins typically arising from the mid rib at more or less regular intervals in *H. ovalis* clearly distinguishes Broadwater *H. minor* in which 4 to 9 often unpaired lateral veins arise at irregular intervals from the midrib (Fig. 2A,B). The smaller number and lack of pairing of veins are clearly illustrated for tropical Queensland specimens of *H. minor* (Fig. 9, Lanyon 1986) but the presence of unpaired veins arising at irregular intervals from the midrib appears not to have been previously used as a taxonomic character to distinguish *H. minor*.

DISCUSSION

The occurrence of *H. minor* in the Southport Broadwater may represent a recent range expansion, with dispersal further south mediated by the effects of climate change and a more strongly flowing East Australian Current (Cai *et al.* 2005). This contention is consistent with the observations that previous surveys of the Southport Broadwater (Kirkman 1975; Hyland *et al.* 1989; McLennan & Sumpton 2005) did not record *H. minor* and that the species is considered to be tropical (den Hartog 1970; den Hartog & Kuo 2006: 13), also supported by the

Table 1. Diagnostic characters for *Halophila minor*. Data in first column is based on a sample of 10 leaves from Moreton Bay samples (this study); data in second is taken from Kuo (2000).

Characters	Moreton Bay *Halophila minor*	*Halophila minor* (Kuo 2000)
Lamina length (mm)	6–8	6–12
Lamina breadth (mm)	1.7–2.8	3.5–6.0
Number of lateral veins	4–9	(4) 7–12 (13)
Distance between lateral veins (mm)	0.42–0.75	0.65–0.85
Distance between intramarginal vein and lamina margin (mm)	0.15–0.19	0.15–0.19

fact that all Queensland specimens of *H. minor* in the Queensland Herbarium have been collected in the tropics (Henderson 2002). However, it is equally plausible that *H. minor* has always been present in Moreton Bay but has been overlooked or included in *H. ovalis*, an ecologically common and geographically widespread species which ranges in Australia from the tropics to temperate Cowaramup Bay in Western Australia (Robertson 1984; Hillman *et al.* 1995) and to Mallacoota on the eastern Australian coast (West *et al.* 1989; Harden 1990). *Halophila ovalis* exhibits considerable morphological plasticity with respect to leaf shape and size (den Hartog 1970; Young & Kirkman 1975; Robertson 1984; Poiner 1984; Poiner *et al.* 1987), occurring in Moreton Bay as two statistically significant size morphs differentiated by leaf breadth: the small morph of the intertidal zone with a blade breadth < 5mm and the large subtidal morph with a blade breadth > 5mm (Poiner 1984). As leaf breadth is one of the characters used to separate *H. minor* from *H. ovalis* (Lanyon 1986; Poiner *et al.* 1987; Kuo & McComb 1989), and the only visible character for field identifications, it is reasonable to suggest that Moreton Bay *H. minor* may have been misidentified as the narrow morph of *H. ovalis*. Some ecological surveys (Birch & Birch 1984; Poiner *et al.* 1987) have avoided the problem of distinguishing co-occurring *H. minor* from narrow *H. ovalis* in the field by presenting combined data for the two species.

Future seagrass surveys of the Australian east coast should endeavour to examine narrow-leaved *Halophila* plants microscopically to distinguish narrow *H. ovalis* from *H. minor*. Further taxonomic studies are required to clearly define species boundaries for *H. ovalis* and *H. minor* for the purposes of accurate species identification. This study clearly demonstrates the importance of lodging voucher specimens in herbaria in order to verify the identity of species reported by ecological surveys.

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