Index convention: `Basin_ID = Table_Index + 1` → *one-step translation between raster pixels and table rows*

Step 1. Plant outlet seeds *(BAT → BSN, once before any pass)*

Attribute Table (BAT)		Global 2D Raster (BSN)
`BAT[Table_Index] = {Basin_ID, outlet_row, outlet_col, …}`	*for each row in BAT* →	`BSN[outlet_row, outlet_col] = Basin_ID` `others = NoData`

Step 2. Sliding-window sweep schedule *(6 passes; 36° windows; Pass 2–5 step 18°)*

Pass 1	Pass 2	Pass 3	Pass 4	Pass 5	Pass 6
centered on 30 largest basins	baseline (0°, 0°)	lon shift (+18°, 0°)	lat shift (0°, +18°)	diagonal (+18°, +18°)	anti-meridian wrap-around

Step 3. Mark complete basins as "closed" *(at the start of each pass)*

observed *(labels currently in BSN)*
`labeled_count[Basin_ID - 1]`

expected *(UPG, downstream-routed pixel count)*
`BAT[Basin_ID - 1].basin_cell_count`

Compare: `labeled_count[Basin_ID - 1] = BAT[Basin_ID - 1].basin_cell_count` **?**

`MSK = 2 (closed)` mark basin and skip it in subsequent passes

Step 4. Per-tile upstream tracing *(inside each pass, every tile)*

Global 2D Input	Local Tile (in-memory)	Global 2D Write-back (BSN)
`MSK` *(read-only)* `DIR` *(read-only)* `BSN` *(read)*	`mskTile = MSK[window]` `dirTile = DIR[window]` `bsnTile = BSN[window]`	`BSN[window] = bsnTile` *(updated labels only)*

`if mskTile == 1 (open):` *trace and label upstream pixels*

Step 5. Record bounding boxes *(BSN → BAT, once after all basins delineated)*

Attribute Table (BAT)		Global 2D Raster (BSN)
`BAT[Basin_ID - 1].{` `row_min..max,` `col_min..max}`	← *for each labeled pixel*	`BSN[row, col] = Basin_ID`