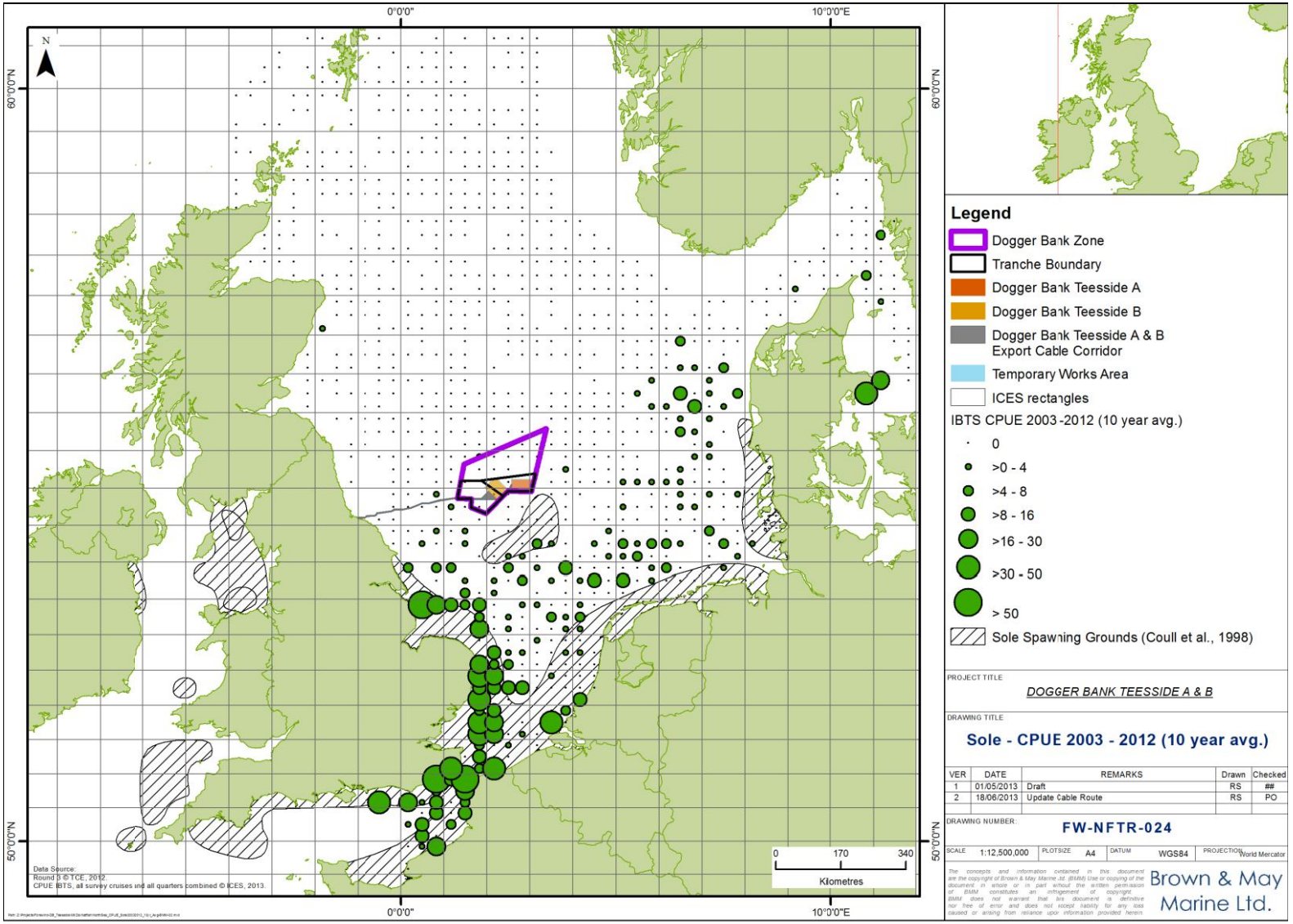

Figure 6.15 Average number (catch per standardised haul) of sole from IBTS survey data 2003-2012

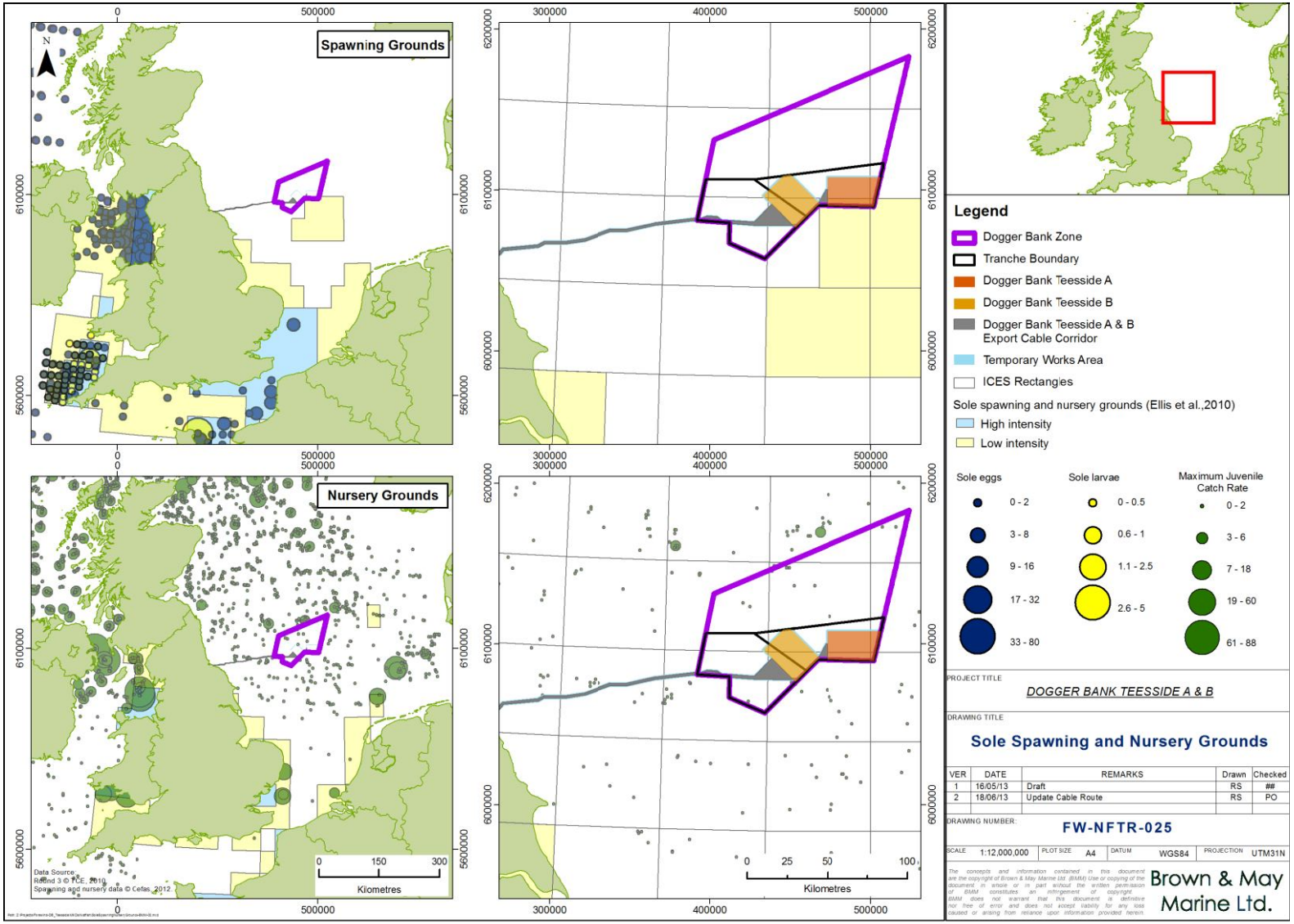

Figure 6.16 Sole spawning and nursery grounds (Modified from Ellis *et al.* 2010 and Coull *et al.* 1998)

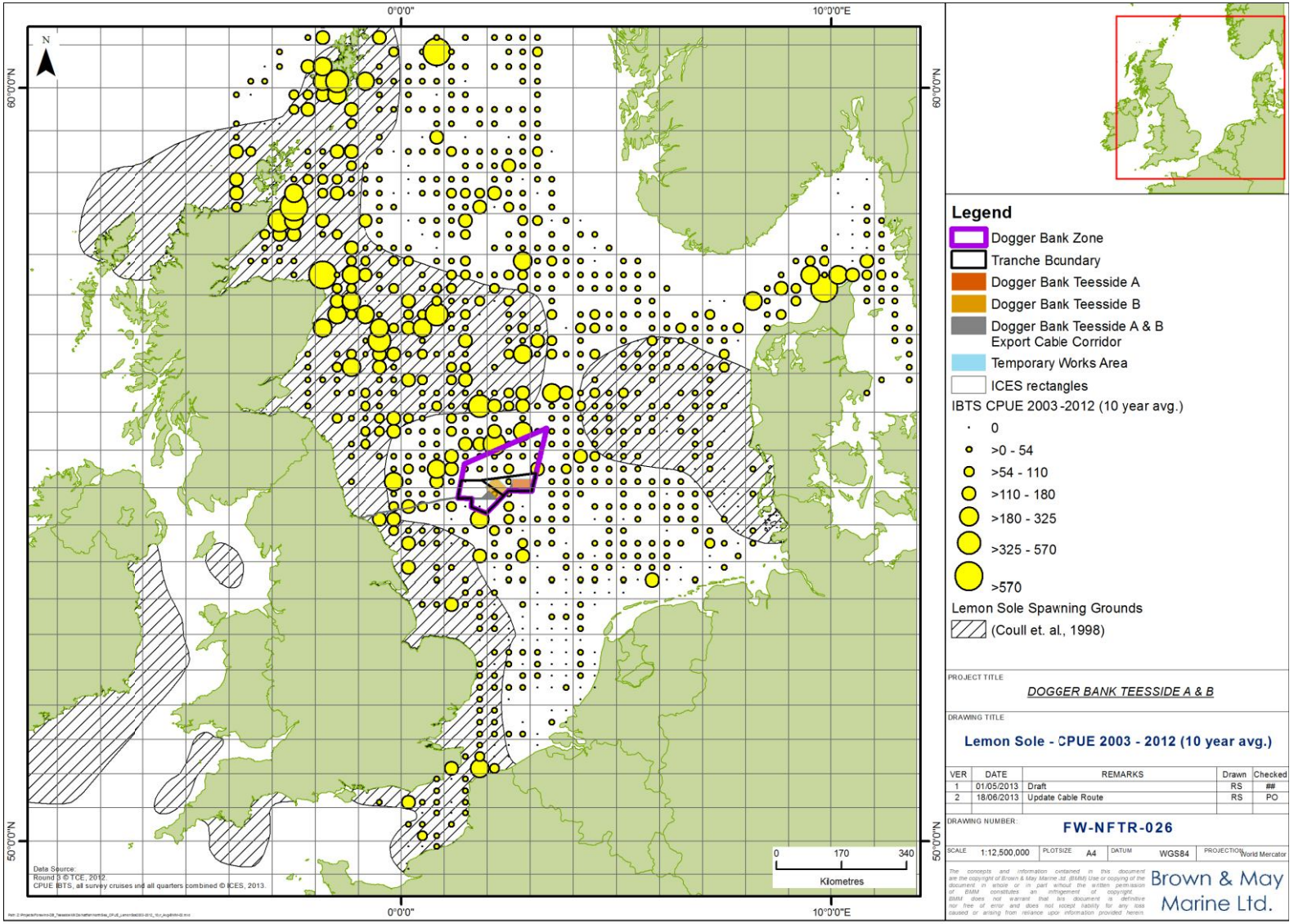

Figure 6.17 Average number (catch per standardised haul) of lemon sole from IBTS survey data 2003-2012

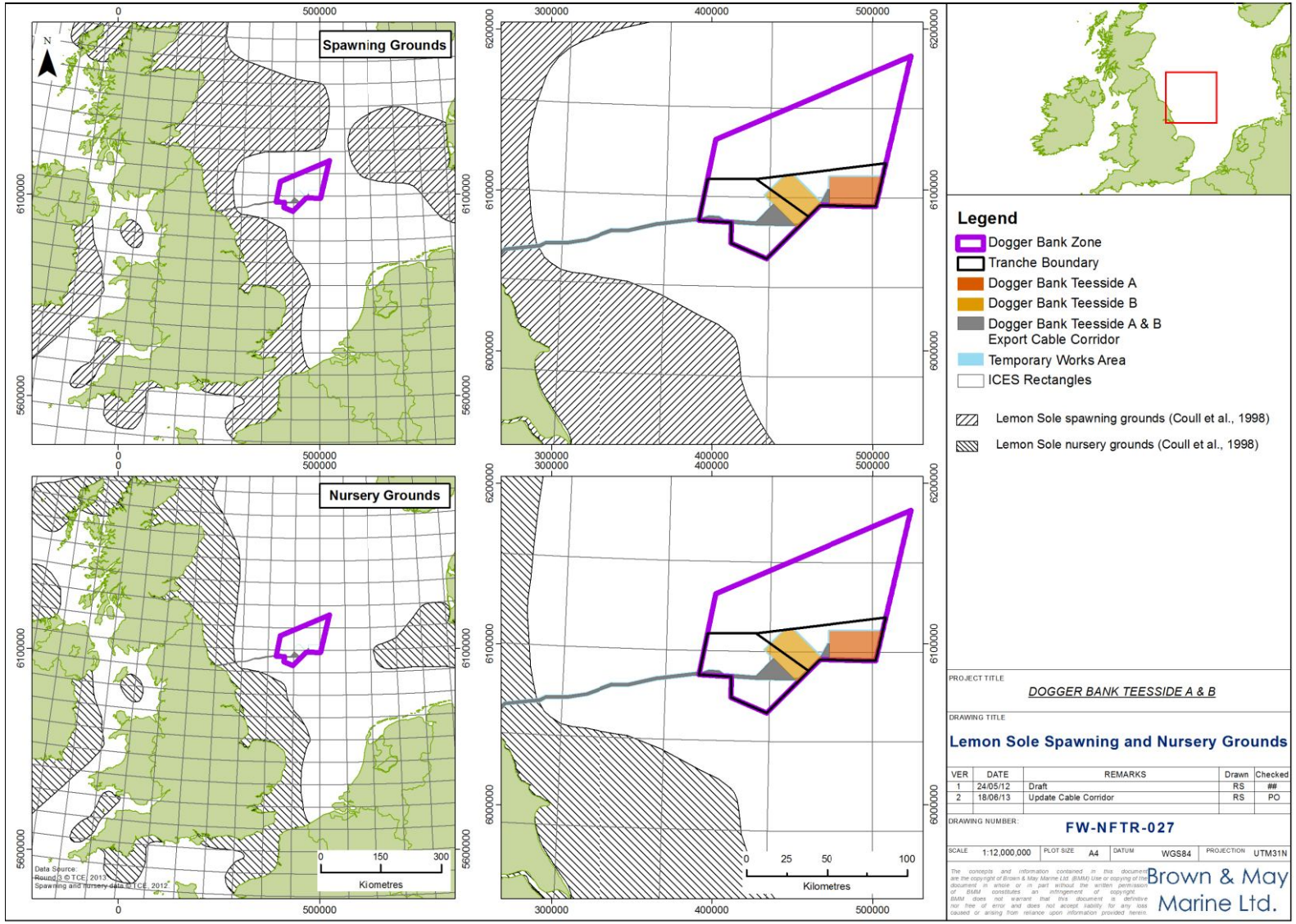

Figure 6.18 Distribution of lemon sole spawning and nursery grounds (Coull *et al.* 1998)

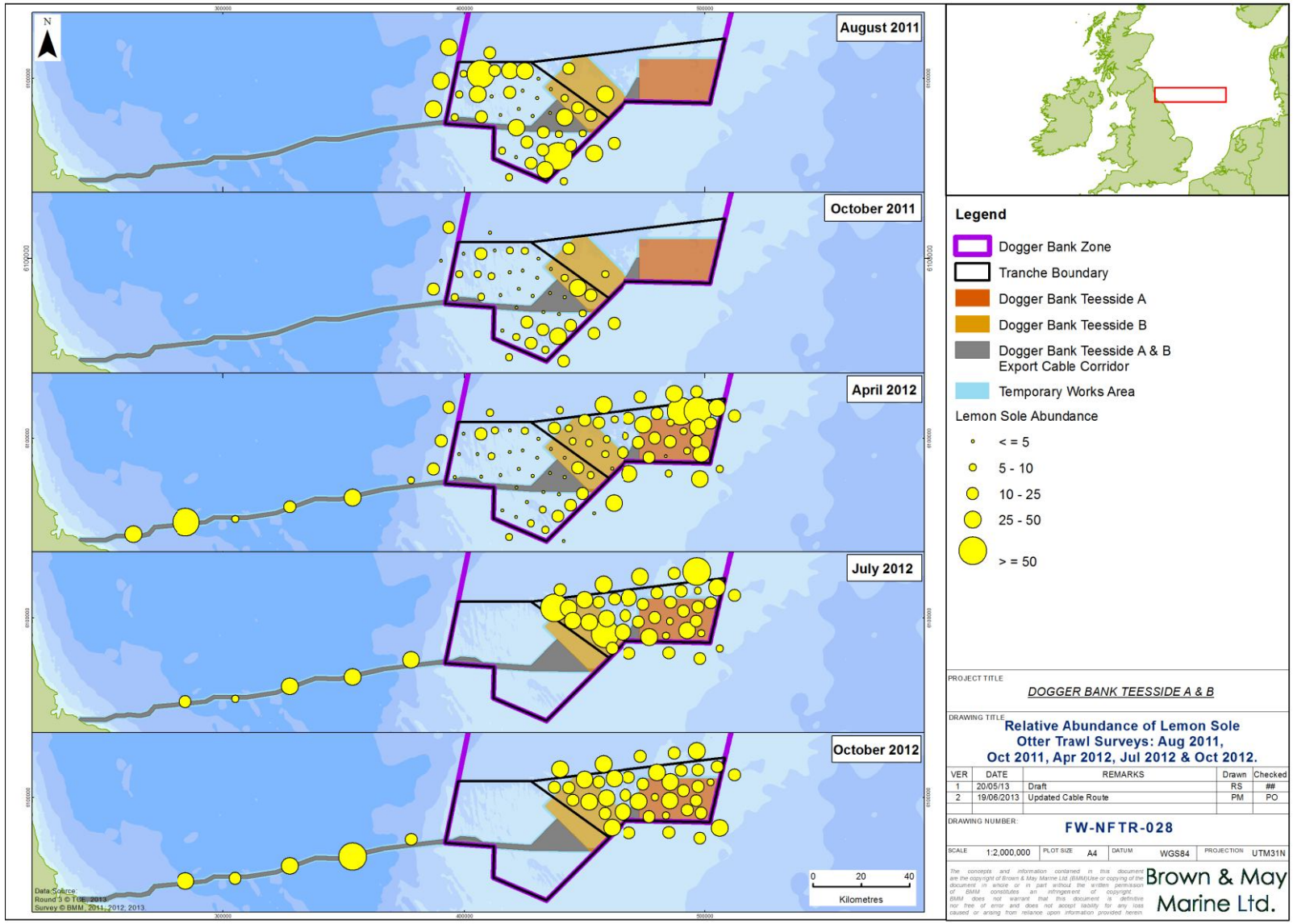

Figure 6.19 Average number (catch per standardised haul) of Lemon sole from IBTS survey data 2003-2012

6.1.6 Grey Gurnard

6.1.6.1 General

161. Grey gurnard are a demersal species found on sand, rock or mud down to depths of 140m (Barnes 2008a). The species is typically associated with offshore areas (such as the Dogger Bank) where they are most common at depths in the 20-50m range (Wheeler 1978). Grey gurnard is the most common gurnard species found in the North Sea.

162. Grey gurnard eat benthic crustaceans, such as brown and pink shrimp, small crabs, and fish, such as gobies and dragonets (Wheeler 1978). Research examining the diet of grey gurnard on the Dogger Bank (Weinert *et al.,* 2010) found that shrimp *Crangon allmani* and sandeels were the most common prey items observed in stomach contents of fish captured from shallow areas. In contrast, the most frequently observed prey in samples from deeper regions was the amphipod *Hyperia galba.* Accordingly, *C. allmani* was one of the more abundant species recorded during the Tranche B epibenthic survey (**Appendix 12A Epibenthic Survey Report**).

6.1.6.2 Distribution

163. An indication of the distribution of grey gurnard in the North Sea is given in **Figure 6.20** based on average abundances recorded from 2003 to 2012 in IBTS surveys. The species is abundant at sites to the north and east of the Wind farm area but very few individuals were captured at sites within tranche A or tranche B, where Dogger Bank Teesside A & B are located. Large numbers of grey gurnard were also found at sites in the vicinity of the offshore section of the Dogger Bank Teesside A & B Export Cable corridor.

6.1.6.3 Life History

164. Grey gurnard is thought to concentrate in the central western North Sea in the winter and spread into the southern part during spring to spawn (ICES 2005). Spawning is thought to occur from April to August (Wheeler 1978).

165. Gurnards have a strong seasonal migration through the North Sea and forms dense semi-pelagic aggregations to the northwest of Dogger Bank (ICES 2005, Greenstreet *et al.,* 2007) in winter, before dispersing and becoming more widespread during summer months.

6.1.6.4 Exploitation

166. Grey gurnard is taken as by-catch in demersal fisheries, part of which is landed for human consumption (Heessen and Daan 1996). As suggested by the landings data shown in Section 5.4, grey gurnard are recorded in commercial landings in the Export Cable Study Area and, more significantly, in the Wind

Farm Study Area (particularly in ICES rectangle 38F2 where Dogger Bank Teesside B is located).

6.1.6.5 Management

167. There is currently no management for any of the gurnard species in the EU. The status of the stock of grey gurnard is unknown and reference points are not defined. ICES advises that catches should not be allowed to increase in 2013 (ICES 2012). Survey indices for the North Sea suggest that the abundance of this species has been increasing since the late 1980s.

6.1.6.6 Site Specific Information

168. Grey gurnard were the most abundant species found in the otter trawl surveys carried out in tranches A and B (**Table 5.3** and **Table 5.4**). An indication of its seasonal spatial distribution as derived from the results of the otter trawl surveys is given in **Figure 6.21** below. As shown, grey gurnard were found at sites in Dogger Bank Teesside A & B and along the route of the Dogger Bank Teesside A & B Export Cable Corridor in all otter trawl surveys.

169. In addition to grey gurnard, other species of gurnard were found in the otter trawl surveys carried out in tranches A, and B including red gurnard *Aspitrigla cuculus* and tub gurnard *Trigla lucerna.* These were, however, recorded in very low numbers.

6.1.6.7 Conservation status

170. Grey gurnard is not listed for conservation status.

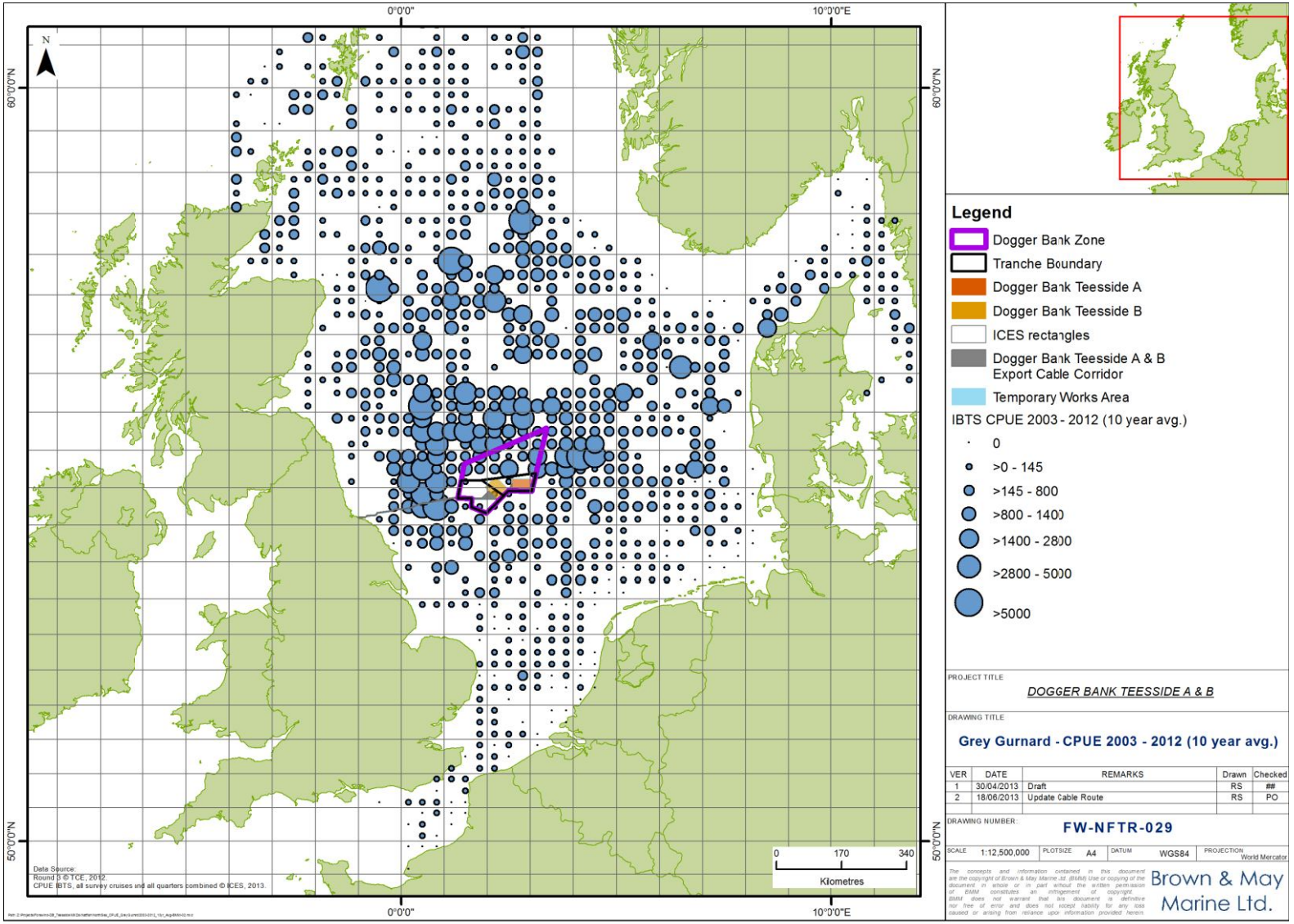

Figure 6.20 Average number (catch per standardised haul) of Grey gurnard from IBTS survey data 2003-2012

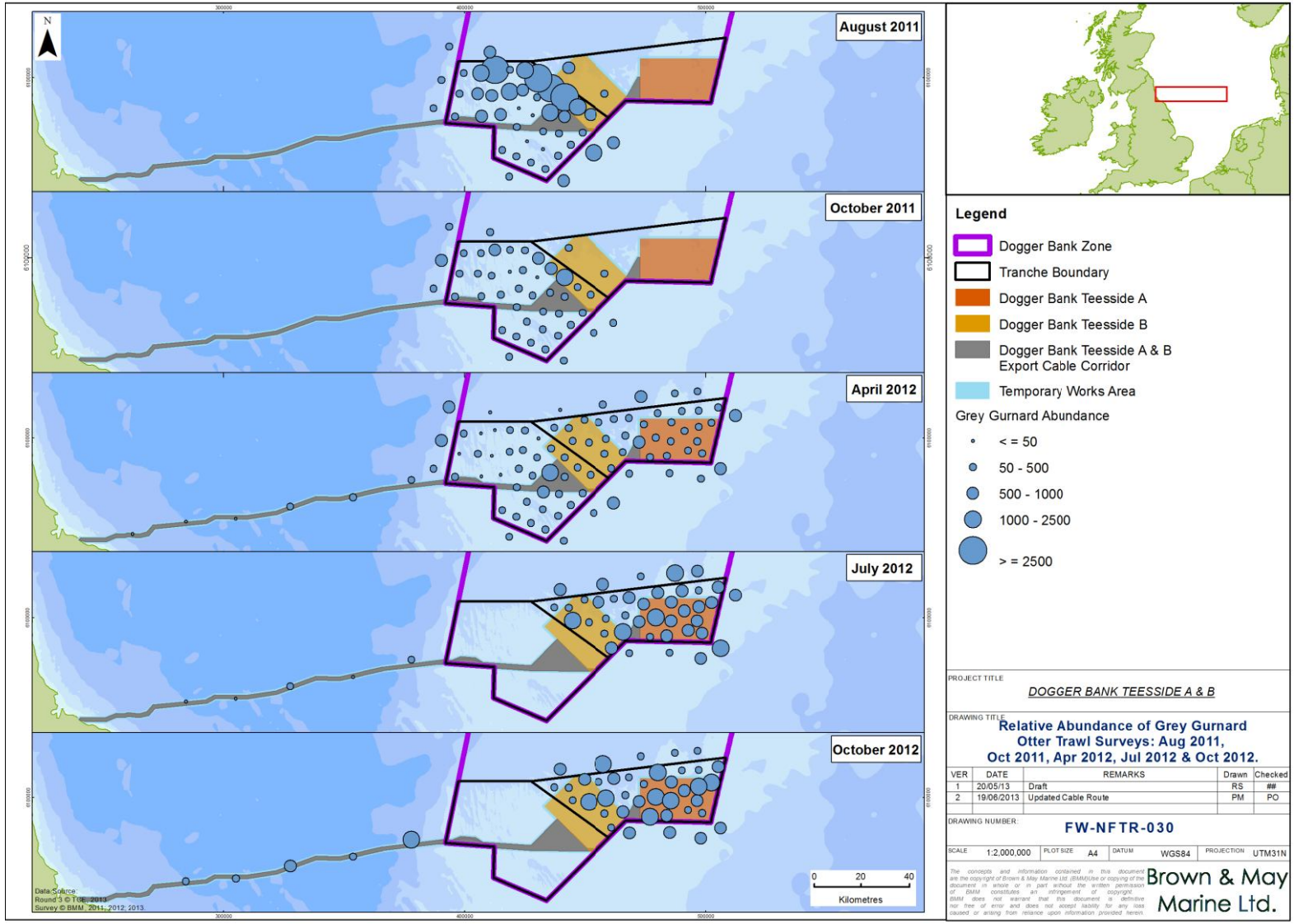

Figure 6.21 Seasonal Distribution of Grey Gurnard within tranches A and B and along the Teesside Export Cable Corridor

6.1.7 Whiting

6.1.7.1 General

171. Whiting is a bentho-pelagic species very common in shallow waters, being most abundant between 30m and 100m. They are generally found near mud and gravel substrates, but also on sandy and rocky areas (Wheeler 1978, Barnes 2008b).

172. Adult whiting feed almost entirely on fish, including a variety of small species such as Norway pout, sprat and sandeel, and the younger age classes of larger species such as herring, cod, and haddock. Immature fish feed primarily on crustaceans such as euphausiids, mysids and crangonid shrimps (Hislop *et al.,* 1991, ICES 2005, Wheeler 1978). During the night they primarily feed on bottom-dwelling prey, whilst feeding on pelagic prey during daylight (ICES 2005).

6.1.7.2 Distribution

173. Whiting are widely distributed throughout the North Sea with high densities of both juvenile and adult whiting being found almost anywhere. An exception to this is the Dogger Bank area, which generally shows a marked gap in their distribution (ICES 2005).

174. The distribution of whiting in the North Sea, based on average abundance in IBTS surveys for the period 2003 to 2012, is given in **Figure 6.22**. As shown, whiting tend to be present in relatively high numbers to the east and south of the Dogger Bank Zone and in the vicinity of the Dogger Bank Teesside A & B Export Cable Corridor. Relatively few whiting were recorded within tranches A and B.

6.1.7.3 Life History

175. Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor fall within defined spawning and nursery grounds for whiting as illustrated in **Figure 6.23** (Ellis *et al.,* 2010). Spawning takes place from February to June (Coull *et al.,* 1998) but mostly in spring, in shallow water (Wheeler 1978).

6.1.7.4 Exploitation

176. Whiting is generally considered of secondary commercial importance. They are caught in large numbers throughout the entire North Sea; however, large quantities of the catch tend to be discarded (ICES 2005). As suggested by UK landings data (Section 5.4), whiting is one of the main species landed from the Export Cable Study Area. This species is also of commercial importance to non-UK fleets, particularly the French, which hold historic fishing rights between the 6 and 12nm limits off the east coast of England (see *Chapter 15 - Commercial Fisheries*).

6.1.7.5 Management

177. Reference points for whiting are not defined but ICES is currently developing and evaluating a management plan for this stock. ICES has advised that landings of whiting in the North Sea and Eastern Channel should not exceed 26,000 tonnes in 2013 (ICES 2012a).

6.1.7.6 Site Specific Information

178. An indication of the seasonal distribution of whiting in tranches A and B and along the Dogger Bank Teesside A & B Export Cable Corridor, as recorded in site specific otter trawl surveys, is given in **Table 5.3** and **Table 5.4**. In general terms, the highest catch rates were found at sites along the western edge of tranche A and within Dogger Bank Teesside A & B. Whiting were also recorded in relatively high numbers in a number of stations along the Dogger Bank Teesside A & B Export Cable Corridor. During the pelagic fish survey carried out in September, they were also recorded in high numbers at stations located along the Dogger Bank Teesside A & B Export Cable Corridor (**Figure 6.24** Similarly, they were one of the most abundant species recorded in the trammel net surveys carried out in the inshore area of the Dogger Bank Teesside A & B Export Cable Corridor (**Table 5.9**)

6.1.7.7 Conservation status

179. Whiting is listed as a UK BAP priority species (see **Table 5.20**)

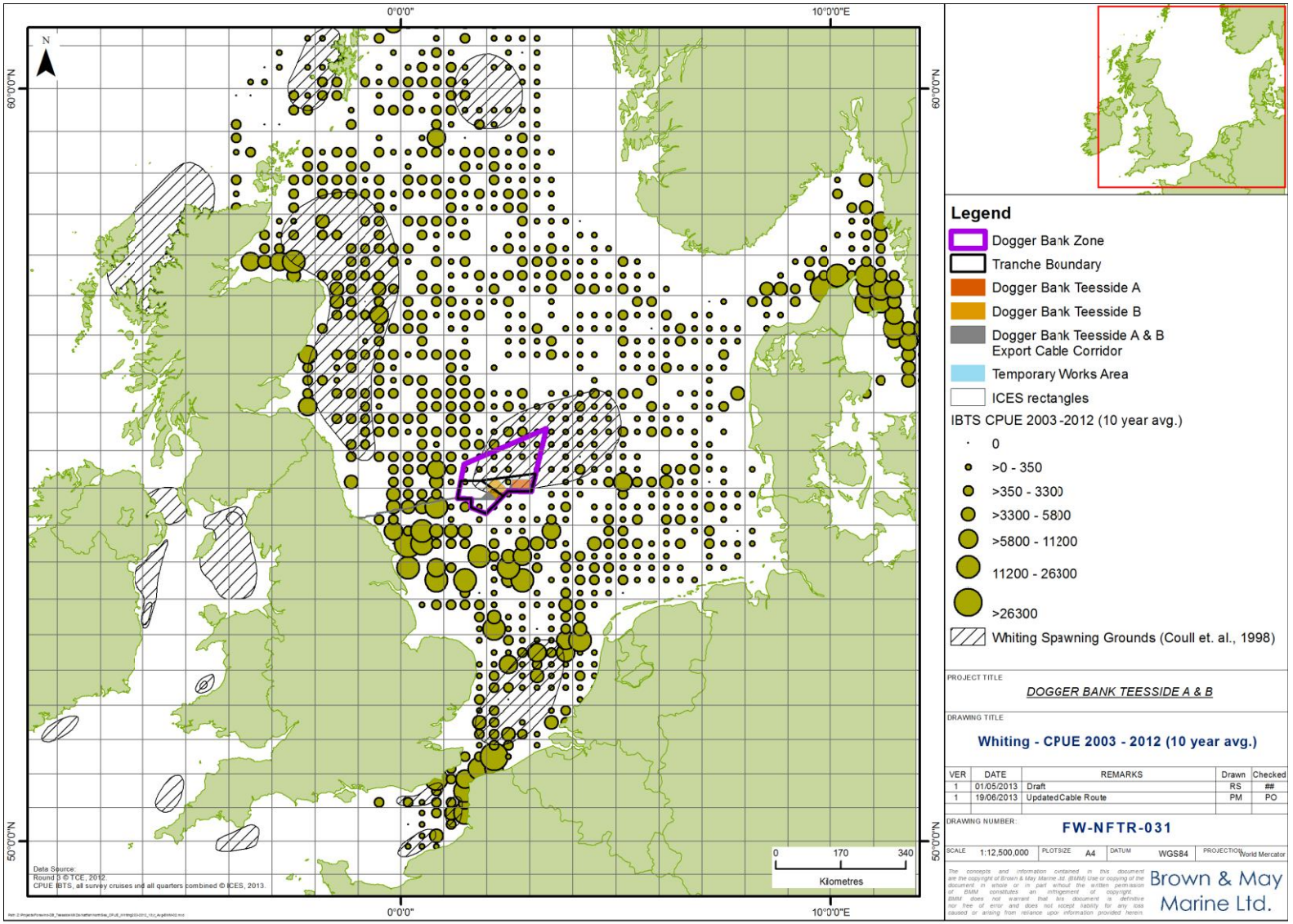

Figure 6.22 Average number (catch per standardised haul) of Whiting from IBTS survey data 2003-2012

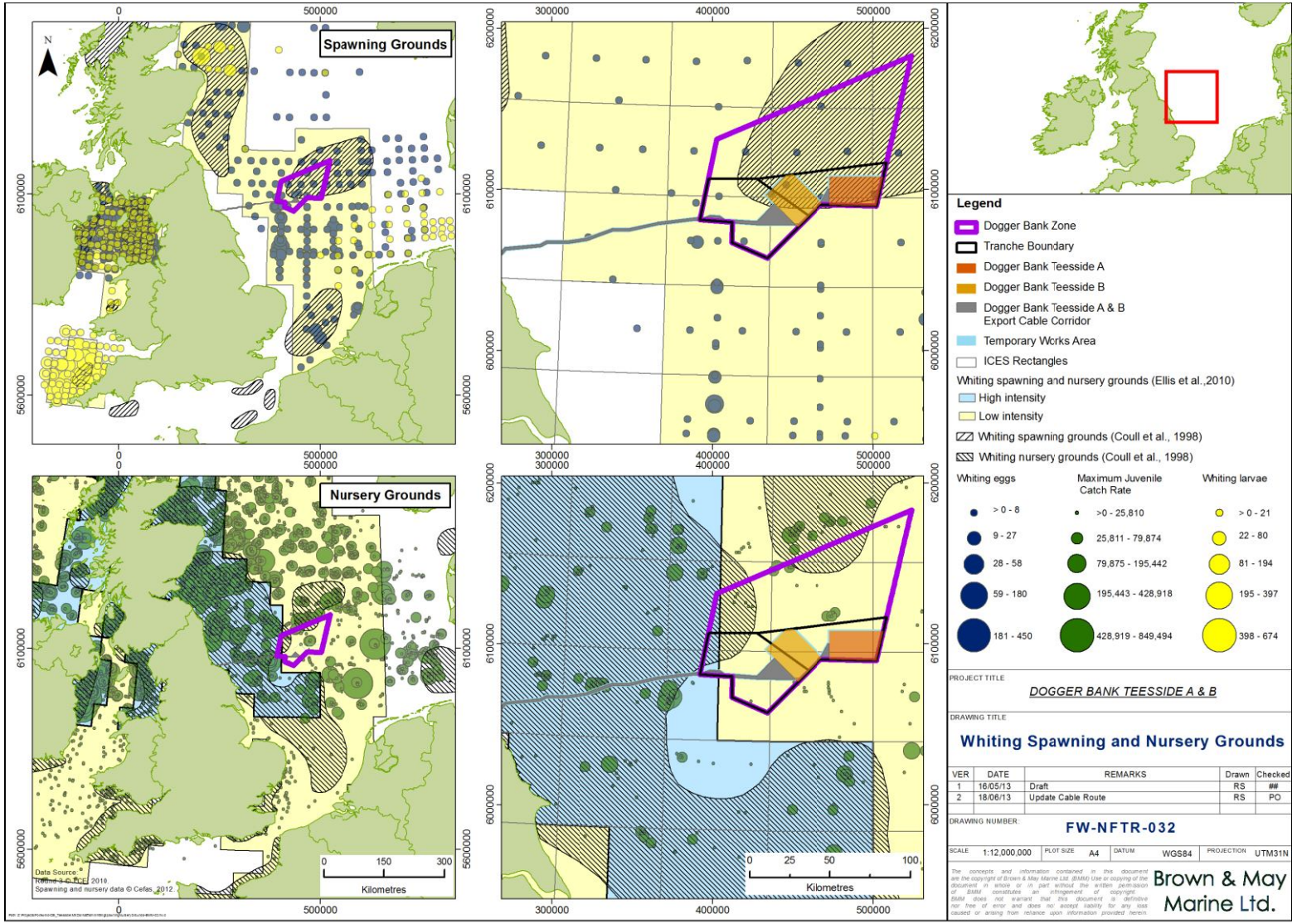

Figure 6.23 Whiting Spawning and Nursery Grounds (Modified from Ellis *et al.,* 2010 and Coull *et al.,* 1998)

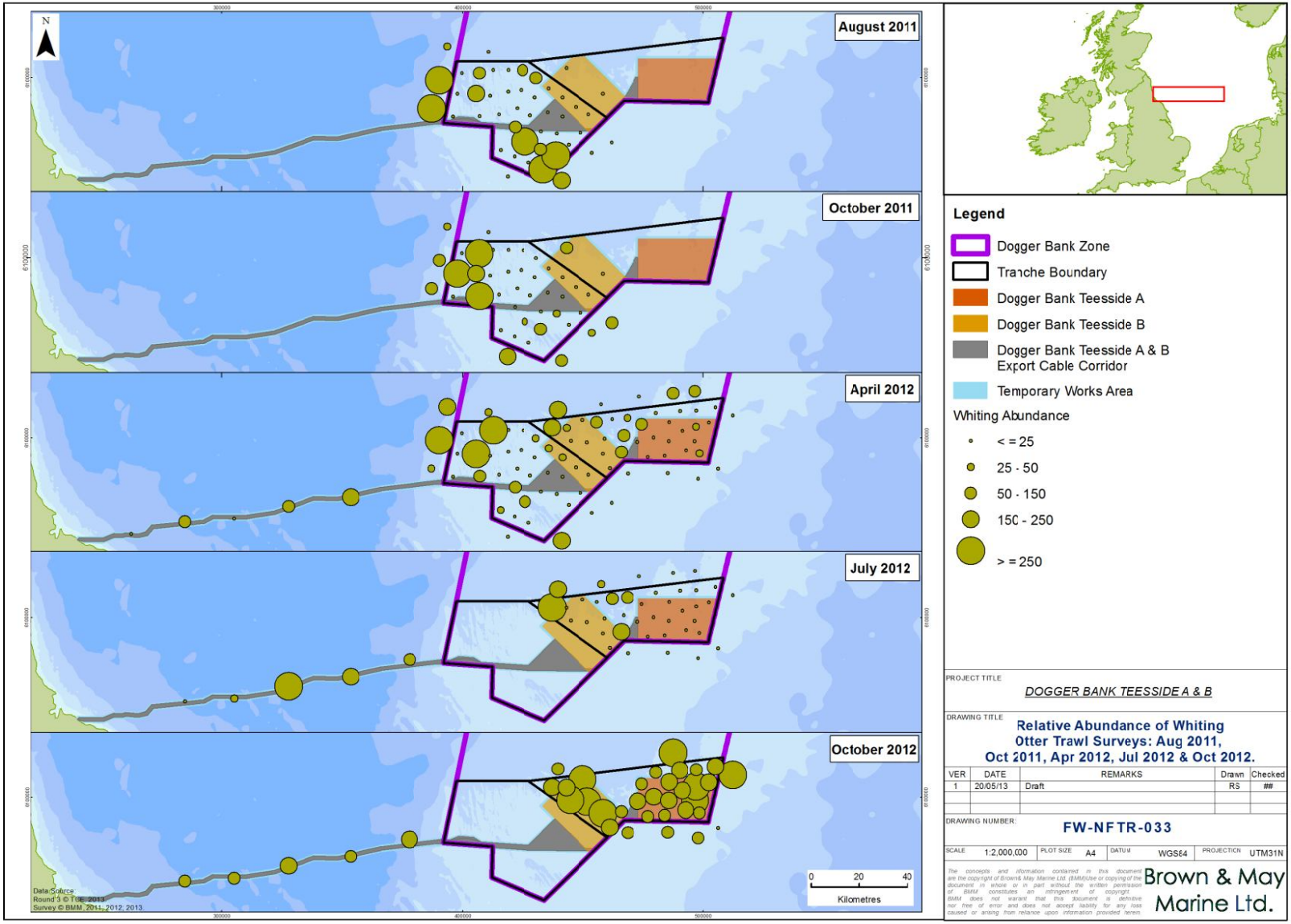

Figure 6.24 Seasonal Distribution of Whiting within tranches A and B and along the Dogger Bank Teesside A & B Export Cable Corridor

6.1.8 Cod

6.1.8.1 General

180. Cod feed mainly on copepods when young, becoming increasingly dependent on fish as they age, preying on herring, poor cod, haddock and even other cod (Wilding and Heard 2004, Wheeler 1978, Arnett and Whelan 2001).

6.1.8.2 Distribution

181. Cod is widely distributed in the North Sea (Heessen 1993), being found from shallow coastal waters to the shelf edge (200m depth) and even beyond (ICES 2005) (**Figure 6.25**). South of the Dogger Bank, adult cod are thought to migrate southward for spawning during autumn and north again to feeding grounds in the spring (ICES 2005).

6.1.8.3 Life History

182. The distribution of spawning and nursery grounds for cod is illustrated in **Figure 6.26**.Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor fall within defined low intensity spawning grounds for this species.

183. The distribution of stage I cod eggs derived from the first ichthyoplankton survey (Fox *et al.,* 2008) to cover the whole North Sea, undertaken in 2004, is illustrated in **Figure 6.27**. As shown, Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor are located at considerable distance from areas of high cod egg production. This was also the first survey to make extensive use of DNA-based molecular methods to identify early developmental stage cod eggs. Fox *et al.,* (2008) compared the findings of the ichtyoplankton survey with estimated egg production inferred from the distribution of mature cod in contemporaneous trawl surveys and found that hot spots of cod egg production were located around the southern and eastern edges of the Dogger Bank, in the German Bight, the Moray Firth and to the east of the Shetlands. Significant numbers of cod eggs at the historic spawning ground off Flamborough (northeast coast of England) were not found. The results suggest that most of the major spawning grounds of cod in the North Sea are still active but that some localised populations may have been reduced to the point where it is now difficult to detect the presence of eggs in the plankton (Fox *et al.,* 2008).

6.1.8.4 Exploitation

184. As suggested by landings data, cod is, in general terms, of secondary commercial importance in the Wind Farm Study Area (See **Table 5.13**,

185.

186. Table 5.14 and **Chapter 15 Commercial Fisheries***)*. Landings for this species are, however, of relative importance in the Export Cable Study Area, particularly in rectangles 38E8 and 38E9 (**Table 5.15** and **Table 5.16**).

6.1.8.5 Management

187. ICES has advised that landings of cod in the North Sea, Eastern Channel and Skagerrak should not exceed 25,441 tonnes in 2013. There has been a gradual improvement in the status of the stock over the last few years but the North Sea stock is classified as suffering from reduced reproductive capacity and depleted to a level at which productivity is impaired. Recruitment since 2000 has been poor (ICES 2012).

6.1.8.6 Site Specific Information

188. Cod was among the principal species caught in the otter trawl surveys in tranche A but relatively few individuals were recorded in tranche B and along the Export Cable Corridor (**Figure 6.28**). Cod were also captured during trammel net surveys (**Table 5.9**).

6.1.8.7 Conservation status

189. As shown in **Table 5.20**, cod is listed as a UK BAP priority species. In addition, they are included in the OSPAR list of threatened and/or declining species. The IUCN defines the status of the species as “Vulnerable”.

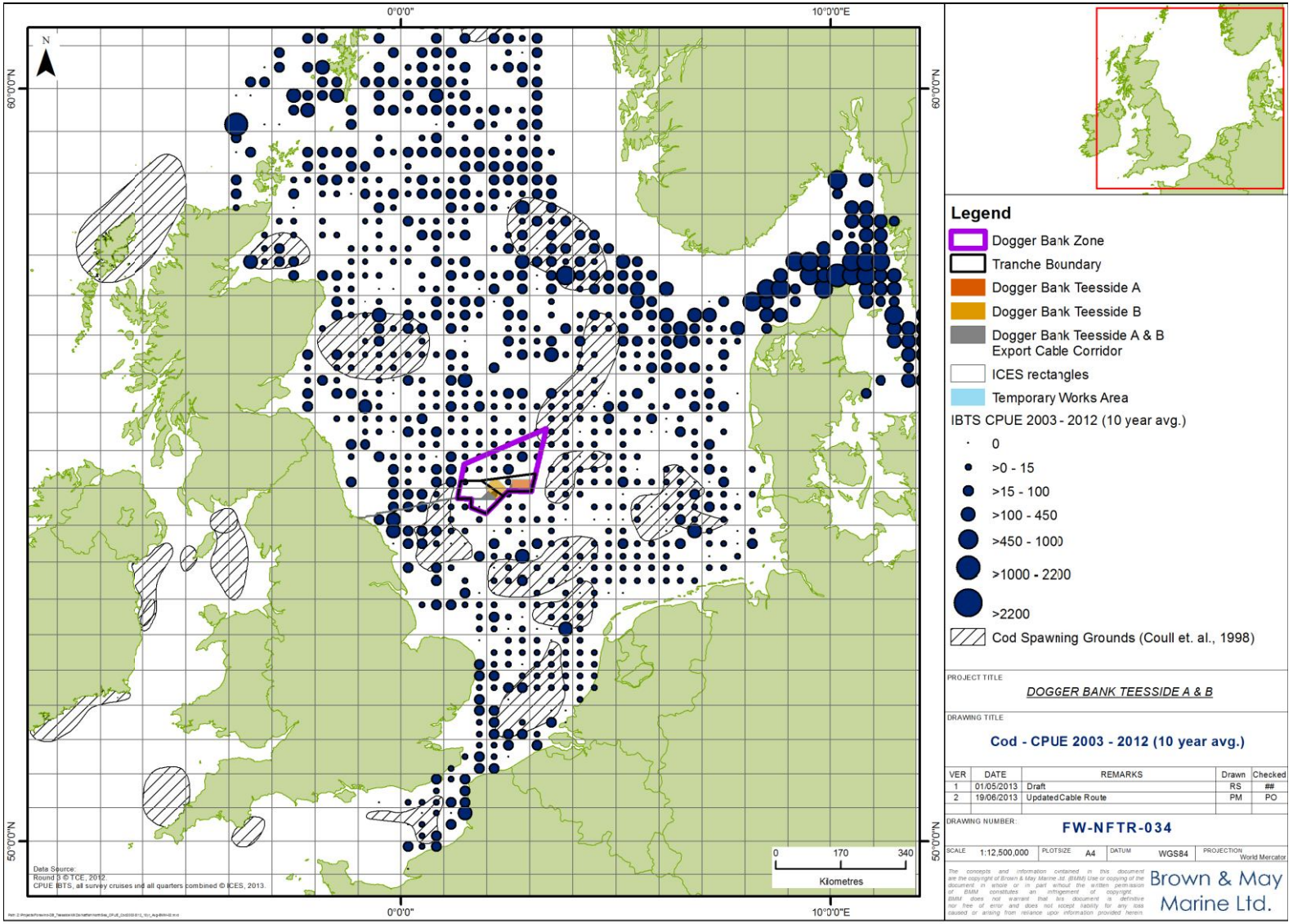

Figure 6.25 Average number (catch per standardised haul) of Cod from IBTS survey data 2003-2012

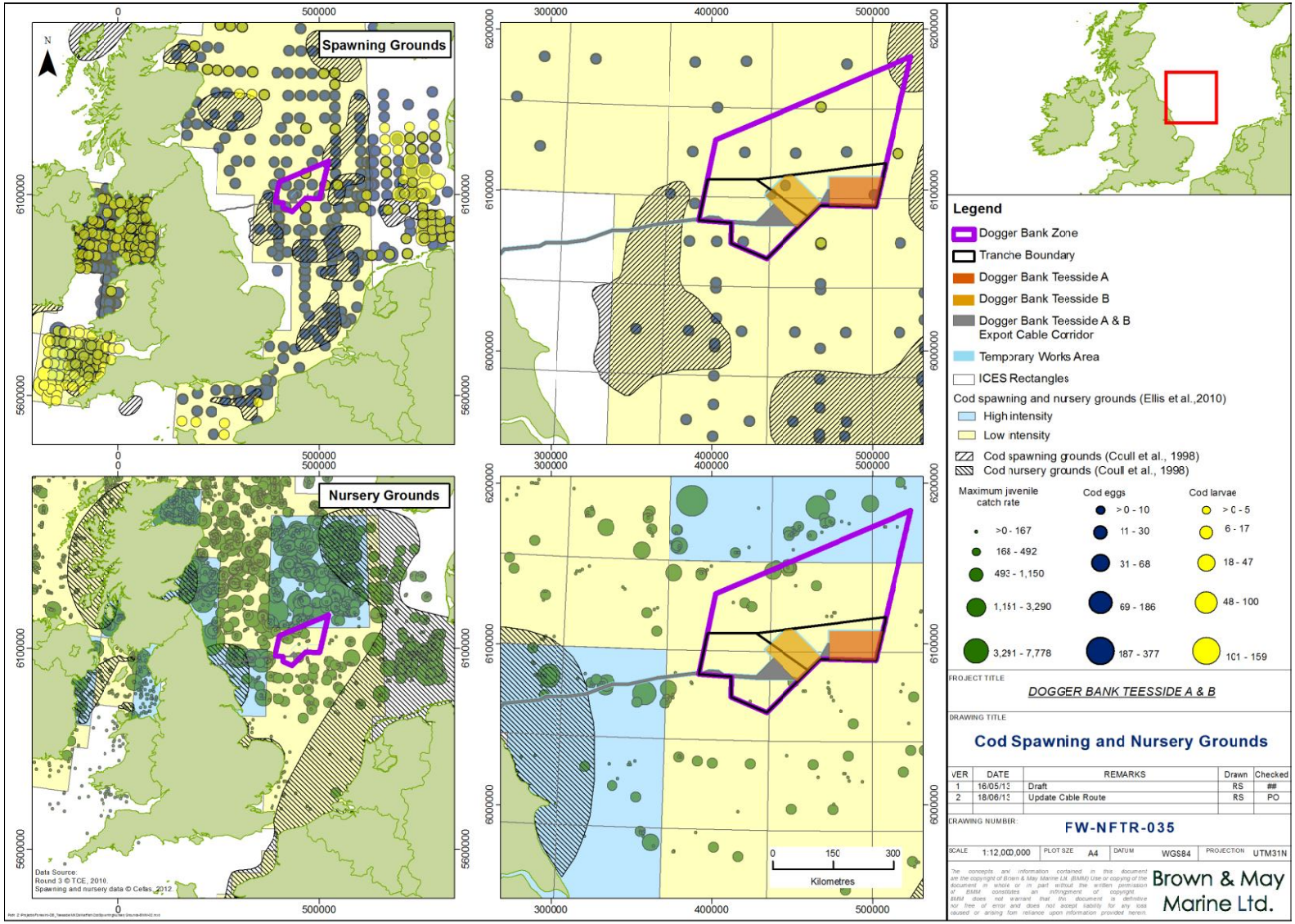

Figure 6.26 Cod Spawning and Nursery Grounds (Modified from Ellis *et al.*, 2010 and Coull *et al.*, 1998)

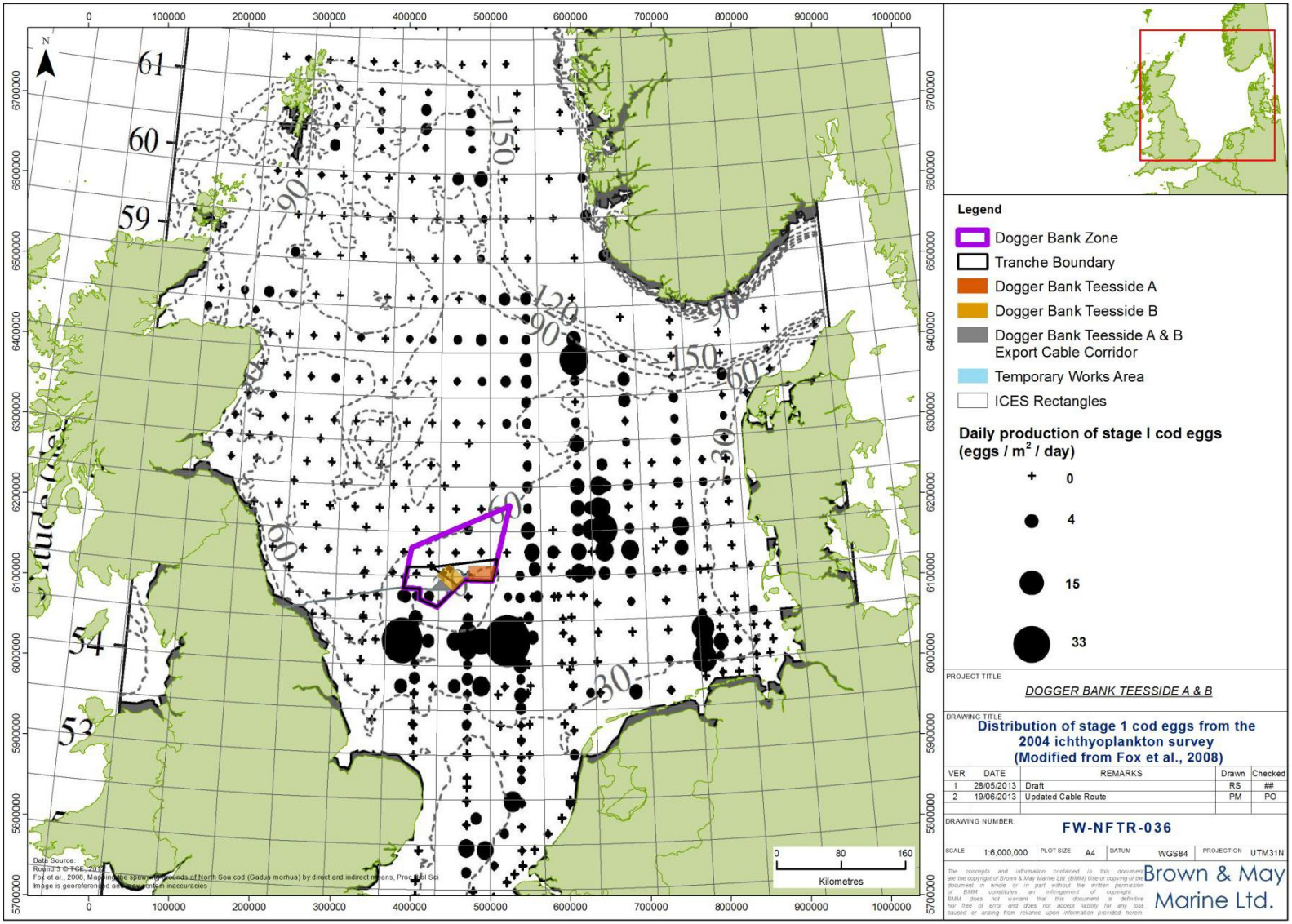

Figure 6.27 Distribution of Stage I Cod Eggs from the 2004 Icthyoplankton Surveys (modified from Fox *et al.*, 2008)

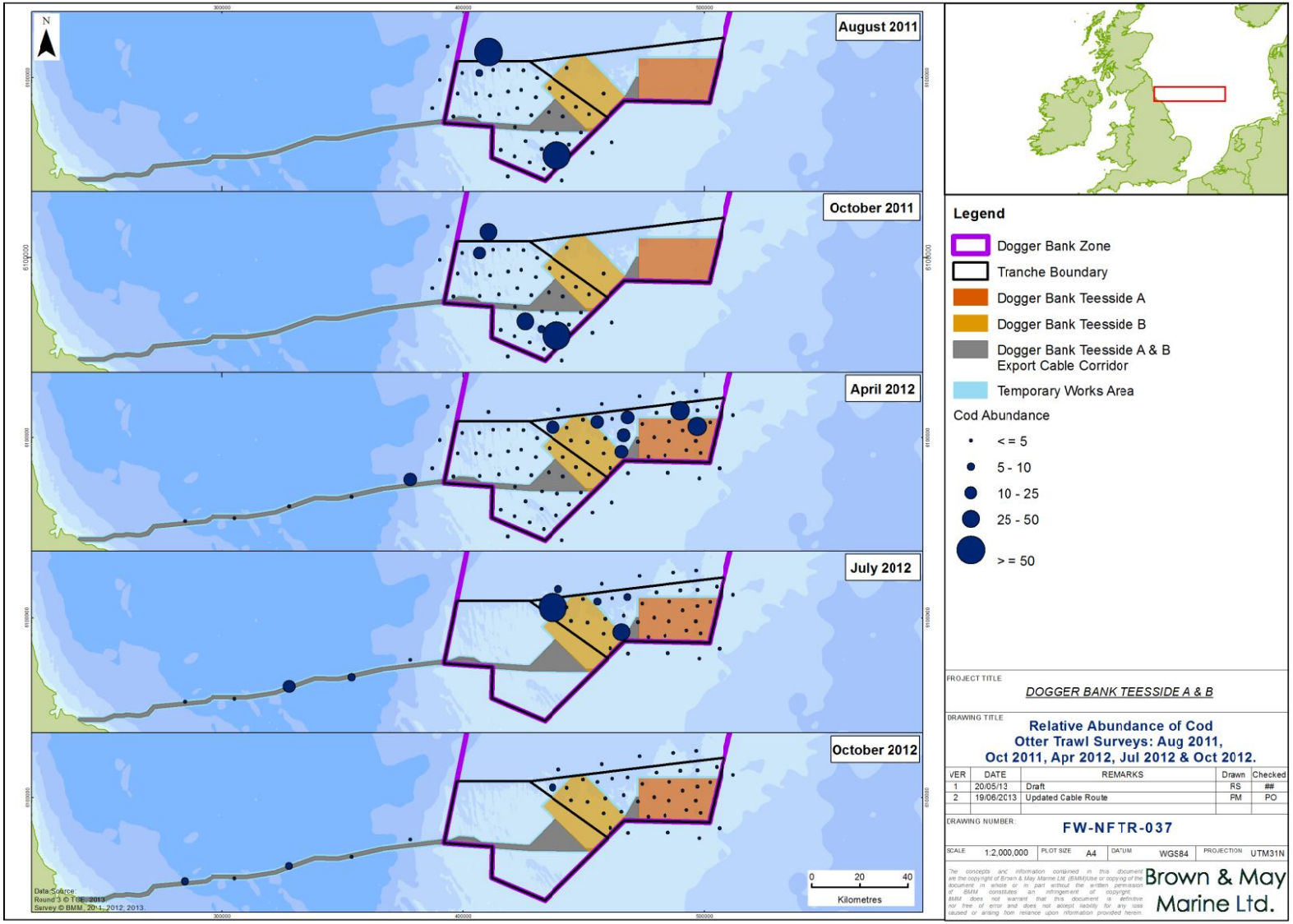

Figure 6.28 Seasonal Distribution of Cod within tranches A and B and along the Dogger Bank Teesside A & B Export Cable Corridor

6.1.9 Turbot

6.1.9.1 General

190. Turbot are visual feeders and mainly feed on other benthic fishes and small pelagic species(ICES 2011a) including sandeels, sprat, herring, whiting, pouting *Trisopterus luscus* and less often other flatfish species, dragonets and gobies (Wheeler 1987).

6.1.9.2 Distribution

191. Turbot is most usually associated with sandy, gravel or shell gravel and occasionally muddy substrates or areas of mixed sand and rocks (Walters 2008) from 20m to 800m. They are distributed throughout the North Sea and occur within the Dogger Bank Zone Project area as shown in **Figure 6.29**. They are generally considered sedentary, although there are some indications of migratory patterns.

6.1.9.3 Life History

192. In the North Sea, migrations from the nursery grounds in the south-eastern part to more northerly areas have been recorded. Adult turbot are more tolerant of the colder conditions in the northern areas of the North Sea where temperatures are too low for juveniles to survive (ICES 2011a).

6.1.9.4 Exploitation

193. Turbot are a valuable by-catch in the fishery for flatfish and demersal species (ICES 2011a). The highest landings for this species are recorded in rectangle 38F2 (**Table 5.13** and

194.

195. **Table** 5.14) where Dogger Bank Teesside A & B are located. In addition to occurring as by catch from mixed flat fish fisheries prosecuted by demersal towed gear fisheries, turbot are also targeted directly by Danish vessels operating gill nets (*See Appendix 15: Commercial Fisheries Technical Report*).

6.1.9.5 Management

196. ICES have advised for 2012 and 2013 on the basis of precautionary consideration that catches should not increase (ICES 2012a).

6.1.9.6 Site Specific Information

197. Turbot were found in low numbers in the otter trawl surveys carried out in tranches A and B. However, as suggested in Section 5.4, they are of commercial

importance in the Wind Farm Study Area where they record the second highest landings by value after plaice.

6.1.9.7 Conservation status

198. Turbot is not listed for conservation status.

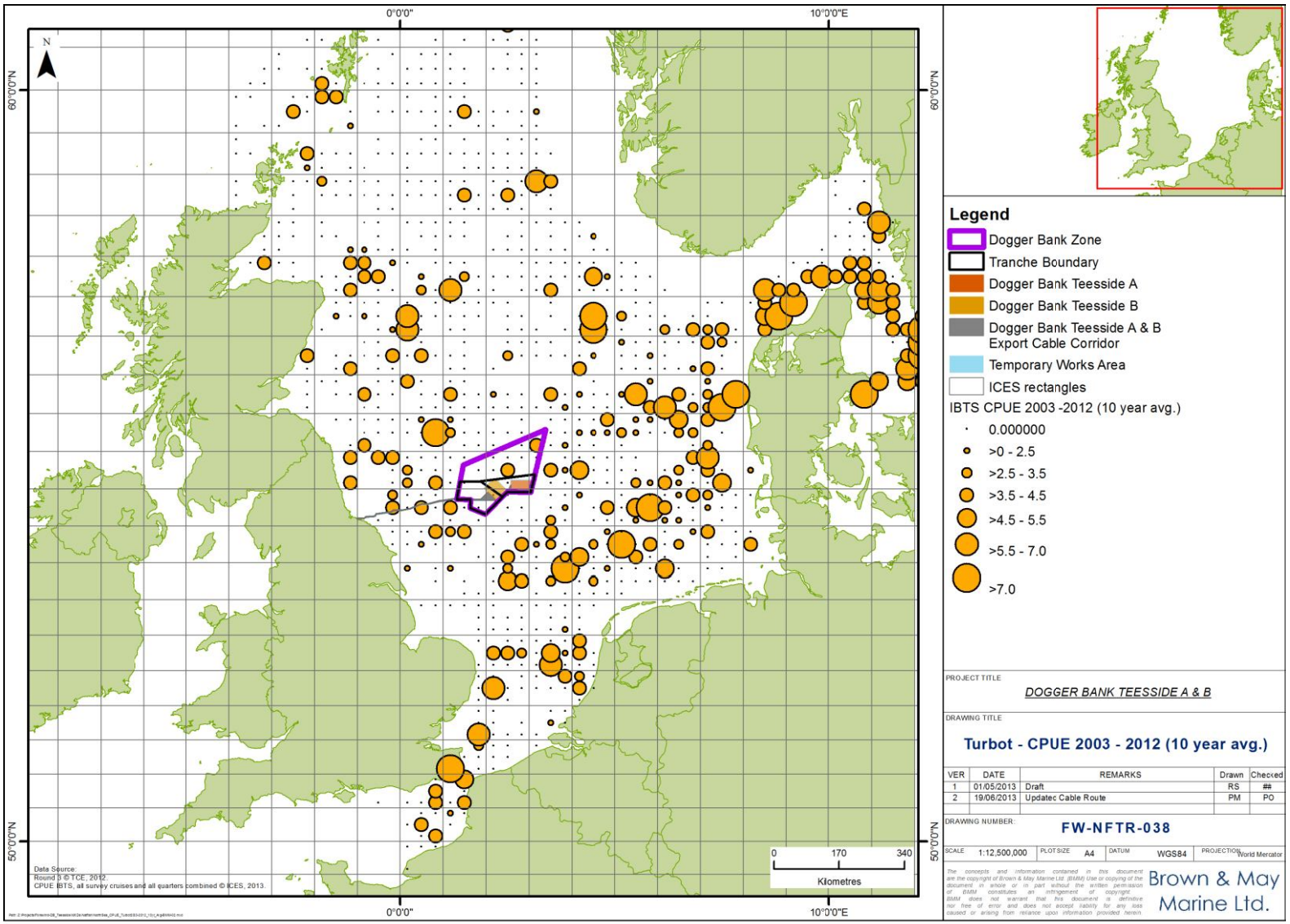

Figure 6.29 Average number (catch per standardised haul) of Turbot from IBTS survey data 2003-2012

6.1.10 Other demersal Species

6.1.10.1 Haddock

199. Haddock are demersal fish which shoal in colder waters at depths 40-300m. They can be found over rock, sand, gravel or shells (Barnes 2008c). In the North Sea, the bulk of haddock is found in the northerly areas. The southern distribution border extends from north-east England, along the Dogger Bank, to Skagerrak and Kattegat and closely follows the 50m depth contour (ICES 2005). They mainly feed on brittlestars, worms and molluscs although occasionally they eat small fish such as sandeels (Wheeler 1978).

200. They were recorded in relatively low numbers in the otter trawl surveys carried out in tranches A and B. As shown in Section 5.4, haddock are, however, amongst the principal fish species landed by weight and to a lesser extent by value in the Wind Farm Study and Export Cable Study Area. Haddock is a specific target for some fleets, although it is also caught as part of a mixed fishery catching cod, whiting and *Nephrops* (ICES 2012a).

201. ICES has advised (June 2012), on the basis of the EU-Norway management plan, that landings of North Sea haddock should not be more than 47,811 tonnes in 2013 (ICES 2012a).

6.1.10.2 Angler Fish

202. Anglerfish *Lophius piscatorius* occur in coastal waters all around Britain and Ireland, being most common on the west coast of England, Wales and Scotland and north, south and east coasts of Ireland (Reeve 2008). Relatively few anglerfish were recorded by IBTS surveys in the central and southern sectors of the North Sea and few fish were caught in the Project area (**Figure 6.30**). They are found on sandy, shell or gravel substrates being less frequently found on muddy or rough grounds and generally feed on smaller fish (Wheeler 1978).

203. Spawning takes place in spring and early summer (Wheeler 1978). It appears to occur mainly in deep water off the edge of the continental shelf, although mature females are rarely encountered (ICES 2012b). The area of Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor fall within the broad low intensity nursery grounds defined for this species (Ellis *et al.,* 2010). The distribution of these is shown in **Figure 6.31.**

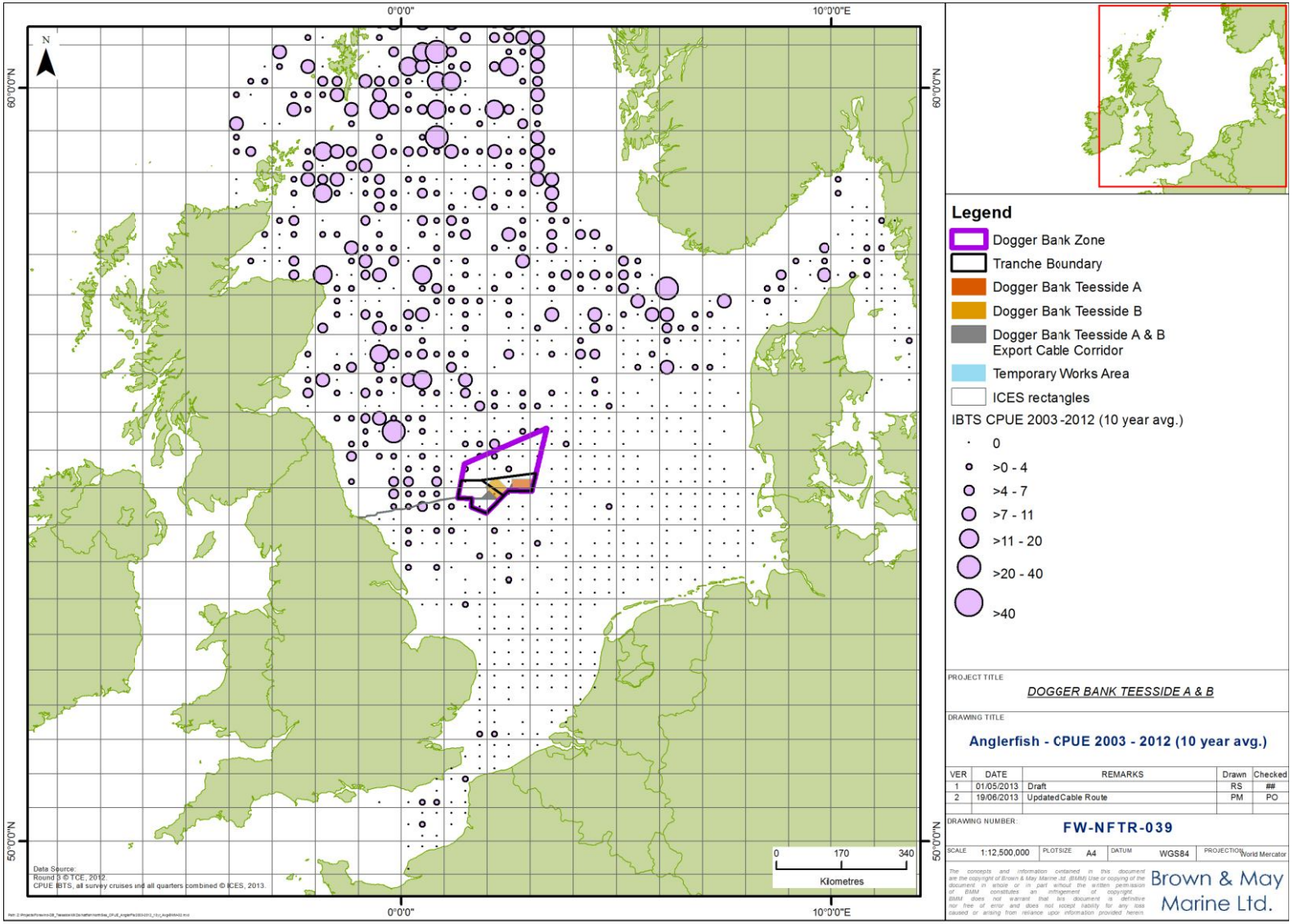

Figure 6.30 Average number (catch per standardised haul) of Anglerfish from IBTS survey data 2003-2012

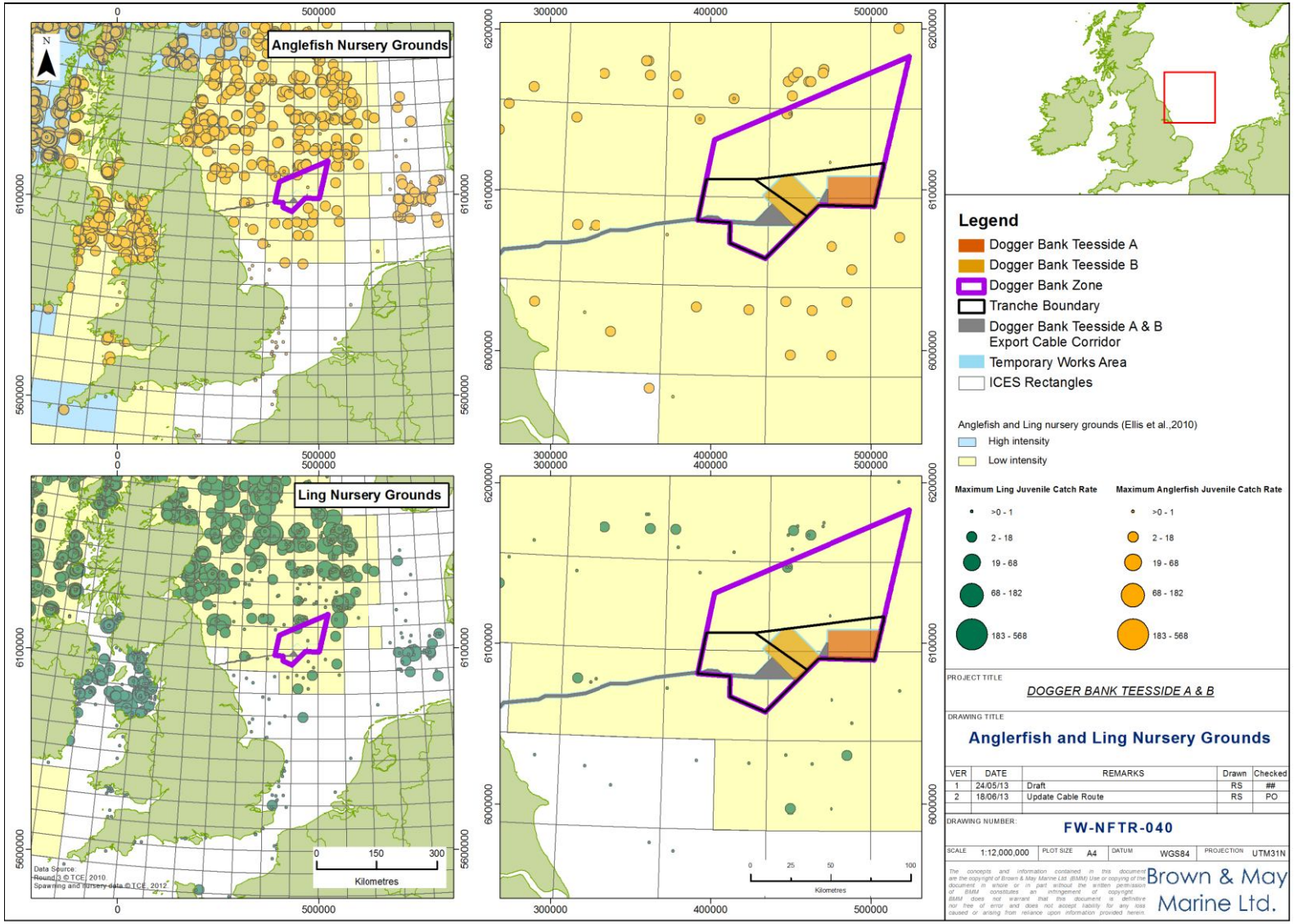

Figure 6.31 Distribution of Anglerfish and Ling Nursery Grounds (Ellis *et al.*, 2010)

204. In the North Sea, anglerfish are mainly caught as bycatch in demersal fisheries for mixed roundfish and *Nephrops* (ICES 2012b). As shown in Section 5.4, they record relatively low landings weights and values in the Wind Farm and Export Cable Study Areas. They were found in comparatively low numbers in the August 2011 otter trawl surveys carried out in Tranche A and were recorded in all otter trawl surveys conducted in Tranche B.

205. As shown in **Table 5.20,** they are of conservation interest being listed as UK BAP species.

6.1.10.3 Ling

206. Ling *Molva molva* is mainly a deep-water fish, being most abundant at depths of 300-400m and on rocky substrates (Wheeler 1978). Juveniles, and occasionally adults, are however found in shallow waters (Rowley 2008).

207. Ling are primarily piscovorous feeding on a variety of species including Norway pout, cod, blue whiting *Micromesistius poutassou* and herring. Invertebrates such as large crustaceans may also be consumed less frequently . Spawning occurs between March and August at depths of 100m to 300m. The principal spawning grounds are found to the North of the British Isles (Wheeler 1978, Rowley 2008). As illustrated in **Figure 6.31**, Dogger Bank Teesside A & B and the offshore section the Dogger Bank Teesside A & B Export Cable Corridor fall within the broad nursery grounds defined for this species (Ellis *et al.,* 2010).

208. Ling were found in very low numbers in the otter trawl surveys carried out in Tranche A. MMO landings data (Section 5.4) suggests the species is of little commercial importance within either the Wind Farm or Export Cable Study Areas.

209. As shown in **Table 5.20** ling is currently listed as UK BAP species.

6.1.10.4 Blue Whiting

210. Blue whiting is a bentho-pelagic species found off northern Scotland, in the North Sea and off the southern and western coasts of Ireland and the British Isles (Barnes 2008d). Spawning generally takes place along the shelf edge and on banks west of the British Isles. Juveniles are also widely distributed, with the main nursery area believed to be in the Norwegian Sea (ICES 2011 Book 9 advice). Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor fall within the broad low intensity nursery grounds defined for this species (**Figure 6.32**). Blue whiting feeds primarily on crustaceans and it is important as prey for a larger fish species such as ling, cod, hake and deep water sharks (Wheeler 1978). In addition, as shown in **Table 5.20**, it is of conservation interest, being listed as a UK BAP species.

211. Blue whiting are not of commercial importance in the Wind Farm and the Export Cable Study Areas. This species is, however, commercially targeted both for human consumption and industrial purposes in other areas (i.e. south of the Faroes, west of Scotland and around the Porcupine Bank) (ICES 2011 Book 9). This species was not recorded in either the otter trawl surveys or in the pelagic survey.

6.1.10.5 Hake

212. Hake are usually found at depths of 70-350m, feeding alone on the seabed, or in shoals in the water column (Barnes 2008e). They may, however, be found in shallower waters in the summer. They primarily feed on fish and squid with crustaceans also being an important dietary component, particularly for young fish (Wheeler 1978).

213. Spawning takes place in spring and summer at depths of around 200m. The eggs and larvae then drift into inshore waters, where juvenile fish remain during their first year of life (Wheeler 1978). As shown in **Figure 6.32**,Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor fall within low intensity nursery grounds defined for this species (Ellis *et al.,* 2010).

214. Hake were found in very low numbers in the otter trawl surveys carried out in tranches A and B. As suggested by MMO landings data (Section 5.4) hake are of secondary importance in the Wind Farm Study Area (**Figure 4.1**), with the landings by value and weight being comparatively low (**Table 5.13** and **Table 5.14**) The majority of the landings of hake within the Wind Farm Study Area are recorded in ICES rectangles 38F2 and 39F2.

215. Hake is of conservation interest, being listed as a UK BAP species (**Table 5.20**).

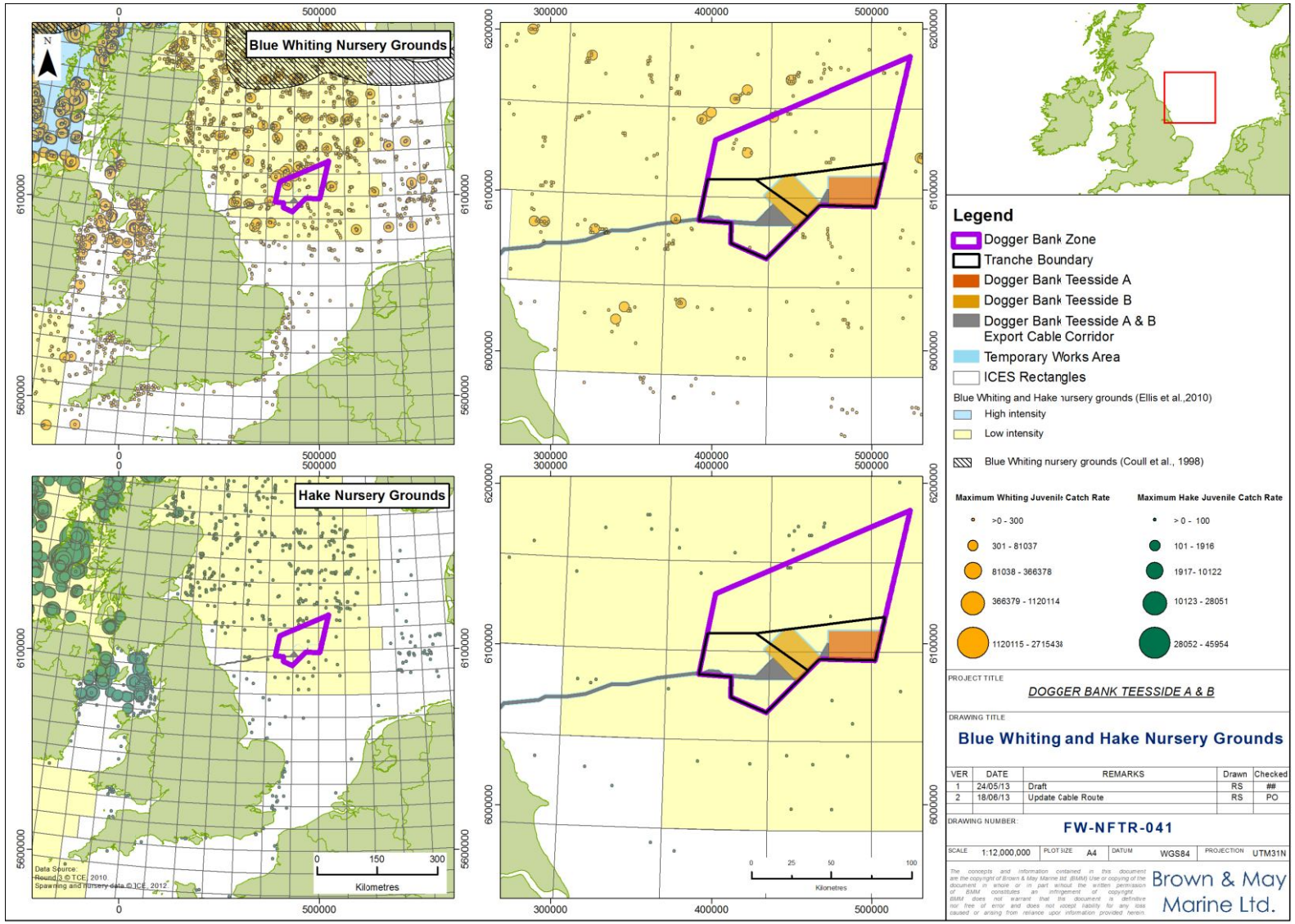

Figure 6.32 Distribution of Blue Whiting and Hake Nursery Grounds (Ellis *et al.,* 2010)

6.1.11 Non–Commercial Species

216. In addition to the species above, non-commercial demersal species such as solenette and gobies constitute an important component of the fish assemblage of Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor. These were among the principal species found in the 2m beam trawl surveys carried out in tranches A and B (**Table 5.5** and **Table 5.6**).

217. Solenette are common on sandy substrates, offshore in depths of 5m to 40m (Wheeler 1978, Ruiz 2007d). They are principally present in waters moderately influenced by estuaries, being rare in very estuarine and shallow waters (Amara *et al.,* 2004). They feed on small, bottom-living animals, particularly small crustaceans and worms, but also molluscs and fish (Ruiz 2007b, Amara *et al.,* 2004). Spawning takes place in the summer and both the eggs and larvae are pelagic (Wheeler 1978).

218. An indication of the seasonal distribution of solenette in Dogger Bank Teesside A & B and along the Dogger Bank Teesside A & B Export Cable Corridor is given in **Figure 6.33,** based on catch (catch rates) by sampling station recorded in the 2m beam trawl surveys carried out in tranches A and B (**Table 5.6**).

219. A number of species of goby were recorded in the area during the beam trawl survey including sand goby *Pomatochistus minutus*, painted goby *Pomatochistus pictus* and transparent goby *Aphia minuta*. Of these, sand goby and painted goby were the species found in greatest numbers (**Table 5.5** and **Table 5.6).**

220. Sand goby are abundant along all British coasts and are found on sandy or muddy substrates, generally at depths of about 20m (Riley 2007).The species was one of the most abundant recorded in Tranche A, Tranche B and along the Dogger Bank Teesside A & B Export Cable Corridor (**Table 5.5** and **Table 5.6**) . They move into deeper waters in the winter and spawn from March to July. Females lay their eggs in empty bivalve shells where they are guarded by the male (Wheeler 1978, Hamerlynck and Catrijsse 1994). Sand goby are important prey for many demersal fish (ICES 2005), being consumed by 0-group gadoids and a number of other species including bullrout *Myoxocephalus scorpius*, pouting and bass *Dicentrarchus labrax* (Hamerlynck and Catrijsse 1994). They are also preyed upon by sea birds such as terns (Hamerlynck and Catrijsse 1994, Wheeler 1978). In addition, sand goby are of conservation interest, being protected under the Bern Convention, Appendix III. They primarily feed on small crustaceans, particularly copepods, amphipods and brown shrimps (Wheeler 1978).

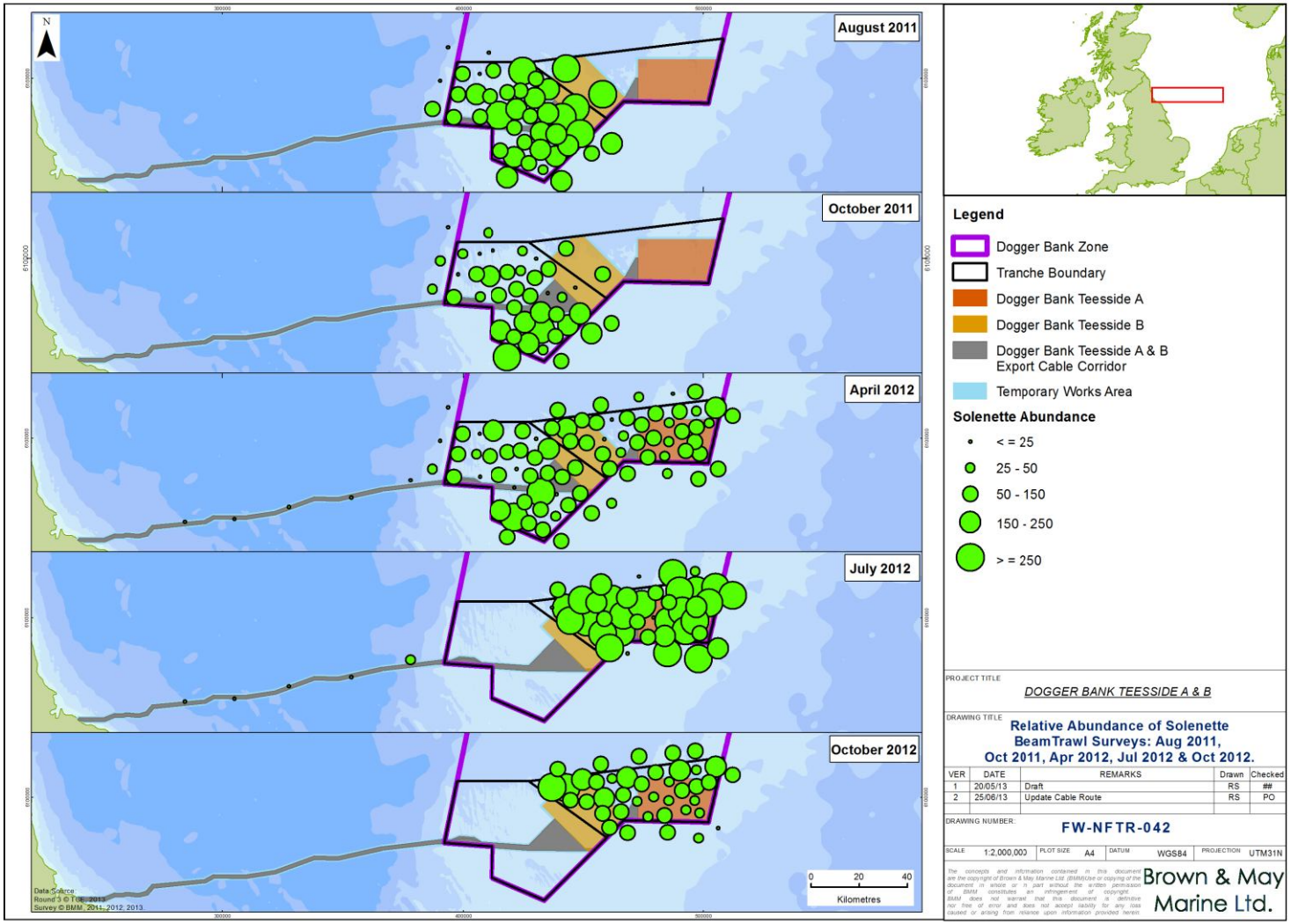

Figure 6.33 Relative Distribution of Solenette in Beam Trawl Samples

221. Painted goby are found in inshore waters up to 50m depth. They are generally found on gravel, shell or coarse sand mixed with shells and stones. Spawning takes place from April to July, and as described above for sand gobies, eggs are laid on bivalve shells and guarded by the male (Wheeler 1978).

222. Other non-commercial fish species found in the 2m beam trawl surveys include scaldfish, lesser weever, pogge *Agonus cataphractus* and common dragonet *Callionymus lyra*. For a full list of fish species recorded in these surveys, see **Table 5.5** and **Table 5.6**.

6.2 Pelagic Species

6.2.1 Herring

6.2.1.1 General

223. Herring is numerically one of the most important pelagic species in the North Sea and this species has been intensively exploited for several centuries.

224. As previously mentioned, herring are important prey not only for piscivorous fish but also for marine mammals and seabirds (Section**.5.7**), they mainly feed on Calanoid copepods during their early juvenile life, and also consume euphausids, hyperiid amphipods, juvenile sandeels, sea-squirts (*Oikopleura spp*.) and fish eggs. Larger herring predominantly consume copepods in conjunction with small fish, arrow worms and ctenophores (ICES 2005). Herring move to the central and northern North Sea to feed in spring (Corten 2001).

6.2.1.2 Distribution

225. Herring are widely distributed throughout the Northwest and Northeast Atlantic. Herring occur throughout the North Sea but 1-group herring are generally restricted to within the 100m depth contour. Adult fish are found mostly on the continental shelf to depths of 200m. The distribution of herring from IBTS surveys is shown in **Figure 6.34**.

226. Juvenile herring are found along the east coast of England, down to The Wash, and also off the west coast of Denmark (ICES 2010b). They generally remain for up to two years in nursery areas before joining adult fish migrations (ICES 2010b).

6.2.1.3 Life History

227. Herring are substrate specific spawners. They produce benthic eggs which are attached to gravely substrate on the seabed. Spawning typically occurs on coarse gravel (0.5-5cm) to stone (8-15cm) substrates and often on the crest of a ridge rather than hollows. As a result of the requirement for a very specific substrate, spawning occurs in small discrete areas (ICES 2010b).

228. The distribution of herring spawning and nursery grounds in relation to the location of Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B

Export Cable Corridor is shown in **Figure 6.35** as defined in Ellis *et al.,* (2010). Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor fall within broad low intensity herring nursery grounds, as defined in Ellis *et al.,* (2010). As shown, the Dogger Bank Teesside A & B Export Cable Corridor falls within the defined Flamborough coastal herring spawning grounds. In addition, herring grounds have been defined in the vicinity of Dogger Bank Teesside A & B in the Dogger Bank area (**Figure 6.35**). It should be noted, however, that these offshore grounds are now considered to be former (historic), with herring spawning being currently confined to small areas along the English east coast, from the Farne Islands to the Dowsing area, from August to October (ICES 2010b).

229. The distribution of sediment types based on PSA of grab samples collected along the Dogger Bank Teesside A & B Export Cable Corridor during the benthic survey is shown in **Figure 6.36**. As shown in the majority of stations in the Dogger Bank Teesside A & B Export Cable Corridor the substrate was characterised by the presence of fine sediment classes, including areas which overlap with areas defined as herring spawning grounds. It is, however, recognised that coarser substrate suitable for herring spawning may be available in the inshore section of the Dogger Bank Teesside A & B Export Cable Corridor, where sediment samples were not collected. As illustrated in **Figure 6.37,** where the distribution of sediment types in the active inshore herring grounds in the area relevant to the Dogger Bank Teesside A & B Export Cable Corridor is shown, suitable coarse substrates for spawning herring (gravelly sand and sandy gravel) are widespread within the spawning grounds defined in Coull *et al.* (1998). The coarser sediments, most likely preferred by spawning herring, are located close inshore, along the Dogger Bank Teesside A & B Export Cable Corridor but also in the wider area.

230. The distribution of substrate sediment types over the former Dogger Bank herring spawning grounds and the wider North Sea is given in **Figure 6.38**. As shown, some sections of the defined spawning grounds overlap with areas of coarse sediment (gravel, sandy gravel, gravelly sand). It should be noted that these types of substrate are available in other areas of the North Sea, where spawning grounds have not been defined for herring, and that the sole presence of adequate coarse sediment may not necessarily imply that herring will use a given area for spawning.

231. An indication of the spatial distribution of sediment types within tranches A and B, derived from the results of PSA of grab samples collected during the benthic survey is given in **Figure 6.39**. As shown, samples of coarse sand (with a relatively high percentage of gravel) were found mainly in the western section of Tranche A and in the northern section of Dogger Bank Teesside B. However, the majority of samples collected with Dogger Bank Teesside A & B, were characterised by the presence of finer sediment classes.

6.2.1.4 IHLS and IMARES larval surveys

232. The spawning grounds of the Banks herring in the North Sea are surveyed annually as part of the IHLS. The distribution of herring larvae recorded in 3rd quarter IHLS surveys conducted in each year between 2002 and 2011 is given in **Figure 6.40** to **Figure 6.48.** As shown, the inshore section of the Dogger Bank Teesside A & B Export Cable Corridor falls in an area where relatively high herring larval densities may be present.

233. Given the current lack of spawning activity in the grounds around the Dogger Bank, ICES rectangles in the vicinity of the Project area are not routinely surveyed as part of the IHLS. In 2007, however, after anecdotal reporting of spawning on these grounds, the Netherlands extended their IHLS stations grid towards the Dogger Bank. No larvae were found in the area (Schmidt *et al.,* 2008) as shown in **Figure 6.45.**

234. The Dogger Bank area was also sampled in 2011 by IMARES as part of a monthly ichthyoplankton survey (van Damme *et al.,* 2011). The distribution of yolk sac herring larvae recorded in this survey is given in **Figure 6.49**. As shown, no herring larvae were found in the area and there was no evidence of re-colonisation of the Dogger Bank spawning grounds.

235. Based on the results of ICES larval surveys, the Dogger herring have largely disappeared.

6.2.1.5 Exploitation

236. Herring landings are low in the Wind Farm and Export Cable Corridor Study Area and this species is not ranked amongst the main species in terms of either landings or catch value.

6.2.1.6 Management

237. The North Sea herring stock collapsed in the late 1970's. The initial recovery was almost entirely due to an increase in biomass of the Orkney/Shetland herring sub-stock. In recent years, however, larval abundance appears to have been more significant in the Downs sub-stock, which has produced the majority of herring larvae in the North Sea (Schmidt *et al.,* 2009). Overall, recruitment in the North Sea has been low in recent years. This is thought to be related to a decrease in survival rates during the larval overwintering phase associated with contemporary warming of the North Sea and changes in the plankton community (Payne *et al.,* 2009).

238. The North Sea herring stock is divided into four main "races" on the basis of the areas used for spawning. The component relevant to Dogger Bank Teesside A & B and the Dogger Bank Teesside A & B Export Cable Corridor is the Banks or Central North Sea herring.

239. ICES currently classify the North Sea stock as being at full reproductive capacity and harvested sustainably. The stock is however still considered to be in a low productivity phase (ICES 2012a).

6.2.1.7 Site Specific Information

240. The pelagic fish survey undertaken in the Dogger Bank former grounds in September 2011 as part of the baseline characterisation for tranches A and B, found no evidence of spawning herring in the area. The majority of the herring caught in this survey were juvenile fish.

241. As previously mentioned, in the pelagic survey, herring were found in some numbers, with the majority of the catch being recorded in Transect C and characterised by the presence of juvenile fish. They were also recorded, although in small numbers, in the three otter trawl surveys carried out, particularly in stations located along the Dogger Bank Teesside A & B Export Cable Corridor.

6.2.1.8 Conservation status

242. Herring is of conservation interest, being listed as a UK BAP priority species (**Table 5.20**).

243. Herring are regarded as a species that are sensitive to anthropogenic noise disturbance and deposition of their eggs in dense mats on the seabed makes this species particularly susceptible to activities such as offshore oil and gas industries, marine aggregate extraction and eutrophication (ICES 2012).

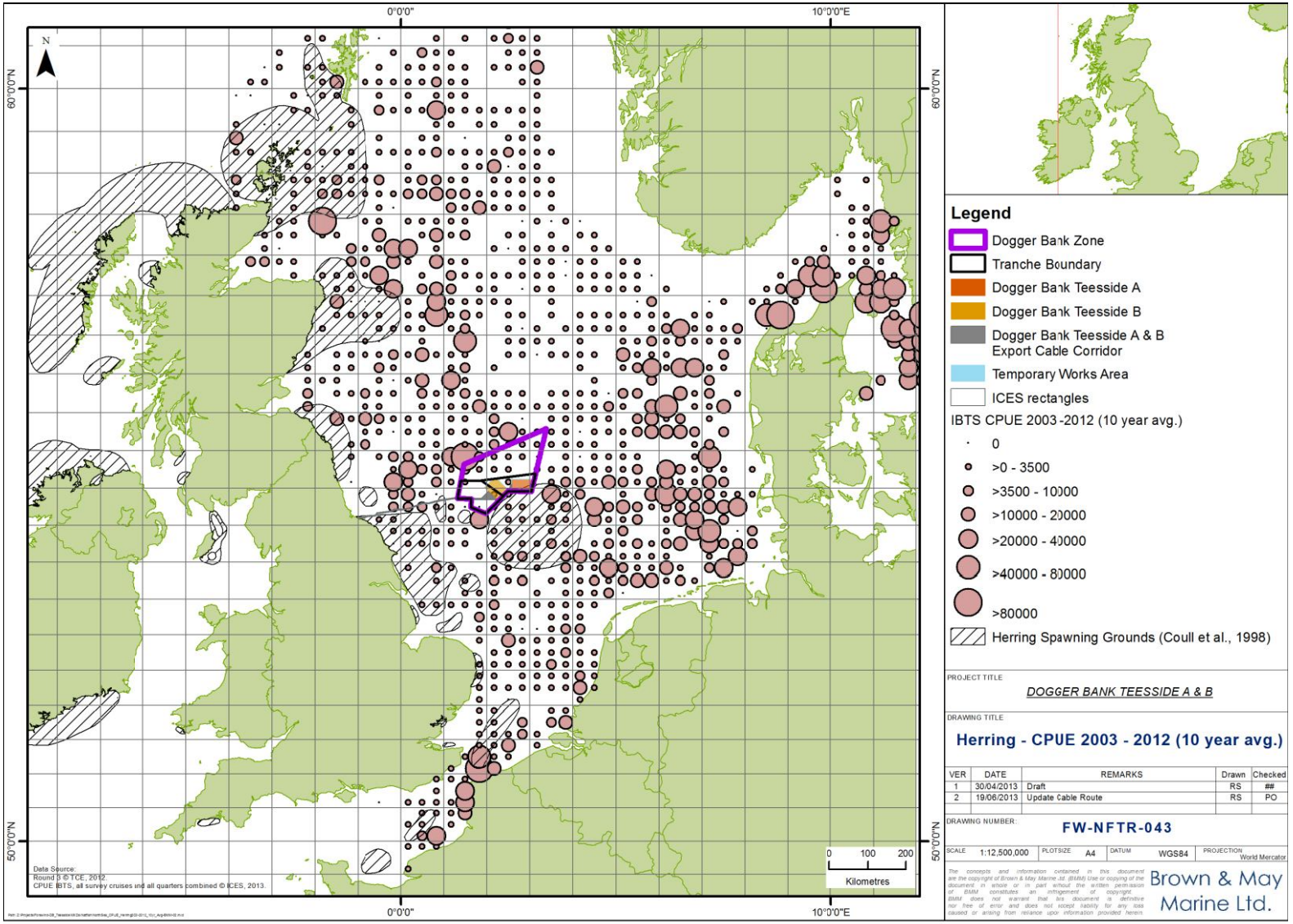

Figure 6.34 Average number (catch per standardised haul) of Herring from IBTS survey data 2003-2012

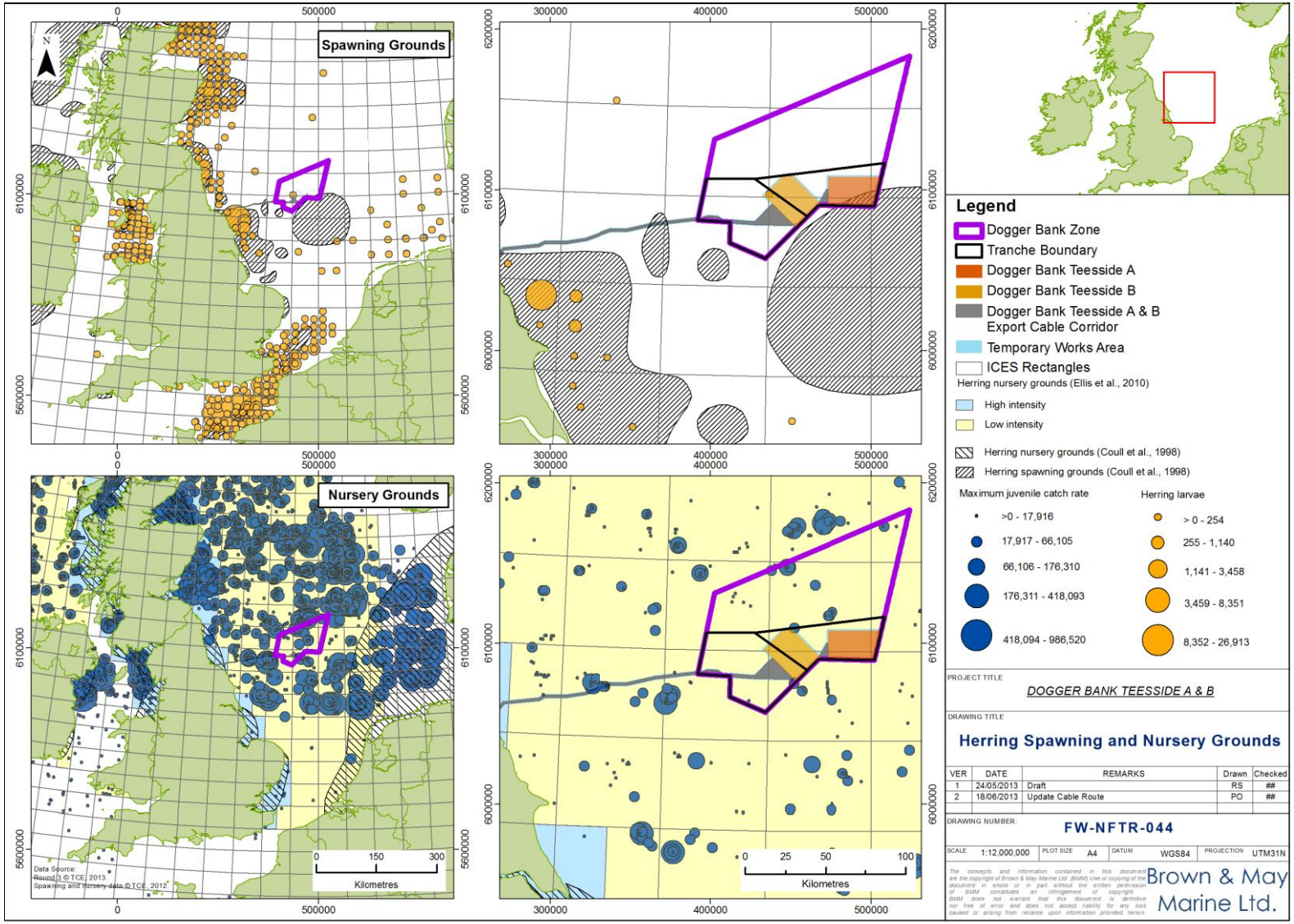

Figure 6.35 Distribution of Herring Spawning and Nursery Grounds (Ellis *et al.*, 2010)

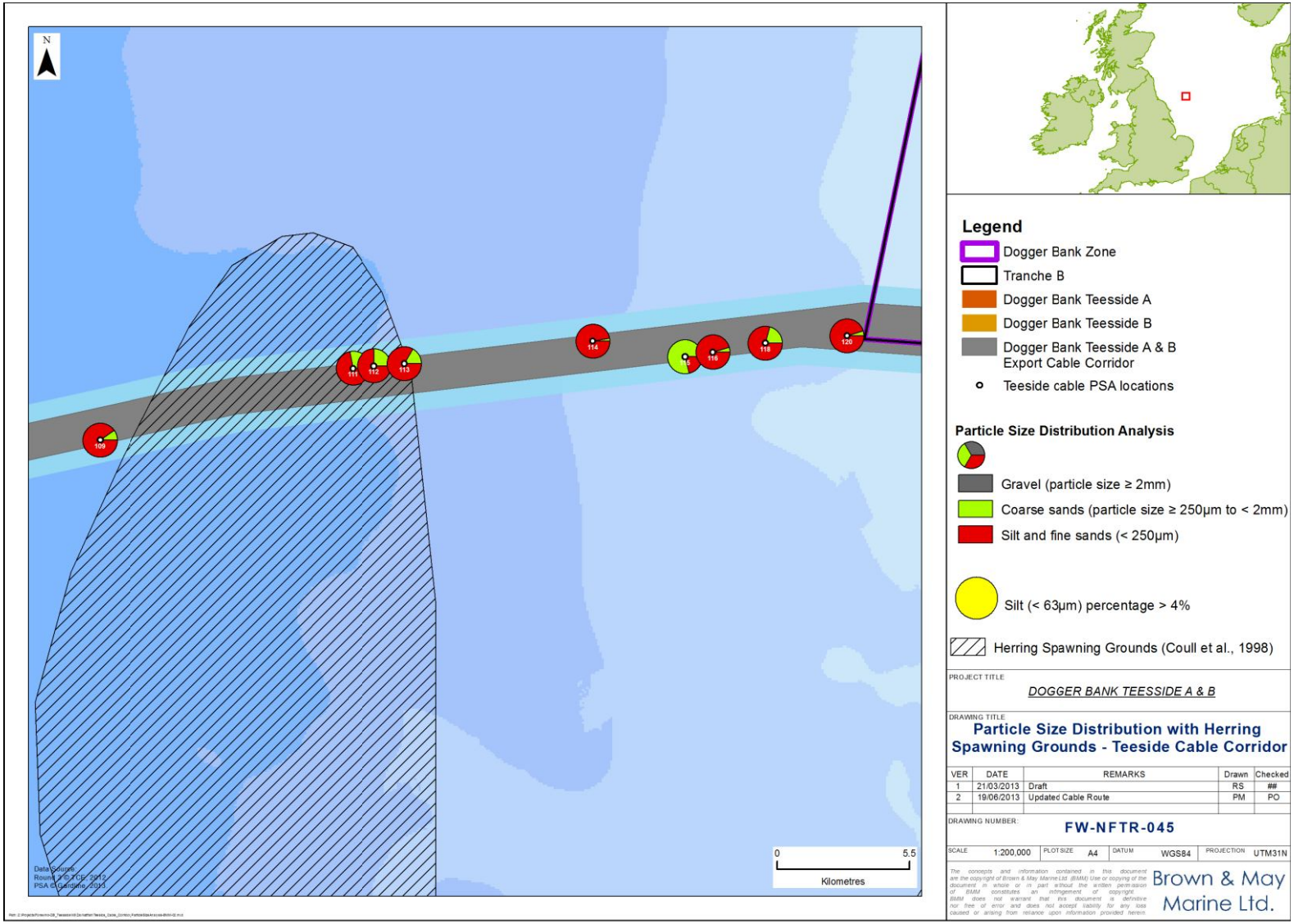

Figure 6.36 Distribution of Sediment Types along the Dogger Bank Teesside A & B Export Cable Corridor

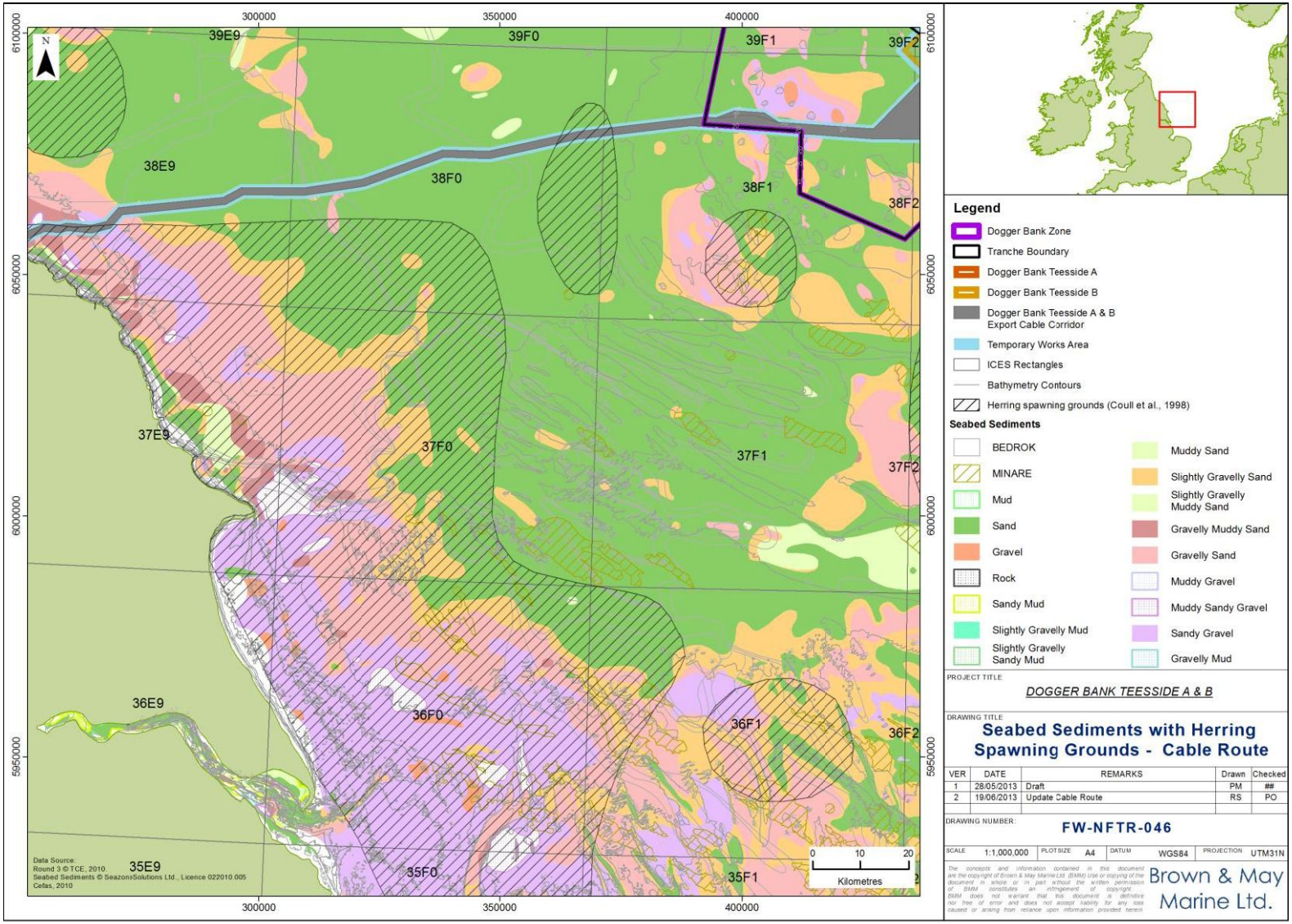

Figure 6.37 Distribution of Sediment and Herring Spawning Grounds Along the Dogger Bank Teesside A & B Export Cable Corridor

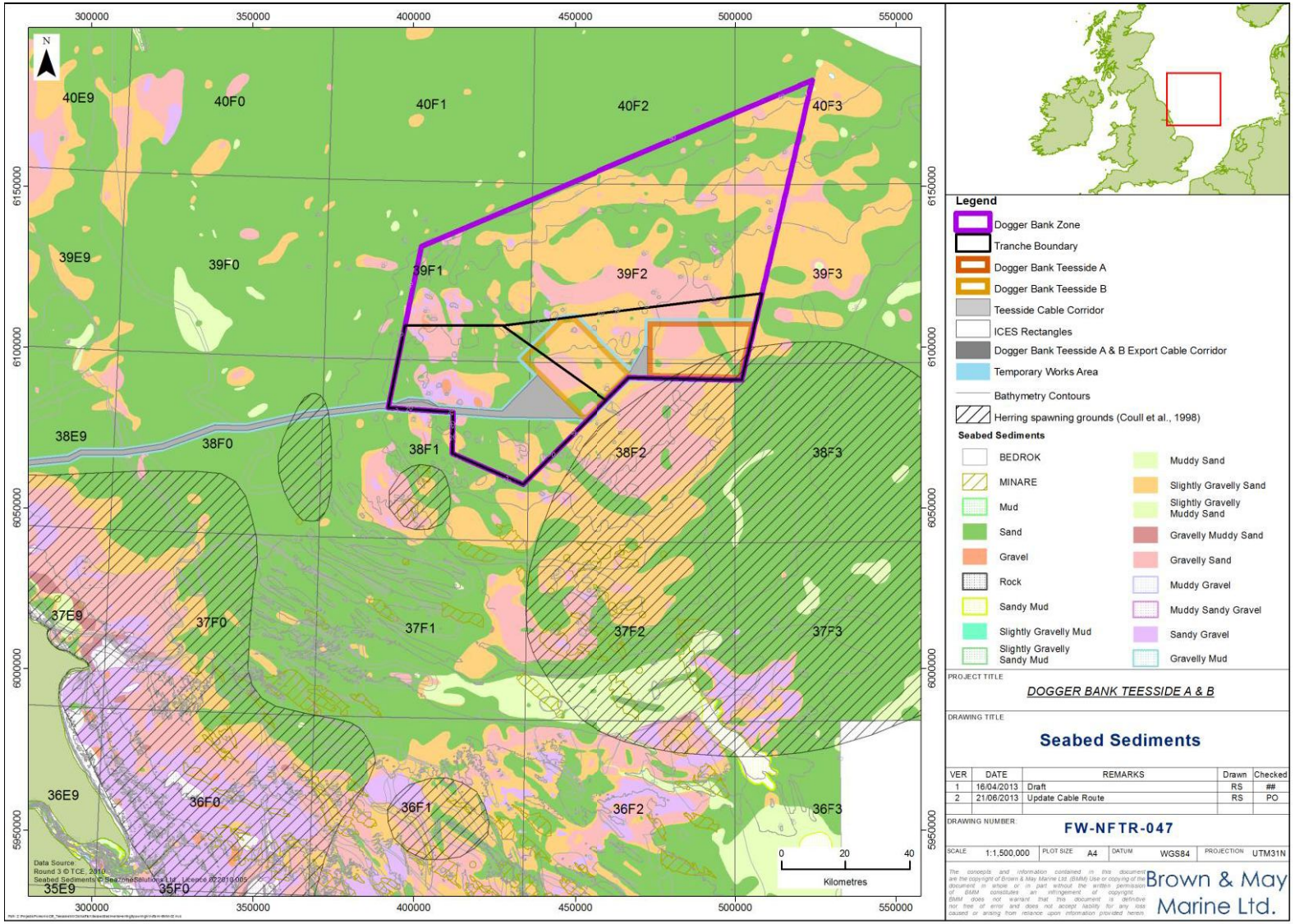

Figure 6.38 Distribution of Sediment Types and Herring Spawning Grounds

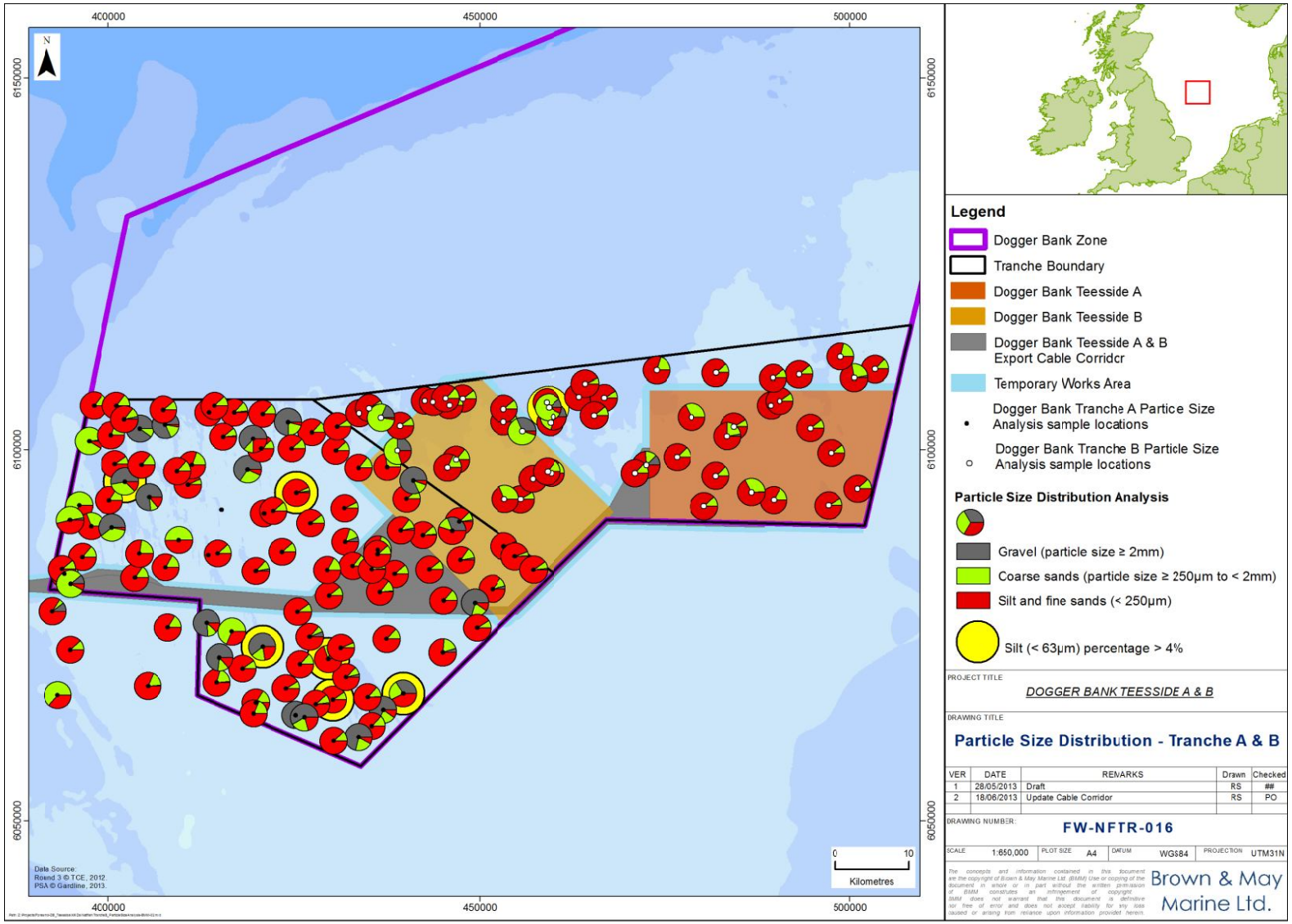

Figure 6.39 Distribution of Sediment Types in Tranche A and Tranche B and former Herring Spawning Grounds

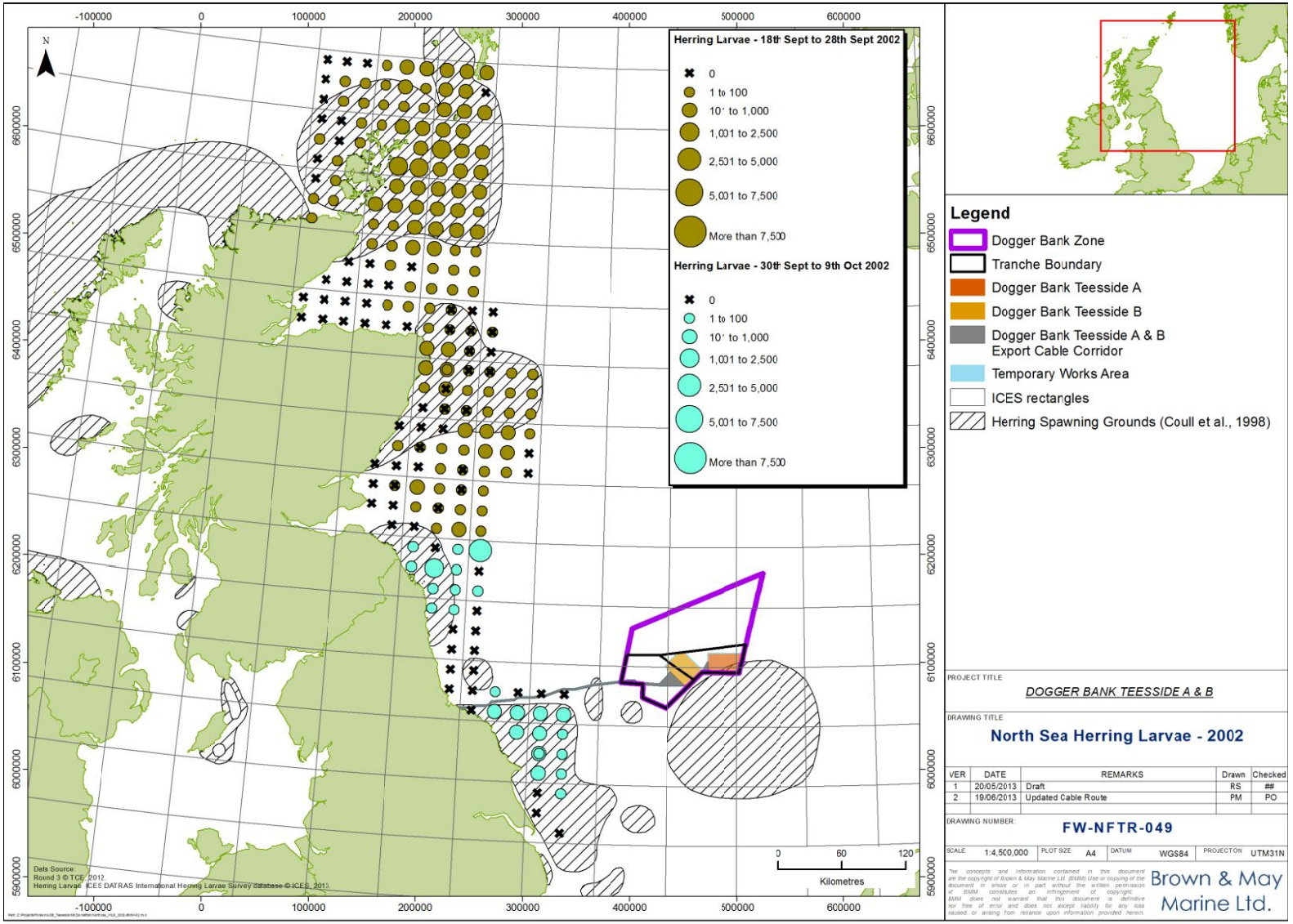

Figure 6.40 IHLS abundance of herring larvae <10 mm (n/m^2) in the Orkney, Buchan and Central North Sea area (2002)

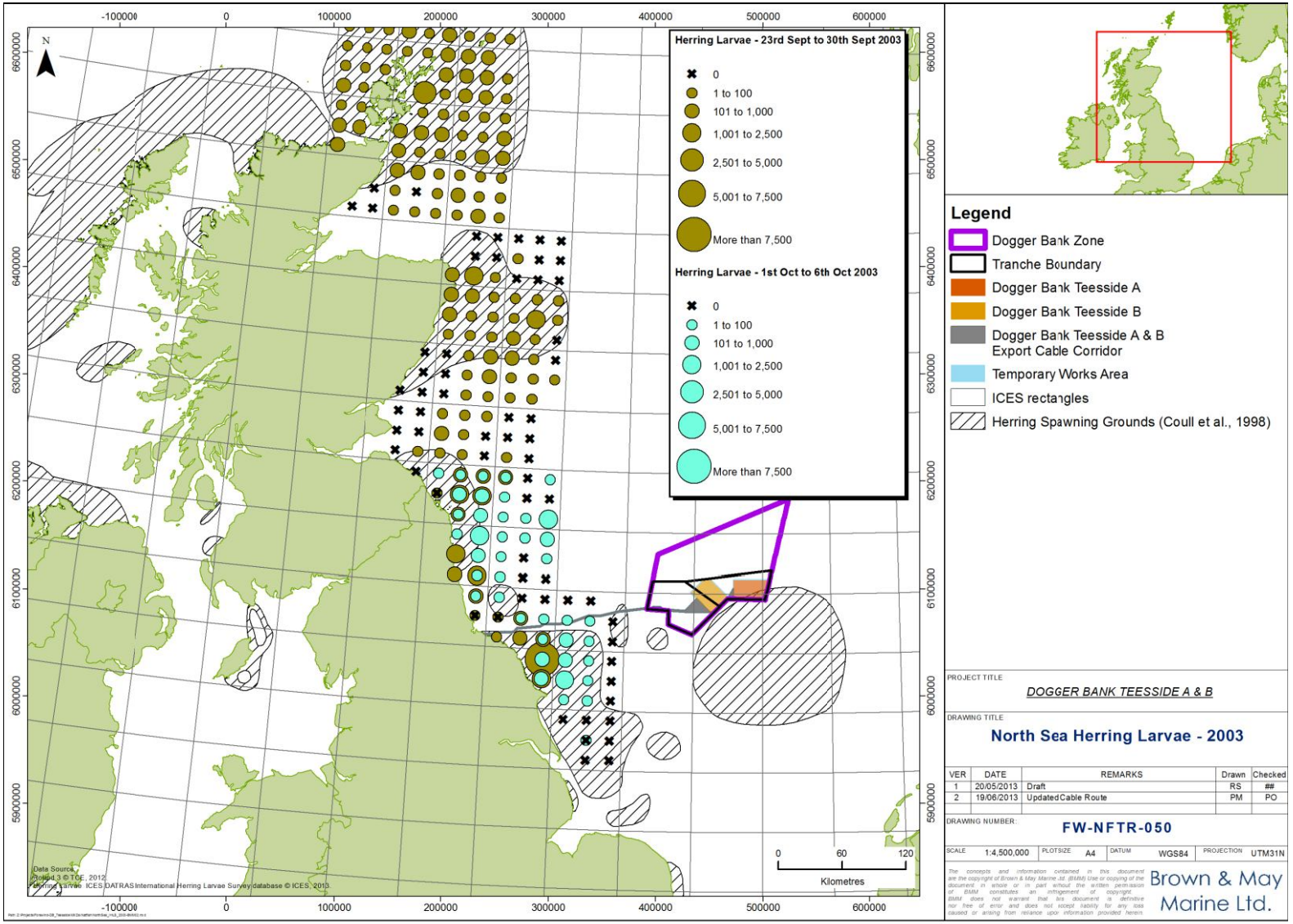

Figure 6.41 IHLS abundance of herring larvae <10 mm (n/m^2) in the Orkney, Buchan and Central North Sea area (2003)

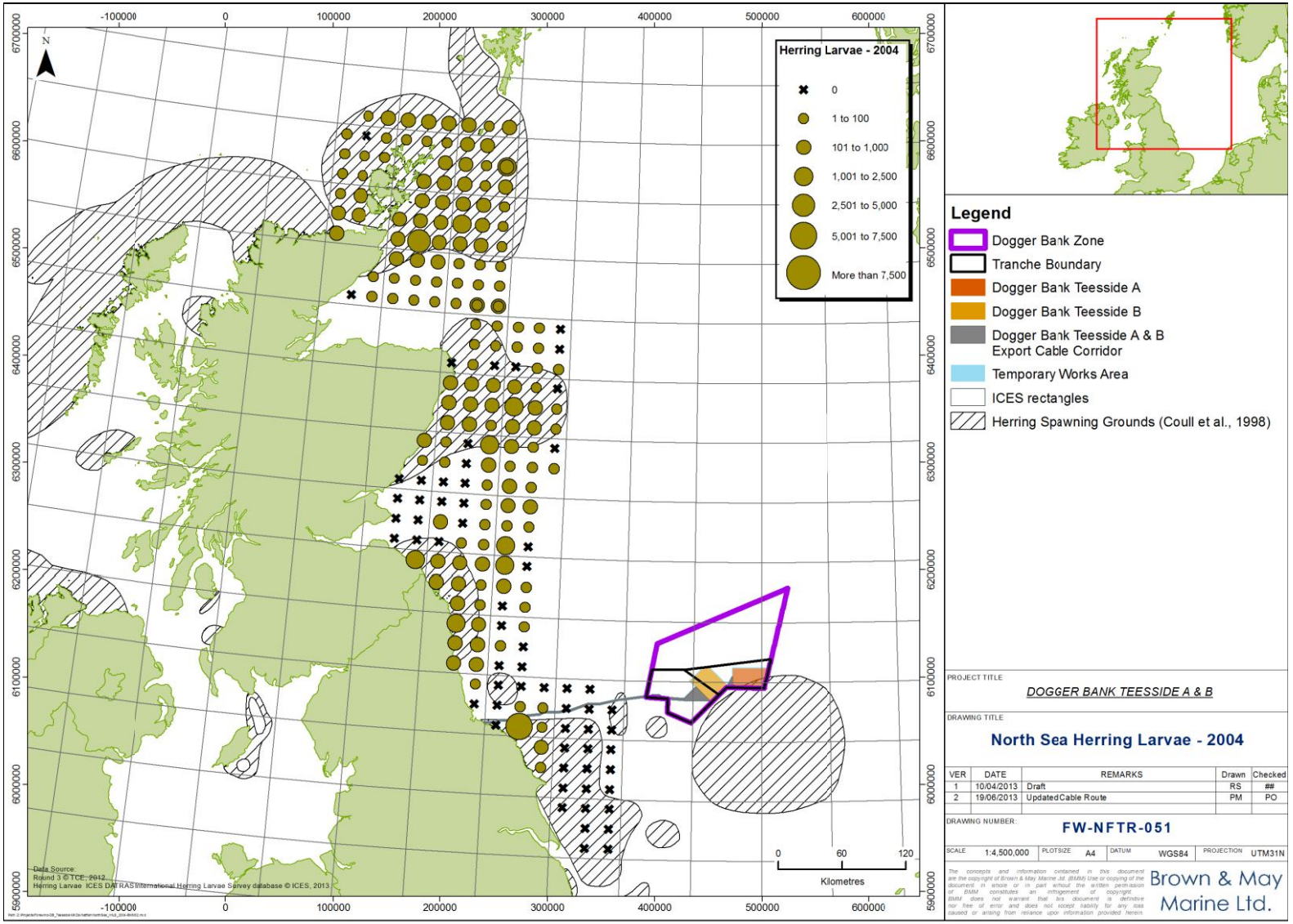

Figure 6.42 IHLS abundance of herring larvae <10 mm (n/m^2) in the Orkney, Buchan and Central North Sea area (2004)

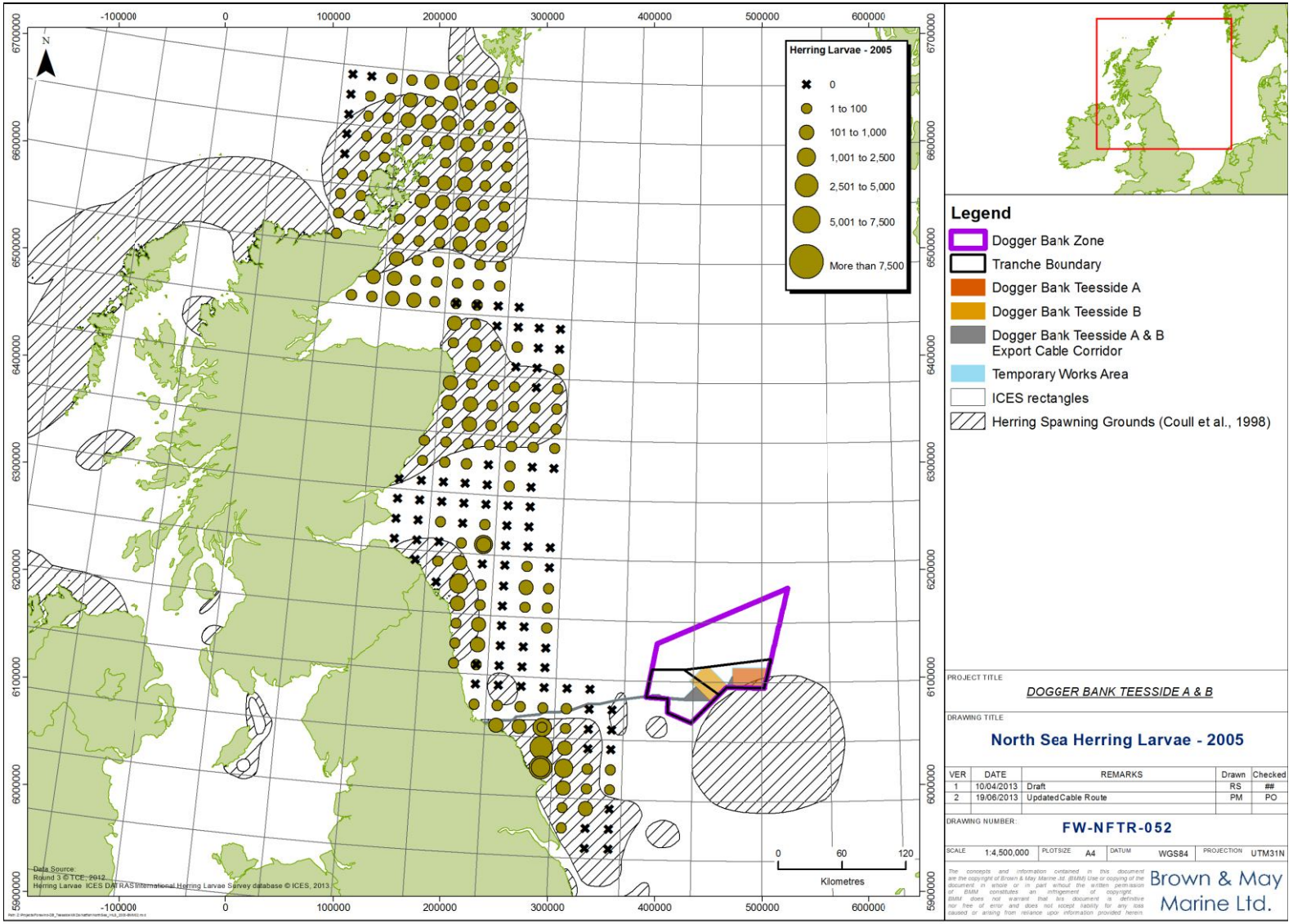

Figure 6.43 IHLS abundance of herring larvae <10 mm (n/m^2) in the Orkney, Buchan and Central North Sea area (2005)

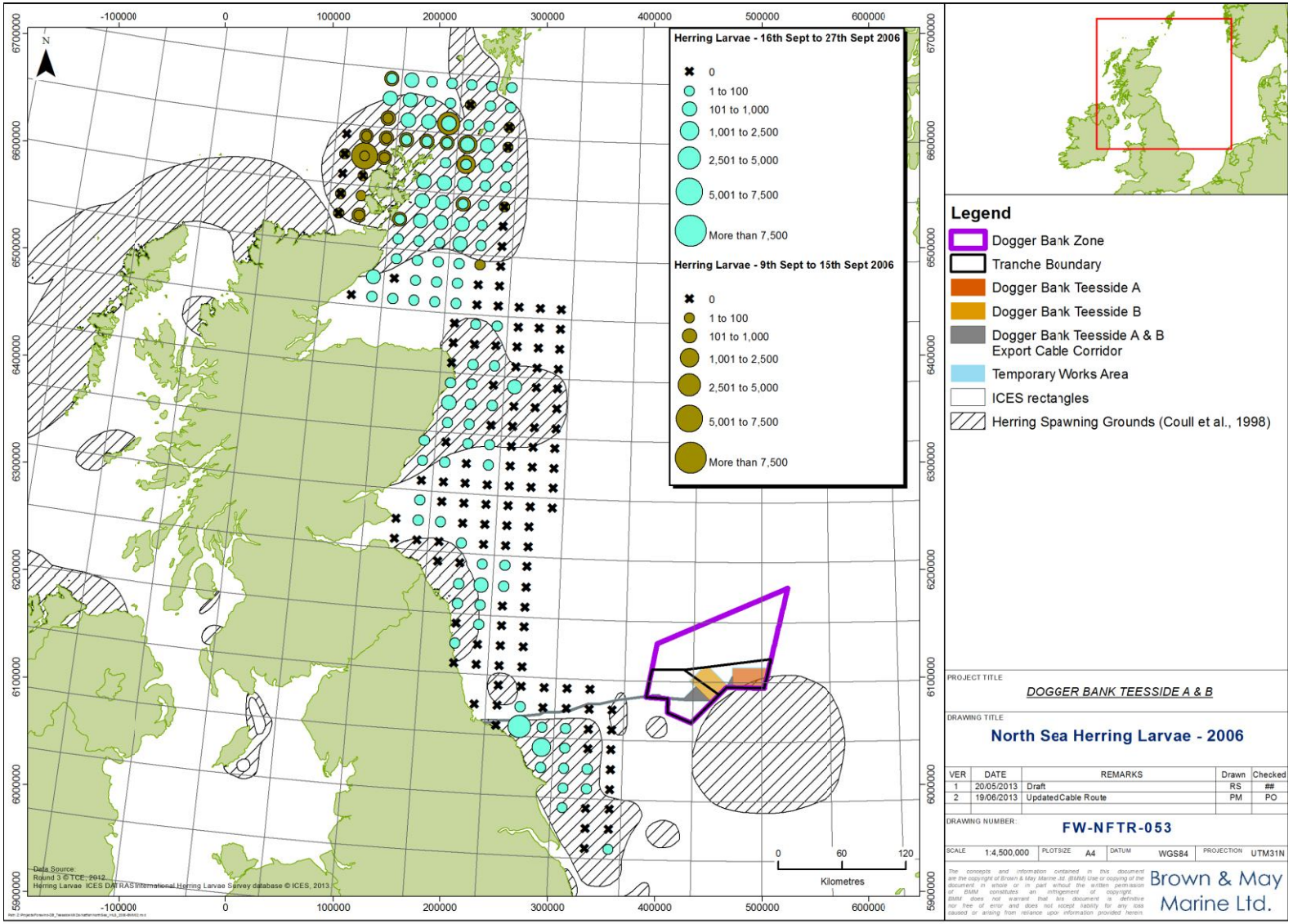

Figure 6.44 IHLS abundance of herring larvae <10 mm (n/m^2) in the Orkney, Buchan and Central North Sea area (2006)