Table 2.1. Manning's Roughness Coefficients for Various Boundaries.	
	Manning's n
Rigid Boundary Channels	
Very smooth concrete and planed timber	0.011
Smooth concrete	0.012
Ordinary concrete lining	0.013
Wood	0.014
Vitrified clay	0.015
Shot concrete, untrowelled, and earth channels in best condition	0.017
Straight unlined earth canals in good condition	0.020
Mountain streams with rocky beds	0.040 - 0.050
Minor Streams (top width at flood stage < 30 m (100 ft)	
Streams on Plain	
1. Clean, straight, full stage, no rifts or deep pools	0.025-0.033
2. Same as above, but more stones and weeds	0.030-0.040
3. Clean, winding, some pools and shoals	0.033-0.045
4. Same as above, but some weeds and stones	0.035-0.050
5. Same as above, lower stages, more ineffective slopes and sections	0.040-0.055
6. Same as 4, but more stones	0.045-0.060
7. Sluggish reaches, weedy, deep pools	0.050-0.080
8. Very weedy reaches, deep pools, or floodways with heavy stand of timber and underbush	0.075-0.150
Mountain Streams, no vegetation in channel, banks usually steep, trees and brush along banks submerged at high stages	
1. Bottom: gravels, cobbles, and few boulders	0.030-0.050
2. Bottom: cobbles with large boulders	0.040.0.070
Floodplains	
Pasture, No Brush	
1. Short Grass	0.025-0.035
2. High Grass	0.030-0.050
Cultivated Areas	
1. No Crop	0.020-0.040
2. Mature Row Crops	0.025-0.045
3. Mature Field Crops	0.030-0.050

Table 2.1. Manning's Roughness Coefficients for Various Boundaries.	
	Manning's n
Floodplains (continued)	
Brush	
1. Scattered brush, heavy weeds	0.035-0.070
2. Light brush and trees in winter	0.035-0.060
3. Light brush and trees in summer	0.040-0.080
4. Medium to dense brush in winter	0.045-0.110
5. Medium to dense brush in summer	0.070-0.160
Trees	
1. Dense willows, summer, straight	0.110-0.200
2. Cleared land with tree stumps, no sprouts	0.030-0.050
3. Same as above, but with heavy growth of sprouts	0.050-0.080
4. Heavy stand of timber, a few down trees, little undergrowth, flood stage below branches	0.080-0.120
5. Same as above, but with flood stage reaching branches	0.100-0.160
Major Streams (Top width at flood stage > 30 m (100 ft) The n value is less than that for minor streams of similar description, because banks offer less effective resistance.	
Regular section with no boulders or brush	0.025-0.060
Irregular and rough section	0.035-0.100
Alluvial Sandbed Channels (no vegetation)[1]	
Tranquil flow, Fr < 1	
1. Plane bed	0.014 - 0.020
2. Ripples	0.018 - 0.030
3. Dunes	0.020 - 0.040
4. Washed out dunes or transition	0.014 - 0.025
5. Plane bed	0.010 - 0.013
Rapid Flow, Fr > 1	
1. Standing waves	0.010 - 0.015
2. Antidunes	0.012 - 0.020
[1]Data is limited to sand channels with D_{50} < 1.0 mm, details to be discussed in Chapter 3.	