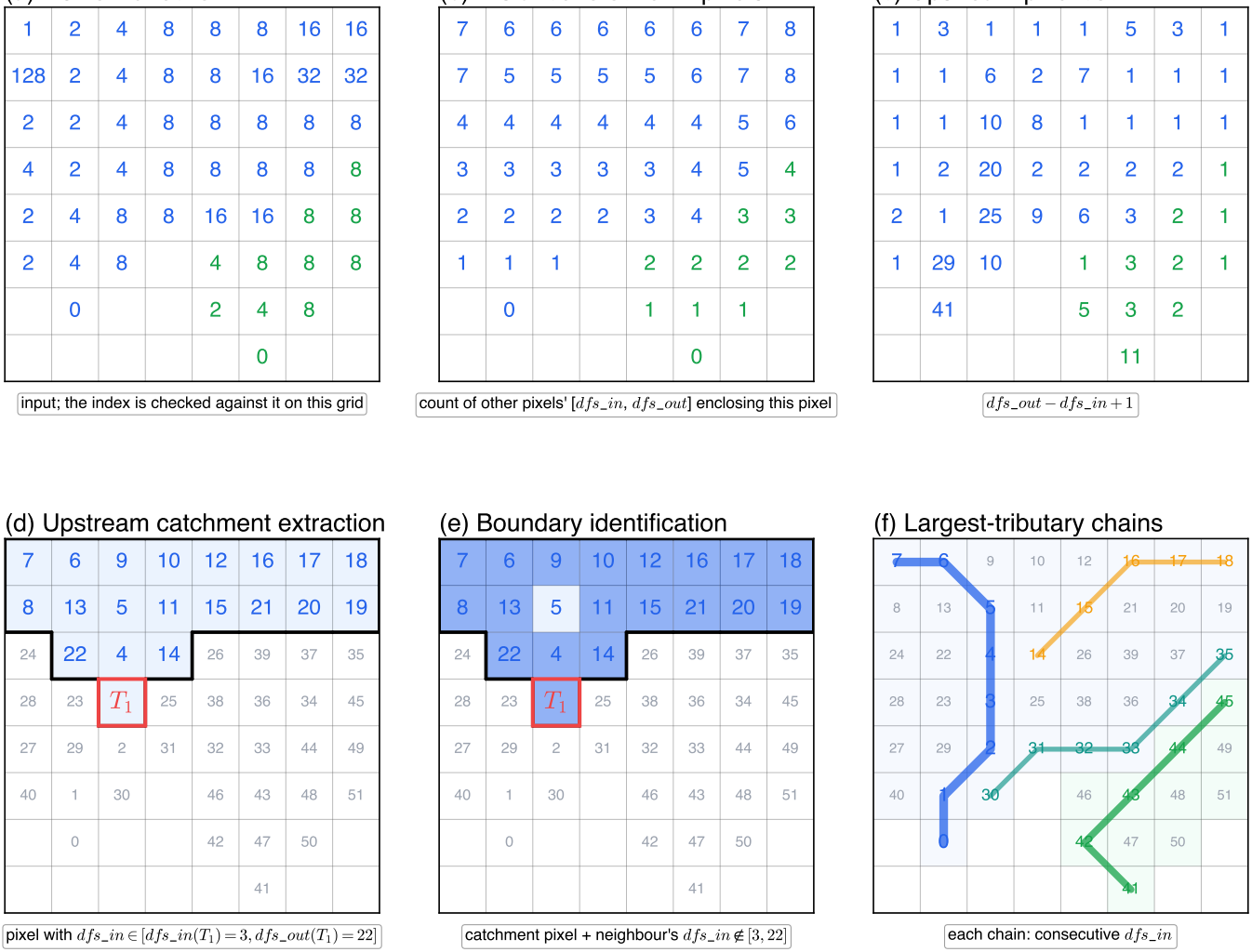

(a) D8 flow direction
1 2 4 8 8 8 16 16
128 2 4 8 8 16 32 32
2 2 4 8 8 8 8 8
4 2 4 8 8 8 8 8
2 4 8 8 16 16 8 8
2 4 8 4 8 8 8
0 2 4 8
0
input; the index is checked against it on this grid
(b) Distance to outlet in pixels
7 6 6 6 6 6 7 8
7 5 5 5 5 6 7 8
4 4 4 4 4 4 5 6
3 3 3 3 3 4 5 4
2 2 2 2 3 4 3 3
1 1 1 2 2 2 2
0 1 1 1
0
count of other pixels' [dfs_in, dfs_out] enclosing this pixel
(c) Upstream pixel count
1 3 1 1 1 5 3 1
1 1 6 2 7 1 1 1
1 1 10 8 1 1 1 1
1 2 20 2 2 2 2 1
2 1 25 9 6 3 2 1
1 29 10 1 3 2 1
41 5 3 2
11
$dfs_out - dfs_in + 1$
(d) Upstream catchment extraction
7 6 9 10 12 16 17 18
8 13 5 11 15 21 20 19
24 22 4 14 26 39 37 35
28 23 T_1 25 38 36 34 45
27 29 2 31 32 33 44 49
40 1 30 46 43 48 51
0 42 47 50
41
pixel with $dfs_in \in [dfs_in(T_1) = 3, dfs_out(T_1) = 22]$
(e) Boundary identification
7 6 9 10 12 16 17 18
8 13 5 11 15 21 20 19
24 22 4 14 26 39 37 35
28 23 T_1 25 38 36 34 45
27 29 2 31 32 33 44 49
40 1 30 46 43 48 51
0 42 47 50
41
catchment pixel + neighbour's $dfs_in \notin [3, 22]$
(f) Largest-tributary chains
7 6 9 10 12 16 17 18
8 13 5 11 15 21 20 19
24 22 4 14 26 39 37 35
28 23 3 25 38 36 34 45
27 29 2 31 32 33 44 49
40 1 30 46 43 48 51
0 42 47 50
41
each chain: consecutive dfs_in