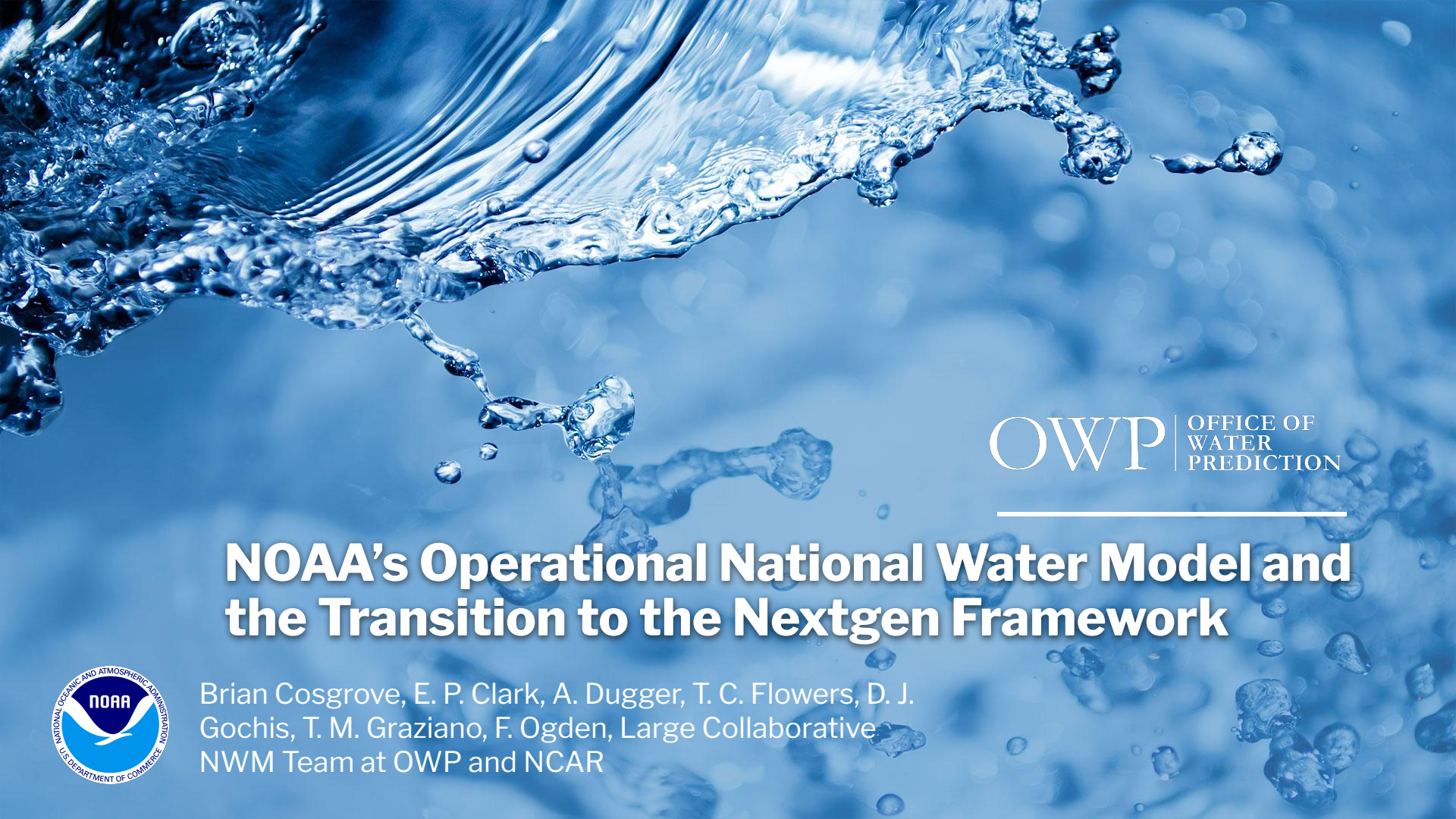

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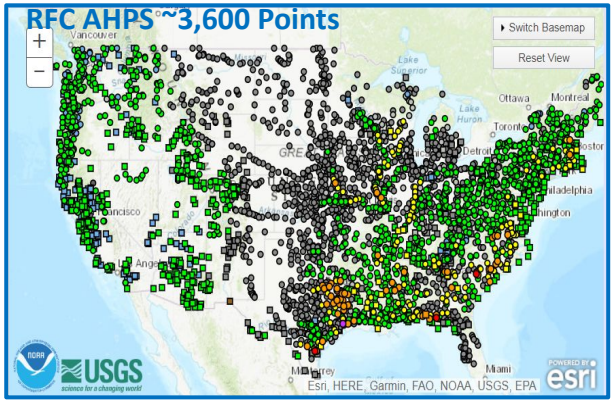
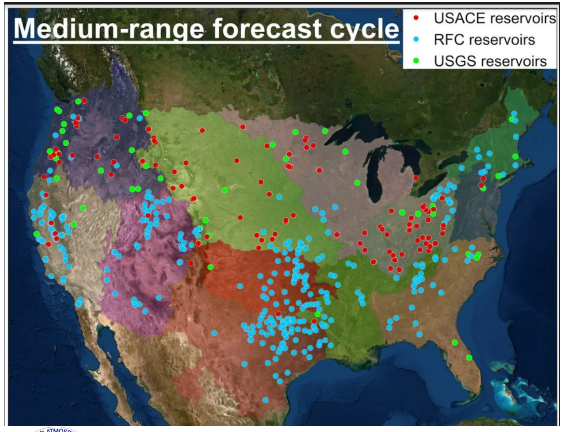
NOAA's Operational National Water Model and the Transition to the Nextgen Framework

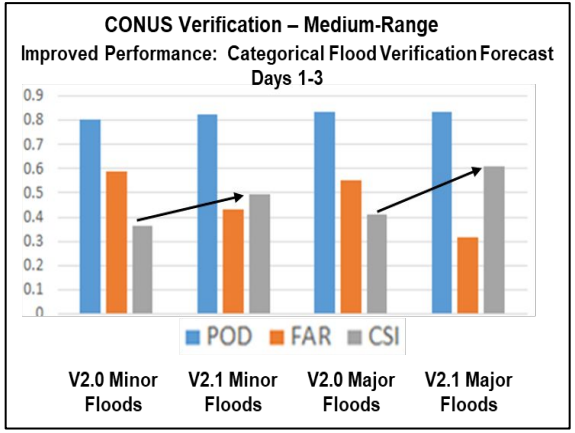
Brian Cosgrove, E. P. Clark, A. Dugger, T. C. Flowers, D. J. Gochis, T. M. Graziano, F. Ogden, Large Collaborative NWM Team at OWP and NCAR

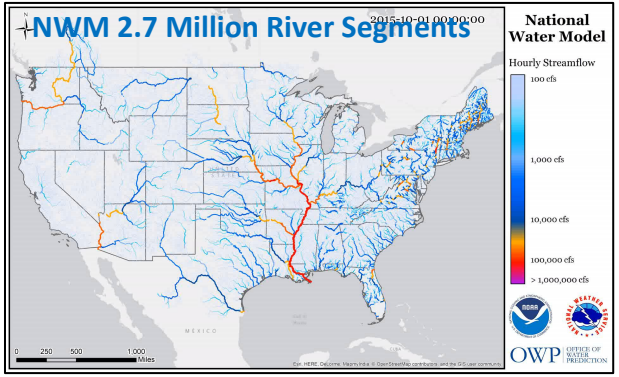
National Water Model Overview

- The NWM revolutionizes how hydrologic guidance is developed and delivered, providing both complementary and first-time coverage and outputs
- Most recent NWM upgrade, v2.1 in April 2021
- Strong skill improvement, especially reservoir outflow





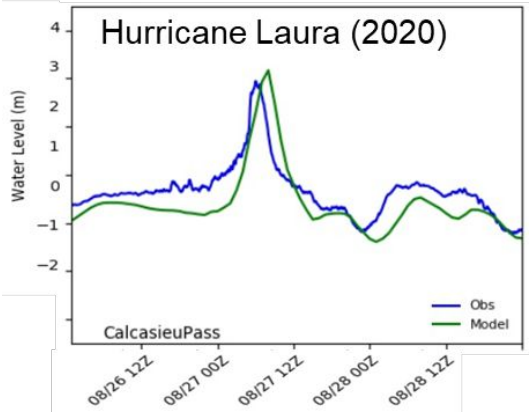


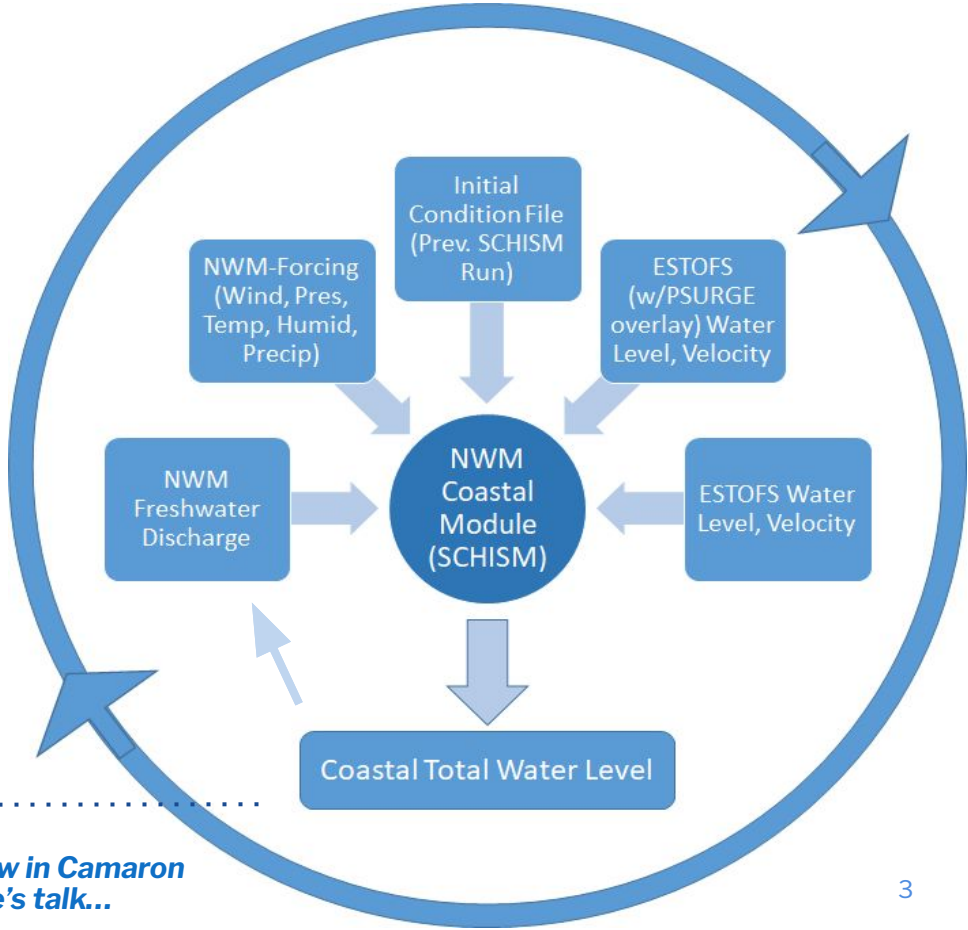


NWM v3.0 (2023): New Coupled Total Water Forecasting Capability

Looking Ahead: Filling the capability gap

- Over 100 million people live near the coast without national total water guidance today
- National total water level forecasts will complement existing regional forecasts with first ever CONUS-wide, Hawaii, PR/VI guidance
- This new freshwater-estuary-ocean coupling will leverage the NWM, a new inland hydraulic routing module, SCHISM, ESTOFS & PSURGE





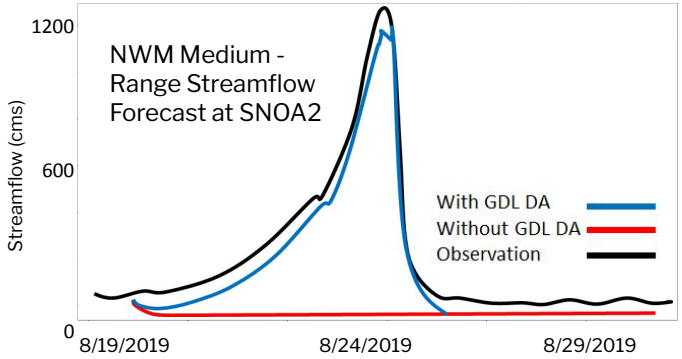
Details follow in Camaron George's talk…

NWM v3.0 (2023): New Alaska Domain

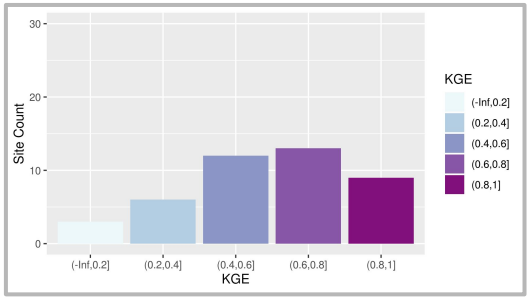
Overarching Goal: Implement NWM Alaska domain to provide augmented streamflow and distributed water cycle guidance to help protect Alaskan communities and infrastructure.

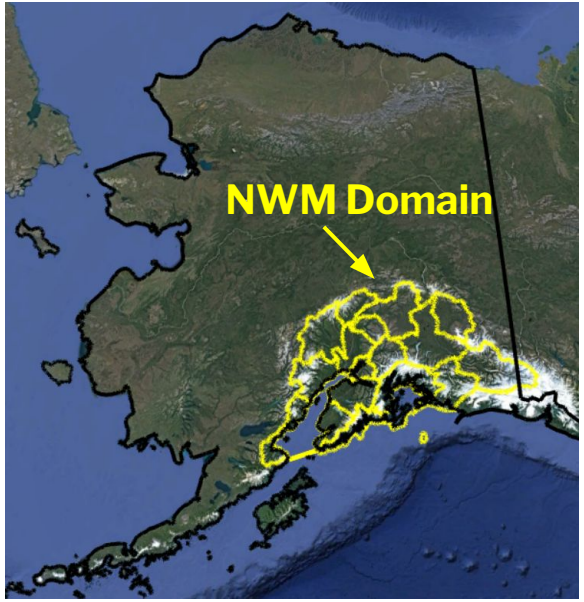
NWM Alaska Summary

- Close configuration/forcing coordination with APRFC
- Ingest of APRFC glacial dam lake (GDL) outflow forecasts
- Customized model and forcing configurations (APRFC MPE (Stage IV), MRMS, HRRR-AK, GFS, NBM)



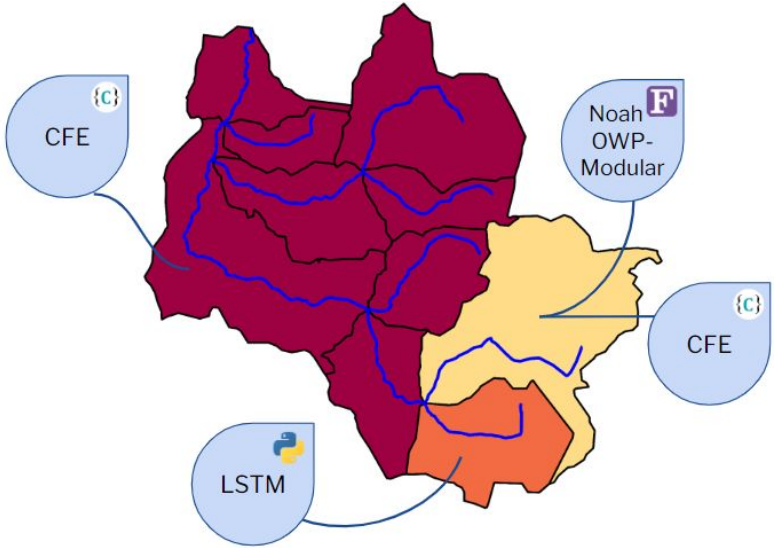
KGE Distribution of Uncalibrated NWM Streamflow (2005-2019)





NWM v4.0 (2025): Advancing Operations with Nextgen Framework

- The NWM software architecture is being rewritten from the ground up - Next Generation Water Resources Water Modeling Framework (Nextgen)
- A core feature of the community-oriented Nextgen framework is the ability to vary model components by hydrologic catchment…



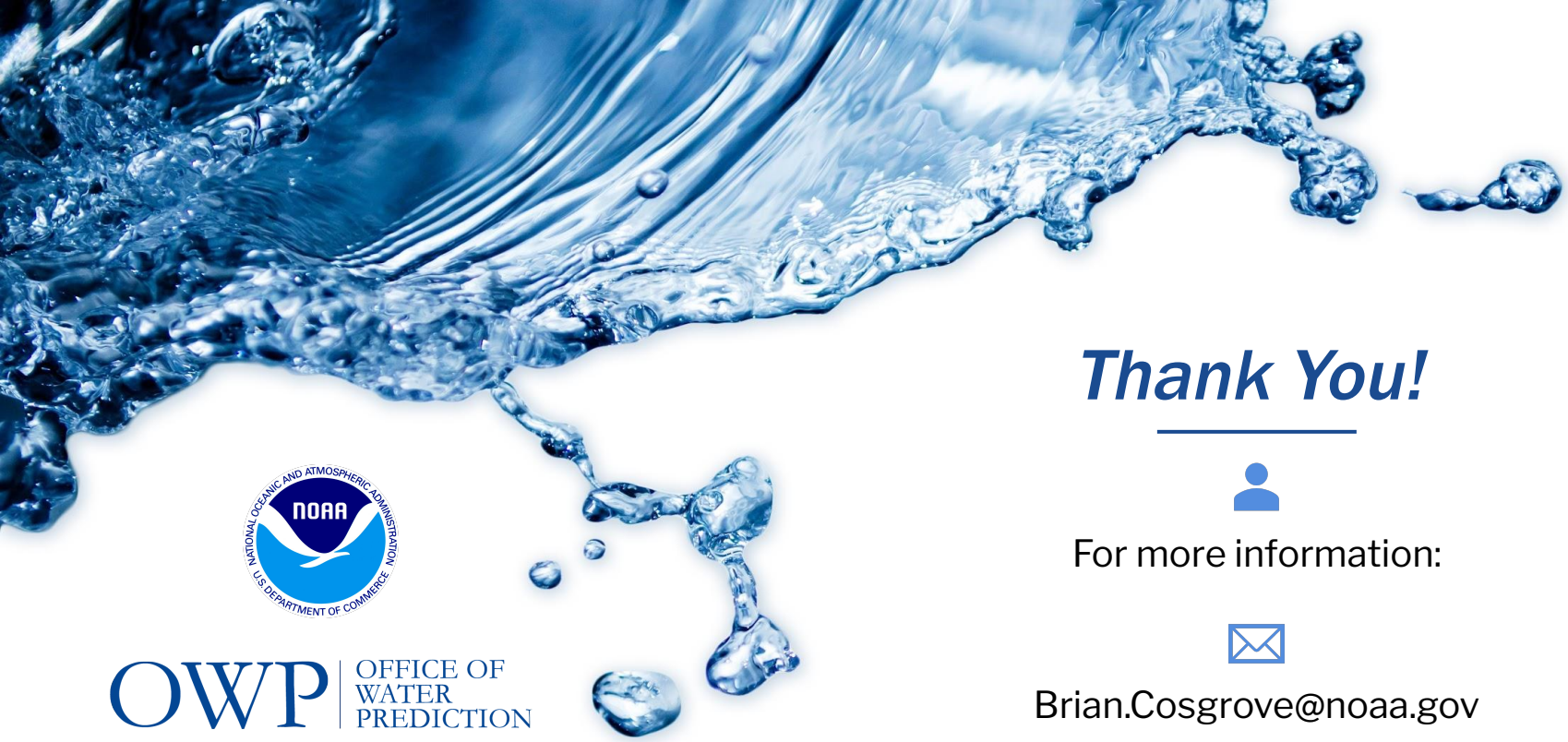
Multiple catchments - Multiple formulations

This will lead to key operational improvements

Forecast Accuracy	Module selection tailored to each catchment's hydrologic characteristics (soil, snow, other)
Computational Efficiency	Lighter-weight formulations can be used when appropriate (i.e., turn off snow)
Model Capability	Framework flexibility (LSTM, CFE, Topmodel, Noah OWP-Modular) enables ensembles

Closing Thoughts

- The coverage and breadth of the operational NWM drives operational forecasting, research, and commercial applications in a way not before possible
- What exists now is a foundation that will continue to be built upon
- v2.1 in April 2021, with V3.0 in mid-2023
- Actively developing Nextgen-based NWM v4.0, will underpin operational advances
- Steady upgrades to model skill, value-added visualization products, partnerships with end users and community development will continue to advance the system



Thank You!

For more information:

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https://water.noaa.gov

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