

Appendix-8: Allowable Water abstraction for UK Rivers

Appendix 8: Allowable Water abstraction for UK Rivers

(Ref: Developing environmental standards for abstractions from UK Rivers to implement the EU Water Framework Directive, Hydrological Sciences Journal)

Table 1 River water reach types based on Holmes et al. (1998), who classified UK rivers on the basis of macrophytic plant communities found during site surveys at over 1500 sites, together with their trophic status, geology, sediment and flow type.

Type A (A1 to A4) Alluvium/clay and/or Chalk; low altitude; low slope; eutrophic; silt/clay-gravel bed; smooth flow; predominantly C and SE England		Type B (B1 and B2) Hard limestone and sandstone low-medium altitude; low-medium slope; mesotrophic?; gravel-boulder (predominantly pebble-cobble), mostly smooth flow, small turbulent areas SW, NW, NE England, E Scotland, C and S Wales		Type C (C1 and C2) Non-calcareous shales, hard limestone and sandstone; medium altitude; medium slope; oligo-meso-trophic; pebble, cobble, boulder bed, smooth flow with abundant riffles and rapids; SW, NE England, Lake District, W Wales, Southern Uplands, Grampians		Type D (D1 and D2) Granites and other hard rocks; low and high altitudes; gentle and steep slopes; ultraoligo – oligotrophic; cobble, boulder, bedrock, pebble; smooth with turbulent areas – torrential; C, N and W Scotland, scattered in W Wales, SW, NW and S England	
Type A1 Lowest gradients (0.8 ± 0.4 m/km) and altitudes (36 ± 25 m); predominantly clay; SE England and East Anglia & Cheshire plain	Type A2 (hw and ds) Slightly steeper (1.7 ± 0.8 m/km); low altitude (55 ± 38 m); Chalk catchments; predominantly gravel beds base-rich	Type B1 Gradient: 4.1 ± 9.9 m/km; altitude: 93 ± 69 m; hard sandstone, calcareous shales; predominantly S. & SW England and SW Wales	Type B2 Shallower than B1 (2.7 ± 10.7 m/km); altitude: 71 ± 58 m; predominantly NW England, E Scotland	Type C1 Gradient: 5.4 ± 6.5 m/km; altitude: 101 ± 84 m; hard limestone; more silt and sand than C2; mesotrophic	Type C2 Steeper than C1 (7.3 ± 10.8 m/km); altitude: 130 ± 90 m; non-calcareous shales; pebble-bedrock; oligo-mesotrophic	Type D1 Medium gradient (11.3 ± 15.6 m/km); low altitude (93 ± 92 m), oligotrophic, substrate finer than D2 (incl. silt & sand); more slow flow areas than D2	Type D2 High gradient (25.5 ± 33 m/km); high altitude (178 ± 131 m); stream order 1 & 2 bed rock and boulder; ultra-oligo trophic torrential
Example rivers where water body types (river reaches) can be found:							
Wissey, Lark, Nar, Wensum, Bure, (lowland reaches only) Welland, Cherwell, Tame, Evenlode	Test, Piddle, Frome, Itchen, Mimram, Hull, headwaters of East Anglian rivers listed on left	Tamar, Torridge, Exe, Teifi, Monnow, Lugg, Dove	Ribble, Wharfe, Eden, Tweed, Lunan, Ythan	Scattered	Lower Findhorn, Spey, Dee, Esk, Ure, Derwent, Conwy, Dee, Cothi, Barle	English lowland acid heaths (New Forest), Scottish Flow Country, Western Isles	Dartmoor, Exmoor, Brecon, Beacons, Snowdonia, Pennines, Cairngorms, NW Highlands

Table 3 Summary of thresholds defined by river scientists for UK river types for achieving GES. For macrophytes and macro-invertebrates, the thresholds are given as % allowable abstraction of natural flow (thresholds are for annual flow statistics); for fish the thresholds are given as % allowable abstraction of natural flow exceeding Q_{95} i.e. % of residual flow (natural flow minus Q_{95}).

Macrophytes:			Macro-invertebrates:		Fish:	
	% flow	Period	% flow	Period	% (flow – Q_{95})	Period
A1	10	Mar.–May	30	All year	50	Jul.–Apr. HOF Q_{98}
	20	Jun.–Feb.			20	May–Jun. HOF Q_{98}
A2	10	Mar.–May	10	All year	20	All year
	20	Jun.–Feb.				10% flow < Q_{95} 5% flow < Q_{99}
B1	10	Mar.–May	10	All year	50	Rheophilic cyprinids Jul.–Jan.
	20	Jun.–Feb.				25% flow < Q_{90} 20% flow < Q_{99} HOF Q_{99}
B2	20	All year	20	All year		
C1	20	All year	20	All year	50	Feb.–Jun. HOF Q_{90}
C2	10	Mar.–May	10	All year	50	Adult salmonids All year HOF Q_{95}
	20	Jun.–Feb.				
D1	10	Mar.–May	20	All year		Salmonid spawning and nursery
	20	Jun.–Feb.				May–Sep. HOF Q_{95}
D2	10	Mar.–May	10	All year	20	Oct.–Apr. HOF Q_{80}
	20	Jun.–Feb.			20	
HOF Q_{97} Mar.–May			HOF flow Q_{97} All year			