Pacific oyster - case study

The Pacific oyster, *Crassostrea gigas* was introduced throughout Europe in the 1970s for cultivation purposes to replace declining populations of the native oyster, *Ostrea edulis* and the Portuguese oyster, *Crassostrea angulata* (Ruesink *et al.,* 2005).

After its introduction to Europe, it was assumed that natural spatfall of *C. gigas* would not occur in higher latitudes (such as Britain, Netherlands and Germany) as the waters would be too cold for reproduction. However, this species has a tolerance for a wide range of temperatures and can grow at temperatures between 4–35 ºC (Nehring, 2006) and can temporarily resist very low salinities (~ 5ppt). Fecundity is high with females producing 20–100 million eggs per spawning. The free-swimming planktonic larvae can spend up to three weeks in the water column before finding a suitable clean substrate to settle on, potentially giving the species a wide dispersal range.

The Pacific oyster is now established or has been detected in Belgium, Denmark, France, Germany, Ireland, Netherlands, and UK (Ruesink *et al.,* 2005). There are also records established populations as far north as Norway and Sweden (ICES, 2008, 2009). Populations of *C. gigas* became established in the German Wadden Sea in 1991 (Nehring, 2006) and has since expanded northwards reaching the Danish Wadden Sea in 1999 (Figure 1.5.5.2.3. Reise *et al.,* 2005).

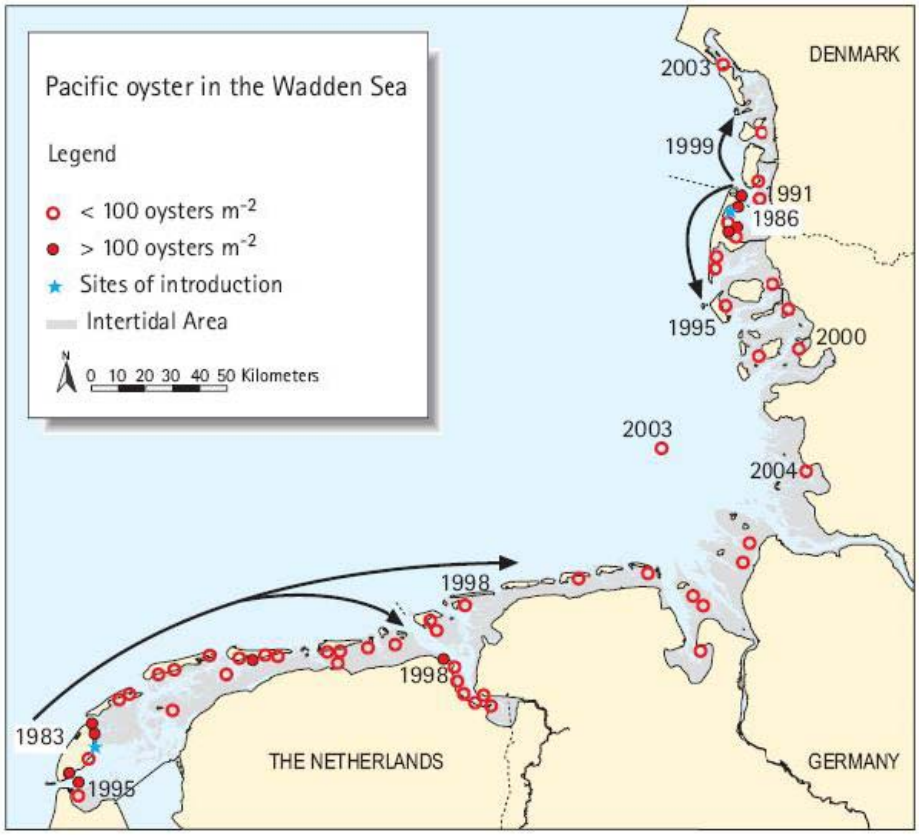

Figure 1.5.5.2.3 The Pacific oyster in the Wadden Sea. Asterisks indicate introduction sites (Texel, The Netherlands and Sylt, Germany). Years indicate first records of settlement. Circles refer to mean Pacific oyster abundance in 2003. From Reise *et al.,* 2005.

Pacific oysters form solid reefs. Their role as ecosystem engineers is particularly pronounced in soft sediment environments such as the mudflats of the Wadden Sea where hard substrate is rare except for mussel beds and oyster shells (Ruesink *et al.,* 2005; Kochmann *et al.,* 2008). In the northern German region of the Wadden Sea, *Mytilis edulis* beds are declining while populations of *C. gigas* appear to be increasing. Changing climate conditions during the last decade appear to be the primary cause of the proliferation of *C. gigas* and the decline of *M. edulis*. As yet, there is no strong evidence that these non-indigenous species have caused the decline of the native mussels (Nehls *et al.,* 2006; Nehls and Büttger, 2007). However, community structure differs between habitats created by oysters and mussels, with concomitant implications on their overall function in the marine environment (Kochmann *et al.,* 2008).

Given the Pacific oyster's high reproductive capacity, its considerable adaptive ability allied with increasing sea temperatures, and the large standing stock of Pacific oysters in the OSPAR region, the species must now be considered a permanent constituent of the European coastal ecosystems (Nehls and Büttger, 2007). Future management strategies for these areas must consider the influence this species has on the structure and function of these marine ecosystems. The long-term impacts are unknown.

➥*Go to full ICES overview assessment of non-indigenous species in the OSPAR maritime area (ICES 2009, Advice Book 1, section 1.5.5.2)*