The following appendix accompanies the article

Life strategies of fishes in European estuaries: the functional guild approach

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Appendix 1

Table A1. Estuarine use functional group (EUFG) categories, their main characteristics and previous categorisations (synonyms) according to literature (original sources and later uses or modifications) (modified from Elliott et al. 2007). 1: Day et al. (1981) (temperate and tropical estuaries); 2: Elliott et al. (1990) (Forth, UK); 3: Potter et al. (1990) (temperate Western Australia & Southern Africa estuaries); 4: Whitfield (1994) (South African estuaries); 5: Elliott & Dewailly (1995) (European estuaries, Atlantic seaboard); 6: Thiel et al. (1995) (Elbe, Germany); 7: Marshall & Elliott (1996) (Humber, UK); 8: Blaber (1997) (tropical estuaries); 9: Mariani (2001) (Fogliano & Caprolace, Italy); 10: Thiel & Potter (2001) (Elbe estuary, Germany); 11: Blaber (2002) (tropical estuaries); 12: Elliott & Hemingway (2002) (European estuaries); 13: Lobry et al. (2003) (Gironde, France); 14: Nordlie (2003) (estuarine saltmarshes, eastern North America); 15: Thiel et al. (2003) (Tagus, Portugal, and Elbe, Germany); 16: McLusky & Elliott (2004) (estuarine ecosystem); 17: Able (2005) (re-examination of estuarine dependence); 18: Akin et al. (2005) (Koycegiz, Turkey); 19: Maes et al. (2005) (Scheldt, Netherlands); 20: Pombo et al. (2005) (Ria de Aveiro, Portugal); 21: Elliott et al. (2007) (guild revision for worldwide application). See main article 'Literature cited' for full details of citations here

ESTUARINE SPECIES, ES:
May breed in the estuary; highly euryhaline species, able to move throughout the full length of the estuary

Including	Species spawning only in estuaries, where they complete their life cycle Species with a marine larval dispersal phase, and postlarval stages and early juveniles returning to estuary to complete their life cycle Species showing regular movements between the estuary and adjacent aquatic habitats Species also represented by discrete marine populations
Synonyms	Truly estuarine resident (2), (5), (6), (7), (12), (13), (16), (20); solely estuarine, estuarine & marine (3), (10), (15), (19); estuarine residents, estuarine migrants (9), (18), (21); estuarine species (1), (4), (8), (11), (17), (18); permanent residents (14); euryhaline freshwater species (4), (17)

MARINE MIGRANTS, MM:
Spawn at sea and regularly enter estuaries in large numbers; highly euryhaline species, able to move throughout the full length of the estuary

Including	Marine species using estuaries as nursery grounds (entering as juveniles, staying there until the sub-adult stage is attained, then migrating seawards), either opportunistically or being dependent on estuarine nurseries (main representatives of the group) Species spending much of their life within estuaries, either using them as nursery and visiting them regularly at adult stages Species paying seasonal visits only at adult and sub-adult life stages
Synonyms	Marine seasonal migrant, marine juvenile migrant (2), (5), (6), (7), (12), (13), (16), (20); marine estuarine-opportunists (3), (10), (15), (19); marine migrants (1), (8), (9), (11), (17), (18), (21); marine nursery (14); euryhaline marine species (4), (17); marine estuarine-opportunists, marine estuarine-dependent (21)

MARINE STRAGGLERS, MS:
Spawn at sea; usually associated to coastal marine waters, enter estuaries accidentally in low numbers; predominantly stenohaline species, occur most frequently in the estuary lower reaches

Synonyms	Marine adventitious visitors (2), (5), (6), (7), (12), (13), (16), (20); marine stragglers or adventitious visitors (3), (10), (15), (19); marine stragglers (9), (18), (21); marine transient (14), (17); marine species (4)

FRESHWATER SPECIES, F:
Spawn in freshwaters

Including	Species entering regularly into estuaries, in moderate numbers, moving varying distances down estuaries Species entering accidentally into estuaries, in low numbers, and restricted to low-salinity, upper reaches of estuaries and to periods of heavy freshwater flooding
Synonyms	Freshwater adventitious (2), (5), (6), (7), (12), (13), (16), (20); freshwater (3), (10), (15), (19); freshwater stragglers (9), (18), (21); freshwater migrants (1), (4), (8), (11), (17), (18), (21)

Table A1. (continued)

ANADROMOUS SPECIES, A:
Live in the sea but regularly use estuaries as pathways of migration to freshwaters, where they reproduce

Including Species whose spawning run from the sea extends as far as the upper estuary, rather than going into freshwater
Species migrating from the sea to freshwater and in which the migration is not related to reproduction
Species (or a part of their populations) which may spend part of their life in estuaries

Synonyms Diadromous migrant (2), (5), (6), (7), (12), (13), (16), (20); anadromous, semi-anadromous (3), (10), (15), (19); anadromous (1), (4), (8), (9), (11), (17), (18), (21); diadromous (14); semi-anadromous, amphidromous (21)

CATADROMOUS SPECIES, C:
Live in freshwater but regularly use estuaries as pathways of migration to the sea, where they reproduce

Including Species whose spawning run is only to estuarine areas rather than the marine environment
Species migrating to the sea from freshwater and in which the migration is not related to reproduction
Species (or a part of their populations) which may spend part of their life in estuaries

Synonyms Diadromous migrant (2), (5), (6), (7), (12), (13), (16), (20); catadromous (3), (10), (15), (19); obligate catadromous (4); catadromous (1), (4), (8), (9), (11), (17), (18), (21); diadromous (14); semi-catadromous, amphidromous (21)

Table A2. Feeding mode functional group (FMFG) categories, their main characteristics and previous categorisations (synonyms) according to literature (original sources and later uses or modifications) (modified from Elliott et al. 2007). 1: Elliott & Dewailly (1995) (European estuaries, Atlantic seaboard); 2: Blaber (1997) (subtropical & tropical fishes); 3: Wootton (1999) (teleost fishes); 4: Elliott & Hemingway (2002) (European estuaries); 5: Horn & Ferry-Graham (2006) (California marine fishes); 6: Elliott et al. (2007) (guild revision for worldwide application). See main article 'Literature cited' for full details of citations here

MICROBENTHIVORES, Bmi:
Feed mainly on benthic, epibenthic and hyperbenthic fauna, with prey size <1 cm

Synonyms Benthic invertebrate feeders (5); invertebrate feeders (1); bed feeders, hyperbenthos feeders (4); benthophagous, hyperbenthophagous (6); meiofauna feeders (2);, benthivores (3)

MACROBENTHIVORES, BMa:
Feed mainly on benthic, epibenthic and hyperbenthic fauna, with prey size >1 cm

Synonyms Benthic invertebrate feeders (5); invertebrate feeders (1); bed feeders, hyperbenthos feeders (4); benthophagous, hyperbenthophagous (6); macrobenthos feeders (2); benthivores (3)

PLANKTIVORES, PL:
Feed predominantly on zooplankton and occasionally on phytoplankton in the water column, mainly by filter feeding.

Synonyms Zooplankton feeders (5); plankton feeders (1), (2); zooplanktonic feeders, phytoplanktonic feeders (4); planktivorous (6); zooplanktivores, phytoplanktivores (3)

HYPERBENTHIVORES/ZOOPLANKTIVORES, HZ:
Feed just over the bottom, predominantly either on smaller mobile invertebrates living over the bottom and zooplankton; different feeding strategies for prey capture (ram, suction, or manipulation)

Synonyms Zooplankton feeders, benthic invertebrate feeders (5); carnivorous (1); zooplanktonic feeders, hyperbenthos feeders (4); planktivorous, hyperbenthophagous (6); plankton feeders (2)

HYPERBENTHIVORES/PISCIVORES, HP:
Feed just over the bottom, predominantly either on larger mobile invertebrates living over the bottom and fish; different feeding strategies for prey capture (ram, suction; or manipulation)

Synonyms Fish feeders (5); hyperbenthos feeders, piscivorous (4); hyperbenthophagous, piscivorous (6); carnivorous (1); piscivorous (2); benthivores, piscivores (3)

DETRITIVORES, DV:
Feed on all the small organisms in or on the surface layer of the substratum (e.g. benthic algae such as diatoms, microfauna including Foraminifera and Flagellata, and to a lesser extent smaller meiofauna) and associated organic matter (usually of plant origin); ingest relatively large volumes of sand or mud (by suction mechanisms), digest the food material and pass out the inorganic particles

Synonyms Detritivores (3), (5); detritivores and scavengers (4); detritivorous (6); iliophagous (2)

Table A2. (continued)

HERBIVORES, HV:
Graze predominantly on living macroalgal and macrophyte material

Synonyms Herbivores (5); herbivorous (2), (4), (6); grazers, browsers (3)

OMNIVORES, OV:
Ingest both plant and animal material by feeding mainly on macrophytes, periphyton, epifauna and filamentous algae

Synonyms Omnivores (3), (5); partly carnivorous, partly herbivorous (1); omnivorous (1), (6); partial herbivores (2)

Table A3. Reproductive mode functional groups (RMFG) categories, their main characteristics and previous categorisations (synonyms) according to literature (original sources and later uses or modifications) (modified from Elliott et al. 2007). 1: Elliott & Dewailly (1995) (European estuaries, Atlantic seaboard); 2: Wootton (1999) (teleost fishes); 3: DeMartini & Sikkel (2006) (California marine fishes); 4: Elliott et al. (2007) (guild revision for worldwide application). See main article 'Literature cited' for full details of citations here

VIVIPAROUS, V:
Internal fertilisation and live-bearing of young with a broad range of provisioning post-fertilisation, from no (strictly lecithotrophic viviparity, with live-bearing of young provisioned entirely by ovum yolk) to extensive provisioning beyond the nutrition provided by ovum yolk (matrotrophic viviparity)

Synonyms Viviparous, ovoviviparous (1), (3), (4); internal bearers (2)

OVIPAROUS:
Lecithotrophic maternal provisioning (limited to the yolking of ovarian oocytes prior to fertilisation) and external fertilisation; zygotes developing outside the maternal environment and independent of further energetic investment by either parent

Further distinguished in:

Oviparous with PELAGIC EGGS, Op:
Buoyant, pelagic eggs

Synonyms Oviparous, pelagic eggs (1), (4); non-guarders, open substrate spawners, pelagic spawners (2)

Oviparous with BENTHIC EGGS, Ob:
Demersal eggs settling on the substratum

Synonyms Oviparous, benthic eggs (1), (4); non-guarders, open substrate spawners, benthic spawners (2)

Oviparous with ADHESIVE EGGS, Ov:
Demersal eggs, adhesive and attached to substrata and/or vegetation

Synonyms Oviparous, adhesive eggs (1), (4); non-guarders, open substrate spawners, benthic spawners, brood hiders (2)

OVIPAROUS GUARDERS, Og:
Post-fertilisation parental care of eggs by guarding them externally, e.g. in a nest, where they develop into a post-larva or juvenile before being released into the surrounding waters

Synonyms Oviparous, guarders (1), (4); guarders, substrate choosers, nest spawners (2)

OVIPAROUS SHELTERERS, Os:
Post-fertilisation parental care of eggs by sheltering them in a part of their body (e.g. mouth, brood pouch) where they develop into a post-larva or juvenile before being released into the surrounding waters

Synonyms Oviparous, sheltered eggs (1), (4); external bearers (2)

Table A4. Fish species in European transitional environments. The functional groups and the frequency (freq.) of occurrence in the study sites (see Tables A1 to A3 for explanation of abbreviations)

	Species	EUFG	FMFG	RMFG	Freq.
1	*Abramis brama*	F			0.32
2	*Acipenser sturio*	A			0.11
3	*Agonus cataphractus*	ES,MS	Bmi, BMa	Ov	0.26
4	*Aidablennius sphynx*	MS			0.03
5	*Alburnus alburnus*	F			0.32
6	*Alburnus chalcoides*	F			0.03
7	*Alosa alosa*	A			0.18
8	*Alosa fallax*	A			0.58
9	*Ameiurus melas*	F			0.05
10	*Ammodytes marinus*	MS			0.05
11	*Ammodytes tobianus*	ES,MS	PL	Ob	0.45
12	*Anarhichas lupus*	MS			0.03
13	*Anguilla anguilla*	C			0.87
14	*Aphanius fasciatus*	ES	OV	Ov	0.21
15	*Aphanius iberus*	ES	Bmi	Ov	0.03
16	*Aphia minuta*	ES,MM	PL	Ov	0.29
17	*Argyrosomus regius*	MS			0.11
18	*Arnoglossus imperialis*	MS			0.03
19	*Arnoglossus laterna*	MS			0.16
20	*Aspius aspius*	F			0.05
21	*Atherina boyeri*	ES	HZ	Ov	0.45
22	*Atherina hepsetus*	MS			0.08
23	*Atherina presbyter*	MM	PL	Ov	0.39
24	*Atherina* spp.	ES	PL,HZ	Ov	0.03
25	*Balistes capriscus*	MS			0.11
26	*Ballerus ballerus*	F			0.05
27	*Barbatula barbatula*	F			0.05
28	*Barbus barbus*	F			0.16
29	*Barbus bocagei*	F			0.05
30	*Barbus plebejus*	F			0.05
31	*Bathyraja brachyurops*	MS			0.08
32	*Belone belone*	MM,MS	HP	Ov	0.58
33	*Blennius ocellaris*	MS			0.03
34	*Blicca bjoerkna*	F			0.24
35	*Boops boops*	MS			0.24
36	*Bothus podas*	MS			0.08
37	*Buglossidium luteum*	MS			0.24
38	*Callionymus lyra*	MS			0.39
39	*Callionymus maculatus*	MS			0.11
40	*Callionymus pusillus*	MS			0.03
41	*Callionymus reticulatus*	MS			0.05
42	*Callionymus risso*	MS			0.08
43	*Capoeta capoeta bergamae*	F			0.03
44	*Carassius auratus*	F			0.13
45	*Carassius carassius*	F			0.34
46	*Carassius gibelio*	F			0.05
47	*Centrolabrus exoletus*	MS			0.08
48	*Chelidonichthys cuculus*	MS			0.08
49	*Chelidonichthys lucernus*	MM,MS	Bmi, BMa,HP	Op	0.45
50	*Chelon labrosus*	MM	DV	Op	0.82
51	*Chirolophis ascanii*	MS			0.05
52	*Chondrostoma nasus*	F			0.03
53	*Chondrostoma toxostoma*	F			0.03
54	*Ciliata mustela*	MM	Bmi, BMa	Op	0.39
55	*Ciliata septentrionalis*	MS			0.08
56	*Citharus linguatula*	MS			0.03
57	*Clinitrachus argentatus*	MS			0.03
58	*Clupea harengus*	MM	PL	Ov	0.47
59	*Cobitis taenia*	F			0.16
60	*Conger conger*	MS			0.32
61	*Coregonus albula*	F			0.05
62	*Coregonus lavaretus*	ES	HZ	Ob	0.05
63	*Coregonus oxyrinchus*	ES	HZ	Ob	0.05
64	*Coris julis*	MS			0.08
65	*Cottus gobio*	F			0.13
66	*Crystallogobius linearis*	MS			0.03
67	*Ctenolabrus rupestris*	MS			0.16
68	*Ctenopharyngodon idella*	F			0.03
69	*Cyclopterus lumpus*	MM,MS	HZ	Og	0.32
70	*Cyprinus carpio*	F			0.42
71	*Dactylopterus volitans*	MS			0.03
72	*Dasyatis pastinaca*	MM,MS	BMa	W	0.13
73	*Deltentosteus quadrimaculatus*	MS			0.03
74	*Dentex dentex*	MS			0.03
75	*Dentex gibbosus*	MM	HZ,HP	Op	0.03
76	*Dicentrarchus labrax*	MM	HZ,HP	Op	0.79
77	*Dicentrarchus punctatus*	MM	HZ,HP	Op	0.13
78	*Dicologlossa cuneata*	MM	Bmi, BMa	Op	0.16
79	*Diplecogaster bimaculata*	ES	Bmi	Og	0.03
80	*Diplodus annularis*	MM,MS	OV	Ob	0.39
81	*Diplodus bellottii*	MM	OV	Ob	0.05
82	*Diplodus cervinus*	MM	OV	Ob	0.03
83	*Diplodus puntazzo*	MM,MS	OV	Ob	0.16
84	*Diplodus sargus*	MM,MS	OV	Ob	0.42
85	*Diplodus vulgaris*	MM,MS	OV	Ob	0.32
86	*Dipturus batis*	MS			0.05
87	*Echiichthys vipera*	MS			0.29
88	*Economidichthys pygmaeus*	F			0.03
89	*Enchelyopus cimbrius*	MS			0.05
90	*Engraulis encrasicolus*	MM,MS	PL	Op	0.63
91	*Entelurus aequoreus*	MS			0.16
92	*Epinephelus aeneus*	MS			0.03
93	*Esox lucius*	F			0.29
94	*Eutrigla gurnardus*	MM,MS	Bmi, BMa,HP	Op	0.29
95	*Fundulus heteroclitus*	ES	OV	Ov	0.05
96	*Gadus morhua*	MM	HZ,HP	Op	0.45
97	*Gaidropsarus mediterraneus*	MS			0.08
98	*Gaidropsarus vulgaris*	MS			0.08
99	*Galeorhinus galeus*	MS			0.08
100	*Gambusia affinis*	ES,F	OV	V	0.34
101	*Gasterosteus aculeatus*	A,ES,F	HZ	Og	0.63
102	*Glyptocephalus cynoglossus*	MS			0.05
103	*Gobio gobio*	F			0.18
104	*Gobius ater*	ES	Bmi	Og	0.03
105	*Gobius auratus*	ES,MS	Bmi	Og	0.05
106	*Gobius cobitis*	MS			0.08
107	*Gobius cruentatus*	MS			0.05
108	*Gobius niger*	ES	Bmi,HP	Og	0.63
109	*Gobius paganellus*	ES	Bmi,HP	Og	0.26
110	*Gobius strictus*	ES	Bmi	Og	0.03
111	*Gobiusculus flavescens*	MS			0.16
112	*Gymnocephalus cernuus*	F			0.24
113	*Halobatrachus didactylus*	ES	Bmi,HP	Og	0.11
114	*Helicolenus dactylopterus*	MS			0.03
115	*Hippocampus guttulatus*	ES,MS	Bmi	Os	0.24
116	*Hippocampus hippocampus*	ES,MS	Bmi	Os	0.26

Table A4. (continued)

Species	EUFG	FMFG	RMFG	Freq.
117 *Hippoglossoides platessoides*	MS			0.08
118 *Hippoglossus hippoglossus*	MS			0.03
119 *Hyperoplus lanceolatus*	MS			0.29
120 *Hypophthalmichthys molitrix*	F			0.11
121 *Hyporhamphus picarti*	MM	HV	Ov	0.05
122 *Knipowitschia caucasica*	ES,F	Bmi	Og	0.08
123 *Knipowitschia panizzae*	ES	Bmi	Og	0.08
124 *Labrus bergylta*	MS			0.18
125 *Labrus merula*	MS			0.03
126 *Labrus mixtus*	MS			0.05
127 *Labrus viridis*	MS			0.13
128 *Lagocephalus lagocephalus*	MS			0.03
129 *Lampetra fluviatilis*	A			0.32
130 *Lampetra planeri*	F			0.03
131 *Lepidorhombus boscii*	MS			0.03
132 *Lepidorhombus whiffiagonis*	MS			0.05
133 *Lepidotrigla cavillone*	MS			0.03
134 *Lepomis gibbosus*	F			0.11
135 *Leucaspius delineatus*	F			0.08
136 *Leuciscus cephalus*	F			0.24
137 *Leuciscus idus*	F			0.11
138 *Leuciscus leuciscus*	F			0.16
139 *Leuciscus pyrenaicus*	F			0.03
140 *Leucoraja naevus*	MS			0.03
141 *Lichia amia*	MS			0.08
142 *Limanda limanda*	MM	Bmi, BMa	Op	0.37
143 *Liparis liparis*	ES,MM	Bmi,		
BMa	Ov	0.26		
144 *Liparis montagui*	MS			0.05
145 *Lipophrys adriaticus*	ES	OV	Og	0.03
146 *Lipophrys dalmatinus*	ES	OV	Og	0.03
147 *Lipophrys pholis*	MS			0.03
148 *Lithognathus mormyrus*	MM,MS	Bmi, BMa	Ob	0.24
149 *Liza aurata*	MM	DV	Op	0.61
150 *Liza carinata*	MM	DV	Op	0.03
151 *Liza ramado*	C,MM	DV	Op	0.68
152 *Liza saliens*	C,MM	DV	Op	0.47
153 *Lophius piscatorius*	MS			0.11
154 *Lota lota*	F			0.08
155 *Lumpenus lampretaeformis*	MS			0.03
156 *Maurolicus muelleri*	MS			0.03
157 *Melanogrammus aeglefinus*	MS			0.16
158 *Merlangius merlangus*	MM,MS	HP	Ob	0.39
159 *Merluccius merluccius*	MS			0.16
160 *Micrenophrys lilljeborgii*	MS			0.03
161 *Microchirus azevia*	MM	Bmi, BMa	Op	0.05
162 *Microchirus ocellatus*	MM	Bmi, BMa	Op	0.03
163 *Microchirus variegatus*	MS			0.03
164 *Micromesistius poutassou*	MS			0.08
165 *Micropterus salmoides*	F			0.03
166 *Microstomus kitt*	MS			0.18
167 *Misgurnus fossilis*	F			0.05
168 *Molva molva*	MS			0.05
169 *Monochirus hispidus*	MS			0.05
170 *Mugil cephalus*	C,ES, MM	DV	Op	0.50
171 *Mullus barbatus*	MM,MS	Bmi, BMa	Op	0.26
172 *Mullus surmuletus*	MM,MS	Bmi, BMa	Op	0.45
173 *Muraena helena*	MS			0.03
174 *Mustelus asterias*	MS			0.03
175 *Mustelus mustelus*	MS			0.08
176 *Myliobatis aquila*	MS			0.03
177 *Myoxocephalus scorpius*	ES,MS	HP	Og	0.37
178 *Nerophis lumbriciformis*	ES	Bmi,HZ	Os	0.11
179 *Nerophis maculatus*	MS			0.03
180 *Nerophis ophidion*	ES,MS	Bmi,HZ	Os	0.32
181 *Oblada melanura*	MM,MS	OV	Op	0.08
182 *Oedalechilus labeo*	MS			0.11
183 *Oncorhynchus mykiss*	F			0.21
184 *Osmerus eperlanus*	A			0.34
185 *Pagellus acarne*	MM,MS	Bmi, BMa	Op	0.08
186 *Pagellus bogaraveo*	MM,MS	Bmi, BMa,HP	Op	0.11
187 *Pagellus erythrinus*	MS			0.08
188 *Pagrus major*	MS			0.03
189 *Pagrus pagrus*	MS			0.05
190 *Parablennius gattorugine*	MS			0.11
191 *Parablennius incognitus*	MS			0.03
192 *Parablennius sanguinolentus*	ES,MS	HV	Og	0.13
193 *Parablennius tentacularis*	MS			0.05
194 *Parablennius zvonimiri*	MS			0.03
195 *Paralipophrys trigloides*	ES	OV	Og	0.03
196 *Pegusa impar*	ES,MM	Bmi, BMa	Op	0.05
197 *Pegusa lascaris*	MM,MS	Bmi, BMa	Op	0.21
198 *Pelecus cultratus*	F			0.03
199 *Perca fluviatilis*	F			0.34
200 *Petromyzon marinus*	A			0.32
201 *Pholis gunnellus*	ES,MS	Bmi, BMa	Og	0.37
202 *Phoxinus phoxinus*	F			0.08
203 *Phrynorhombus norvegicus*	MS			0.03
204 *Phycis phycis*	MS			0.05
205 *Platichthys flesus*	MM	Bmi, BMa	Op	0.79
206 *Pleuronectes platessa*	MM	Bmi, BMa	Op	0.45
207 *Pollachius pollachius*	MM,MS	HP	Op	0.32
208 *Pollachius virens*	MS			0.21
209 *Polyprion americanus*	MS			0.03
210 *Pomadasys incisus*	MS			0.03
211 *Pomatomus saltatrix*	MS			0.08
212 *Pomatoschistus canestrinii*	ES	Bmi	Og	0.08
213 *Pomatoschistus knerii*	ES	HZ	Og	0.03
214 *Pomatoschistus lozanoi*	MM,MS	Bmi,HZ	Og	0.13
215 *Pomatoschistus marmoratus*	ES,MS	Bmi	Og	0.24
216 *Pomatoschistus microps*	ES	Bmi	Og	0.71
217 *Pomatoschistus minutus*	ES,MM	Bmi	Og	0.66
218 *Pomatoschistus pictus*	MS			0.24
219 *Pomatoschistus* sp.	ES	Bmi	Og	0.03
220 *Pomatoschistus tortonesei*	ES	Bmi	Og	0.03
221 *Psetta maxima*	MM,MS	HP	Op	0.55
222 *Pseudophoxinus stymphalicus*	F			0.03

Table A4. (continued)

Species	EUFG	FMFG	RMFG	Freq.
223 *Pseudorasbora parva*	F			0.08
224 *Pteromylaeus bovinus*	MS			0.03
225 *Pungitius pungitius*	F			0.32
226 *Raja clavata*	MS			0.21
227 *Raja microocellata*	MS			0.03
228 *Raja montagui*	MS			0.03
229 *Raja undulata*	MS			0.08
230 *Raniceps raninus*	ES,MS	BMa,HP	Op	0.24
231 *Remora remora*	MS			0.03
232 *Rhodeus amarus*	F			0.03
233 *Rhodeus sericeus*	F			0.13
234 *Rutilus rutilus*	F			0.37
235 *Rutilus ylikiensis*	F			0.03
236 *Salaria basilisca*	ES	OV	Og	0.03
237 *Salaria fluviatilis*	F			0.05
238 *Salaria pavo*	ES,MS	OV	Og	0.26
239 *Salmo salar*	A			0.39
240 *Salmo trutta*	A,F			0.50
241 *Sander lucioperca*	F			0.26
242 *Sardina pilchardus*	MM,MS	PL	Op	0.53
243 *Sardinella aurita*	MM,MS	PL	Op	0.05
244 *Sarpa salpa*	MM,MS	HV	Op	0.32
245 *Scardinius acarnanicus*	F			0.03
246 *Scardinius erythrophthalmus*	F			0.21
247 *Sciaena umbra*	MS			0.08
248 *Scomber scombrus*	MS			0.39
249 *Scomberesox saurus*	MS			0.08
250 *Scophthalmus rhombus*	MM,MS	HP	Ob	0.55
251 *Scorpaena porcus*	ES,MS	BMa,HP	Ob	0.11
252 *Scorpaena scrofa*	MS			0.05
253 *Scyliorhinus canicula*	MS			0.13
254 *Scyliorhinus stellaris*	MS			0.03
255 *Serranus cabrilla*	MS			0.03
256 *Serranus hepatus*	MM,MS	BMa,HP	Ob	0.13
257 *Serranus scriba*	MS			0.05
258 *Silurus glanis*	F			0.05
259 *Solea aegyptiaca*	MM	Bmi, BMa	Op	0.03
260 *Solea senegalensis*	MM	Bmi, BMa	Ob	0.21
261 *Solea solea*	MM	Bmi, BMa	Op	0.84
262 *Sparisoma cretense*	MS			0.03
263 *Sparus aurata*	MM,MS	Bmi, BMa	Ob	0.53
264 *Sphoeroides spengleri*	MM	Bmi, BMa	?	0.03
265 *Sphyraena sphyraena*	MS			0.11
266 *Spicara maena*	MM	OV	Op	0.03
267 *Spicara smaris*	MS			0.05
268 *Spicara* sp.	MS			0.03
269 *Spinachia spinachia*	ES,MS	HZ	Og	0.21
270 *Spondyliosoma cantharus*	MM,MS	OV	Ob	0.26
271 *Sprattus sprattus*	MM	PL	Op	0.63
272 *Squalus acanthias*	MS			0.08
273 *Squatina squatina*	MS			0.03
274 *Symphodus bailloni*	MS			0.13
275 *Symphodus cinereus*	MS			0.16
276 *Symphodus mediterraneus*	MS			0.03
277 *Symphodus melops*	ES,MS	Bmi, BMa	Og	0.32
278 *Symphodus ocellatus*	MS			0.03
279 *Symphodus roissali*	ES	Bmi, BMa	Og	0.03
280 *Symphodus* sp.	MS			0.03
281 *Symphodus tinca*	MS			0.08
282 *Synapturichthys kleinii*	MS			0.05
283 *Syngnathus abaster*	ES,MM	Bmi	Os	0.45
284 *Syngnathus acus*	ES,MM,MS	Bmi	Os	0.61
285 *Syngnathus rostellatus*	ES	HZ	Os	0.37
286 *Syngnathus taenionotus*	ES	HZ	Os	0.08
287 *Syngnathus tenuirostris*	MM	Bmi	Os	0.03
288 *Syngnathus typhle*	ES,MS	HZ	Os	0.45
289 *Syngnathus variegatus*	MS			0.03
290 *Synodus saurus*	MS			0.03
291 *Taurulus bubalis*	MS			0.29
292 *Thorogobius ephippiatus*	MS			0.03
293 *Thymallus thymallus*	F			0.03
294 *Tilapia* spp.	F			0.03
295 *Tinca tinca*	F			0.26
296 *Torpedo marmorata*	MS			0.08
297 *Trachinotus ovatus*	MS			0.03
298 *Trachinus araneus*	MS			0.03
299 *Trachinus draco*	MS			0.16
300 *Trachurus mediterraneus*	MS			0.03
301 *Trachurus trachurus*	MS			0.39
302 *Trigla lyra*	MM,MS	Bmi, BMa,HP	Op	0.11
303 *Trigloporus lastoviza*	MS			0.05
304 *Triglopsis quadricornis*	ES	Bmi, BMa,HP	Og	0.05
305 *Trisopterus esmarkii*	MS			0.08
306 *Trisopterus luscus*	MM	Bmi, BMa,HP	Op	0.32
307 *Trisopterus minutus*	MS			0.24
308 *Umbrina cirrosa*	MM,MS	Bmi, BMa	Op	0.18
309 *Uranoscopus scaber*	MS			0.03
310 *Vimba melanops*	F			0.05
311 *Vimba vimba*	F			0.05
312 *Xyrichtys novacula*	MS			0.03
313 *Zebrus zebrus*	MS			0.03
314 *Zeugopterus regius*	MS			0.03
315 *Zeus faber*	MS			0.03
316 *Zoarces viviparus*	ES,MS	Bmi, BMa	V	0.39
317 *Zosterisessor ophiocephalus*	ES	Bmi, BMa	Og	0.13

Table A5. Percentage species richness of each functional group in European estuarine fish assemblages (see Tables A1 to A3 for explanation of abbreviations). Data for feeding modes functional groups (FMFG) and reproductive modes functional groups (RMFG) are reported separately for estuarine species (ES) and marine migrants (MM). Different letters (in brackets) indicate significant differences as determined from pairwise comparisons (Mann-Whitney test). n: mean number of species

	Mean ± SD	Range	CV(%)	Mean ± SD	Range	CV(%)
EUFG (n = 53)						
ES	19.0 ± 7.5 (ab)	2.6–30.0	39			
MM	29.9 ± 9.3 (a)	8.0–51.7	31			
MS	27.7 ± 12.7 (a)	0.0–56.4	46			
F	14.0 ± 14.2 (bc)	0.0–58.0	101			
A	5.7 ± 4.8 (cd)	0.0–17.4	84			
C	3.7 ± 2.6 (d)	0.0–12.5	70			
FMFG	**ES** (n = 10)			**MM** (n = 15)		
DV	0.2 ± 1 (c)	0.0–6.2	500	16.7 ± 16.1 (ab)	0.0–57.1	96
Bmi	47.4 ± 14 (a)	0.0–75.0	30	16.6 ± 5.6 (a)	7.1–32.5	34
BMa	7.7 ± 8.1 (b)	0.0–22.7	105	15.9 ± 4.8 (a)	7.1–23.3	30
HP	8.9 ± 5.4 (b)	0.0–16.7	61	18.5 ± 8.4 (a)	4.2–34.5	45
HZ	22.6 ± 11.0 (a)	7.1–50.0	49	7.4 ± 5.3 (b)	1.9–25.0	72
PL	7.3 ± 10.1 (bc)	0.0–50.0	138	16.9 ± 10.5 (a)	0.0–50.0	62
HV	0.2 ± 1.4 (c)	0.0–8.3	700	0.5 ± 2.0 (c)	0.0–11.1	400
OV	5.8 ± 11.1 (bc)	0.0–42.9	191	7.4 ± 9.7 (b)	0.0–26.7	131
RMFG	**ES** (n = 10)			**MM** (n = 15)		
Op	2.1 ± 3.6 (c)	0.0–11.1	171	71.5 ± 8.6 (a)	52.6–90.0	12
Ob	5.0 ± 6.4 (c)	0.0–25.0	128	14.2 ± 11.2 (b)	0.0–40.0	79
Ov	18.8 ± 17.8 (b)	0.0–100	95	10.1 ± 6.5 (b)	0.0–25.0	64
Og	46.5 ± 13.1 (a)	0.0–75.0	28	2.7 ± 4.6 (c)	0.0–16.7	170
Os	24.0 ± 11.3 (b)	0.0–50.0	47	0.7 ± 2.3 (c)	0.0–9.5	329
V	3.6 ± 4.5 (c)	0.0–14.3	125	0.4 ± 1.2 (c)	0.0–4.3	300