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APPENDIX I
Summary Tables

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Summary Tables

1. Fishes occuring in English estuaries. A list of the all fishes recorded in the 22 named estuaries and coastal areas. Scientific and common names.

2. Biology and life habits of estuarine fishes.

3. Distribution of fishes in English estuaries. A list of all fishes recorded in the 22 named estuaries and coastal areas including marine vagrants that are often found in the mouths of estuaries.

4. Distribution of fishes in English estuaries (excluding marine vagrants).

5. Human impacts in English estuaries.

Foot notes:

1. There is still some doubt on whether *Atherina boyeri* and *Atherina presbyter* are the same species and it maybe for the sake of the tables that these should be treated as one species.

2. There are many other species that use the mouths of estuaries and special habitats associated with them during different phases of their life histories. Many juvenile stages use estuaries as early feeding grounds including many labrids, gobies and others.

Table 1. Fishes occuring in English estuaries. A list of all the fishes recorded in the 22 named estuaries and coastal areas. Scientific and common names

		Key	
Lampetra fluviatilis*	**Lampern**		
Petromyzon marinus*	**Sea lamprey**	**bold**	estuarine fishes
Lamna nasus	Porbeagle	*	protected or threatened
Cetorhinus maximus	Basking shark		
Alopias vulpinus	Thresher shark		
Galeus melastomus	Black-mouthed dogfish		
Scyliorhinus canicula	Dogfish		
Scyliorhinus stellaris	Nurse hound		
Galeorhinus galeus	Tope		
Mustelus mustelus	Smooth hound		
Prionace glauca	Blue shark		
Squalus acanthias	Spurdog		
Squatina squatina	Angel fish		
Torpedo sp.	Electric ray		
Torpedo nobiliana	Electric ray		
Raja alba	White skate		
Raja batis	Common skate		
Raja brachyura	Blonde ray		
Raja clavata	Thornback ray		
Raja fullonica	Shagreen ray		
Raja microocellata	Painted ray		
Raja montagui	Spotted ray		
Raja naevus	Cuckoo ray		
Raja oxyrinchus	Long-nosed skate		
Raja undulata	Undulate ray		
Dasyatis pastinaca	Stingray		
Acipenser sturio *	**Sturgeon**		
Anguilla anguilla	**Eel**		
Conger conger	Conger eel		
Alosa alosa*	**Allis shad**		
Alosa fallax*	**Twaite shad**		
Clupea harengus	**Herring**		
Sardina pilchardus	**Pilchard/Sardine**		
Sprattus sprattus	**Sprat**		
Engraulis encrasicolus	Anchovy		
Salmo salar	**Salmon**		
Salmo trutta	**Trout**		
Osmerus eperlanus	**Smelt**		
Argentina sphyraena	Argentine		
Maurolicus muelleri	Pearlside		
Apletodon dentatus	Small-headed clingfish		
Diplecogaster bimaculata	Two-spotted clingfish		
Lepadogaster candollei	Connemara clingfish		
Lepadogaster lepadogaster	Shore clingfish		
Lophius piscatorius	Angler		

Ciliata mustela	Five-bearded rockling
Ciliata septentrionalis	Northern rockling
Gaidropsarus mediterraneus	Shore rockling
Gaidropsarus vulgaris	Three-bearded rockling
Enchelyopus cimbrius	Four-bearded rockling
Melanogrammus aeglefinus	Haddock
Merlangius merlangus	**Whiting**
Micromesistius poutassou	Blue whiting
Molva molva	Ling
Phycis blennoides	Greater fork-beard
Gadus morhua	**Cod**
Pollachius pollachius	Pollack
Pollachius virens	Saithe
Raniceps raninus	Tadpole fish
Trisopterus esmarkii	Norway pout
Trisopterus luscus	**Bib**
Trisopterus minutus	Poor cod
Merluccius merluccius	Hake
Ophidion barbatum	Snake blenny
Cheilopogon sp.	Flying fish
Belone belone	Garfish
Scomberesox saurus	Skipper
Atherina boyeri	**Big-eyed sand-smelt**
Atherina presbyter	**Sand-smelt**
Zeus faber	John dory
Capros aper	Boarfish
Lampris guttatus	Opah
Gasterosteus aculeatus	**Three-spined stickleback**
Pungitius pungitius	**Nine-spined stickleback**
Spinachia spinachia	**Fifteen-spined stickleback**
Macroramphosus scolopax	Snipefish
Entelurus aequoreus	Snake pipefish
Hippocampus ramulosus	Seahorse
Nerophis lumbriciformis	Worm pipefish
Nerophis ophidion	Straight-nosed pipefish
Syngnathus acus	**Greater pipefish**
Syngnathus rostellatus	**Nilsson's pipefish**
Syngnathus typhle	**Deep-snouted pipefish**
Sebastes marinus	Redfish
Aspitrigla cuculus	Red gurnard
Aspitrigla obscura	Long-finned gurnard
Eutrigla gurnardus	Grey gurnard
Trigla lucerna	Tub gurnard
Trigla lyra	Piper
Trigloporus lastoviza	Streaked gurnard
Myoxocephalus scorpius	Bull rout
Micrenophrys lilljeborgi	Norway bullhead
Taurulus bubalis	**Sea scorpion**
Agonus cataphractus	**Pogge**

Cyclopterus lumpus	Lumpsucker
Liparis liparis	**Sea snail**
Liparis montagui	Montagu's sea snail
Dicentrarchus labrax	**Sea bass**
Polyprion americanus	Wreckfish
Seriola dumerili	Amberjack
Trachinotus ovatus	Derbio
Trachurus trachurus	Scad
Boops boops	Bogue
Pagellus bogaraveo	Red sea-bream
Sparus aurata	Gilthead
Spondyliosoma cantharus	Black sea-bream
Argyrosomus regius	Meagre
Mullus surmuletus	Red mullet
Cepola rubescens	Red band-fish
Chelon labrosus	**Thick-lipped mullet**
Liza aurata	**Golden mullet**
Liza ramada	**Thin-lipped mullet**
Mugil cephalus	**Golden grey mullet**
Centrolabrus exoletus	Rock cook
Crenilabrus melops	Corkwing
Ctenolabrus rupestris	Goldsinny
Labrus bergylta	Ballan wrasse
Labrus mixtus	Cuckoo wrasse
Trachinus draco	Greater weever
Echiichthys vipera	Lesser weever
Blennius ocellaris	Butterfly blenny
Coryphoblennius galerita	Montagu's blenny
Lipophrys pholis	Shanny
Parablennius gattorugine	Tompot blenny
Anarhichas lupus	Wolf fish
Chirolophis ascanii	Yarrell's blenny
Zoarces viviparous	**Viviparous blenny**
Pholis gunnellus	Butterfish
Ammodytes marinus	Raitt's sandeel
Ammodytes tobianus	**Sandeel**
Gymnammodytes semisquamati	Smooth sandeel
Hyperoplus immaculatus	Corbin's sandeel
Hyperoplus lanceolatus	Greater sandeel
Callionymus lyra	Common dragonet
Callionymus maculatus	Spotted dragonet
Callionymus reticulatus	Reticulated dragonet
Aphia minuta	Transparent goby
Buenia jeffreysii	Jeffrey's goby
Crystallogobius linearis	Crystal goby
Gobius cobitis	Giant goby
Gobius couchi	Couch's goby
Gobius niger	Black goby
Gobius paganellus	Rock goby

Gobiusculus flavescens	Two-spotted goby
Lebetus guilleti	Guillet's goby
Pomatoschistus lozanoi	Lozano's goby
Pomatoschistus microps	**Common goby**
Pomatoschistus minutus	**Sand goby**
Pomatoschistus pictus	**Painted goby**
Thorogobius ephippiatus	Leopard-spotted goby
Trichiurus lepturus	Hairtail
Auxis rochei	Frigate mackerel
Euthynnus alletteratus	Little tunny
Katsuwonus pelamis	Skipjack tuna
Sarda sarda	Atlantic bonito
Scomber japonicus	Spanish mackerel
Scomber scombrus	Mackerel
Thunnus alalunga	Longfin tuna
Thunnus thynnus	Bluefin tuna
Tetrapturus albidus	White marlin
Xiphias gladius	Swordfish
Centrolophus niger	Blackfish
Lepidorhombus whiffiagonis	Megrim
Psetta maxima	**Turbot**
Scophthalmus rhombus	**Brill**
Zeugopterus punctatus	Topknot
Arnoglossus laterna	Scaldfish
Glyptocephalus cynoglossus	Witch
Hippoglossoides platessoides	Long rough dab
Hippoglossus hippoglossus	Halibut
Limanda limanda	Dab
Microstomus kitt	Lemon sole
Platichthys flesus	**Flounder**
Pleuronectes platessa	**Plaice**
Buglossidium luteum	Solenette
Microchirus variegatus	Thickback sole
Solea lascaris	Sand sole
Solea solea	**Sole**
Balistes carolinensis	Grey triggerfish
Mola mola	Sunfish

Table 2. Biology and life habits of estuarine fishes.

	Migratory	Anadromous	Catadromous	Marine	Brackish	Freshwater	Resident	Seasonal
Lampetra fluviatilis	+	+		+	+	+		
Petromyzon marinus	+	+		+	+			
Acipenser sturio	+	+		+	+			
Anguilla anguilla	+		+	+	+	+		
Alosa alosa	+	+		+	+	+		
Alosa fallax	+	+		+	+			
Clupea harengus	+			+	+			+
Sprattus sprattus	+			+	+			+
Sardina pilchardus	+			+	+			+
Salmo salar	+	+		+	+	+		
Salmo trutta	+	+		+	+	+		
Osmerus eperlanus	+	+		+	+		+	
Gadus morhua	+			+	+			+
Merlangius merlangus	+			+	+			+
Trisopterus luscus	+			+	+			+
Atherina boyeri				+	+		+	
Atherina presbyter				+	+		+	
Gasterosteus aculeatus					+		+	
Pungitius pungitius					+		+	
Spinachia spinachia				+	+		+	
Syngnathus acus				+	+		+	
Syngnathus rostellatus				+	+		+	
Syngnathus typhle				+	+		+	
Taurulus bubalis				+	+		+	
Agonus cataphractus				+	+		+	
Liparis liparis				+	+		+	
Dicentrarchus labrax	+			+	+			+
Chelon labrosus				+	+		+	
Liza aurata				+	+		+	
Liza ramada				+	+		+	
Mugil cephalus				+	+		+	
Zoarces viviparous				+	+		+	
Ammodytes tobianus				+	+		+	
Pomatoschistus microps				+	+		+	
Pomatoschistus minutus				+	+		+	
Pomatoschistus pictus				+	+		+	
Psetta maxima	+			+	+			+
Scophthalmus rhombus	+			+	+			+
Platichthys flesus	+		+	+	+	+	+	
Pleuronectes platessa	+			+	+			+
Solea solea	+			+	+			+
TOTAL 41	21	8	2	39	41	6	22	11

Table 3. Distribution of fishes in English estuaries. A list of all fishes recorded in the 22 named estuaries and coastal areas including marine vagrants that are often found in the mouths of estuaries.

	Holy Is-Farne Is.	Humber	Wash	Orwell	Stour	B'water & Colne	Thames	Langstone C'chester	Poole Harbour	Exe	Salcombe Kingsbr.	Tamar Sound	Fal Helford	Camel	Taw Torridge	Severn	Dee	Mersey	Ribble	Morecambe Bay	Duddon	Solway Firth
Lampetra fluviatilis		+					+		+							-				-		+
Petromyzon marinus						+	+		+	+		+				-				-		+
Lamna nasus						+						+										+
Cetorhinus maximus												-	+			-						+
Alopias vulpinus													-									+
Galeus melastomus													+									+
Scyliorhinus canicula		+				-	-					-	+			-		+		-		+
Scyliorhinus stellaris													+			-						+
Galeorhinus galeus		-	-			-							+			-				-		+
Mustelus mustelus						-	+															+
Prionace glauca																						+
Squalus acanthias		+											+			-				-		-
Squatina squatina						-							+			-						+
Torpedo nobiliana												+										+
Torpedo sp.																		+				
Raja alba														+								
Raja batis																-				+		+
Raja brachyura											+		-									+
Raja clavata		+	+			+	+	+			+	+	-		-	-				-	+	+
Raja fullonica																						+
Raja microocellata													+		+							+
Raja montagui												-				+						+
Raja naevus																						+
Raja oxyrinchus																						+
Raja undulata							+									-						+
Dasyatis pastinaca						+	+					+	+									+
Acipenser sturio			+			+	+									+	+					+
Anguilla anguilla		+	+	+	+	+	-	-	+	+	+	-	+	-	+	+	+	+	+	+		+
Conger conger		+				+	+	+	+	+	+	-	+		-	+				+		+
Alosa alosa							+			+		+				+	+					+
Alosa fallax							+	+	+	+			+		-	+	+					+
Clupea harengus		+	+	+	+	+	+	+	-	+		+	+		+	+		+	+	+		+
Sardina pilchardus							+	+				+	+			+						
Sprattus sprattus		+	+			+	+	+	+	+	+	+	+		-	+	+	+	+	-	+	+
Engraulis encrasicholus							+									+						+
Salmo salar		+		+	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	+		+
Salmo trutta		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+
Osmerus eperlanus		+				+	+		+		+	+					+		+	+		

Table 3 (cont'd). Distribution of fishes in English estuaries. A list of all fishes recorded in the 22 named estuaries and coastal areas including marine vagrants that are often found in the mouths of estuaries.

	Holy Is	Humber	Wash	Orwell	Stour	B'water	Thames	Langstone	Poole	Exe	Salcombe	Tamar	Fal	Camel	Taw	Severn	Dee	Mersey	Ribble	M'cambe	Duddon	Solway
	Farne Is.					& Colne		Chichester	Harbour		Kingsbr.	Sound	Helford		Torridge					Bay		Firth
Argentina sphyraena																-						+
Maurolicus muelleri																-						
Apletodon dentatus								-					+									
Diplecogaster bimaculata						+							+									+
Lepadogaster candollei													+									
Lepadogaster lepadogaster												+	+	+								
Lophius piscatorius							+					-	+			+				+		+
Ciliata mustela	+					+	+	+	+			+	+			-		+		-		+
Ciliata septentrionalis							+					+				-						
Gadus morhua	+	+	+	+	-	-	+		+				+		-	-		+		+		+
Gaidropsarus mediterraneus							+		+				+					+				+
Gaidropsarus vulgaris	-					+	+						+			-				-		
Enchelyopus cimbrius							+						+									+
Melanogrammus aeglefinus		+					+									-						+
Merlangius merlangus	-	+	+	+	+	+	+						+		-	-	-	+		+	+	+
Micromesistius poutassou						+	+									-						+
Molva molva							+									-						+
Phycis blennoides													+			-						+
Pollachius pollachius	+						+	-	+	+	+	-	+	+		+				-		+
Pollachius virens	+	+								+	+		+	+		+				+		+
Raniceps raninus							+									-						+
Trisopterus esmarkii							+						+			-				+		
Trisopterus luscus	+	+				+	+	-	+		+	-	+	+		+				+	+	+
Trisopterus minutus						+	+		-			+	+	+		+				+		+
Trisopterus sp.											+							+				
Merluccius merluccius						+	+						+			-						+
Ophidion barbatum														+								
Cheilopogon sp.													+									
Belone belone						+	+	+	+	+		+	+									+
Scomberesox saurus						+	+															+
Atherina boyeri													+			+						
Atherina presbyter				+	+			+		+	+	+	+			+				+		
Zeus faber						+	+				+	+	+			+						+
Capros aper																+						
Lampris guttatus																						+
Gasterosteus aculeatus						+	+	+	+	+		+	+			+	+	+	+	-		
Pungitius pungitius							+									-	+					
Spinachia spinachia	+					+	+	-	+	+	+	-	+			+				+		+
Macroramphosus scolopax													+									

Table 3 (cont'd). Distribution of fishes in English estuaries. A list of all fishes recorded in the 22 named estuaries and coastal areas including marine vagrants that are often found in the mouths of estuaries.

	Holy Is-	Humber	Wash	Orwell	Stour	B'water	Thames	Langstone	Poole	Exe	Salcombe	Tamar	Fal	Camel	Taw	Severn	Dee	Mersey	Ribble	M'cambe	Duddon	Solway
	Farne Is.					& Colne		Chichester	Harbour		Kingsbr.	Sound	Helford		Torridge					Bay		Firth
Entelurus aequoreus							+				+	+				-						+
Hippocampus hippocampus							+															
Hippocampus ramulosus							+					+	-									+
Nerophis lumbriciformis							+	+	+			+	+			+				-		+
Nerophis ophidion												+	+			+						
Syngnathus acus		+				+	+	+	+	+	+	-	+	+		+				+		+
Syngnathus rostellatus		+				-	+	+		+						+				-		+
Syngnathus typhle							+	+				+	+			-						+
Syngnathus sp.	+										+						+					
Sebastes marinus																						+
Aspitrigla cuculus						+	+					+	+			+						+
Aspitrigla obscura													+									
Eutrigla gurnardus							+			+		+	+			-				+		+
Trigla lucerna							+	+				+	+			+				-		+
Trigla lyra						+																
Trigloporus lastoviza							+						+			+						+
Trigla sp.		+																				
Myoxocephalus scorpius	+		+			+	+	+		+			+			+				+		+
Micrenophrys lilljeborgi							+													-		
Taurulus bubalis	+					+	+	+	+	+	+	+	+	+		+		+		+		+
Agonus cataphractus	+	+	+			+	+	+	+	+		+	+		-	+		+		+		+
Cyclopterus lumpus	+					+	+	+	+			+	+			+				+		+
Liparis liparis		+				+	+	+				+				+				+		+
Liparis montagui	+						+	+					+			+				+		+
Dicentrarchus labrax		+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+
Polyprion americanus																+						
Seriola dumerili											+											
Trachinotus ovatus																						+
Trachurus trachurus		+				+	+	+	+			+	+			+						+
Boops boops													+									
Pagellus bogaraveo									+				+									+
Sparus aurata											+											
Spondyliosoma cantharus							+	+	+			+				+						+
Argyrosomus regius																+						+
Mullus surmuletus							+		+		+	+	+			+						+
Cepola rubescens									+													
Chelon labrosus							+	+	+	+		+	+	+	+	+		+		+		+
Liza aurata							+	+				+	+	+	+		+					
Liza ramada							+	+	+				+			+		+				+

Table 3 (cont'd). Distribution of fishes in English estuaries. A list of all fishes recorded in the 22 named estuaries and coastal areas including marine vagrants that are often found in the mouths of estuaries.

	Holy Is-	Humber	Wash	Orwell	Stour	B'water	Thames	Langstone	Poole	Exe	Salcombe	Tamar	Fal	Camel	Taw	Severn	Dee	Mersey	Ribble	M cambe	Duddon	Solway
	Farne Is.					& Colne		Chichester	Harbour		Kingsbr.	Sound	Helford		Torridge					Bay		Firth
Mugil cephalus														+								
Mugil sp.		+				+					+	+					+					
Centrolabrus exoletus											+	+	+	+		+						+
Crenilabrus melops								+	+	+	+	+	+	+		+						+
Ctenolabrus rupestris	+						+		+		+	+	+	+		+						+
Labrus bergylta	+						+	+	+	+	+	+	+	+		+						+
Labrus mixtus							+		+			+	+	+		+						+
Trachinus draco													+									+
Trachinus sp.		+				+																
Echiichthys vipera	+						+	+		+		+	+			+				+	+	+
Blennius ocellaris													+									
Coryphoblennius galerita													+			+						
Lipophrys pholis	+							+	+	+		+	+	+	+					+		+
Parablennius gattorugine						+		+	+			+	+			+						
Anarhichas lupus	+																					
Chirolophis ascanii	+												+									
Zoarces viviparous	+	+				+	+															
Pholis gunnellus	+		+			+	+	+	+		+	+	+		+	+				+		+
Ammodytes marinus							+	+					+									
Ammodytes tobianus	+	+					+	+	+	+	+	+	+			+				+		+
Ammodytes sp.	+	+									+	+					+		+			
Gymnammodytes semisquamatus								+								+						
Hyperoplus immaculatus								+				+										
Hyperoplus lanceolatus							+	+				+	+			+			+			+
Callionymus lyra	+	+	+			+	+	+	+	+	+	+	+	+		+				+	+	+
Callionymus maculatus																						+
Callionymus reticulatus													+			+						+
Callionymus sp.	+											+										
Aphia minuta						+	+	+	+		+	+	+			+				+		
Buenia jeffreysii																+						
Crystallogobius linearis																+						
Gobius cobitis													+									
Gobius couchi													+									
Gobius niger						+	+	+	+		+	+	+			+						+
Gobius paganellus							+	+	+		+	+	+			+				+		
Gobius sp.		+																				
Gobiusculus flavescens						+		+	+	+	+	+	+	+		+						+
Lebetus guilleti																						
Lebetus sp.																+						

Table 3 (cont'd). Distribution of fishes in English estuaries. A list of all fishes recorded in the 22 named estuaries and coastal areas including marine vagrants that are often found in the mouths of estuaries.

	Holy Is.	Humber	Wash	Orwell	Stour	B'water	Thames	Langstone	Poole	Exe	Salcombe	Tamar	Fal	Camel	Taw	Severn	Dee	Mersey	Ribble	M'cambe	Duddon	Solway
	Farne Is.					& Colne		Chichest	Harbour		Kingsbr.	Sound	Helford		Torridge					Bay		Firth
Pomatoschistus lozanoi							+									-						
Pomatoschistus microps							+	-		+		+	+			+	+			-		+
Pomatoschistus minutus	+	+	+			-	+	-	+	+	+	-	+		+	-	+		+	+	+	+
Pomatoschistus pictus	-		+				+	-			+	+	-		+					+		+
Pomatoschistus sp.	+										+	+							+			
Thorogobius ephippiatus							+				+	-	+	+	+							
Trichiurus lepturus													+									
Auxis rochei																						+
Euthynnus alletteratus																						+
Katsuwonus pelamis																						+
Sarda sarda																						+
Scomber japonicus																						+
Scomber scombrus		+	+				+	-	-	+		+	+	+	+	+				+		+
Thunnus alalunga											+											+
Thunnus thynnus																						+
Tetrapturus albidus											+									+		
Xiphias gladius																+						+
Centrolophus niger													+									+
Lepidorhombus whiffiagonis																-						
Psetta maxima		+	+			+	+	-	+	+	+	+	+			+				-		+
Scophthalmus rhombus		+	+			+	+	+	+	+		+	+		+	+				+		+
Phrynorhombus regius							+															
Zeugopterus punctatus	+					+	+					+	+			-						+
Arnoglossus laterna							+						+			+						+
Glyptocephalus cynoglossus						+										+						+
Hippoglossoides platessoides						-	+															+
Hippoglossus hippoglossus																						+
Limanda limanda	+	+	+			+	+	+	+	+	+	+	+		+	+		+		-	+	+
Microstomus kitt						+	+						+									+
Platichthys flesus	+	+	+	+	+	+	+	-	+	+	+	+	+	+	+	-	+	+	+	+		+
Pleuronectes platessa	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	+	+	+
Pleuronectes sp.	+										+											
Buglossidium luteum		+					+	-					+								+	+
Microchirus variegatus								+														+
Solea lascaris												+									+	+
Solea solea		+	+	+	+	+	+	-	+	+	+	-	+		+	+	+	+	+	+	+	+
Balistes carolinensis							+				+	+	+			+						+
Mola mola							+					+				+						+
TOTAL 181	31	40	22	11	11	61	101	62	53	39	46	80	110	28	26	111	21	22	14	59	12	130

Table 4. Distribution of fishes in English estuaries (excluding marine vagrants).

	Holy Is-	Humber	Wash	Orwell	Stour	B'water	Thames	Langstone	Poole	Exe	Salcombe	Tamar	Fal	Camel	Taw	Severn	Dee	Mersey	Ribble	M'cambe	Duddon	Solway
	Farne Is.					& Colne		C'chester	Harbour		Kingsbr.		Helford		Torridge					Bay		Firth
Lampetra fluviatilis		+					+		+							+				–		+
Petromyzon marinus						+	+		+	+		+				+				–		+
Acipenser sturio			+			–	–									+	+					+
Anguilla anguilla		–	+	–	–	–	+	–	+	–	+	–	–	+	–	+	+	+	+	–		+
Alosa alosa							+			+		–				+	+					+
Alosa fallax							–	–	+	+			+		+	+	+					+
Clupea harengus		–	+	+	–	–	+	+	–	+		–	+		+	+		+	–	–		+
Sardina pilchardus							–	+				–	+			+						
Sprattus sprattus		+	+			–	+	+	+	+	–	+	+		+	–	+	+	+	–	+	+
Salmo salar		+		+	+	–	+	+	+	+	+	–	+	+	+	–	–	+	+	–		+
Salmo trutta		+	+	+	+	+	+	+	+	+	+	–	+	+	–	+	+	+	+	–		+
Osmerus eperlanus		+				+	+		+		+	–					+		+	–		
Gadus morhua	+	+	+	+	+	+	+		+				+		+	+		+		–		+
Merlangius merlangus	+	+	+	+	–	+	+						–		+	+	+	+		–	+	+
Trisopterus luscus	+	+				+	+	+	+		+	–	+	+		+				+	+	+
Atherina boyeri													+			+						
Atherina presbyter				+	+			+		+	+	–	+			+				–		
Gasterosteus aculeatus						+	+	+	+	+		+	+			+	+	+	+	+		
Pungitius pungitius							+									+	+					
Spinachia spinachia	+					+	+	+	+	+	+	+	+			+				–		+
Syngnathus acus		+				+	+	+	+	+	+	+	+	+		+				+		+
Syngnathus rostellatus		+				+	+	+		+						+				–		+
Syngnathus typhle							+	+				–	+			+						+
Taurulus bubalis	+		+			+	+	+		+		–	+			+				+		+
Agonus cataphractus	+	+	+			–	+	+	+	+		–	+		–	+		+		+		+
Liparis liparis		+				+	+	+								–				+		+
Dicentrarchus labrax		+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+
Chelon labrosus							+	+	+	+		+	+	+	+	+		+		+		+
Liza aurata							+	+				+	+	+	+		+					
Liza ramada							+	+	+				+			+		+				+
Mugil cephalus														+								
Zoarces viviparous	+	+				+	+					+										
Ammodytes tobianus	+	+					+	+	+	+	+		+			+				+		+
Pomatoschistus microps							+	+		+		–	+			+	+			–		+
Pomatoschistus minutus	+	+	+			+	+	+	+	+	+	–	+		+	+	+		+	+	+	+
Pomatoschistus pictus	+		+				+	+			+	+	+		–					+		+
Psetta maxima		+	+			+	+	+	+	+	+	+	+			+				+		+
Scophthalmus rhombus		+	+			+	+	+	+	+		+	+		+	+				+		+
Platichthys flesus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+
Pleuronectes platessa	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Solea solea		+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+
TOTAL 41	12	23	16	11	11	26	38	30	25	25	17	29	31	11	18	36	18	15	12	30	6	32

Table 5. Human impacts in English estuaries.

	Holy Is.-Farne Is.	Humber	Wash	Orwell	Stour	Blackwater & Colne	Thames	Langstone & Chichester	Poole Harbour	Exe	Salcombe Kingsbr.	Tamar	Fal Helford	Camel	Taw Torridge	Severn	Mersey	Dee	Ribble	M'cambe Bay	Duddon	Solway Firth
Agriculture	+	+	+	+					+	+	+	+	+		+	+		+		+	+	+
Bait-digging	+		+	+	+		+	+	+	+	+	+	+		+	+				+	+	+
Barrage					+																	
Commercial fisheries	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+		+	+		+
Docks/shipping		+				+	+	+	+	+		+	+	+	+	+	+	+	+			
Dredging	+	+		+	+	+		+	+			+	+				+	+	+			
Ed/Scientific	+		+				+	+	+	+	+	+	+	+	+	+				+		
Heavy metals			+	+	+	+	+	+	+			+	+	+	+	+	+	+	+			+
Land reclamation			+	+	+			+	+			+			+		+	+	+	+		
Military			+					+	+			+			+							
Mining												+	+								+	
Oil/gas		+		+	+				+				+		+							
Power generation						+	+		+						+	+			+			
Radioactivity						+										+			+			
Recreation	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+		+
Sediment extraction									+		+		+		+	+			+			+
Urbanisation		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+
Waste/domestic		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Waste/industrial		+	+			+	+	+	+	+	+	+	+	+	+	+	+		+	+		+

APPENDIX II
Reviews of fishes of named English estuaries

APPENDIX II
Reviews of fishes of named English estuaries

1 Holy Island to Farne Island coast
2 The Humber Estuary
3 The Wash
4 Orwell Estuary
5 Stour Estuary
6 Blackwater and Colne Estuaries
7 Thames Estuary
8 Chichester and Langstone Harbours
9 Poole Harbour
10 Exe Estuary
11 Salcombe and Kingsbridge Estuaries
12 Plymouth Sound and Tamar Estuary
13 Fal and Helford Estuaries
14 Camel Estuary
15 Taw/Torridge Estuary
16 Severn Estuary
17 Dee Estuary
18 Mersey Estuary
19 Ribble Estuary
20 Morecambe Bay
21 Duddon Estuary
22 Solway Firth

Foot notes:

1. Not every reference listed is referred to in the text.

1

THE FISHES
of
HOLY ISLAND TO FARNE ISLAND COAST

THE FISHES OF
THE HOLY ISLAND TO FARNE ISLAND COAST

1.1 Introduction

The Farne Islands are situated between 2 and 6 km offshore. Holy Island is an inhabited island and encloses extensive mud and sand flats between it and the mainland. Holy Island to Farne Island coast is not a true estuary as the sea is fully saline throughout the area. There is considerable conservation interest and the area is designated an SSSI of marine biological importance, particularly for the seal and seabird populations. The marine biology has been relatively little studied (Connor, 1989; Davies *et al.*, 1990).

The coast between Holy Island and the Farne Islands contains a variety of inshore habitats and is recognised as having considerable conservation importance. While not a true estuary, it is described as a barrier beach system fully open to the sea and with some freshwater run off from the Rivers Ross, Low and Belford Burn into Budle Bay. The total area is recorded at 3,274 ha. of which 2,840 is intertidal on a shoreline of 33km (Davidson *et al.*, 1991). The area contains a nature reserve and is designated a SSSI for its marine biological importance and particularly with respect to the extensive sea bird colonies that use the area as feeding grounds or as nesting areas. The Farne Islands contain the most important grey seal breeding ground on the east coast south of the Orkneys. Commons seals are also present, although reduced following the outbreak of phocine distemper virus. (Hywel-Davies & Thom, 1986; Connor, 1989; Davies *et al.*, 1990).

The dependence of seabirds and seals on fish as food suggest a rich fish fauna.

1.2 Estuarine habitats

Between Holy Island and the mainland there are extensive areas of dune/salt marsh and mud flats which form important feeding grounds for waders and wildfowls. These areas have a rich infauna which provide food for both seabirds and inshore fishes. The mudflats are dissected by drainage channels and small streams. The habitat diversity in the region is high ranging from sheltered mudflats to exposed rocky reefs at the Farne Islands. Very little has been done on the sublittoral region except for one survey by Edwards (1983) who identified new species records for the area (Davies *et al.*, 1990).

1.3 Fish lists

There is no specific published fish list for the area Holy Island to Farne Island coast. However, the fish fauna is expected to be similar to surrounding fully marine coasts. The NRA carried out a beam trawl and have identified 15 fish species (Peaty, pers. comm. 1992). There are fish lists for wider areas and detailed lists for other north east coastal areas (Johnson, 1838, 1841; Howse, 1890; Meek & Dunn, 1904; Bolam, 1919; Davis, 1980; Evans, 1981; Davis, 1983; Davis & Edwards, 1988). Some studies have been carried out on the fishes of the Cullercoats coast. The number of fish species recorded from the Holy Island to Farne Island coast is 31 (see Table 1.1)

1.4 Fish and fisheries

There have been no published fish lists for the area between Lindisfarne and the Farne Islands, although as a fully saline section of the coast it is to be expected the fish fauna will not differ significantly from MAFF records for that coastal sea sector. The Cullercoats Laboratory also holds records that will be representative and notes on the St. Abbs area to the north should also be consulted.

Sand eels (*Ammodytidae*) are recorded from mobile sediments in the area and in addition Hywel-Davies and Thom (1986). They mention that the diet of grey seals from the Farne Islands included; conger eel, herring, lumpsucker, pollack, ray, salmon, skate, whiting and wrasse.

1.5 Impacts

The area is largely **rural** and does not suffer the problems of pollution typical in areas with a greater degree of urbanisation and industrialisation.

Small **inshore fisheries** will have some effect on fish populations.

Tourism in the area is significant and increasing and SCUBA diving around the Farne Islands is popular.

Some **bait digging** by anglers occurs.

1.6 Water Quality

The areas has no major sources of pollution and the seawater quality is "good" (NRA, 1991), being mainly fully saline (see Figure 1.1). Some freshwater dilution of coastal waters is likely especially during the winter months. The water quality was subjected to a survey by Edmondson & Watts (1992).

1.7 Summary

The littoral and sublittoral region between Holy Island and the Farne Islands is likely to contain a range of biologically important habitats that have been shown of significance to seabird and seal populations. As yet no significant survey has been conducted of the fish populations.

8. Recommendations

It is recommended that:

1. In view of the importance of coastal fishes as food for seabirds and seals, a detailed survey is carried out on the fishes of this region.

2. Studies on the behavioural ecology of sand eel populations in relation to their seasonal abundance and diurnal distribution should contribute to our understanding of inshore food webs.

3. With the increase in SCUBA diving in the area, a voluntary fish recording scheme could be established.

4. In view of the relatively unpolluted conditions and importance for seal and sea bird breeding colonies, the area should be designated a conservation area and marine reserve.

1.9 References

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Table 1.1 The Fishes of the Holy Island to Farne Island coast

Ciliata mustela
Gadus morhua
Gaidropsarus vulgaris
Merlangius merlangus
Pollachius pollachius
Pollachius virens
Trisopterus luscus
Spinachia spinachia
Syngnathus sp.
Myoxocephalus scorpius
Taurulus bubalis
Agonus cataphractus
Cyclopterus lumpus
Liparis montagui
Ctenolabrus rupestris
Labrus bergylta
Echiichthys vipera
Lipophrys pholis
Anarhichas lupus
Chirolophis ascanii
Zoarces viviparous
Pholis gunnellus
Ammodytes sp.
Ammodytes tobianus
Callionymus sp.
Callionymus lyra
Pomatoschistus sp.
Pomatoschistus minutus
Pomatoschistus pictus
Zeugopterus punctatus
Limanda limanda
Platichthys flesus
Pleuronectes platessa
Pleuronectes sp.

Potts & Swaby (1993)

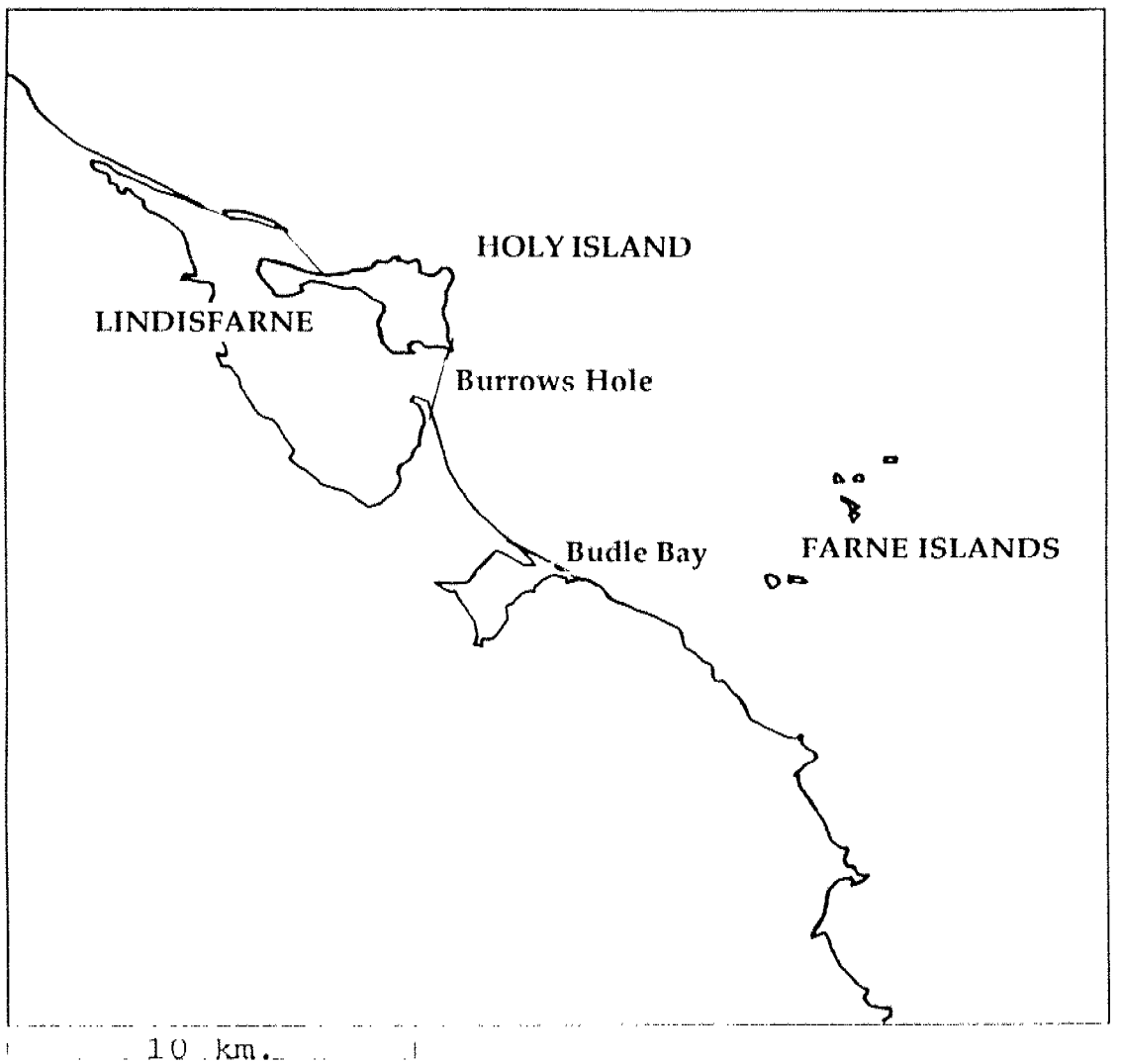

Figure 1.1 Map of the Holy Island to Farne Island coast.