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# Available Water Storage

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**Available water storage (AWS)** is the total volume of water (in centimeters) that is expected to be available to plants when the soil, inclusive of rock fragments, is at field capacity. It is commonly estimated as the amount of water held between field capacity and the wilting point, with corrections for salinity, rock fragments, and rooting depth. AWS is reported as a single value (in centimeters) of water for the specified depth of the soil.

AWS is calculated as the available water capacity times the thickness of each soil horizon to a specified depth. For each soil layer, available water capacity, used in the computation of AWS, is recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A “representative” value indicates the expected value of this attribute for the component. For the derivation of AWS, only the representative value for available water capacity is used. The available water storage for each map unit component is computed as described above and then aggregated to a single value for the map unit by the process described below.

A map unit typically consists of one or more “components.” A component is either soil or a nonsoil entity, e.g., rock outcrop. For the attribute being aggregated (e.g., available water storage), the first step of the aggregation process is to derive one attribute value for each of a map unit’s components. From this set of component attributes, the next step of the process is to derive a single value that represents the map unit as a whole. Once a single value for each map unit is derived, a thematic map for the map units can be generated. Aggregation is needed because map units rather than components are delineated on the soil maps. The composition of each component in a map unit is recorded as a percentage. A composition of 60 indicates that the component typically makes up approximately 60 percent of the map unit. For the available water storage, percent composition is the weighting factor when a weighted average of all component values is computed.

## Script Breakdown

#### Insert identifier(s) string and WKT geometry for each area of interest (AOI) polygon

SELECT @aoiGeom = GEOMETRY::STGeomFromText('MULTIPOLYGON (((-102.12335160658608 45.959173206572416, -102.13402890980223 45.959218442561564, -102.13386921506947 45.944643788188387, -102.12327175652177 45.944703605814198, -102.12335160658608 45.959173206572416)))', 4326);

SELECT @aoiGeomFixed = @aoiGeom.MakeValid().STUnion(@aoiGeom.STStartPoint());

INSERT INTO #AoiTable ( landunit, aoigeom )

VALUES ('T9981 Fld3', @aoiGeomFixed);

SELECT @aoiGeom = GEOMETRY::STGeomFromText('MULTIPOLYGON (((-102.1130336443976 45.959162795100383, -102.12335160658608 45.959173206572416, -102.12327175652177 45.944703605814198, -102.1128892282776 45.944710506326032, -102.1130336443976 45.959162795100383)))', 4326);

SELECT @aoiGeomFixed = @aoiGeom.MakeValid().STUnion(@aoiGeom.STStartPoint());

INSERT INTO #AoiTable ( landunit, aoigeom )

VALUES ('T9981 Fld4', @aoiGeomFixed);

| **aoiid** | **landunit** | **aoigeom** |
| --- | --- | --- |
| 1 | T9981 Fld3 | POLYGON ((-102.13386921506947 45.944643788188387, -102.12327175652177 45.9447036058142, -102.12335160658608 45.959173206572416, -102.13402890980223 45.959218442561564, -102.13386921506947 45.944643788188387)) |
| 2 | T9981 Fld4 | POLYGON ((-102.12327175652177 45.9447036058142, -102.1128892282776 45.944710506326032, -102.1130336443976 45.959162795100383, -102.12335160658608 45.959173206572416, -102.12327175652177 45.9447036058142)) |

#### Create summary acres for each landunit

CREATE TABLE #AoiAcres

( aoiid INT,

landunit CHAR(20),

landunit\_acres FLOAT

);

INSERT INTO #AoiAcres (aoiid, landunit, landunit\_acres )\

SELECT aoiid, landunit,

SUM( ROUND( ( ( GEOGRAPHY::STGeomFromWKB(aoigeom.STAsBinary(), 4326 ).STArea() ) / 4046.8564224 ), 3 ) ) AS landunit\_acres

FROM #AoiTable

GROUP BY aoiid, landunit;

| **aoiid** | **landunit** | **landunit\_acres** |
| --- | --- | --- |
| 1 | T9981 Fld3 | 328.952 |
| 2 | T9981 Fld4 | 318.722 |

#### Populate intersected soil polygon table with geometry

-- Create intersected soil polygon table with geometry

CREATE TABLE #AoiSoils

( polyid INT IDENTITY (1,1),

aoiid INT,

landunit CHAR(20),

mukey INT,

soilgeom GEOMETRY

);

INSERT INTO #AoiSoils (aoiid, landunit, mukey, soilgeom)

SELECT A.aoiid, A.landunit, M.mukey, M.mupolygongeo.STIntersection(A.aoigeom ) AS soilgeom

FROM mupolygon M, #AoiTable A

WHERE mupolygongeo.STIntersects(A.aoigeom) = 1;

#### Populate soil geometry with landunit attribute

-- Soil geometry with landunits

CREATE TABLE #AoiSoils2

( aoiid INT,

polyid INT,

landunit CHAR(20),

mukey INT,

poly\_acres FLOAT,

soilgeog GEOGRAPHY

);

-- Populate Soil geometry with landunit attribute

INSERT INTO #AoiSoils2

SELECT aoiid, polyid, landunit, mukey, ROUND((( GEOGRAPHY::STGeomFromWKB(soilgeom.STAsBinary(), 4326 ).STArea() ) / 4046.8564224 ), 3 ) AS poly\_acres, GEOGRAPHY::STGeomFromWKB(soilgeom.STAsBinary(), 4326 ) AS soilgeog

FROM #AoiSoils;

#### Populate soil map unit acres, aggregated by mukey (merges polygons together)

INSERT INTO #M2

SELECT DISTINCT M1.aoiid, M1.landunit, M1.mukey,

ROUND (SUM (M1.poly\_acres) OVER(PARTITION BY M1.landunit, M1.mukey), 3) AS mapunit\_acres

FROM #AoiSoils2 AS M1

GROUP BY M1.aoiid, M1.landunit, M1.mukey, M1.poly\_acres;

### Getting Available Water Storage from MUAGGAT Table

CREATE TABLE #acpfaws

( aoiid INT ,

landunit CHAR(20),

mukey INT,

mapunit\_acres FLOAT,

mu\_pct\_sum INT,

aws0150wta FLOAT )

;

INSERT INTO #acpfaws

SELECT DISTINCT

MA44.aoiid ,

MA44.landunit,

MA44.mukey,

MA44.mapunit\_acres,

mu\_pct\_sum,

aws0150wta

FROM (#M4 AS MA44

INNER JOIN muaggatt AS mt on MA44.mukey=mt.mukey);

| **aoiid** | **landunit** | **mukey** | **mapunit\_acres** | **mu\_pct\_sum** | **aws0150wta** |
| --- | --- | --- | --- | --- | --- |
| 1 | T9981 Fld3 | 354627 | 0.426 | 100 | 24.46999931 |
| 1 | T9981 Fld3 | 354648 | 0.287 | 100 | 15.01000023 |
| 1 | T9981 Fld3 | 2494708 | 1.729 | 100 | 12.56999969 |
| 1 | T9981 Fld3 | 2525720 | 56.699 | 100 | 19.02000046 |
| 1 | T9981 Fld3 | 2525732 | 1.35 | 100 | 19.05999947 |
| 1 | T9981 Fld3 | 2525733 | 0.129 | 100 | 11.13000011 |
| 1 | T9981 Fld3 | 2525739 | 28.479 | 100 | 16.62999916 |
| 1 | T9981 Fld3 | 2525745 | 4.983 | 100 | 26.54999924 |
| 1 | T9981 Fld3 | 2525746 | 16.106 | 100 | 26.62000084 |
| 1 | T9981 Fld3 | 2525754 | 12.638 | 100 | 18.52000046 |
| 1 | T9981 Fld3 | 2525764 | 17.691 | 100 | 19.88999939 |
| 1 | T9981 Fld3 | 2525766 | 0.032 | 100 | NULL |
| 1 | T9981 Fld3 | 2525769 | 181.356 | 100 | 20.85000038 |
| 1 | T9981 Fld3 | 2755648 | 2.449 | 100 | 20.12999916 |
| 1 | T9981 Fld3 | 2755654 | 4.599 | 100 | 21.28000069 |
| 2 | T9981 Fld4 | 2525720 | 8.623 | 100 | 19.02000046 |
| 2 | T9981 Fld4 | 2525724 | 0.458 | 100 | 21.26000023 |
| 2 | T9981 Fld4 | 2525730 | 31.514 | 100 | 16.57999992 |
| 2 | T9981 Fld4 | 2525745 | 62.205 | 100 | 26.54999924 |
| 2 | T9981 Fld4 | 2525746 | 63.55 | 100 | 26.62000084 |
| 2 | T9981 Fld4 | 2525754 | 23.138 | 100 | 18.52000046 |
| 2 | T9981 Fld4 | 2525767 | 3.86 | 100 | NULL |
| 2 | T9981 Fld4 | 2525769 | 103.909 | 100 | 20.85000038 |
| 2 | T9981 Fld4 | 2755639 | 0.443 | 100 | 26.81999969 |
| 2 | T9981 Fld4 | 2755643 | 9.641 | 100 | 11.14000034 |
| 2 | T9981 Fld4 | 2755648 | 11.382 | 100 | 20.12999916 |

CREATE TABLE #aws1

( aoiid INT,

landunit CHAR(20),

landunit\_acres FLOAT,

AWS\_Weighted\_Average0\_150 FLOAT

)

;

INSERT INTO #aws1

SELECT DISTINCT

#acpfaws.aoiid ,

#acpfaws.landunit,

landunit\_acres,

FORMAT (SUM ((mapunit\_acres/landunit\_acres)\*aws0150wta) over(partition by #acpfaws.aoiid) , '#,###,##0.00') AS AWS\_Weighted\_Average0\_150

FROM #acpfaws

LEFT OUTER JOIN #AoiAcres ON #AoiAcres.aoiid=#acpfaws.aoiid

GROUP BY #acpfaws.aoiid, #acpfaws.landunit, mapunit\_acres, landunit\_acres, aws0150wta;

| **aoiid** | **landunit** | **landunit\_acres** | **AWS\_Weighted\_Average0\_150** |
| --- | --- | --- | --- |
| 1 | T9981 Fld3 | 328.952 | 20.34 |
| 2 | T9981 Fld4 | 318.722 | 21.91 |

SELECT DISTINCT landunit, landunit\_acres, CASE WHEN AWS\_Weighted\_Average0\_150 IS NOT NULL THEN CONCAT ('Availible Water Storage' , ':' , 1)

WHEN AWS\_Weighted\_Average0\_150 = 0 THEN CONCAT ('Availible Water Storage' , ':' , 0)

WHEN AWS\_Weighted\_Average0\_150 IS NULL THEN CONCAT ('Availible Water Storage' , ':' , 'Not Rated')

END AS rating\_key,

'Availible Water Storage' AS attributename,

AWS\_Weighted\_Average0\_150 AS [AWS\_0\_150]

FROM #aws1;

| **landunit** | **landunit\_acres** | **rating\_key** | **attributename** | **AWS\_0\_150** |
| --- | --- | --- | --- | --- |
| T9981 Fld3 | 328.952 | Availible Water Storage: | Availible Water Storage | 20.34 |
| T9981 Fld4 | 318.722 | Availible Water Storage:1 | Availible Water Storage | 21.91 |