Creating FMG Datasets for An ArcGIS Online Web Application

# Sections

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# Prerequisites

1. This document assumes a fully QA’d and complete set of forest inventory data is available that includes proper Site\_ID, SID and PID have been created. The specific datasets are listed below

* Site Polygons
* Stand Polygons
* Unit Polygons
* Fixed Plot Points
* Age Plot Points
* Prism Plot Points
* Plot Center Points

Site, Stand, and Unit polygons are not all required. This process document assumes both are available but can still be used if only one is available or requested to be included in web application, simply skip the non-relevant sections.

1. A list, from the requesting forester, of typical and non-typical tree species for the area/pool. These should be provided as USDA species codes.
2. Local or Project name for the area contained in the web app.
3. The FMG Tools ArcGIS toolbox. These can be found at the link below:

[\\mvrdfs.mvr.ds.usace.army.mil\egis\Work\FMG\Framework\Tools\FMG Tools\_103v.tbx](file:///\\mvrdfs.mvr.ds.usace.army.mil\egis\Work\FMG\Framework\Tools\FMG%20Tools_103v.tbx)

1. The FMG Web App ArcGIS toolbox. These can be found at the link below: [\\mvrdfs.mvr.ds.usace.army.mil\egis\Work\FMG\Framework\Tools\tools\ToolUpdate\_07262021\FMG Tool Update Pro Testing.tbx](file:///\\mvrdfs.mvr.ds.usace.army.mil\egis\Work\FMG\Framework\Tools\tools\ToolUpdate_07262021\FMG%20Tool%20Update%20Pro%20Testing.tbx)

# Prepare the Base Datasets for Summary Variables

1. Create copies of the Site, Stand and Plot center feature classes that will be hosted on MVR’s ArcGIS online organization. If the Site and Stand feature classes were not provided by the requesting forester, they can be selected and exported via a ready only connection to MVR’s oracle database (FMG.FMG\FMG.Site, FMG.FMG\FMG.Stand, and FMG.FMG\FMG.Unit).
   1. Right click the feature class to access properties and turn off all unneeded fields, preserving the following ID fields:
      1. For Unit keep: POOL, COMP, UNIT
      2. For Site keep: POOL, COMP, UNIT, SITE
      3. For Stand keep: POOL, COMP, UNIT, SITE, ‘SID’
      4. For Plot Centers keep: POOL, COMP, UNIT, SITE, ‘SID’, ‘PID’
   2. Reproject each feature class from its current coordinate system into the ArcGIS Online standard projection: WGS84 Web Mercator Auxiliary Sphere. Be sure to set an appropriate datum transform, preferably using one that includes ITRF00 or ITRF08.
   3. Ensure the FMG hierarchy fields (POOL, COMP, UNIT, SITE, SID, PID) are all fully qualified. The below examples show what fully qualified identifiers look like for each hierarchy level. Do note you may need to make new fields that have a longer character length for COMP, UNIT and SITE. Use field calculator to concatenate required fields to create each fully qualified identifier.
      1. POOL: p12
      2. COMP: p12c002
      3. UNIT: p12c002u002
      4. SITE: p12c002u002st03
      5. SID: p12c002u002st03s264
      6. PID: p12c002u002st03s264p0734

# Generate Required Summary Tables for Unit, Site, Stand

A base set of summary tables needs to be generated using the FMG toolbox. Each hierarchy level that will be displayed in the web application needs its own set. So if the web application will display Stands, Sites and Units, the process described below will need repeated for each level.

* 1. Generate the Plot Summary table (FMG Plot Summary (Age & Fixed) tool)
     1. Fixed Plot Data: fixed plot point feature class for the area of interest
     2. Age Plot Data: age plot point feature class for the area of interest
     3. Overstory Closure Field: ‘OV\_CLSR’
     4. Overstory Height Field: ‘OV\_HT’
     5. Understory Cover Field: ‘UND\_COV’
     6. Understory Height Field: ‘UND\_HT’
     7. Year of Origin Field: ‘AGE\_ORIG’
     8. Summary Level: Specify either SID, SITE or UNIT
     9. Output Summary Table: Prefix with hierarchy level, then ‘\_PlotSummary’ i.e. ‘Unit\_PlotSummary’
  2. Generate Stand Summary table (FMG Stand Summary Diameter Test tool)
     1. Input Prism Data: prism plot point feature class for the area of interest
     2. Plot ID Field: PID
     3. Tree Species Field: TR\_SP
     4. Diameter (DBH) Field: TR\_DIA
     5. Tree Health Field: TR\_HLTH
     6. Mast Type Field: MAST\_TYPE
     7. Notes/Misc Field: TR\_MISC
     8. Summary Level Field: Specify either SID, SITE or UNIT
     9. Output Summary Table: prefix with hierarchy level then ‘StandSummary’ i.e. ‘Unit\_StandSummary’
  3. Generate Overall Health Summary table (FMG Health Summary tool)
     1. Definition Query on Prism Plot point feature class: None
     2. Prism Data: Prism plot point feature class for the area of interest
     3. Plot ID Field: ‘PID’
     4. Tree Species Field: ‘TR\_SP’
     5. Tree DBH Field: ‘TR\_DIA’
     6. Tree Health Field: ‘TR\_HLTH’
     7. Summary Level: Specify either SID, SITE or UNIT
     8. Output Table: prefix with hierarchy level then ‘\_OV\_Health’ i.e. ‘Unit\_OV\_Health’
     9. Options to Check: None
     10. Mast Type Field: None
  4. Generate Hard Mast Health Summary table (FMG Health Summary tool)
     1. Definition Query on Prism Plot point feature class: None
     2. Prism Data: Prism plot point feature class for the area of interest
     3. Plot ID Field: ‘PID’
     4. Tree Species Field: ‘TR\_SP’
     5. Tree DBH Field: ‘TR\_DIA’
     6. Tree Health Field: ‘TR\_HLTH’
     7. Summary Level: Specify either SID, SITE or UNIT
     8. Output Table: prefix with hierarchy level then ‘\_HM\_Health’ i.e. ‘Unit\_HM\_Health’
     9. Options to Check: Summarize by Mast
     10. Mast Type Field: ‘MAST\_TYPE’
  5. Generate Typical Species Health Summary table (FMG Health Summary tool)
     1. Definition Query on Prism Plot point feature class: TR\_SP IN ('ACSA2', 'PODE3', 'FRPE', 'ULAM', 'SANI', 'MORU2') *<<< This is the typical species list that comes from the requesting forester. Adjust this example as necessary.*
     2. Prism Data: Prism plot point feature class for the area of interest
     3. Plot ID Field: ‘PID’
     4. Tree Species Field: ‘TR\_SP’
     5. Tree DBH Field: ‘TR\_DIA’
     6. Tree Health Field: ‘TR\_HLTH’
     7. Summary Level: Specify either SID, SITE or UNIT
     8. Output Table: prefix with hierarchy level then ‘\_TYP\_Health’ i.e. ‘Unit\_TYP\_Health’
     9. Options to Check: Summarize by species
     10. Mast Type Field: None
  6. Generate Non-Typical Species Health Summary table (FMG Health Summary tool)
     1. Definition Query on Prism Plot point feature class: TR\_SP IN TR\_SP IN ('ACNE2', 'BENI', 'CELA', 'CEOC', 'FOAC', 'GLTR', 'GYDI', 'MOAL', 'PLOC', 'SAIN3', 'SALIX', 'TIAM') *<<< This is the non-typical species list that comes from the requesting forester. Adjust this example as necessary.*
     2. Prism Data: Prism plot point feature class for the area of interest
     3. Plot ID Field: ‘PID’
     4. Tree Species Field: ‘TR\_SP’
     5. Tree DBH Field: ‘TR\_DIA’
     6. Tree Health Field: ‘TR\_HLTH’
     7. Summary Level: Specify either SID, SITE or UNIT
     8. Output Table: prefix with hierarchy level then ‘\_NTYP\_Health’ i.e. ‘Unit\_NTYP\_Health’
     9. Options to Check: Summarize by species
     10. Mast Type Field: None
  7. Generate Canopy Health Summary table (FMG Health Summary tool)
     1. Definition Query on Prism Plot point feature class: TR\_CL IN ( 'CD', 'D')
     2. Prism Data: Prism plot point feature class for the area of interest
     3. Plot ID Field: ‘PID’
     4. Tree Species Field: ‘TR\_SP’
     5. Tree DBH Field: ‘TR\_DIA’
     6. Tree Health Field: ‘TR\_HLTH’
     7. Summary Level: Specify either SID, SITE or UNIT
     8. Output Table: prefix with hierarchy level then ‘\_CNP\_Health’ i.e. ‘Unit\_CNP\_Health’
     9. Options to Check: Summarize by species
     10. Mast Type Field: None

Repeat this series of tool runs for each hierarchy level. There should be a set of 7 summary tables for each hierarchy level.

# Generate required summary table for the Plot feature class

Plot points have a slightly different set of required tables – the Plot Summary and Stand summary are not required as the Plots can get this information directly from the Fixed Plots. However, a matching set of health summary tables does need to be generated.

1. Generate Overall Health Summary table (FMG Health Summary tool)
2. Definition Query on Prism Plot point feature class: None
3. Prism Data: Prism plot point feature class for the area of interest
4. Plot ID Field: ‘PID’
5. Tree Species Field: ‘TR\_SP’
6. Tree DBH Field: ‘TR\_DIA’
7. Tree Health Field: ‘TR\_HLTH’
8. Summary Level: ‘PID’
9. Output Table: ‘Plot\_OV\_Health’
10. Options to Check: None
11. Mast Type Field: None
12. Generate Hard Mast Health Summary table (FMG Health Summary tool)
13. Definition Query on Prism Plot point feature class: None
14. Prism Data: Prism plot point feature class for the area of interest
15. Plot ID Field: ‘PID’
16. Tree Species Field: ‘TR\_SP’
17. Tree DBH Field: ‘TR\_DIA’
18. Tree Health Field: ‘TR\_HLTH’
19. Summary Level: ‘PID’
20. Output Table: ‘Plot\_HM\_Health’
21. Options to Check: Summarize by Mast
22. Mast Type Field: ‘MAST\_TYPE’
23. Generate Typical Species Health Summary table (FMG Health Summary tool)
24. Definition Query on Prism Plot point feature class: TR\_SP IN ('ACSA2', 'PODE3', 'FRPE', 'ULAM', 'SANI', 'MORU2') *<<< This is the typical species list that comes from the requesting forester. Adjust this example as necessary.*
25. Prism Data: Prism plot point feature class for the area of interest
26. Plot ID Field: ‘PID’
27. Tree Species Field: ‘TR\_SP’
28. Tree DBH Field: ‘TR\_DIA’
29. Tree Health Field: ‘TR\_HLTH’
30. Summary Level: ‘PID’
31. Output Table: ‘Plot\_TYP\_Health’
32. Options to Check: Summarize by species
33. Mast Type Field: None
34. Generate Non-Typical Species Health Summary table (FMG Health Summary tool)
35. Definition Query on Prism Plot point feature class: TR\_SP IN TR\_SP IN ('ACNE2', 'BENI', 'CELA', 'CEOC', 'FOAC', 'GLTR', 'GYDI', 'MOAL', 'PLOC', 'SAIN3', 'SALIX', 'TIAM') *<<< This is the non-typical species list that comes from the requesting forester. Adjust this example as necessary.*
36. Prism Data: Prism plot point feature class for the area of interest
37. Plot ID Field: ‘PID’
38. Tree Species Field: ‘TR\_SP’
39. Tree DBH Field: ‘TR\_DIA’
40. Tree Health Field: ‘TR\_HLTH’
41. Summary Level: ‘PID’
42. Output Table: ‘PLOT\_NTYP\_Health’
43. Options to Check: Summarize by species
44. Mast Type Field: None
45. Generate Canopy Health Summary table (FMG Health Summary tool)
46. Definition Query on Prism Plot point feature class: TR\_CL IN ( 'CD', 'D')
47. Prism Data: Prism plot point feature class for the area of interest
48. Plot ID Field: ‘PID’
49. Tree Species Field: ‘TR\_SP’
50. Tree DBH Field: ‘TR\_DIA’
51. Tree Health Field: ‘TR\_HLTH’
52. Summary Level: ‘PID’
53. Output Table: ‘Plot\_CNP\_Health’
54. Options to Check: Summarize by species
55. Mast Type Field: None

# Run the Web App Scripts

There are 5 scripts that will calculate the variables, assemble the tables, then clean up values for use in the web application.

1. The tool ‘1. Create Web App Variables’ calculates the variables for the web app using the health summary tables created in Sections 4 and 5 above. This tool should be run for each hierarchy level that will be presented in the web app (Plot, Stand, Site, Unit)
2. The next set of 4 tool is split between the polygon hierarchy levels (Stand, Site, Unit) and the Plot point hierarchy.
   1. The tool ‘2. Assemble Polygon Summaries for Web App’ should be run against Stand, Site and Units. The required inputs are the table of web app variables produced from Step 1 above as well as the Plot Summary table and Stand Summary table created in Section 4.
   2. The tool ‘3. Clean Assembled Polygon Summary for Web App’ cleans the feature class produced in Step A above and produces the final out put feature class that will be uploaded to ArcGIS online and used to build the web app.
   3. The tool ‘4. Assemble Plot Summaries for Web App’ gets run against the Plot points and uses the study area Fixed plot point feature class and web app variables table produced in Step 1 above.
   4. The tool ‘5. Clean Assembled Plot Summary for Web App’ should be run against the feature class produced in Step C above and creates the final Plot summary feature class that will be uploaded to ArcGIS online and used to build the web app.