APPENDIX 10.21

DIETS OF WILDFOWL, WADERS AND GULLS

DIETS OF SELECTED WILDFOWL

Great-crested Grebe

Summary: Chiefly fish, also to a lesser extent, aquatic invertebrates.

Prey species: Fish include Roach, Bleak, Gudgeon, Dace, Rudd, Tench, Goldfish, Minnow, Perch, Bream, Pike, Trout, Char, sticklebacks and Eel.

Insects and larvae include dragonflies, beetles, caddis-flies, ants, waterbugs, flies, moths and stoneflies.

Crustaceans include crayfish, shrimps and *Pandalus*.

Molluscs include snails, but mollusc remains in stomachs probably mainly a result of eating mollusc-feeding fish.

Spiders, amphibians, and occasionally newts and Grass Snakes.

Plant remains found in small amounts in stomachs include seeds (willow, sedge), parts of reed, pondweeds and algae.

Daily food intake, based on captive birds, amounts to about one-fifth of bodyweight, i.e. 150-250 grams per day.

Cormorant

Summary: Normally, entirely fish.

Stomach analysis and prey species: Chiefly flatfish, gadoids, Cod and Whiting, and shore and estuarine fish, particularly Viviparous Blenny and Sea-Scorpions. Less frequently clupeoids, Common Eel and salmonids.

Also Water Vole *Arvicola amphibia*, frogs *Rana temporaria*, and even kitten of 28cm.

Daily consumption varies between 425-700 grams and averages between 15-17% of bodyweight.

Grey Heron

Summary: Chiefly fish, amphibians, small mammals, insects and reptiles; occasionally crustaceans, molluscs, worms, birds, and (possibly as an aid in pellet formation) plant material.

Prey species/Stomach analysis: Mainly fish, water beetles and their larvae (25.1%), Frogs (20.3%),

Small mammals, Water Shrew, Mole, Water Vole, and Field Vole. Also insects and their larvae.

Minimum daily quantity of food by adults *c.* 330 grams up to 500 grams.

Canada Goose

Summary: Primarily plant materials including roots, rhizomes, tubers, stems, leaves, fruits, and seeds obtained (much as in Anser) mostly by grazing.

Shelduck

Summary: Mainly invertebrates, especially molluscs, insects and crustaceans.

Prey species: Mainly small molluscs (*Hydrobia* etc), small crustaceans and insect larvae. Also plant material, chiefly green seaweed (*Enteromorpha)*, less often *Vaucheria* and Sea Club-rush.

Wigeon

Summary: Almost entirely vegetarian, mainly leaves, stems, stolons, bulbils and rhizomes; also some seeds and occasionally animal materials. Wide range of foods including Eel-grass, grasses, buttercups, clovers etc. Also molluscs, crustaceans and amphibians.

Gadwall

Summary: Chiefly vegetative part of plants.

Teal

Summary: Omnivorous, seeds predominating in winter.

Prey species: Food varies with locality and season, but basically seed eater in autumn and winter, with relatively more animal materials in summer. Plant materials are chiefly seeds of aquatics such as sedges and bulrushes, pondweeds, buttercups and docks. Also Sea Aster and other maritime plants.

Animal prey includes molluscs, flies, caddisfly larvae, water beetles, crustaceans, annelids and chironomids.

Mallard

Summary: Omnivorous and opportunistic, with wide range of food and feeding methods.

Prey species: Diversity of feeding behaviour allows wide use of different habitats; reflected in long list of recorded food items. Plant materials include seeds, buds, and leaves of aquatic and terrestrial species of many families including saltmarsh plants. Animal materials include insects, molluscs, crustaceans, annelids, amphibians, fish, and occasionally even birds and mammals.

Pintail

Summary: Wide variety of plant and animal materials.

Prey species: Plant materials chiefly seeds, tubers and rhizomes of pondweeds *Potamogeton,* sedges, docks, Bistort, grasses and others. Animal materials are mainly insects, especially water beetles, Diptera, caddis-fly larvae, dragonfly larvae and grasshoppers. Also molluscs, Hydrobia, annelids, crustaceans etc.

Shoveler

Summary: Omnivorous, but particularly planktonic crustaceans, small molluscs, insects and larvae, seeds and plant debris.

Prey species: Wide variety of foods recorded. Small crustaceans (amphipods, copepods, cladocerans, ostracods). small molluscs, insects and larvae including caddis-flies, waterbugs, dragonflies, flies and beetles. Seeds of aquatic plants, including sedges, *Scirpus,* pondweeds and grasses. Annelid worms, amphibian spawn and tadpoles, spiders, fish and vegetative plant parts, including buds and shoots.

Pochard

Summary: Plant and animal, proportions vary with season and locality, though in many areas primarily seeds and vegetative parts.

Prey species
Plant materials include seeds, rhizomes, buds, shoots, leaves and tubers. Most frequently recorded include stoneworts, pondweeds, milfoil, hornworts, sedges, persicarias and grasses. Animal materials include crustaceans, molluscs, annelids, insects and larvae, amphibians and small fish.

Tufted Duck

Summary: Omnivorous: generally stationary or slow-moving items collected mainly from bottom.

Prey species: Coastal wintering: chiefly molluscs. Inland wintering areas: often mainly animal materials including molluscs, crustaceans and insects, through plants (especially seeds) may form major part of diet. Spring and summer diet: more variable, in some areas mainly seeds, in others mainly insects or molluscs.

Goldeneye

Summary: Primarily molluscs, crustaceans, and insect larvae.

Prey species: Mainly animal, including molluscs, small crustaceans, insects and larvae, and small fish; occasionally earthworms, frogs, tadpoles, Water Shrews and leeches.

Plant material, more prominent in autumn: includes seeds, tubers, roots, and leaves of aquatic species, also algae.

Moorhen

Summary: Omnivorous, with varying proportions of plant and animal materials.

Prey species: Duckweed; leaves and stems of pondweeds, rushes, reeds, Brooklime and grasses. Seeds of Bulrush, bur-reed, pondweed, sedges, docks, bistort and others. Berries of yew and many other trees and shrubs.

Animal foods include molluscs, earthworms, spiders and harvestmen, insects, including Ephemeroptera, Hemiptera, Aphididae and frog-hopper, caddis-flies, beetles, moths and butterflies.

Coot

Summary: Omnivorous, though plant materials generally predominate.

Prey species: Mainly vegetative parts and seeds of aquatic and sometimes terrestrial plants, including debris drifting on surface. Animal prey chiefly molluscs and invertebrates.

DIETS OF SELECTED WADERS

Oystercatcher

Summary: Predominantly bivalve molluscs, particularly cockles, mussels and Baltic tellin; mainly earthworms inland.

Prey species: Mainly bivalves, especially mussels, cockles, oysters, gastropods locally important, especially limpets, common dogwhelks. Also shore crabs, sandhoppers and bristle worms. Insects taken by inland and sand-dune breeders, predominately larvae of butterflies and moths, but also beetles, moths, flies and earwigs.

Ringed Plover

Summary: On breeding grounds, terrestrial and coastal invertebrates; outside breeding season, principally marine polychaete worms, crustaceans and molluscs.

Prey species: Away from breeding grounds, principally beetles, polychaete worms. Other important prey, from various coastal sites, included molluscs, small oligochaetes and polychaetes, and larval and adult insects.

Golden Plover

Summary: Wide spectrum of invertebrates, but principally beetles and earthworms; also some plant material, including berries, seeds, and grasses.

Prey species: Earthworms and beetles. Other invertebrates include larvae, pupae and adults of moths, larvae of sandflies, craneflies, and horseflies. Adult shield-bugs, froghoppers, ants (Formicidae), orthopterans, dragonflies, earwigs, spiders, millipedes and snails. Marine molluscs and crustaceans infrequently.

Non-breeding: insects, especially beetles, again predominate in diet; and in some localities at certain times of year, also earthworms.

Lapwing

Summary: Predominantly ground-living invertebrates

Prey species: Wide variety, though chiefly small invertebrates living on, or in, ground. Insects, beetles, flies, mayflies, crickets and grasshoppers, earwigs, moths, ants, caddis-flies and dragonflies.

Other prey: **s**piders, earthworms, molluscs, millipedes, harvestmen, woodlice, frogs and small fish.

Knot

Summary: On breeding grounds varying proportions of insects and plant material. Outside breeding season, feeds predominantly on a small range of abundant intertidal invertebrates, chiefly molluscs.

Prey species: During breeding season diet consists of plant (at times predominantly) and animal matter. Plants include shoots, buds and seeds of grasses; flowering parts of sedges *Carex*, stems of horsetails, also bulbils of *Polygonum* etc. and sporophytes of moss *Polytrichum*. Insects are most important animal food, mainly larval and adult dipteran flies (primarily Chironomidae; also Tipulidae and others.) Also Lepidoptera, caddis-flies, beetles, bees, spiders, amphipod crustaceans, molluscs, worms (Polychaeta, Oligochaeta).

Away from breeding grounds, mainly bivalve and gastropod molluscs, particularly Baltic Tellin. Also cockles, perwinkles and mussels. Crustaceans include Shore Crab, amphipods, barnacle and shrimp. Also polychaete *Nereis diversicolor* and oligochaete worms. Insects include eggs and larvae of Diptera. Sand Goby regular in at least one area

Plant matter includes seeds of various grasses, wheat. Also *Enteromorpha*.

Sanderling

Summary: Chiefly small invertebrates.

Prey species: Insects, especially adult and larval dipteran flies (Chironomidae etc) and occasionally beetles and lepidoptera. Also spiders and crustaceans. When animal prey unavailable (e.g. beginning of breeding season) takes plant material, including buds and shoots of alpine plants. Also takes flies, shrimps, molluscs, polychaete worms and some saltmarsh plants.

Dunlin

Summary: Chiefly invertebrates

Prey species: Inland on migration and in winter chiefly insects, especially dipteran flies (mainly Chironomidae), beetles and planktonic crustaceans. In coastal areas chiefly intertidal invertebrates, principally polychaete worms, especially *Nereis*, also *Scoloplos*, *Arenicola*. Also gastropod snails and bivalves.

Crustaceans and occasionally small fish.

Common Snipe

Summary: Chiefly invertebrates

Prey species: Insects include most frequently: larval and adult dipteran flies and beetles. Also ants, caddis-flies, dragonflies and damsel flies, mayflies and bugs. Annelida include oligochaete and polychaete worms (e.g. Nereidae) and leeches (Hirudinea).

Molluscs, crustaceans including *Asellus*) and amphipods. Also spiders and frogs. Plant material consistently recorded and includes vegetative debris (e.g. moss, leaves, roots and stems of grass, rushes, etc.) and seeds.

Black-tailed Godwit

Summary: Chiefly invertebrates; in winter and on migration, also plant material

Prey species: Wide range of invertebrates recorded. Most frequently, at least in breeding season: insects (especially beetles), annelid worms and molluscs. Insects and their larvae: beetles, Dipteran flies, grasshoppers, locusts and Mole Crickets, dragonflies, water-bugs, mayflies, and butterfly caterpillars.

Also mollusks, earthworms, ragworms (*Nereis)*, crustaceans, and spiders. Occasionally fish eggs, frogspawn and tadpoles.

Plant material, most frequently recorded outside breeding season, includes seeds *Polygonum*, *Ranunculus*, sedges etc.

Bar-tailed Godwit

Summary: Chiefly invertebrates, especially insects, molluscs, crustaceans and annelid worms.

Prey species: On coasts: Molluscs (*Littorina*, *Macoma*) and crustaceans (*Balanus*, *Gammarus*, *Jaera*)

Winter and on migration, in particular: Annelids (*Arenicola*, *Nereis*, *Lumbricus*, *Heteromastus*), small crustaceans, small molluscs including *Macoma*, *Hydrobia*, *Littorina* and on occasion small fish, e.g. Sand Eel. Main prey can be polychaete worms; also takes small crustaceans and small molluscs.

Wintering birds on British estuaries take mainly polychaete worms: Ribble Estuary – *Nereis* 59% of diet up to end of January, but by February only 27% with *Macoma* predominating.

Curlew

Summary: Omnivorous, though taking principally invertebrates; seasonal variations in diet partly reflect seasonal differences in habitat.

Prey species: From littoral zone: Polychaetes (Annelida): including *Nereis*. Crustaceans including crabs, shrimps and amphipods (*Gammarus* etc), Bivalve molluscs: including *Macoma*, *Mytilus*, *Mya* and *Cardium*

Occasionally small fish.

Redshank

Summary: Large number of prey species, but typically feeds on limited range of items: crustaceans, molluscs and polychaete worms on estuaries, and earthworms (Lumbricidae) and cranefly larvae (Tipulidae) inland.

Prey species: Most important prey include amphipod crustaceans, polychaete worms, *Nereis diversicolor* and *Nephthys hombergi*, bivalve molluscs (*Macoma balthica)* and (*Scrobicularia plana)*, and gastropod mollusc (*Hydrobia ulvae)*. Shrimps *Crangon* and crabs (*Carcimus maenas)* in pools or surface layers of mud.

Occasionally crabs, winkles (*Littorina*), worms and crustacean *Gammarus* found by turning over weed, small stones and leaves (much like Turnstone). Occasionally cleans out shells of cockle (*Cardium edule)* and mussel (*Mytilus edulis)* opened by other birds, e.g. Oystercatcher.

In marshes and fields take mainly earthworms, larval and adult flies, and adult beetles, in freshwater areas mainly adult and larval insects.

Large variety of other prey recorded, but occur sporadically in diet: include bivalve mollusc (*Cardium edule*, *Tellina tenuis*, *Mytilus edulis)*; polychaete worms (*Cirriformia tentaculata)* and *Arenicola marina*; crustaceans *Balanaus* and Mysidacea.

DIETS OF GULLS

Black-headed Gull

Summary: Mainly animal material, particularly insects and earthworms, but commonly supplemented by plant material and household or industrial waste. Food pirate and scavenger.

Prey species: Very wide range of items reflects extensive use of diverse habitats.

Annelid worms: Oligochaetes (earthworms) and polychaetes (e.g. Nereidae). Insects, particularly beetles. Dipteran flies: especially larval and adult Tipulidae, mayflies, bugs, caddis-flies, dragonflies and stoneflies. Caterpillars and adult moths.

Molluscs: slugs. Crustaceans: important in some areas, particularly small crabs, amphipods, isopods. Occasionally spiders, millipedes, centipedes etc.

Fish especially important in certain areas at certain times. Amphibians, small mammals, fruits and seeds.

Scavenging important, e.g. from slaughter-houses, fish-processing factories, docks, harbours, sewage works, rubbish tips, gardens, parks etc.; takes great variety of items ranging from carrion to bread and cheese.

Breeding season: earthworms and insects predominate in diet, with earthworms occupying as much as 50% of total food mass, and insects *c*. 15%.

Insects may be c. 80-90% of total number of items; mainly ground-dwelling beetles and their larvae (especially those living on or near surface, those of shallow margins, and those of relatively slow flight near water).

Summer and autumn: when vegetation high and ground often hard, earthworms and ground-dwelling insects less often taken, and aquatic insects whose breeding season is finished and not available.

Other insects then taken; also fish, fruit, seed and refuse.

Winter: insects taken less frequently, and other foods exploited, e.g. fish (by food-piracy and from drained fish-ponds), and refuse. Under certain conditions earthworms and insects still figure highly in winter diet.

Common Gull

Summary: Chiefly terrestrial and aquatic invertebrates, and fish, obtained mainly by direct predation but also on occasion by food piracy and scavenging.

More a ground forager than Black-headed Gull, with preference for drier, well-drained soils, and sandy estuarine areas. Over grassland, flocks mover in short leap-frog flights extracting earthworms and other invertebrates from surface. Feeds behind plough, usually on foot. Insects taken from ground or vegetation, and as they emerge from pupae; occasionally snatched in flight; takes insects from Ragwort in flight.

Prey species: Feeds on earthworms, bivalves and amphipod crustaceans. On grassland, land being ploughed, and to a lesser extent arable land, earthworms are important.

In Britain, in summer when earthworms less available, feeds frequently on adult craneflies; also takes other dipteran flies and beetles, small numbers of Elateridae especially in May and June, and, when made available by ploughing, larvae of Elateridae and adults of Staphylinidae, and Carabidae). In autumn, a few earwigs *Forficula* recorded in diet.

Occasionally kills ducklings and young of ground-nesting birds, e.g. Meadow Pipit, Corncrake, and takes eggs, e.g. of Red-throated Diver, Dunlin and terns. Small mammals, mainly voles and mice, taken, especially at hay-cutting time; analysis of pellets from nests near Hamburg showed some individuals to specialise on small mammals, chiefly Field Vole.

From freshwater, takes fish, including salmon parr, molluscs, occasionally frogs, and adult and larval insects, e.g. dragonflies, stoneflies, caddisflies. Coastal areas: takes molluscs (e.g. cockle), echinoderms (e.g. starfish *Asterias*), and crustaceans (e.g. amphipod *Hyale*)

Scavenges in or near towns in cold weather, though usually noticeably shyer than other gulls and does not take such advantage of urban and industrial waste.

Lesser Black-backed Gull

Summary: Omnivorous; diet includes vertebrates and invertebrates of suitable size, plant material, and rubbish.

Prey species: Mammals include voles and mice. Birds include adult Puffin, Manx Shearwater, larks, young Kittiwake, Lapwing, Redshank, ducks, terns, and eggs of various species.

Fish include Roach, Ide, Bleak, Ruffe, Pike-perch, Perch, Pike, Rudd, Gudgeon, Bream, Lamprey, Sea Trout, sand-eels, Capelin, Cod, Herring, eels and flounders.

Insects include beetles, dipteran flies and their larvae, ants, and larvae of antler moths.

Crustaceans include crabs, shrimps, crayfish, isopods. Also molluscs, annelid worms and earthworms, starfish, and plant material including seaweed, grain, and berries, especially of crowberry and cowberry.

Herring Gull

Summary: Predator, scavenger and food-pirate, taking almost anything available of suitable size, texture etc.

Often robs other seabirds, including own species, and waterfowl. Follows fishing boats to take offal, and follows the plough to take earthworms and insects. Foraging distances vary considerably and from some colonies can be considerable, up to 50-60 kilometres.

Prey species: Very wide range of items recorded, with pronounced annual, seasonal and local variation; reflects diverse habitat use, ability to adapt to changing circumstances, and specialisation by individuals. Often impossible to distinguish between items predated or scavenged.

Animals recorded include Coelenterata, Annelida, Arthropoda (Crustacea, Myriapoda, Insecta, (Arachnida), Mollusca, Endoprocta and Ectoprocta, Echinodermata, fish, amphibians, reptiles, birds and mammals.

Plants include, particularly, seeds (including cereals, fruits etc.), and a wide range of vegetative

material.

Great Black-backed Gull

Summary: Omnivorous, taking wide variety of foods throughout range. Voracious predator, scavenger and food-pirate.

Kills prey e.g. Manx Shearwater by stabbing with bill and vigorous shaking; other prey are Puffins and various ducks, terns etc.

Prey species: Often impossible to distinguish if killed or taken as carrion. Mammals include rabbit, rats, lemmings, mice, occasionally, weak sheep. Birds include adults (often incapacitated or ill), young and eggs of various seabirds, ducks, waders, gulls an others. Also amphibians. Fish include Herring, Mackerel and others.

Other prey are Sea-squirts, Sea-cucumbers, Sea-urchins, Brittle-stars, Starfish; insects include dipteran flies, beetles, and ants; crustaceans include crabs, barnacles; annelid worms include polychaetes (e.g. *Nereis*, *Arenicola*) and oligochaetes (*Lumbricidae*); molluscs include mussels, limpet, gastropods, and cephalopods.

Specific carrion records include whale (Cetacea), pinnipeds (e.g. seal), dog, cat, birds, fish, and large invertebrates. Frequently eats waste products, e.g. from fishing industry, slaughterhouses, refuse-dumps.