**Trapezoidal Teacups in RiverWare Output Canvases -- RiverWare 6.8**

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Document Home: R:\doc\Output\OutputCanvas\2015\TrapezoidalTeacups-RW68.docx

# Overview

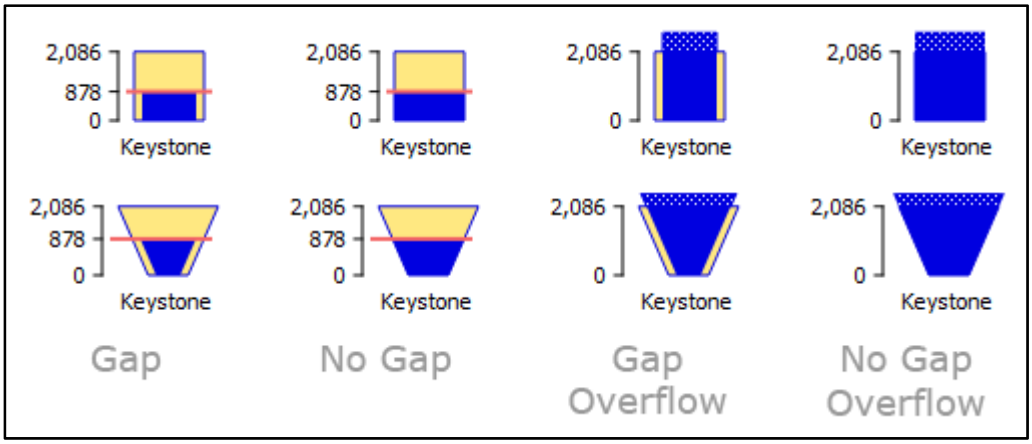
As introduced in RiverWare 6.6, Output Canvas Teacup graphics were limited to a vertical rectangular bar presentation. In RiverWare 6.8, two additional "teacup geometries" were introduced -- two forms of trapezoids. For any particular *teacup group,* the user can now choose between these three Teacup Geometry options:

1. Rectangular (as provided in RiverWare 6.6)
2. Trapezoidal, Congruent
3. Trapezoidal, Constant Top and Bottom Widths

Additionally, the following two features were added:

1. Configuration option to optionally show or hide the horizontal **gap** between the inner "Current" rectangle (or trapezoid) and the outer "Maximum" rectangle (or trapezoid).

2. For *overflow* of the "Current" area above the "Maximum" area, presentation of a distinct **dotted pattern fill.** (This became desirable especially with the ability to remove the gap between the current and maximum areas; that made the overflow area more difficult to discern).



# Trapezoid Geometries

Trapezoid dimensions are configured with three values, in pixel units. These are configured at the teacup *group* level. (Note that an Output Canvas can have multiple teacup groups).

1. Maximum Teacup Height
2. Teacup Bottom Width
3. Teacup Top Width -- or -- Maximum Teacup Top Width

The **Maximum Teacup Height** applies to the teacup within the teacup group having the largest *maximum* value. All teacups within a teacup group have the same **Teacup Bottom Width.**

The two provided Teacup Geometries differ in how the teacup *top widths* are computed:

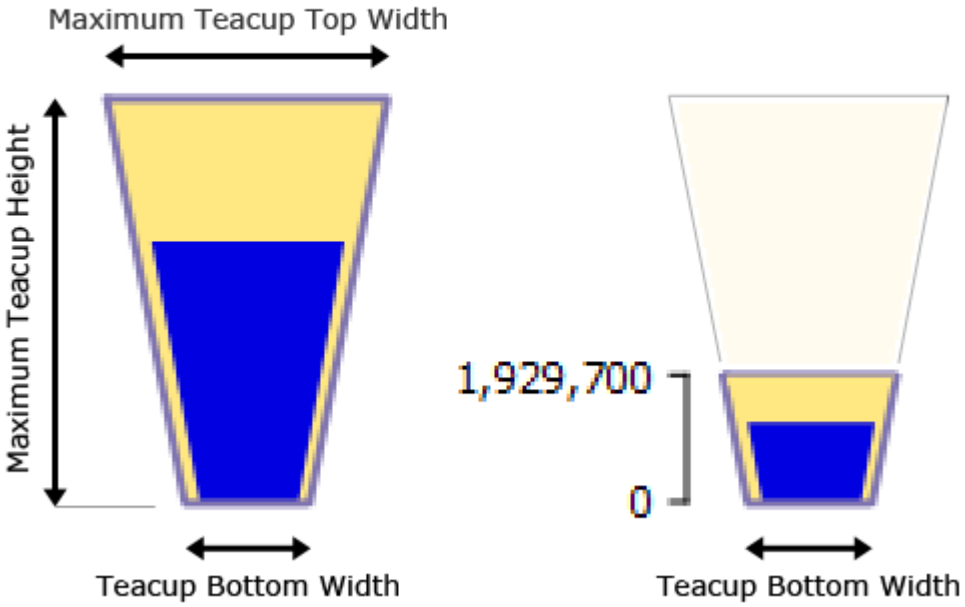
> The **"Trapezoidal, Congruent" geometry** assigns the configured **"Maximum Teacup Top Width"** to the teacup within the teacup group having the largest *maximum* value. The top widths of all other teacups in the group are computed, based on where their *maximum* value falls within the geometry of largest teacup.
>
> The **"Trapezoidal, Constant Top and Bottom Widths" geometry** assigns the configured **"Teacup Top Width"** to all teacups in the teacup group.

In both proposed trapezoidal geometries, teacup values -- typically reservoir volumes -- are linearly mapped to a graphical AREA within the teacup graphic, rather than a HEIGHT above the teacup baseline.

> In the **Rectangular** geometry, all other teacup values are mapped to a vertical position above the teacup's base, proportional to the value-to-vertical-pixel ratio defined by the largest teacup.
>
> For both **Trapezoidal** geometries, a **value-to-area ratio** is computed from the largest teacup. That computed value-to-area ratio is then used for computing geometries within all teacups within the teacup group.

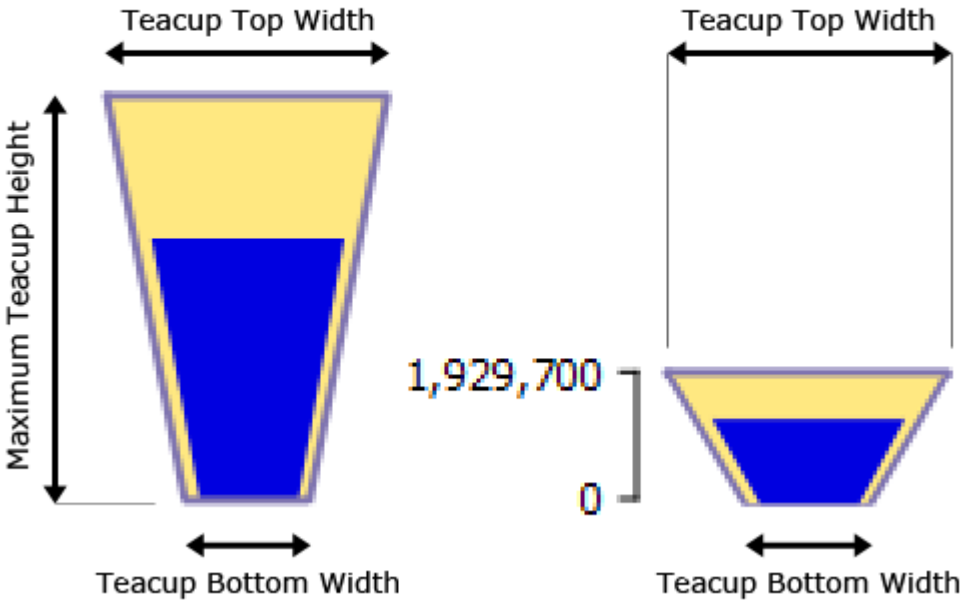
The following diagrams depict these geometries, as applied to the largest teacup in the group, and another teacup in the same group.

## Teacup Geometry: Trapezoidal, Congruent




**Heights** above the teacup base are computed *using metrics associated with the largest teacup's geometry.* This applies also to the top of the trapezoids for all other teacups in the group.

## Teacup Geometry: Trapezoidal, Constant Top/Bottom



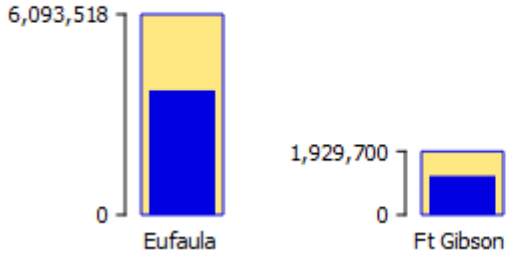

Each teacup effectively has its own function for mapping values to **heights.** The top *width* of the trapezoid is fixed. The top's vertical position is computed given the value-to-area ratio established by the largest teacup and the individual teacup's *maximum* value.

# Teacup Geometry Configuration Settings

Arguments for the teacup geometry computations are configured at the *teacup group* level. They apply to all teacups contained in the teacup group. These arguments are specified in units of *pixels*.

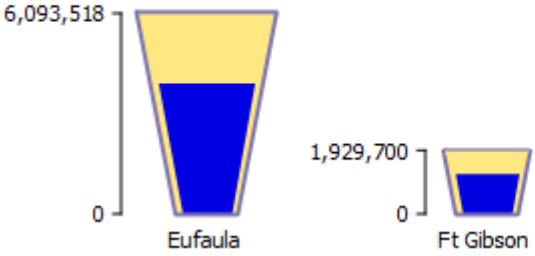
As indicated above, a new **"Show Gap"** (Yes/No) configuration value was added -- this applies to *all three* supported teacup geometries (i.e. Rectangular too). All three geometries support a **"Maximum Teacup Height"** configuration value. The three geometries have distinct "teacup width" settings appropriate for the use of those configuration values.

## Teacup Geometry: Rectangular



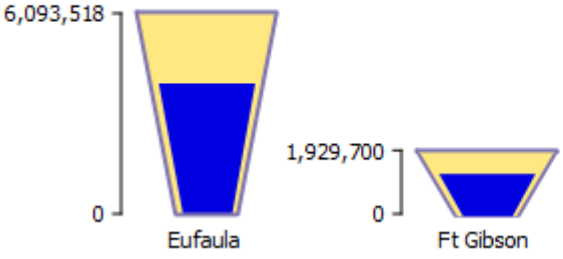

| | |
|---|---|
| Teacup Geometry | Rectangular |
| Show Gap | Yes |
| Maximum Teacup Height | 100 |
| Teacup Width | 41 |
| Show Vertical Axis | Yes |

## Teacup Geometry: Trapezoidal, Congruent

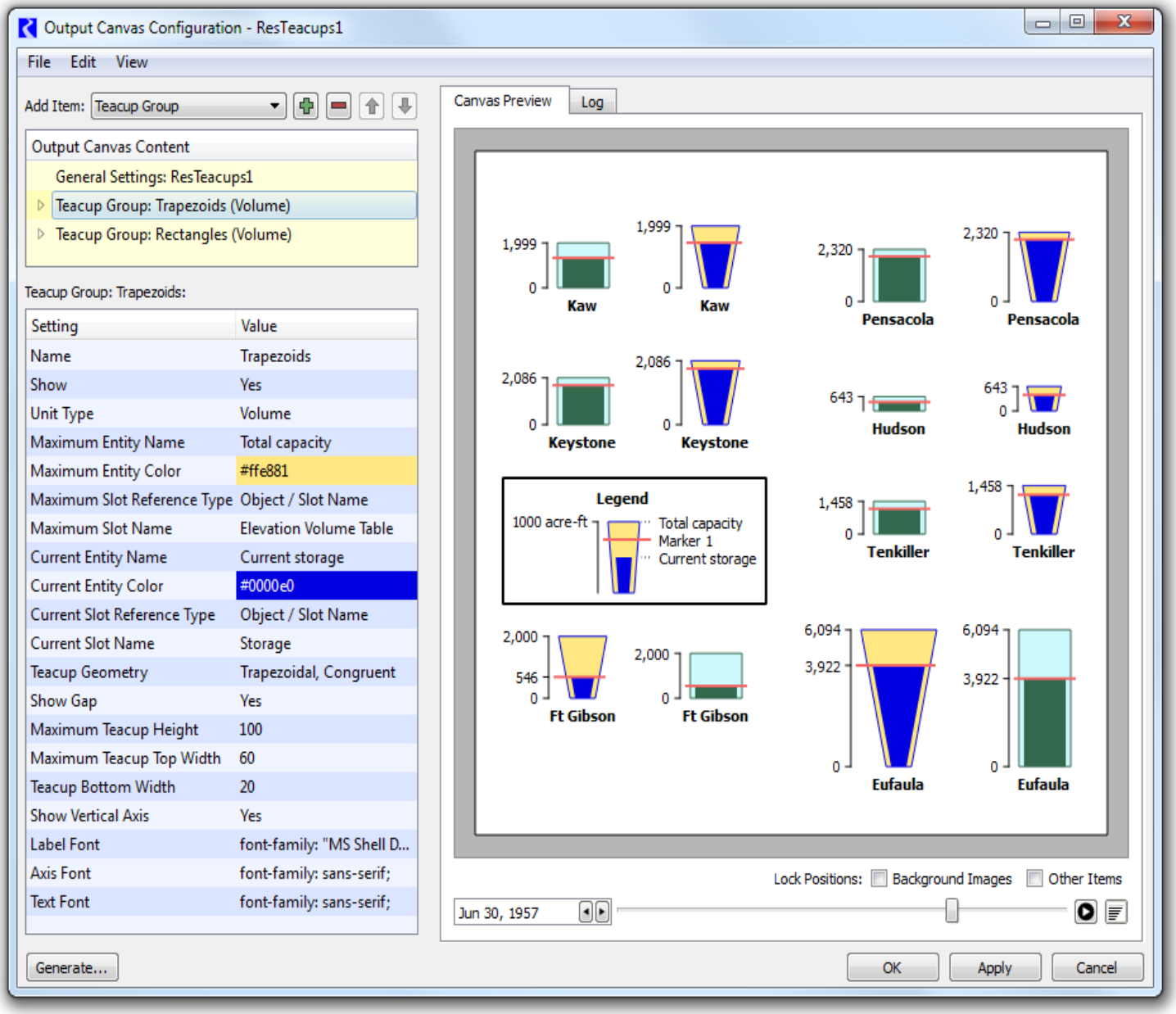



| | |
|---|---|
| Teacup Geometry | Trapezoidal, Congruent |
| Show Gap | Yes |
| Maximum Teacup Height | 100 |
| Maximum Teacup Top Width | 51 |
| Teacup Bottom Width | 31 |
| Show Vertical Axis | Yes |

## Teacup Geometry: Trapezoidal, Constant Top/Bottom




| | |
|---|---|
| Teacup Geometry | Trapezoidal, Constant Top/Bot |
| Show Gap | Yes |
| Maximum Teacup Height | 100 |
| Teacup Top Width | 51 |
| Teacup Bottom Width | 31 |
| Show Vertical Axis | Yes |


Output Canvas Configuration - ResTeacups1
File Edit View
Add Item: Teacup Group
Output Canvas Content
General Settings: ResTeacups1
Teacup Group: Trapezoids (Volume)
Teacup Group: Rectangles (Volume)
Teacup Group: Trapezoids:
Setting Value
Name Trapezoids
Show Yes
Unit Type Volume
Maximum Entity Name Total capacity
Maximum Entity Color #ffe881
Maximum Slot Reference Type Object / Slot Name
Maximum Slot Name Elevation Volume Table
Current Entity Name Current storage
Current Entity Color #0000e0
Current Slot Reference Type Object / Slot Name
Current Slot Name Storage
Teacup Geometry Trapezoidal, Congruent
Show Gap Yes
Maximum Teacup Height 100
Maximum Teacup Top Width 60
Teacup Bottom Width 20
Show Vertical Axis Yes
Label Font font-family: "MS Shell D...
Axis Font font-family: sans-serif;
Text Font font-family: sans-serif;
Canvas Preview
Log
1,999
0
Kaw
2,320
Pensacola
2,086
Keystone
643
Hudson
Legend
1000 acre-ft
Total capacity
Marker 1
Current storage
1,458
Tenkiller
2,000
546
Ft Gibson
6,094
3,922
Eufaula
Lock Positions: Background Images Other Items
Jun 30, 1957
Generate...
OK
Apply
Cancel

--- (end) ---