

CGIA Community Council Progress Report

Hydrography Workgroup

Workgroup page*: <http://cgia.org/cagiscouncil/workgroups/hydrography/>

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NHD pages on the CNRA Open Data site:

<https://data.cnra.ca.gov/dataset/national-hydrography-dataset-nhd> and

<https://data.cnra.ca.gov/dataset/nhd-major-features>

NHD Stewardship Program page on the Department of Water Resources website:

<https://water.ca.gov/Programs/All-Programs/National-Hydrography-Dataset-Stewardship>

Report Date:

December 14, 2023

*See the workgroup page for workgroup charter, members, contact information, and prior reports.

Members of this workgroup regularly interact as part of the ongoing work of the California Department of Water Resources (DWR) National Hydrography Dataset (NHD) Stewardship Program. Our primary partners are US Geological Survey, the **Geographical Information Center (GIC) at CSU Chico**, and the **Center for Geospatial Science and Technology (CGST) at CSU Northridge**. Past and current stewardship partners include CA Department of Fish and Wildlife, State Water Resources Control Board, Redwood National Park, Los Angeles County Public Works, the Marin County collaborators, and the US Forest Service. **New partners are always welcome.**

Requests for Council Action

None

Status Update

NHD is static; USGS is still working on final improvements to the Watershed Boundary Dataset (WBD)

The final version of the National Hydrography Dataset (NHD) will be published in early 2024, according to USGS. Edits to NHD are no longer possible. The final version of the Watershed Boundary Dataset will be published on September 30, 2024. USGS will continue to host the static NHD and WBD on its website as legacy datasets for the duration of the 3DHP build-out. We cannot edit the data, and USGS has told us that corrections to the legacy data will be done in only very rare circumstances.

The first release of the 3D Hydrography Program dataset happened in October as a map service at

<https://apps.nationalmap.gov/services/>.

REST: https://hydro.nationalmap.gov/arcgis/rest/services/3DHP_all/MapServer .

Web Viewer:

https://www.arcgis.com/home/webmap/viewer.html?url=https://hydro.nationalmap.gov/arcgis/rest/services/3DHP_all/MapServer&source=sd

A feature service is expected in early 2024. There is one HU 8 watershed in Alaska that has been built to the new specification, and the rest of the national extent is the best available NHD data converted to the 3DHP data model, but without z values. As new elevation-derived hydrography is accepted into 3DHP it will replace the NHD data for those extents. New 3DHP vector data will have z values. The build-out of the 3DHP is expected to take nine years, depending on federal funding.

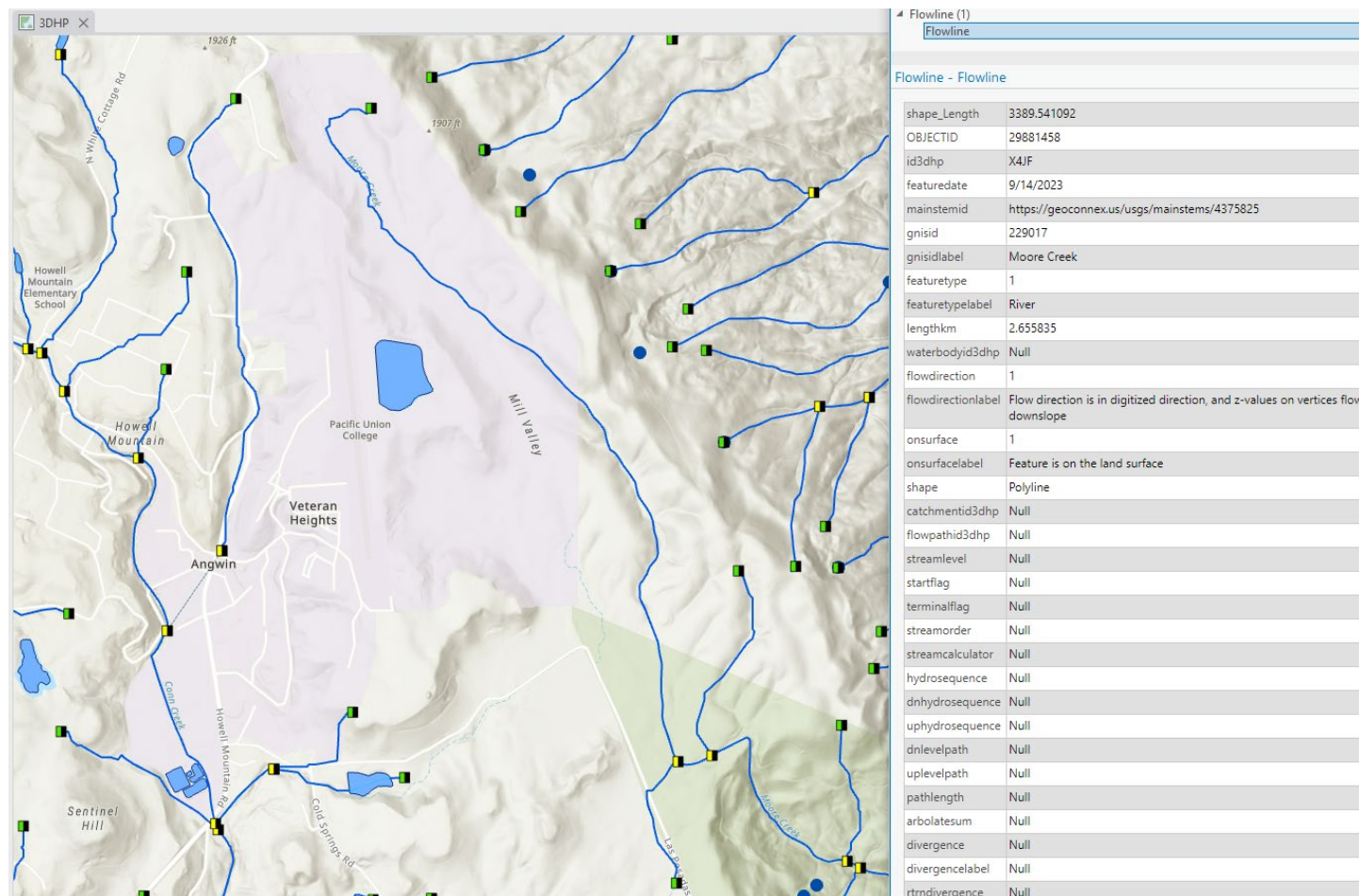
The **NHD stream periodicity attributes** – perennial, intermittent, ephemeral - will be replaced by a numerical value, based on the [USGS Probability of Streamflow Permanence \(PROSPER\) model](#). USGS expects to have this applied to all flowline features in the 3DHP by sometime in 2025.

3D Hydrography Program Data Model

A screenshot of the 3DHP Map Service appears below. Some attributes from NHD Plus appear in the fields but are not yet populated. Mainstem ID replaces the NHD reach code. Mainstem IDs are designed to be compatible with the [Internet of Water's Geoconnex](#). Geoconnex is a system for connecting water data from different data providers via geographic location. "This revolutionary water data-

specific search index links disjointed water data with structured metadata, enabling seamless organization and discovery of information by theme and location. Ultimately, Geoconnex will unlock a Google-like experience, helping save countless hours in water data searches for the benefit of water managers, researchers, and the public alike.” <https://www.youtube.com/watch?v=7zKnSvoVL8w>

More information on this can be presented at a future meeting.



In addition to the vector and tabular datasets, the raster products for flow direction and flow accumulation will be included.

Overall, the data model is much simpler than the NHD data model in that there are many fewer FCode domains

Recent Hydrography Videos from USGS:

Transferring Deep Learning Knowledge for Scaling Up Hydrographic Feature Extraction

https://youtu.be/OR4YwQqK10?si=bxyx7B_Cunis75iK

Our Future in 3D: The 3D National Topography Model and the 3D Hydrography Program

https://www.youtube.com/watch?v=4glCa1Z5_fg

3DHP v2023 Data Model and Database Contents

<https://youtu.be/VJRteEepH2c?si=MteqzBCXggO41dQq>

The video for the November 28, 2023, USGS Hydrography Community Call on "Strategies for improving the Washington State Hydrography Dataset (WASHD)" is now available.

The video is on both YouTube and the USGS site; please see links below:

<https://youtu.be/MKWasqYGzsY>

<https://www.usgs.gov/media/videos/strategies-improving-washington-state-hydrography-dataset-washd>

Background on the 3DHP Program is available at <https://www.usgs.gov/national-hydrography/3d-national-topography-model-call-action-part-1-3d-hydrography-program>

How 3DHP Data is Acquired

A major difference between NHD and 3DHP is in how the data is created and who is creating it. The NHD was created when USGS digitized the blue lines from paper topographic maps that were created from on-the-ground surveys in the mid-20th century. In the 2000's USGS sought help from the states to improve the features using tools and workflow developed and managed by USGS. Participation from the states and from federal partners such as US Forest Service and Bureau of Land Management was inconsistent, mostly due to lack of funding. The editing tools and workflows were challenging and time-consuming. In California, the data has been improved at the 1:24,000 scale over the past nine years, but there are still parts of the state where the features represent what was on maps from the mid-20th century.

The 3DHP hydro feature extraction process takes advantage of automation technology and high-quality elevation surface data that is now available. But USGS is not developing the tools and workflow for 3DHP. Instead, USGS has launched a **Data Collaboration Announcement** to accept proposals for cost-sharing between the state and regional collaborators to have private industry partners do the work under USGS' Geospatial Products and Services Contracts (GPSC). These proposals were due October 20, 2023 (for FY 2024 funding) but later submissions are being accepted. USGS also plans to share funds under Cooperative Agreements with organizations that will do the data creation work. The California stewardship partners will seek funds under the Cooperative Agreement approach when that becomes available, hopefully in the latter half of 2024. California is a very large state and there is an opportunity to get the 3DHP built out more quickly through collaboration and cost sharing via the GPSC along with the Cooperative Agreements. Anyone interested in learning more about this may contact Drew Decker, USGS National Map Liaison, at ddecker@usgs.gov and Jane Schafer-Kramer, Technical Lead for Hydrography Data Stewardship for CA nhd_stewardship@water.ca.gov. The website for the FY24 Data Collaboration Announcement is <https://www.usgs.gov/programs/national-geospatial-program/data-collaboration-announcement-portal>

Planned Conference Presentations

Erik Fintel will present on our teams' behalf on our state's approach to creating 3DHP data at the American Water Resources Association [Geospatial Water Technology Conference](#) in Orlando, FL in March 2024.

Joel Osuna-Williams and Jane Schafer-Kramer are planning a full-day workshop at [CalGIS 2024](#) in Visalia, March 18-20. The workshop will cover the basics of the National Hydrography Dataset, NHDPlus, the new 3D Hydrography Dataset, and linking your own data to the NHD using the Hydro Addressing Tool. This team has also been accepted for a shorter presentation on the development of elevation derived hydrography tools for 3DHP data.

The stewardship team has submitted a proposal for a session at the [California Water and Environmental Modeling Forum Annual meeting](#) in April 2024, in Folsom.

Jane has submitted an abstract for a similar presentation at the Esri UC in July 2024 in San Diego.

Ongoing Work

Our Interagency Agreements with the Geographical Information Center at CSU-Chico and the Center for Geospatial Science and Technology at CSU-Northridge are supporting the development of tools and workflow to create 3DHP-compliant hydrography. Our stewardship team meets regularly to discuss the current pilot study, next steps, and longer-range plans.

Action	Key Date
Scope out future work under interagency agreements with CSU partners	Q1 2024

Complete elevation-derived hydrography pilot for Los Angeles County	Q1 2024
Outreach to Counties and Regional groups on the cost sharing opportunities for 3DHP	ongoing

Other Notes

The datasets may be downloaded from these linked cloud hosting sites:

[Download the NHD by 8-digit Hydrologic Unit \(HU8\)](#)

[Download the NHD by 4-digit Hydrologic Unit \(HU4\)](#)

[Download the NHD by State](#)

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