



California GIS Council Progress Report

Workgroup: National Hydrography Dataset (NHD) Workgroup page*: http://cgia.org/cagiscouncil/workgroups/hydrography/ Workgroup Chair: Jane Schafer-Kramer (jane.schafer-kramer@water.ca.gov) NHD page on the CNRA Open Data site: https://data.cnra.ca.gov/dataset/national-hydrography-dataset-nhd NHD Stewardship Program page on the Department of Water Resources website: https://water.ca.gov/Programs/All-Programs/National-Hydrography-Dataset-Stewardship	Report Date: June 9, 2022
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*See the workgroup page for workgroup charter, members, contact information, and prior reports.

Members of the NHD workgroup regularly interact as part of the ongoing work of the California Department of Water Resources (DWR) NHD Stewardship Program. (Stand-alone CA GIS Council NHD Workgroup meetings have not been held.) Our primary partners are the **Geographical Information Center at CSU Chico** and the **Center for Geospatial Science and Technology at CSU Northridge**. Current and recent stewardship partners are **Redwood National Park**, **Los Angeles County Public Works**, the **Marin County collaborators**, and the **US Forest Service**.

Requests for Council Action

No formal action.

Status Update

MOU Finalized

The Memorandum of Understanding between the California Department of Water Resources and the U.S. Geological Survey for the Stewardship of the National Hydrography Dataset and the Watershed Boundary Dataset in California was signed on March 11, 2022, and will be reviewed every five years. A copy is posted at:

<https://data.cnra.ca.gov/dataset/national-hydrography-dataset-nhd/resource/b7e6fb55-c5ee-45dc-99fe-9610161cf371>

3D Hydrography Program

USGS has announced a new approach to developing and managing the NHD and WBD; they're calling it the 3D Hydrography Program (3DHP). Presently, the NHD data is maintained at the 1:24,000 scale, but the users need this data to be at a much higher resolution. "The 3DHP will significantly improve the level of detail, currency, and inclusion of hydrography data by deriving a 3D stream network and hydrologic units from accurate, high-quality 3D Elevation Program (3DEP) data, as well as hydrologically enhanced digital elevation and other surfaces to support applications like hydrologic and hydraulic modeling. 3DHP will improve information such as streamflow permanence and vastly improve the ability to account for the hydrologic cycle by connecting to wetland, engineered hydrologic systems, and groundwater data."

<https://www.usgs.gov/national-hydrography/3d-national-topography-model-call-action-part-1-3d-hydrography-program>

The concept of the 3DHP was presented to the USGS Hydrography Community at a meeting on August 24, 2021. A video of that meeting is available on the USGS' YouTube channel: <https://youtu.be/VHiQ1GWJdos>. The program appears to be modeled on the 3D Elevation Program (3DEP) in that it fosters public-private partnerships and facilitating collaboration among interested parties and their funding sources. An example of this in action would be the recently completed Marin County project that collected lidar and imagery via 3DEP and produced elevation products, vegetation mapping, 1:5,000 scale NHD data, and HU14 level watersheds.

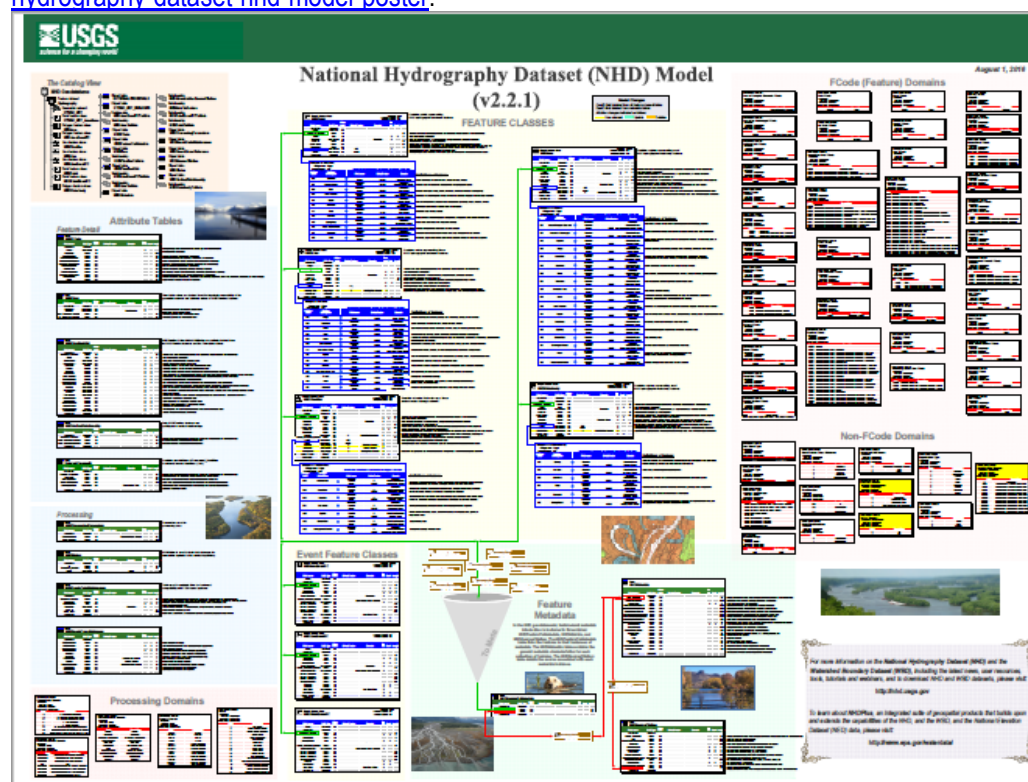


The way we maintain the NHD will change significantly in the coming years, and many of the details are still being developed by USGS. Currently we are improving the NHD in a manual process using tools developed by USGS that work in ArcMap 10.7.1. Our main sources of reference data are NAIP and other imagery available to us, elevation contours provided by USGS 3DEP, and any other reference data we can obtain from local sources. As we transition to 3DHP we will rely on 3DEP elevation surfaces and other derivative products. USGS has not developed the methodology for doing this; they have invited private industry to develop the workflows. The Marin County NHD work was done by their contractor NV5, and the method is proprietary. There are a few other private companies involved in this work, including Dewberry and Woolpert. The California NHD program has begun a pilot study to develop a methodology that can be shared with other state stewards and any other interested parties. USGS has published two documents to guide this work: [Elevation-Derived Hydrography Acquisition Specifications](https://www.usgs.gov/ngp-standards-and-specifications/elevation-derived-hydrography-specifications) and [Elevation-Derived Hydrography—Representation, Extraction, Attribution, and Delineation Rules](https://www.usgs.gov/ngp-standards-and-specifications/elevation-derived-hydrography-representation-extraction-attribution-and-delineation-rules) <https://www.usgs.gov/ngp-standards-and-specifications/elevation-derived-hydrography-specifications>

Data Model Changes

USGS has informed us that the data model of the NHD will be simplified. The original data model for the NHD was designed to include any all water-related features that have been portrayed on their topographic maps, resulting in a complex schema. Over the years, this has proved to be way too much to maintain in the NHD. USGS has not yet proposed a revised model, but they recently invited the state stewards to suggest data model changes. Users of the NHD are encouraged to share their ideas with Jane at jane.schafer-kramer@water.ca.gov, (916) 902-7152.

A pdf of the current data model is available at <https://www.usgs.gov/ngp-standards-and-specifications/national-hydrography-dataset-nhd-model-poster>.





Ongoing Work

A four-year extension to our Interagency Agreements with the Geographical Information Center at CSU-Chico and the Center for Geospatial Science and Technology at CSU-Northridge has been executed, committing funding for the work we've been planning over the past year.

Maintenance on the California NHD at the 1:24,000 scale continues. HU 8 subbasins that were first edited by these centers up to six years ago are being updated using recent NAIP imagery and new reference data sources.

Los Angeles County Department of Public Works Collaboration

A pilot study on elevation-derived hydrography for conflation into the NHD and updating the WBD has been funded and work is commencing. The focus is the Los Angeles River basin using reference datasets provided to us by Los Angeles County Public Works Department. This pilot work will inform our workflows for California NHD Maintenance as USGS develops its 3D Hydrography Program. More information on the 3D Hydrography Program may be found at <https://www.usgs.gov/national-hydrography/3d-national-topography-model-call-action-part-1-3d-hydrography-program>.

U.S. Forest Service NHD and WBD Updates

U.S. Forest Service (USFS) land accounts for approximately 20% of the land in California. Until now we have excluded those areas in our updates due to a handshake agreement going back to the early days of this program, when USFS was more directly involved in NHD editing. We have received approval from the regional folks at U.S. Forest Service to update the NHD and WBD areas within their administrative boundaries and this work has begun. The California Business Rules will be applied to these areas (work is at 1:24,000 scale.) Users of NHD can expect to see a more seamless NHD as it crosses into USFS lands.

Streamgages Added to the NHD

Work continues on bringing all stream gage locations that collect flow data from the California Data Exchange Center (CDEC) <https://cdec.water.ca.gov/> into the NHD with supplemental join tables to allow users to link directly from the 1:24,000 scale NHD to the CDEC website for the latest flow data. Some of these are already appearing as NHDPoint Gaging Station features, and the join tables along with hydro-linked point events will be available later in 2022 on the CNRA Open Data site.

Coastal and Other Feature Improvements

While the focus of our ongoing NHD maintenance work has been on the flowlines and waterbodies, we now have funding in place to begin an update of the Coastline, Estuaries, Bays, and Inlets. This would align with the best available data from NOAA and other authoritative resources and will populate the NHD with more of the named features that are shown on the USGS Topo Maps. Other tasks being planned are bringing additional dams, weirs, levees, springs, and wetlands features into the dataset.

Redwood National Park

NHD improvement work within Redwood National and State Parks continues. The work is being done by USGS-trained editors in the National Park Service.

Action	Key Date
Continue NHD Update work	ongoing
Scope out future work	

Other Notes

The NHD, NHDPlus High Resolution, and WBD are now available in **Geopackage** format. The attribute tables in the .gpkg files contain extra fields in order to convey the attributes residing in subtypes and domains of the Esri file geodatabase format. The .gpkg files provide improved functionality over shapefiles for use in QGIS and other open source applications. Download them at <https://prd-tnm.s3.amazonaws.com/index.html?prefix=StagedProducts/Hydrography/>

The statewide extract of the NHD available for download at <https://www.usgs.gov/core-science-systems/ngp/national-hydrography/access-national-hydrography-products> has been updated after a nearly two-year delay due to technical issues. It now appears that the statewide extract is being updated every two months.

DWR archives the California extracts of the NHD (going back to March 2018) on the Natural Resources Agency Open Data site <https://data.cnra.ca.gov/dataset/nhd-archive> each time the dataset is refreshed on the USGS website, which normally happens two to four times each year. Also found on the CNRA Open Data site are quick links to the various NHD websites and three derivative datasets: NHD Major Rivers, NHD Major Rivers and Creeks, and NHD Major Lakes and Reservoirs. <https://data.cnra.ca.gov/dataset/nhd>. The NHD-aligned Wild and Scenic Rivers – California Designations are available for download at <https://data.cnra.ca.gov/dataset/wild-and-scenic-rivers-california-state-designations-only-2020>.

We are actively reviewing suggested corrections to the NHD received via the [USGS Markup Application](#) and coordinating the editing work needed to resolve the errors. We have made progress on the backlog. Users of the NHD and the Watershed Boundary Dataset may report errors and omissions by way of this application or my contacting the steward at nhd_stewardship@water.ca.gov.

Here is some guidance for reporting errors discovered in the National Hydrography Dataset and Watershed Boundary Datasets to the California State Steward

<http://cgia.org/cagiscouncil/wp-content/uploads/2021/06/Improving-the-California-NHD-One-Markup-at-a-Time.pdf>

Appendix

Accurate and vetted regional and local reference datasets are extremely useful in bringing comprehensive improvements to the NHD as they can provide additional detail that is not always accessible from readily available datasets and aerial imagery. We would love to hear from you if you can share quality reference datasets of your area.

Hydrographic reference datasets (vector) with the following specifications are desired:

Scale: 1:50,000 or finer

Primary Composition/Features of Interest:

River/Streams

Lakes/Ponds/Reservoirs

Washes

Swamps/Marshes

Canals/Ditches



Attribution Composition:
Seasonality/Periodicity of Rivers/Streams
Feature Types

Currentness: Updated within last 5 years

Contact Information:
Jane Schafer-Kramer
Jane.Schafer-Kramer@water.ca.gov or nhd_stewardship@water.ca.gov
Department of Water Resources, Division of Planning