

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:

September 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 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 Watershed Boundary dataset

The final version of the NHD is to be published on September 30, 2023. The final version of the Watershed Boundary Dataset will be published on September 30, 2024.

USGS has said in meetings that the first version of the 3D Hydrography Program (3DHP) data will be published on or about September 30, 2023. This dataset will consist of one small watershed in Alaska built to the new specification, and the rest of the national extent will be 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.

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.

3D Hydrography Program Data Model

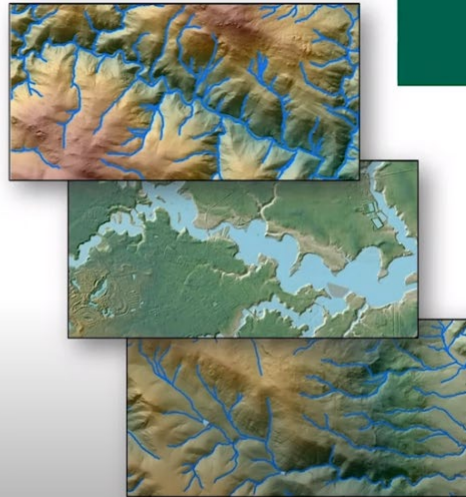
The 3DHP data model has not yet been published, but some information has been revealed in a video presentation "The Next Generation of Hydrography" published a few weeks ago at https://www.youtube.com/watch?v=4gICa1Z5_fg. Here is a screenshot:

3DHP Data Overview

A stack of interoperable hydrography data that are aligned by virtue of being derived from a common elevation source

- Stream network including waterbodies
- Hydrologic units including catchments
- Descriptive attributes and derived attributes that assist with routing and analysis
- Hydroenforced/conditioned DEMs
- Additional data created during processing such as flow accumulation and flow direction

Building on concepts from current hydrography products using the next generation of acquired data and accounting for more of the hydrologic cycle



Some attributes from **NHDPlus** such as FromNode/ToNode, HydroSequence, LevelPathID, Stream Order, Arbolate Sum, modeled Precipitation/Temperature/Runoff and others will be connected to catchments. Instead of the perennial, intermittent, and ephemeral stream classifications, there will be modeled probability numeric values. In addition to the vector and tabular datasets, the raster products for flow direction and flow accumulation will be included.

Overall, the data model will be much simpler than the NHD data model.

This just in from USGS: "Please plan to join the next USGS Hydrography Community Call on Tuesday, September 26, 2023 at 10:00 AM PDT.

The topic will be "3DHP v2023 Data Model and Database Contents."

Our presenter will be Dave Blodgett. Dave is a Civil Engineer with the USGS Water Mission Area and is also on assignment to NGTOC's Topographic Applied Research Team.

Abstract: 2023 has been a busy year for 3DHP applied research and development teams. The initial 3DHP core data model and database contents for 3DHP v2023 are finalized. In this presentation, Dave Blodgett will describe the 3DHP core data model design and describe the purpose of key components of the data. Data according to the v2023 data model has been migrated from the final high resolution NHD to an initial 3DHP database. The second half of the presentation will cover what has and what has not been included in this initial 3DHP database and what that means for users in the first operational year for the 3D Hydrography Program.

If time allows, we may also cover (1) other USGS Hydrography Program news, (2) announcements from the group, and (3) details on upcoming calls.

[Sept 2023 USGS Hydrography Community Call.ics](#)"

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 will be 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 are due October 20, 2023 (for FY 2024 funding). 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. But 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>

Presentations at Esri User Conference

The stewardship team of Jane Schafer-Kramer (DWR), Erik Fintel (GIC) and Joel Osuna-Williams (CGST) presented at the Esri conference in July on our work developing elevation-derived hydrography tools and workflow that produce hydrography geometry compliant with USGS specifications for the 3D Hydrography Program. Slides from "Elevation-Derived Hydrography: Challenges and Solutions" are [posted at this link](#). We presented at the Sunday Water Resources meeting, at a user-presentation session on Tuesday, and at a Special Interest Group on Hydro Feature Extraction meeting on Thursday, all alongside presenters from the states of Washington and Minnesota.



From left: Dean Djokic (Esri), Joel Osuna Williams (CGST), Erik Fintel (GIC), Jane Schafer-Kramer (DWR), Josh Greenberg (WA Dept. of Ecology), Kiah Sagami, Consultant working with Rick Moore (Minnesota IT Services)

Jane and Josh also hosted a Hydrography Stewards meeting at the conference. About 47 people attended. There was a roundtable of state hydrography stewardship activity reports from California, Connecticut, Indiana, Illinois, Michigan, Minnesota, Tennessee, Washington, and the Bureau of Land Management for Oregon and Washington. We also heard from Dr. David Maidment, now retired from University of Texas at Austin; he told the group that he is serving as an Academic Rep on a federal committee that has oversight on 3DEP and 3DHP. He has been voicing concerns about the change in the role of the state stewards in the transition from NHD to 3DHP. The local knowledge of the state stewards has been an important component and that should be given more consideration. The process of creating hydrography is not the same as creating elevation data and he hopes for more dialog and listening between USGS and the States.

Members of this group in the photo (minus Jane) plan to present on each of their state's approach to creating 3DHP data at the American Water Resources Association Geospatial Conference in March 2024.

The California team returned from the Esri conference with renewed confidence that we are on a good path towards mapping surface water with higher spatial accuracy.

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	Q4 2023
Complete elevation-derived hydrography pilot for Los Angeles County	Q4 2023
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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