3DHP FTN Monthly Forum:

Questions and Answers

Crossing State Lines – Coordinating with Neighboring States on Regional Hydrography Mapping

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NOTE: *this particular forum included a lot of participant discussion beyond questions to the presenters. We have included some remarks where relevant but for the complete discussion you are encouraged to watch the NSGIC Knowledge Base recording.*

Participant Questions:

Can you elaborate on how you identified areas of interests based on the HUC eight 3DHP data acquisition requirement?

It just wasn't possible to select HUC 8s that would have capture parts in Maine and New Hampshire. The water doesn't care, it's gonna flow where it's gonna flow. There was almost nothing in [the Saco River HUC8] in Maine that was completely interior to Maine and would have not touched New Hampshire, because that's their only boundary. The decision was made to switch the application to the HUC 10 level and demonstrate that we were able to capture areas in both Vermont and in Maine.

Did you have to overcome challenges with missing/redacted data or co-registration challenges with overlapping areas having differences in elevation precision?

Not the case in our region. We have little redacted data and the existing 3DEP data was for the entire region is current with lots of overlap between states. These are the benefits of being a coalition of small states.

> **Participant Discussion**: There were many comments and questions about about merging data with disparate years/vendors/point density, etc. Ultimately these are issues that need to be addressed with the contractor or the team processing the data. The bigger the disparities and the region, the more important it is to understand what processes, variables, criteria, etc., will be used. This is a highly complicated process and it is in the best interest of the state to understand what decisions the data developer will face and how they will be resolved.

What is the proposed timeline to complete the work?
If all goes to plan, 2 years. Joint funding agreements with the states and USGS will need to be completed meaning the contractor will not likely be able to begin the work until the summer of 2025. 3DHP data processing is expected to take a year after acquisition.

Did you have any problems with the 3DHP data model and specs not meeting any of the state's hydrography requirements?
No anticipated issues. The 3DHP data model and specs actually exceed NE State requirements. We haven't heard from any partners that it will be an issue. We did not create any seamless DEMS, since all of the states have QL1 or higher and the data was acquired via 3DEP or using a GPSC contractor. For Connecticut the extra resolution [2' DEM, higher lidar density at 15 points per square meter inland and 20 points per square meter coastal] was a big help in meshing datasets. More information about Connecticut statewide data QA/QC here.

Generally speaking, what went into your GPSC contractor selection process? Had you or the other relevant partners previously worked with the contractor you eventually selected? Had the contractor previously completed EDH in your region or similar?
It was majority consensus. All of the NE states had worked with at least one of the GPSC contractors in some previous effort. We selected one that we had each worked with and had done previous EDH work in our region.

Minnesota has more frequent flat terrain and our glacial hydromorphic history will make for different challenges of course.
Minnesota may be flatter than most New England states, but the hydromorphic history of Minnesota is somewhat similar to Connecticut (which the other NE states refer to as "flatlanders") and the Connecticut River valley, in that retreat of glacial ice sheets formed large glacial lake basins (Glacial Lake Agassiz in MN & Glacial Lake Connecticut, forming Long Island Sound), which drained to form expansive river valleys, end moraines, and glacial till deposits. Fun fact, the highest point in Minnesota is Eagle Mountain with an elevation of 2,301 feet and in Connecticut is Bear Mountain with an elevation of 2,316 feet. 3DEP/3DHP acquisition for Minnesota could be expected to be similar to Connecticut and the Connecticut River valley, albeit on a much larger scale (~87K mi^2 MN vs. 5.5K mi^2 CT or 72K mi^2 New England).

With regard to difference in the temporal distribution of the 3DEP data, do you know how broad a range?
Two to three years at the most.

> **Participant Discussion**: noted that temporal range, though small, can have a big impact such as seasonal flooding from tidal inundation and hurricanes.

What the process to address these differences?

> **Geospatial Products and Services Contracts (GPSC) Participant response:**

In our case, we collect all the point clouds, run some proprietary meshing and harmonization processes and rebuild the DEM from scratch. There's a lot of considerations to be made such as which acquisition is most current, which is most realistic. We essentially start from scratch, pick the best data available and start running the models from there. There is no clean automated model that is going to overcome all of these issues. That's where the experience really comes into play to create the best data set possible.

Participant Discussion: Just knowing that the process starts with the point clouds is helpful.

We assume more points is better, 500 m overlap is enough and that the processing power is capable of handling all of the nuances. Is this true?
You can't overstate enough how much data is being processed. Especially when dealing with point clouds. Even for a state as small as Connecticut, the point cloud at 15 points and 20 points on the coast is still 50 TB and a few trillion points. That is nothing to sneeze at computationally.

Geospatial Products and Services Contracts (GPSC) Participant response:
Higher resolution is better but key concern is the resolution of ground features. Can we see the channel? Can we accurately detect the flow paths.
Participants added that while small and ephemeral flows are locally important, especially in low-lying, flat areas, 3DHP is a National dataset making some threshold necessary and the 1m DEM resolution is probably about right for CONUS. We cannot expect USGS to address the specific data issues facing both FL and New Mexico.

Participant Discussion: Adapt your process to work in parallel to meet both the 3DHP spec and the local need at the same time because you can't keep going back to ask for more money. In the case of Massachusetts, they want to incorporate wetlands data and are working through that process adding that it is important to make clear to administrators and funding partners that you not just purchasing 3DHP data, that there are cost savings in mapping other features such as high level channels and wetlands, contemporaneously.

What about precision? How many points in the floating raster?

Geospatial Products and Services Contracts (GPSC) Participant response:
Can't think of any need to exceed one centimeter elevation resolution.

From USGS Specification:
Vertical Positional Assessment of Hydrographic Features Relative to the Digital Elevation Model - All lines and water surface edges shall be at or just below the elevation value of the immediately surrounding terrain, within 1 m of the location on the bare-earth DEM (figure 17). Exceptions to this requirement are features that are used to traverse surface terrain (culverts, connectors), are underground conduits (culverts, connectors, pipelines), or are overland pipelines (pipelines).