Forecast AOI Summary Data Fields

https://github.com/PSU-CSAR/bagis-pro/issues/45

Sample output file for the 16 selected AOIs (forecast_aoi_statistics.csv)

Reports of the 16 selected AOIs:
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/13202000_ID_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/14238000_WA_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/14064500_OR_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/10309000_NV_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/08285500_NM_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/10318500_NV_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/13292000_OR_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/06099500_MT_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/09498500_AZ_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/09172500_CO_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/10217000_UT_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/12301300_MT_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/09119000_CO_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/10296500_CA_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/09251000_CO_USGS_Watershed-Report.pdf
https://www.wcc.nrcs.usda.gov/ftpref/support/aoi/06191500_MT_USGS_Watershed-Report.pdf

stationTriplet
stationName

aoiArea_SqMeters

Description: AOI area in square meters - from shape

Note: pourpoint.AOISHPAREA reports the area in Sq Km. This is the same field that is used by the report title page. Use ESRI Geometry.ConvertTo API to convert to Sq Meters

aoiArea_SqMiles

Description: AOI area in square miles - from shape

Note: pourpoint.AOISHPAREA reports the area in Sq Km. This is the same field that is used by the report title page. Use ESRI Geometry.ConvertTo API to convert to Sq Miles

ann_runoff_ratio_pct

Description: annual runoff ratio (%) - from the report

Note: 1) Download the annual runoff csv file from the NRCS Portal 2) Use BAGIS-Pro QueryAnnualRunoffValue to query the runoff value with the station triplet 3) Load the Analysis object using the AOI Path 4) Query for the PrecipVolumeKaf (note: PrecipVolumeKaf is recorded when the Excel charts are generated) 5) Calculate the runoff ratio as (dblAnnualRunoff / oAnalysis.PrecipVolumeKaf)

centroid_x_dd and centroid_y_dd

Description: x and y coordinates (in DD) of the centroid of the AOI polygon - from shape

Note: 1) Use FeatureToPoint GP tool with inside option selected. 2) Use Project GP tool to project step 1 output to WGS 1984. Use NAD_1983_To_WGS_1984_1 projection 3) Use Calculate Geometry Attributes GP tool to calculate the point x and point y coordinates (POINT_X, POINT_Y).

state_codes

Description: states that AOI boundaries intersect with (2-character state abbriv.)

Note: 1) Clip aoi_v to feature service
https://services.arcgis.com/ue9rwulIoeLEI9bj/arcgis/rest/services/US_StateBoundaries/Feature
Server.2) Extract abbreviations from STATE_ABBR field

elev_min_ft

elev_max_ft

elev_range_ft

Description: elevation range min and max (in feet) - from the report

Note: 1) Use GetDemStatsAsync to query values in meters 2) Use ESRI Geometry.ConvertTo
API to convert to Feet

elev_median_ft

Description: median elevation (in feet)

Note: 1) Use Zonal Statistics tool with aoi_v, aoiname is zone field, filled_dem is value raster,
median statistics type 2) Query output raster (result will be in meters) 3) Use ESRI
Geometry.ConvertTo API to convert to Feet

auto_sites_buffer

Description: Buffer distance with amount and units that was used when clipping the automated
sites (snotel, snolite, or coop_pillow) layers.
Note: 1) Query the metadata of the 3 automated sites layers and publish the values for the first
one found. All three automated sites layers use the same buffer distance. 2) If there are
automated sites but the layers don't have a buffer distance, print the default batch tool setting.
The default batch tool configuration uses the same buffer distance for automated and snow
course sites but BAGIS-Pro has the capability for two different buffer sizes.

scos_sites_buffer

Description: Buffer distance with amount and units that was used when clipping the snow course layer.
Note: 1) Query the metadata of the snow course layer and publish the value. 2) If there are snow course sites but the layers don't have a buffer distance, print the default batch tool setting.

snotel_sites_all

snolite_sites_all

scos_sites_all

coop_sites_all

Description: site counts for SNOTEL, SNOLITE, Coop Pillow, Snow Courses within 5 km buffer

Note:

snotel_sites_inside

snolite_sites_inside

scos_sites_inside

coop_sites_inside

Description: site counts for SNOTEL, SNOLITE, Coop Pillow, Snow Courses within AOI

Note:

snotel_sites_outside

snolite_sites_outsite

scos_sites_outside

coop_sites_outside

Description: site counts for SNOTEL, SNOLITE, Coop Pillow, Snow Courses outside AOI and within 5 km buffer

Note:

auto_rep_area_pct

scos_rep_area_pct

Description: % area represented by automated and snow course site

Note: For automated sites: 1) Use BAGIS-Pro GeodatabaseTools.CalculateTotalPolygonAreaAsync() to get area of polygons in snotel_rep fc (includes snolite and coop pillow sites). 2) Use BAGIS-Pro GeodatabaseTools.CalculateTotalPolygonAreaAsync() to get area of polygons in aoi_v fc. 3) Calculate percentage as Math.Round(repArea / aoiArea * 100)
For snow course sites: 1) Use BAGIS-Pro GeodatabaseTools.CalculateTotalPolygonAreaAsync() to get area of polygons in scos_rep. 2) Re-use area from automated sites rep area calculation? 3) Calculate percentage as Math.Round(repArea / aoiArea * 100)

aspect_zones_def

Description: Comma-separated list defines the aspect zones of the current AOI. Example: Flat, N, S, E, W. 1) Query AspectDirectionsCount from the analysis.xml of current AOI 2) Use GetAspectClasses() method to return a List of Interval objects that we can iterate over.

aspect_area_pct

Description: % area by aspect. Display in the same order as aspect_zones_def. If no area in an aspect zone, display 0.

Note: 1) Use aspzone layer that is created when generating the charts 2) Raster Statistics as table using aspzone as zonal layer and clipped_dem as input value 3) Use a cursor to query the output table. Sum the count(s) to get the total number of cells. Divide the summed count by the cell count in each zone to get the pct area for each zone 4) Report the results of the calculation in a comma-separated field surrounded with quotations. Example output: "17.44,13.81,14.51,20.22,34.02"

This gives the analyst flexibility to use any number of aspect directions supported by BAGIS-Pro.

elev_zones_def

Description: Comma-separated list defines the elevation zones of the current AOI. Example: "<7800,7800-7900,7900-8000,8000-8100,8100-8200,8200-8300,8300-8400,8400-8500,8500-8600,8600-8700,8700-8800,8800-8900,8900-9000,>9000".

Note: 1) Query ElevationZonesInterval from the analysis.xml of current AOI 2) Use GetElevationClasses() method to return a List of Interval objects that we can iterate over. This method requires aoi min and max elevation. Re-use those from elev_min, elev_max retrieved earlier. Retrieve dem units and dem display units from the batch tool settings.

elev_zones_area_pct

Description: % area by elevation. Display in the same order as elev_zones_def. If no area in an elevation zone, display 0.

Note: 1) Use elevzone layer that is created when generating the charts 2) Raster Statistics as table using elevzone as zonal layer and clipped_dem as input value 3) Use a cursor to query the output table. Sum the count(s) to get the total number of cells. Divide the summed count by the cell count in each zone to get the pct area for each zone 4) Report the results of the calculation in a comma-separated field surrounded with quotations. Example output: "0,28.8,10.3,10.6,10.7,11.6,8,5.5,4.4,3.9,2.5,2.8,0.8,0.2"

Elevation zones vary across AOIs due to topography. This approach provides flexibility without generating unnecessary columns. It also keeps the percentages in sync with maps that have elevation intervals.

auto_site_count_elev_zone

Description: Automated sites count, tallied by elevation zones (elev_zones_def). Includes Snotel, Snolite, and Coop Pillow

Note: 1) Re-use List of Interval objects from elev_zones_def 2) Retrieve list of sites using AssembleMergedSitesListAsync(). (source is merged_sites layer) This list contains the elevation (meters) and site type for all sites 3) Use upper and lower bound of interval object to determine which elevation zone contains the site. 4) Results are reported in a comma-separated string. If there are no sites in an elevation zone that place will be set to 0. If the merged_sites layer is missing, this field will be set to "Not Found".

scos_site_count_elev_zone

Description: Snow course sites count, tallied by elevation zones (elev_zones_def)

Note: See note for auto_site_count_elev_zone

critical_precip_zones_def

Description: Critical precipitation zones

Note: A comma-separated list of the elevation zones that are shaded in red on the critical precipitation zones chart in the batch tool report. 1) Query gridcode values from the criticalprecipzone layer that is created when the Excel tools are run to generate critical precipitation zones. 2) Use the zone value to extract the elevation range from the elev_zones_def. Values will appear in a text column like this: 8000-9000, 10000-11000, 11000-12000.

critical_precip_zones_pct

Description: Critical precipitation zones area percent area of AOI (would be close to 66% for most AOIs)

Note: Record a single percent value for the AOI

forested_area_pct

Description: % forested area

Note: 1) Clip forestedzone to aoi_v 2) Use BAGIS-Pro
GeodatabaseTools.CalculateTotalPolygonAreaAsync() to get area of polygons in clipped layer.
3) Re-use area from automated sites rep area calculation? 4) Calculate percentage as
Math.Round(forestedArea / aoiArea * 100)

wilderness_area_pct

Description: % wilderness

Note: 1) Clip land_ownership layer to aoi_v 2) Selection criteria for
CalculateTotalPolygonAreaAsync(): Where AGBUR begins with "Wilderness". 3) Calculate
percentage as Math.Round(wildernessArea / aoiArea * 100)

public_non_wild_area_pct

Description: % public non-wilderness
Note: 1) Re-use clipped land ownership layer from wilderness_area_pct 2) Selection criteria for
CalculateTotalPolygonAreaAsync(): where suitable =1 and AGBUR <> 'AIR'. 2) Calculate
percentage as Math.Round(public non-wilderness / aoiArea * 100)

air_area_pct

Description:
Note: 1) Re-use clipped land ownership layer from wilderness_area_pct 2) Selection criteria for
CalculateTotalPolygonAreaAsync():where AGBUR = 'AIR'. 2) Calculate percentage as
Math.Round(air / aoiArea * 100)

all_site_density

Description: Ratio of number of sites to a buffered AOI area
Note: Total # of sites / buffered AOI area; units are # site / 100 square miles for readability. 1) Re-use
auto_sites_buffer and scos_sites_buffer values. Do we want to set these values to the buffer
distance(s) from the batch tool configuration if they are missing? For the statistics .csv fine?
 2) If buffer distance is missing for either of these layers (that has sites), use the buffer distance(s)
from the batch tool configuration 3) Create buffer layers for the snotel and snow course sites layers
using the buffer distance and aoi_v as the source. If the buffer distance is the same, we only need to
do this once. 4) Calculate the area for both buffers (if different) and use the larger buffer to calculate

the density 5) Get number of sites from snotel_sites_all, snolite_sites_all, coop_sites_all, scos_sites_all values for the calculation

auto_site_density

Description: Ratio of number of automated sites to a buffered AOI area
Note: Total # of sites / buffered AOI area; units are # site / 100 square miles for readability. 1) Re-use the area of the snotel_sites buffer calculated for all_site_density 2) Get number of sites from snotel_sites_all, snolite_sites_all, coop_sites_all values for the calculation

scos_site_density

Description: Ratio of number of snow course sites to the buffered AOI area
Note: Total # of sites / buffered AOI area; units are # site / 100 square miles for readability.1) Re-use the area of the snowcourse_sites buffer calculated for all_site_density 2) Get number of sites from scos_sites_all, snolite_sites_all, coop_sites_all values for the calculation

area_outside_usa_pct

Description: % area in Canada (outside US)
Note: 1) Re-use clipped layer from state_codes statistic 2) Project clipped layer to NAD 1983 Albers North America so that we have the correct units for calculating the pct 3) Use CalculateTotalPolygonAreaAsync() to calculate the polygon area of the clipped polygon. This area will be reduced by any area outside of the USA 4) Report the inverse of the percentage of the AOI occupied by the clipped polygons
Sample AOI(s):
15485500:AK:USGS
15515500:AK:USGS
12321500:ID:USGS (30% outside US)

slope_zones_def

Description: Comma-separated list defines the slope zones of the current AOI. Example: Flat - 10%,10% - 20%,20% - 30%,30% - 40%,40% - 50%,50% - 70%,75% - 100%. 1) Use ReadReclassRasterAttribute() method to extract the List of Interval objects from slpzone.

slope_area_pct

Description: 1) Use slpzone layer that is created when generating the charts 2) Raster Statistics as table using slpzone as zonal layer and clipped_dem as input value 3) Use a cursor to query the output table. Sum the count(s) to get the total number of cells. Divide the summed count by the cell count in each zone to get the pct area for each zone