

# National Geospatial Advisory Committee

## Public-Private Partnership Use Case:

### GPS ON BENCH MARKS PARTNERSHIP

#### Background

[GPS on Bench Marks](#) (GPSonBM) is the National Geodetic Survey's (NGS) crowdsourcing approach for working with Federal and State government agencies, universities, and private sector firms to improve the local accuracy of national scale models and tools that the NGS builds to serve the Nation.

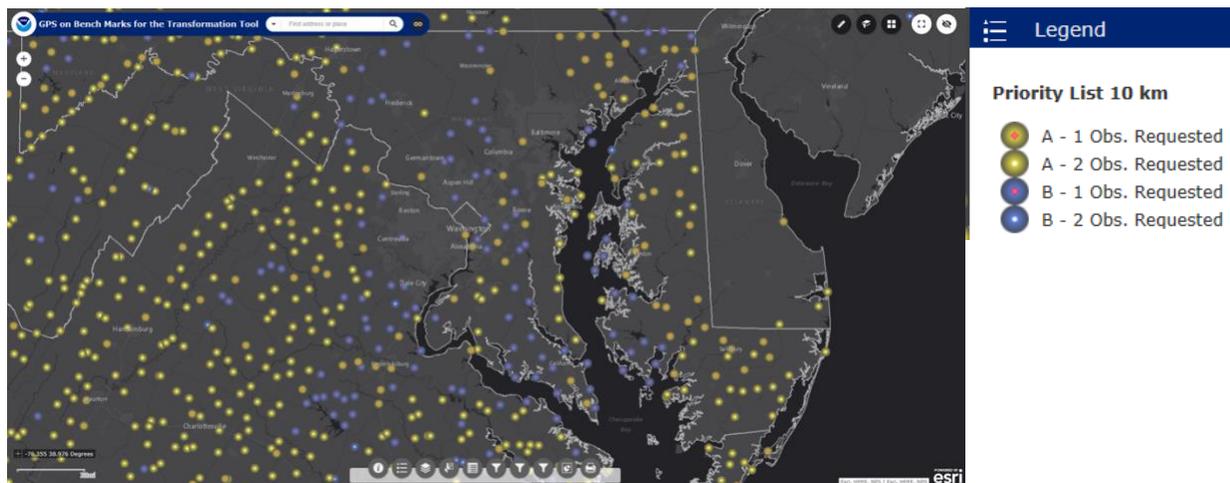
Since 2014, the NGS has invited surveyors to [collect and share survey-grade Global Positioning System \(GPS\) data](#) in celebration of National Surveyors Week. In 2018, participants provided thousands of new data points that were then used to create [GEOID18](#), the NGS' hybrid geoid model. This new data closed significant data gaps and significantly improved the overall fit of the model.

In 2020, the NGS is working with partners on the [GPS for Transformation Tool Campaign](#), the purpose of which is to:

- Collect data required to enable the NGS Coordinate Conversion and Transformation Tool (NCAT) to convert from the current vertical datums to the new North American-Pacific Geopotential Datum of 2022 (NAPGD2022); and
- [Find and report back on existing NGS survey control marks](#) to update descriptive information and provide an up to date status of the bench mark.

To help users prepare for the upcoming modernization of the National Spatial Reference System, all observations submitted to the NGS through the GPSonBM campaign will be reprocessed and used to update coordinates in the new system.

To guide users on where to focus their efforts, the NGS has developed [a prioritized list of bench marks](#) where new data will provide the most benefit for improving future transformation tools. The prioritized bench marks can be viewed on this web map application:



View of and Legend for the GPS on Bench Marks for the Transformation Tool Web Map Application (<https://noaa.maps.arcgis.com/apps/webappviewer/index.html?id=6093dd81e9e94f7a9062e2fe5fb2f7f5>)

The bench marks have been assigned into two categories (priority A and B):

- **Priority A:**
  - Elevation obtained via 1<sup>st</sup> or 2<sup>nd</sup> order leveling.
  - Useable for GPS observations.
  - Last recovery indicates that monument was found.
  - One or two observations requested.
- **Priority B:**
  - Lower quality monuments that will be used to fill gaps and considered for use in the transformation tool.

## How It Works

The GPSONBM campaign consists of three phases (recovery, observations, and submit the collected information to the NGS).

- Using the information (web application and bench mark description) provided by NGS the participant will recover the benchmark.
- Once the bench mark has been recovered and is determined to be in good condition the GPS observations will be collected.
- After the GPS observation(s) have been collected the information will be submitted to the NGS using Online Positioning User Service (OPUS).
- The bench mark recovery information (description of what was found) will be submitted to the NGS using the Mark Recovery Form (<https://geodesy.noaa.gov/surveys/mark-recovery/>).
- Once the submitted observations are accepted by the NGS the web map application will be updated to show that the GPS observations has been completed on the submitted bench marks.

## Why It Works

Anyone can participate in the program. For mark recovery information anyone using a smartphone can submit recovery information, update the scaled position of a bench mark, and submit photos of the bench mark. Participants with a survey grade GPS receiver can submit GPS observations, in addition to the recovery information, and photographs.

## Lessons Learned

Many of the bench marks in the National Spatial Reference System (NSRS) are defined horizontally by a scaled position (latitude and longitude). The submitted GPS information will assist the NGS in the development of a relationship (transformation tool) between the current vertical datum (North American Vertical Datum of 1988) and the North American-Pacific Geopotential Datum of 2022 (NAPGD2022).

## Conclusions

The GPSONBM program allows NGS to harness the power of partners across the country to collect the data needed to improve the local accuracy of national scale models and tools. It provides an engaging opportunity for outreach and education through geocaching type Mark Recovery efforts, as well as helping geospatial professionals get more used to accessing the NSRS through GPS observations.