A Summary National Precipitation Forecast Skill

and the FIRO Expansion Pathfinder Effort

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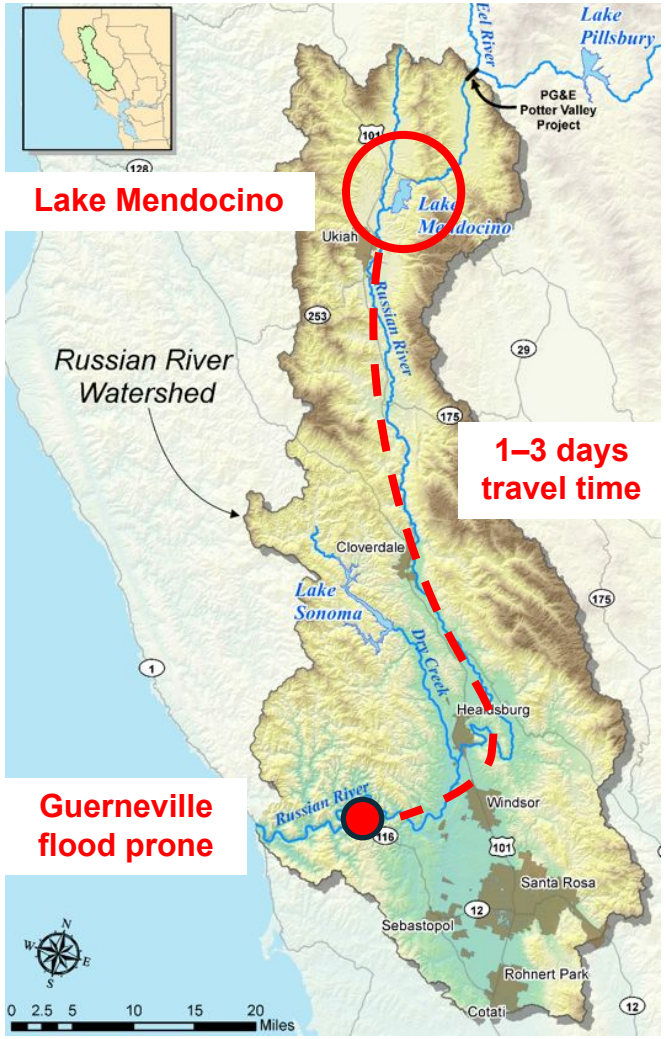
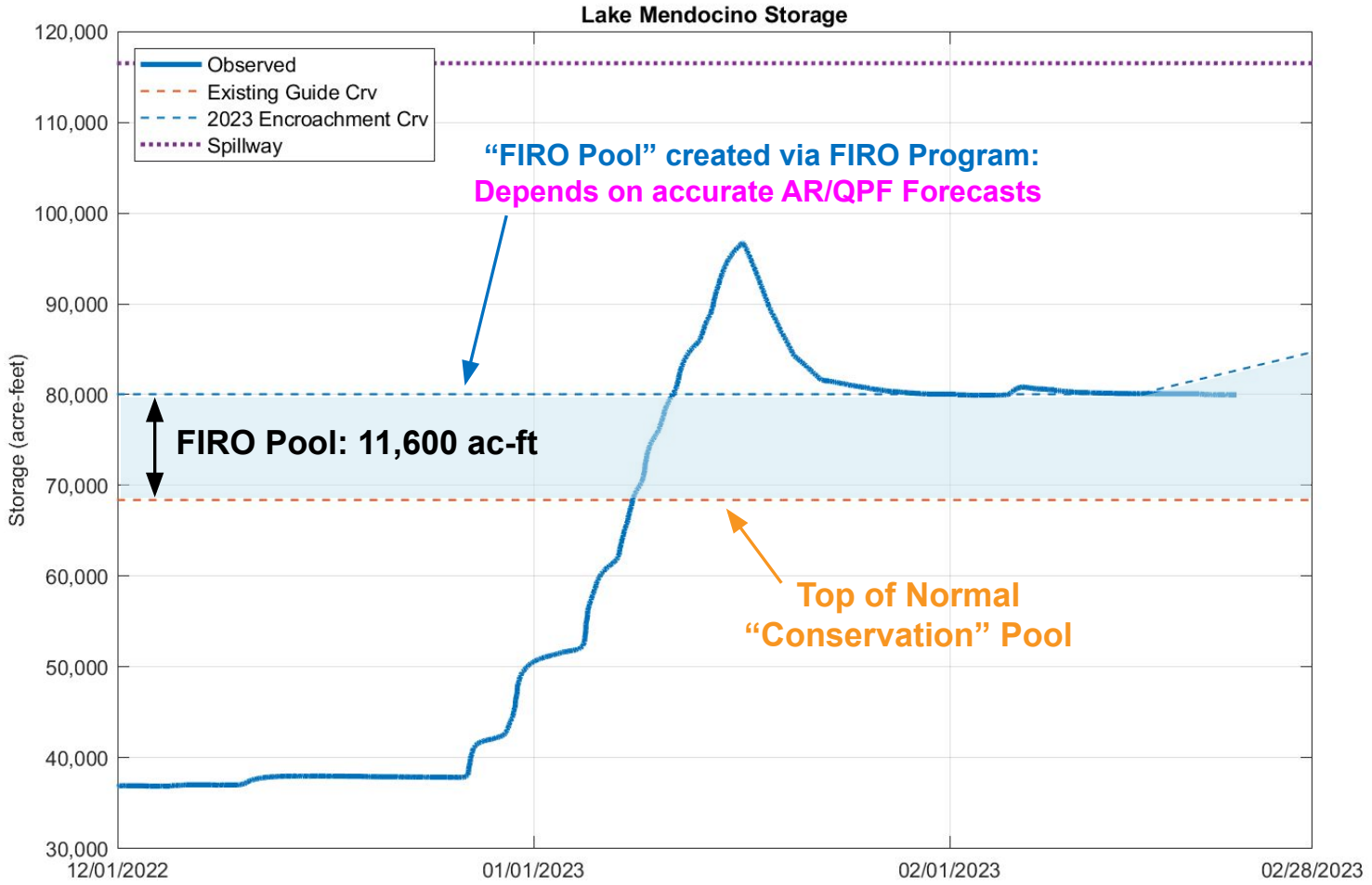
Whether or not forecasts can be used to manage reservoirs is influenced by precipitation forecast skill, which is an indicator of streamflow forecast skill.

Motivation and Application: Forecast Informed Reservoir Operations (FIRO)

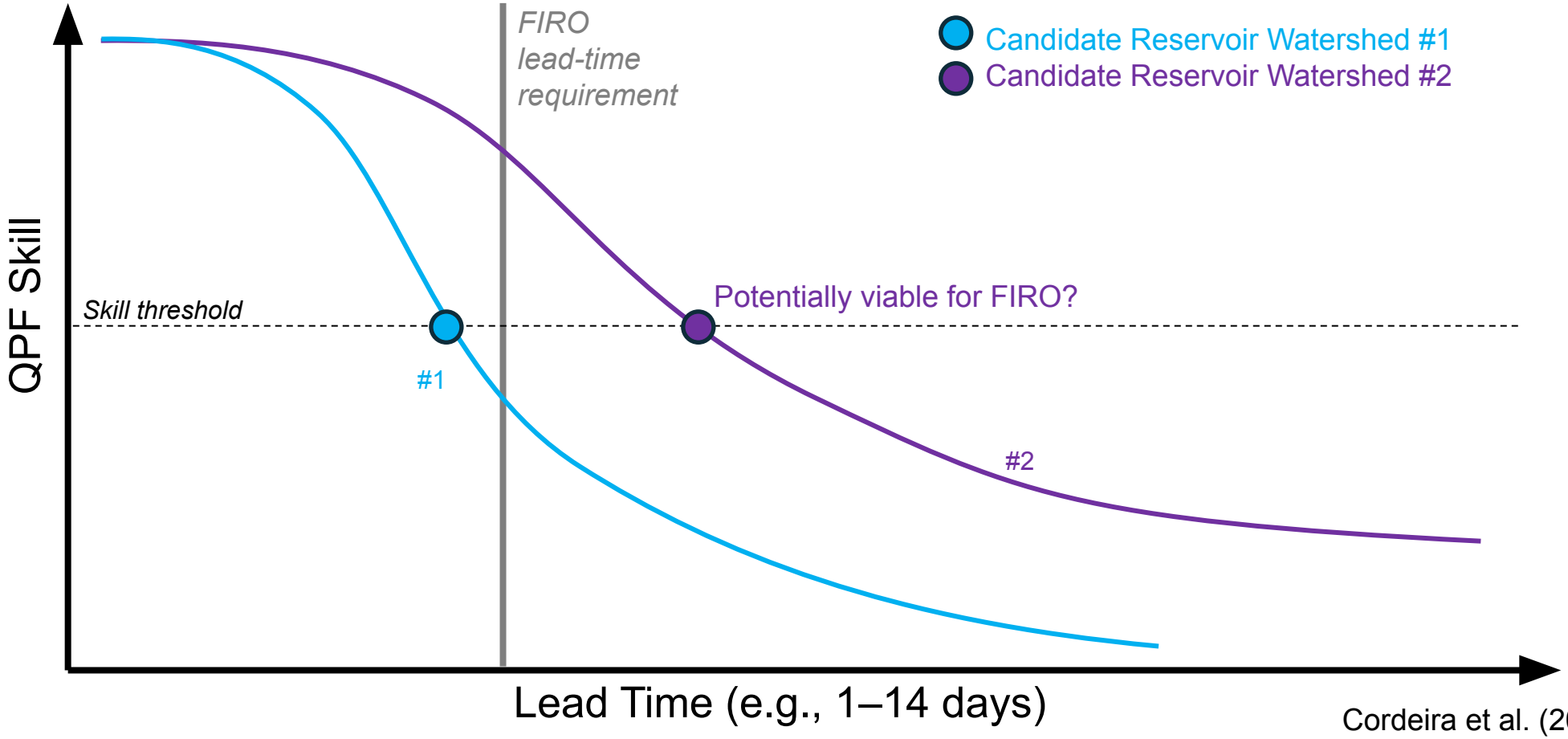




FIRO allowed retention of an extra 11,600 acre-feet at Lake Mendocino after the onslaught of ARs during Dec 2022–Jan 2023; FIRO requires skillful AR/QPF forecasts.

Motivation and Application: Forecast Informed Reservoir Operations (FIRO)

CW3E is leading FIRO efforts with USACE to screen for viability across the U.S.
Viability is influenced by **whether skill is high enough** at a given **FIRO lead-time requirement**.



Cordeira et al. (2024; submitted)

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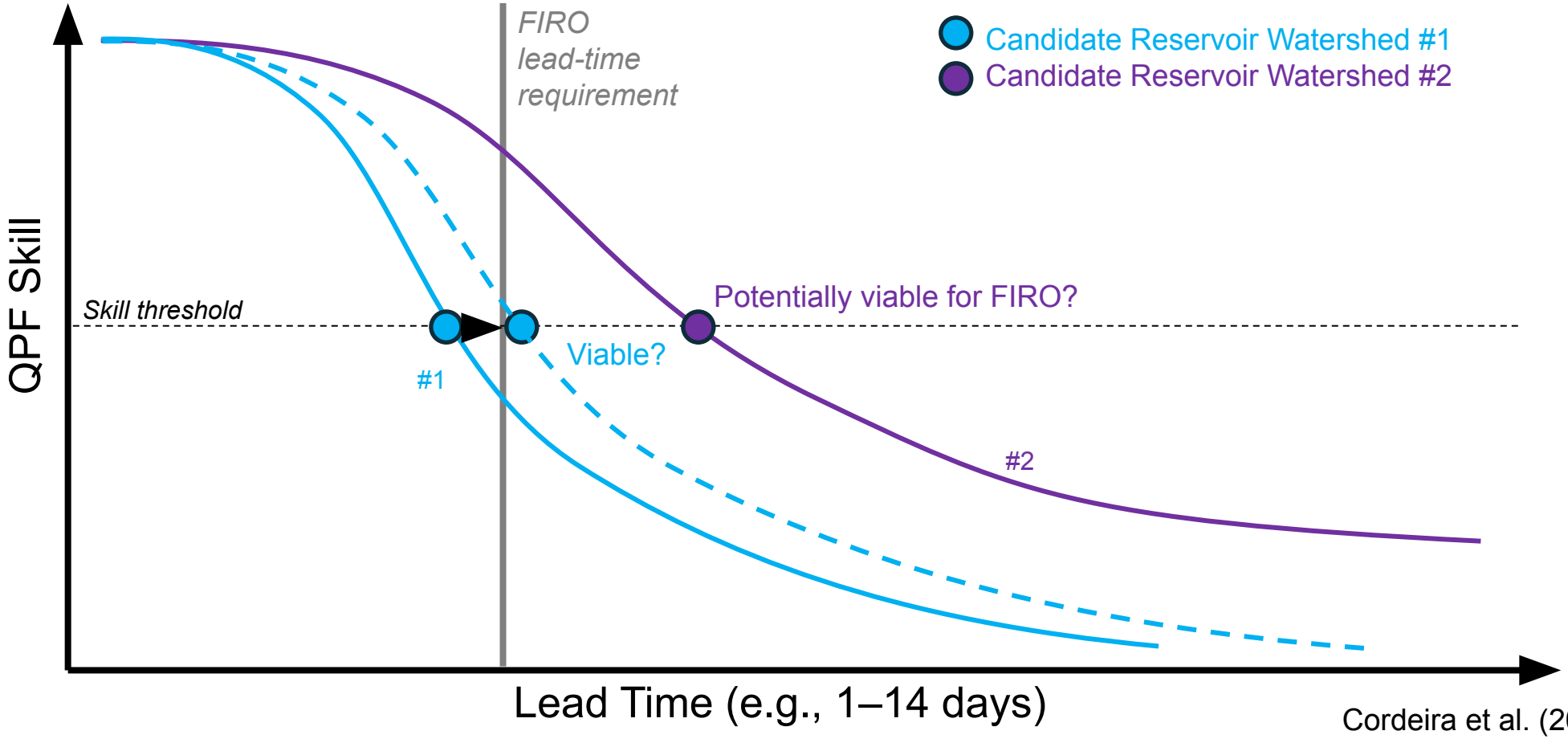

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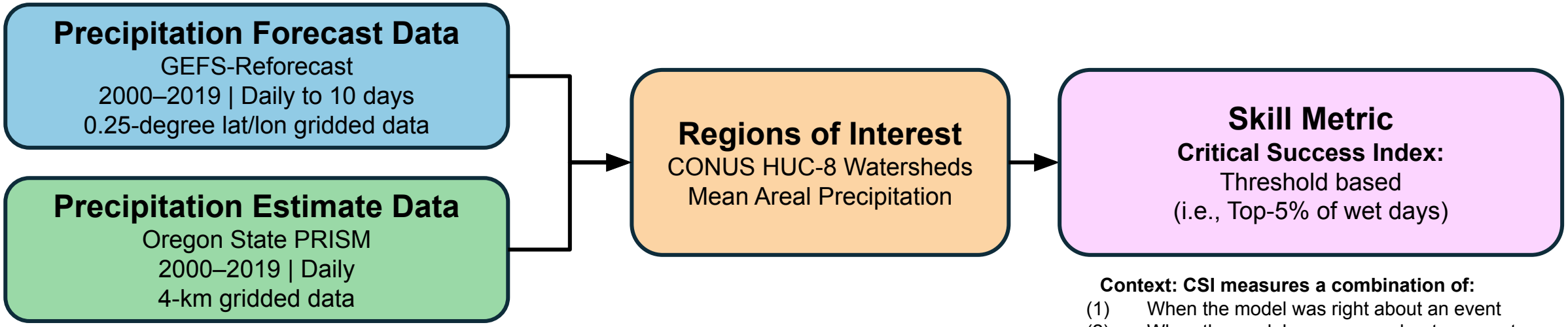
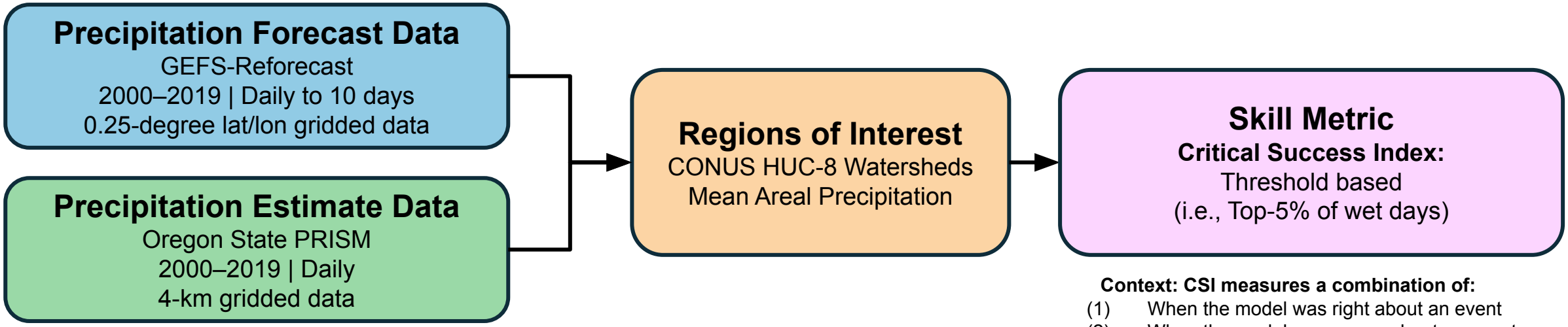
Designing a National QPF Skill Assessment



Context: CSI measures a combination of:

(1) When the model was right about an event
(2) When the model was wrong about an event
(3) When the model missed an event

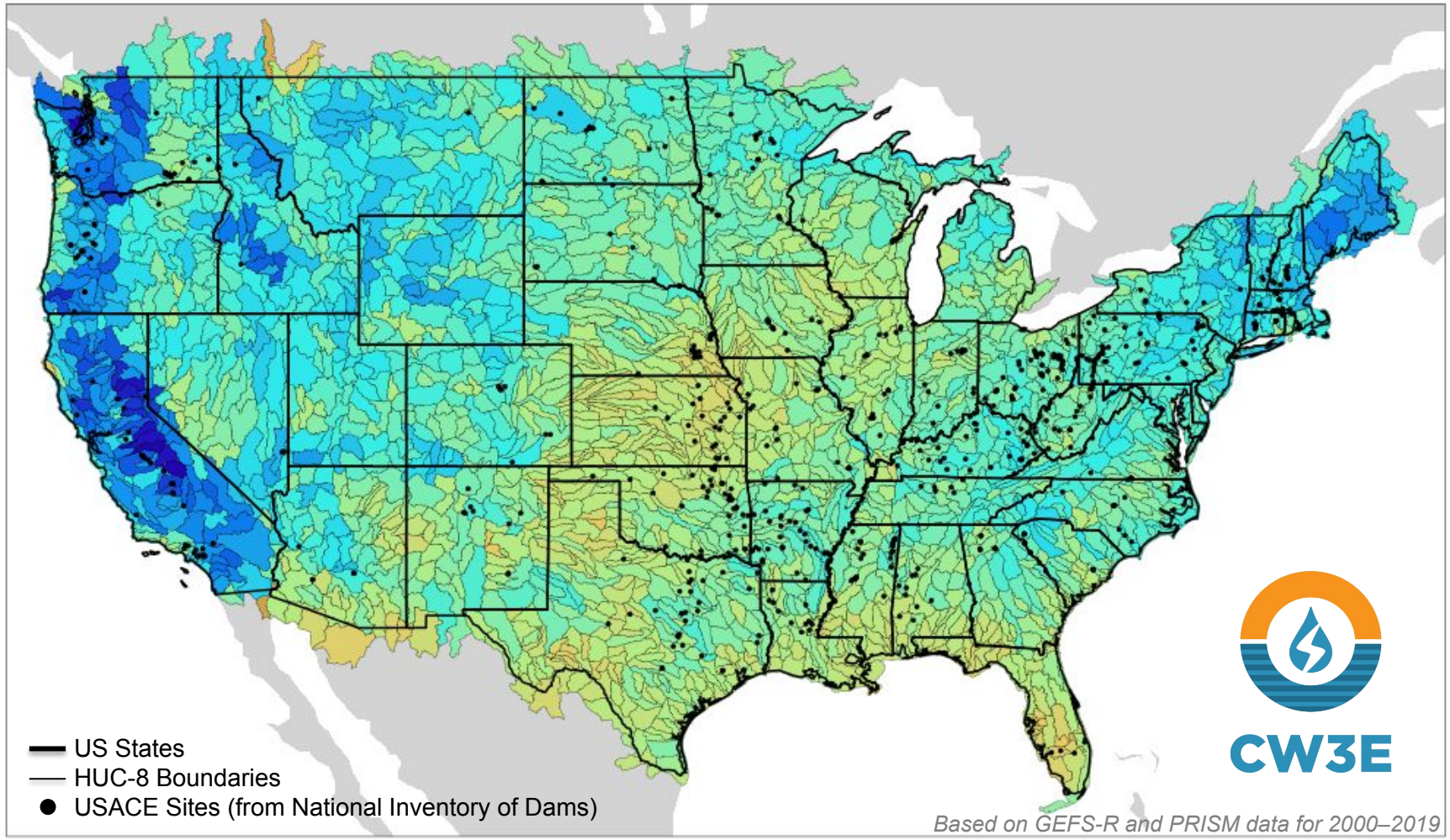
Designing a National QPF Skill Assessment



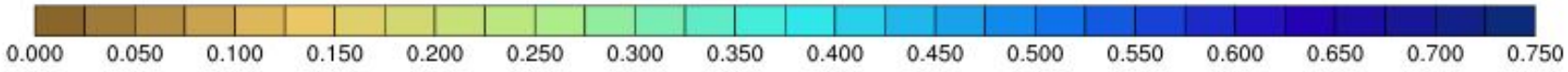
There are many options in designing a national QPF skill assessment.
This presentation summarizes a fraction of possible options.

A complementary QPF skill analysis is being presented this week at the PPGC Workshop by NOAA on WPC's operational QPF skill.

Nationwide QPF Skill (CSI) | Top-5% | Day-1



Day-1 [F12–F36] Critical Success Index



Key Results:

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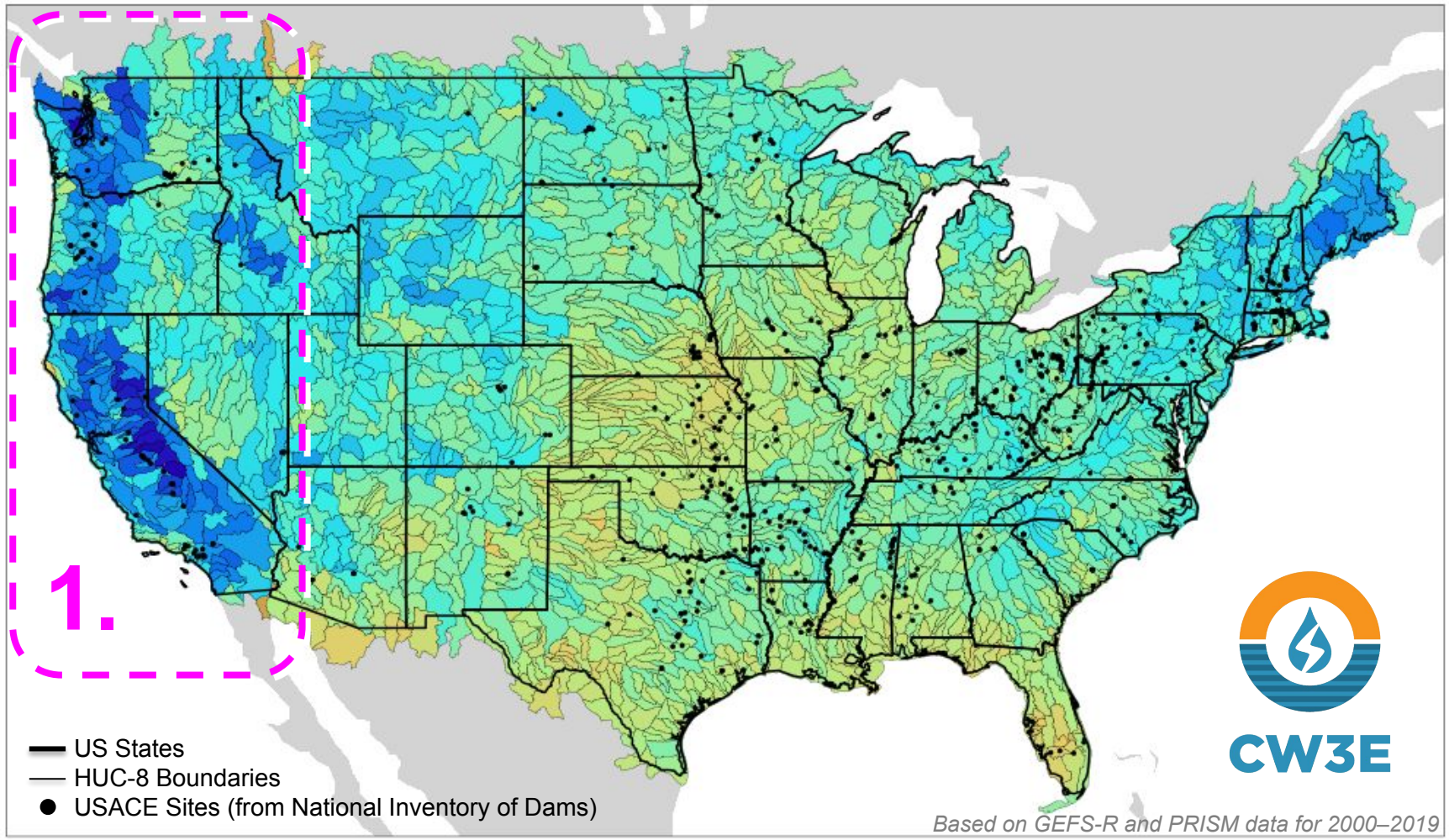

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Key Results:

1. Highest skill over West anchored by terrain and atmospheric rivers (ARs).

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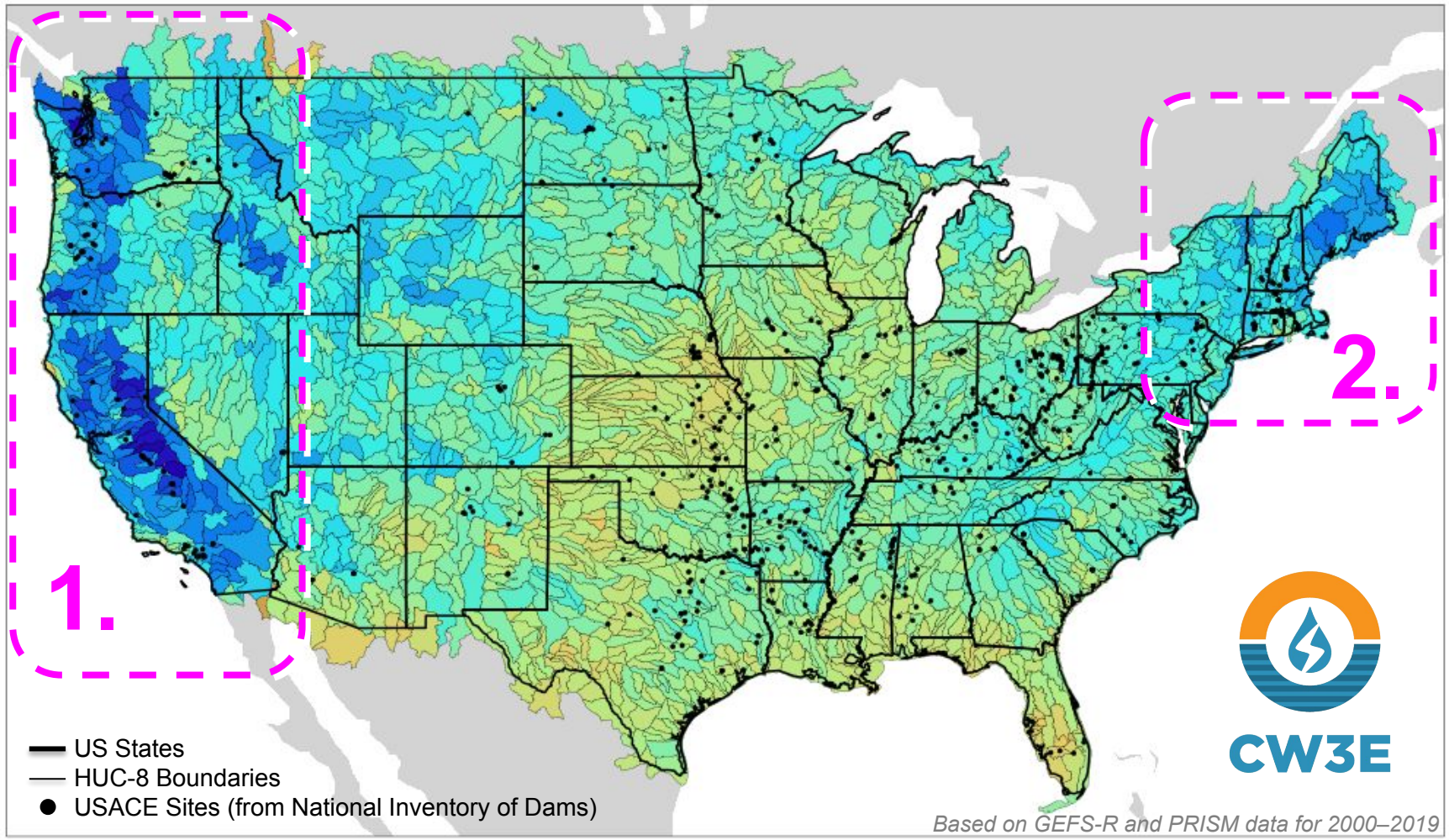

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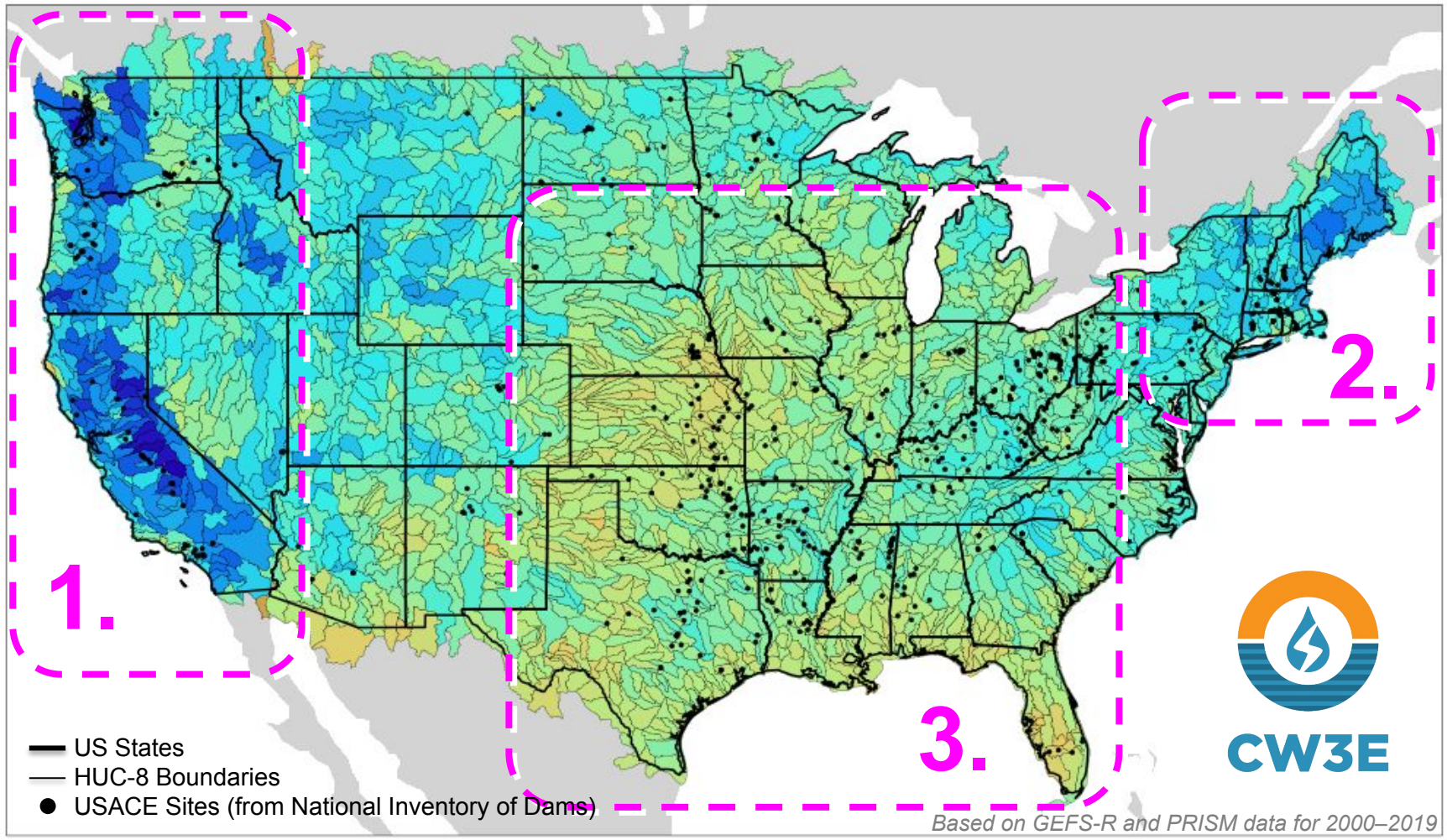

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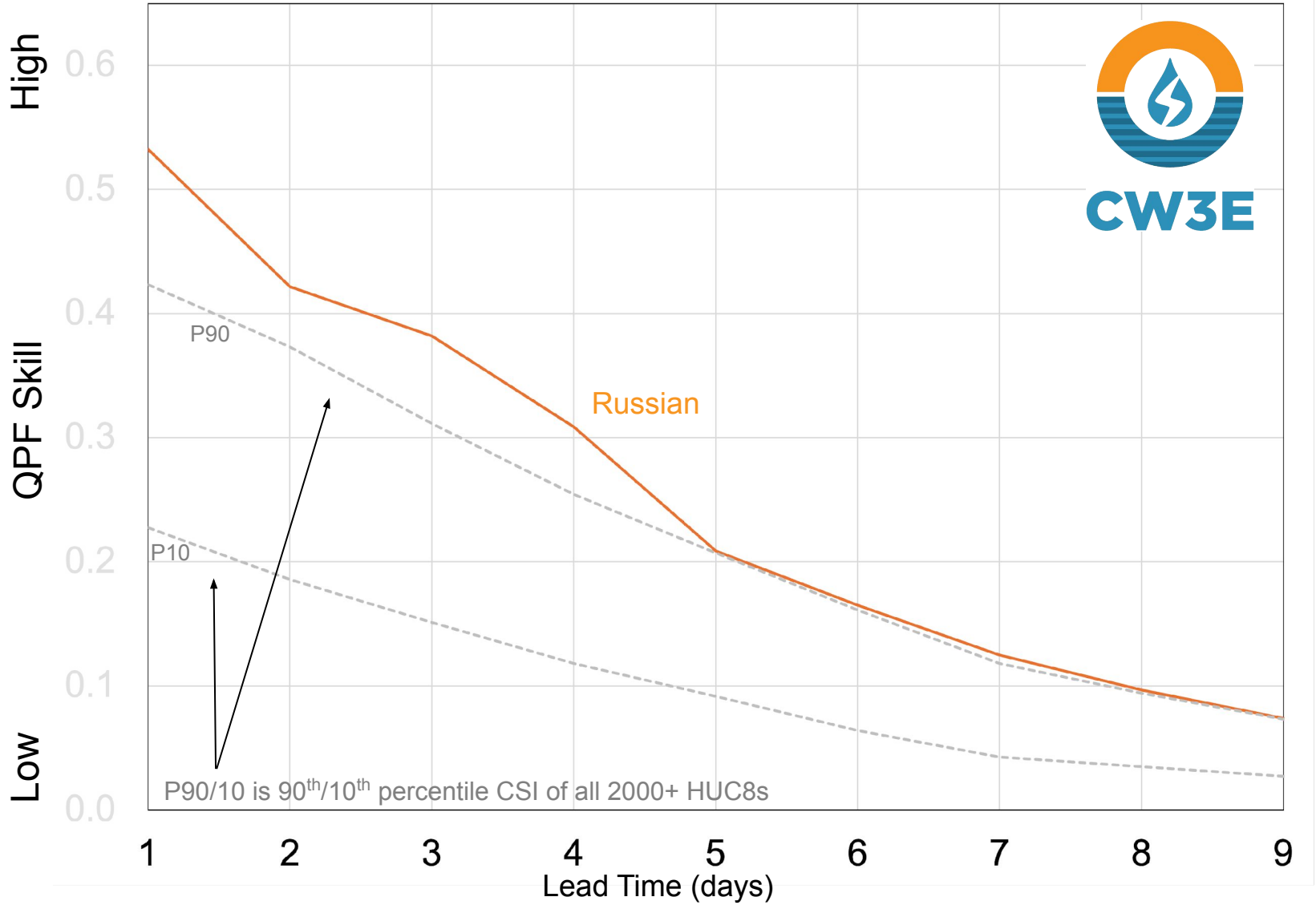
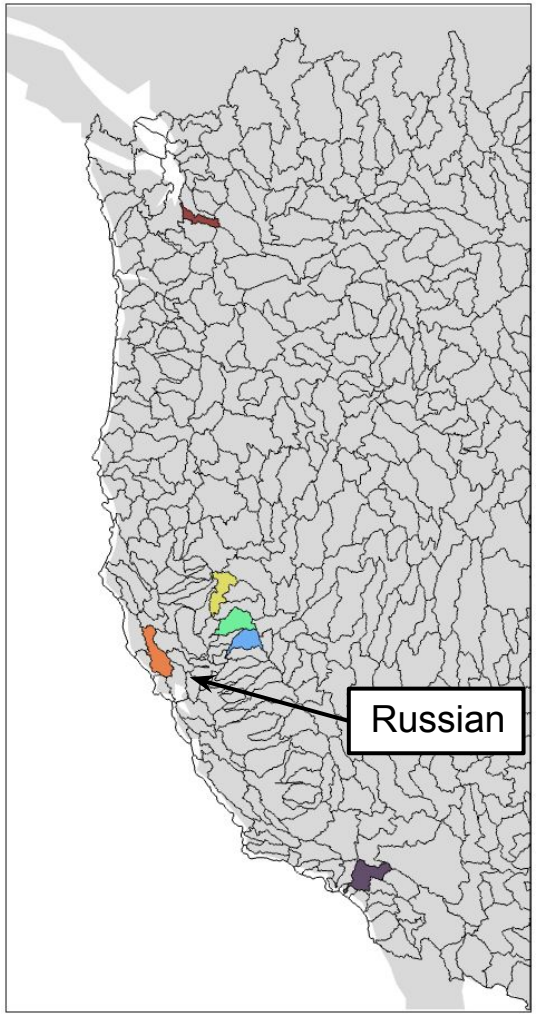
Key Results:

1. Highest skill over West anchored by terrain and atmospheric rivers (ARs).
2. Higher skill also over New England and Mid-Atlantic influenced by ARs and Nor'easters.
3. Lower skill over Central and Southeast influenced by convection and tropical processes (with some exceptions; e.g., along the Appalachians).

FIRO HUC-8 QPF Skill (CSI) | Top-5% | Days 1–9





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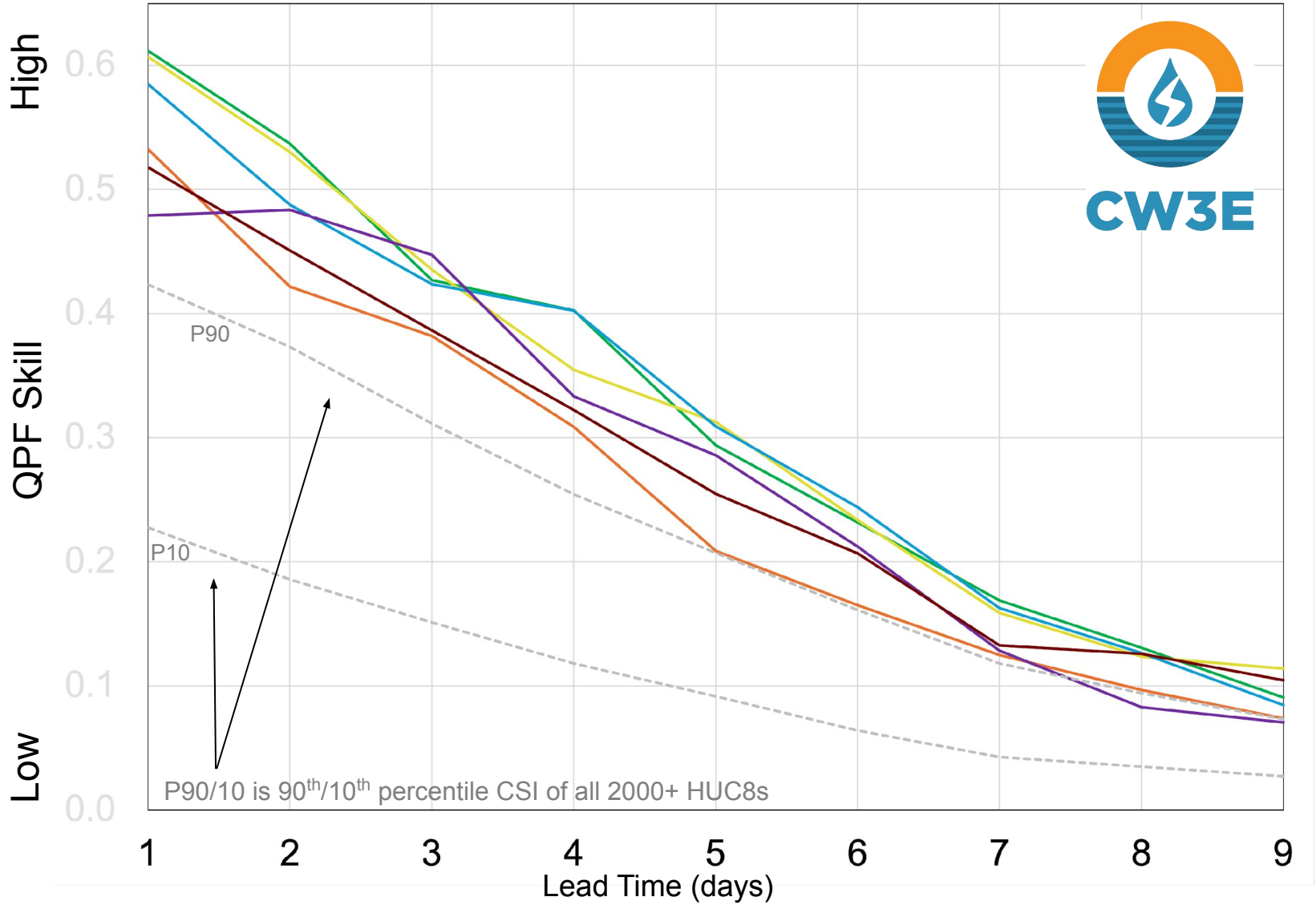
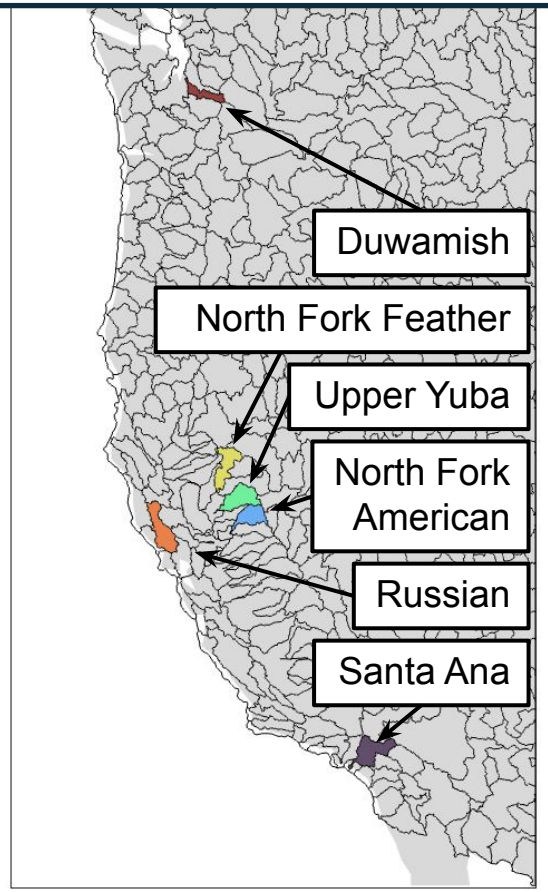


Current "FIRO HUC-8" watersheds contain skill in the top-10% nationally



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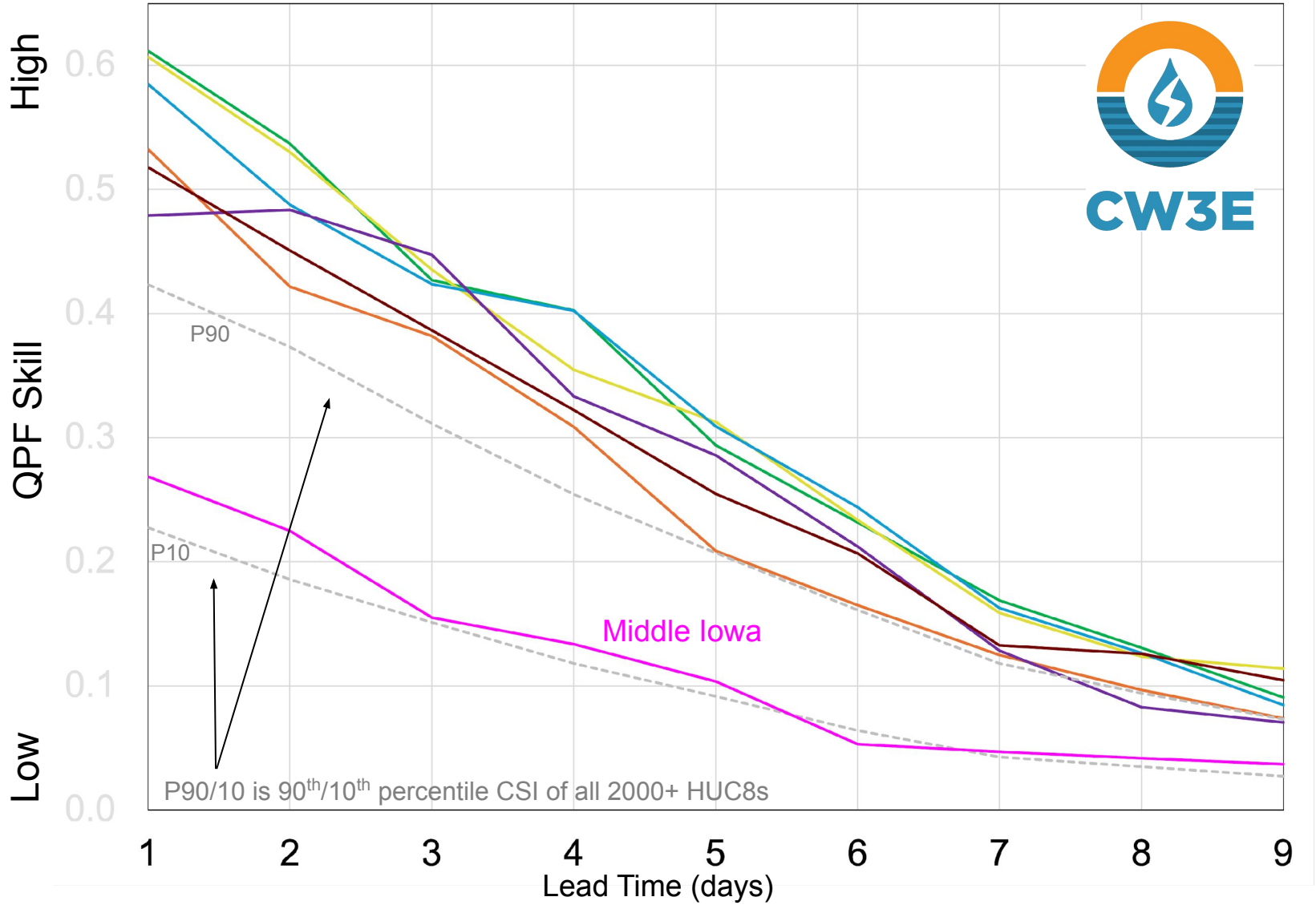

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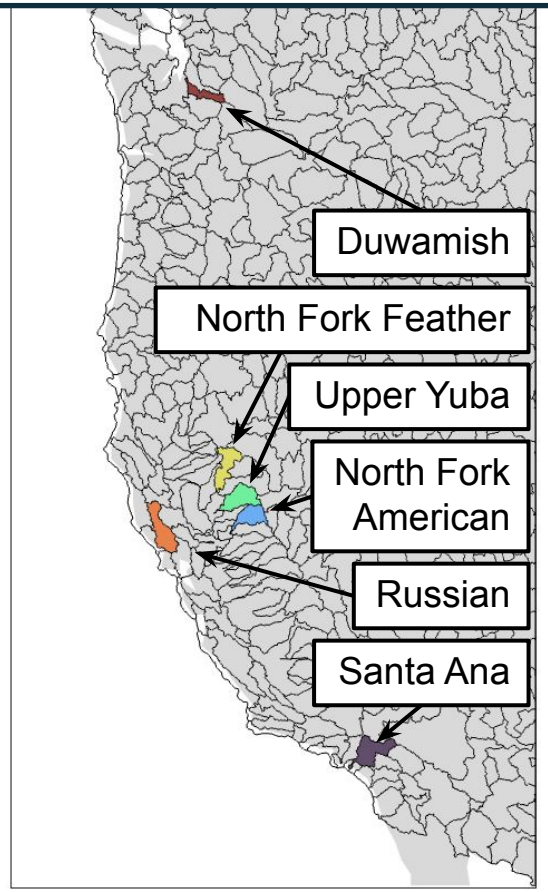
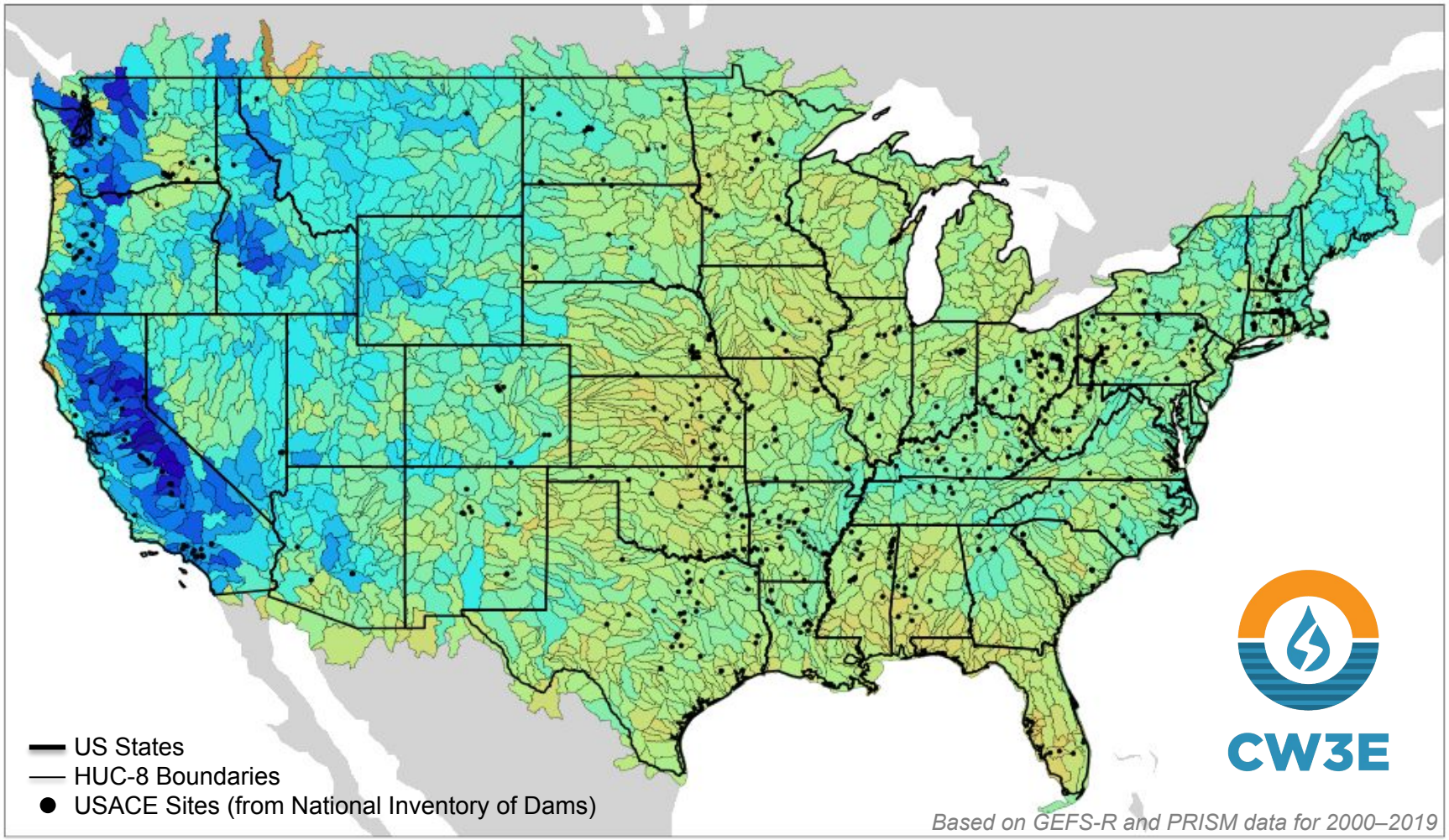
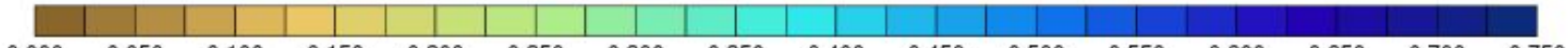


Nationwide QPF Skill (CSI) | Top-5% | Days 1–3 Aggregate



Days 1–3 [F12–F84] Critical Success Index



Key Results:

1. Overall spatial pattern for 3-day aggregate skill is like day-1

2. Values are numerically similar:

	CONUS	"18" CA
Day-1:	0.326	0.463
Days 1-3:	0.305	0.470

3. Although individual daily skill "perishes" quickly (i.e., drops below a meaningful threshold), the aggregate skill remains relatively high for several days lead time

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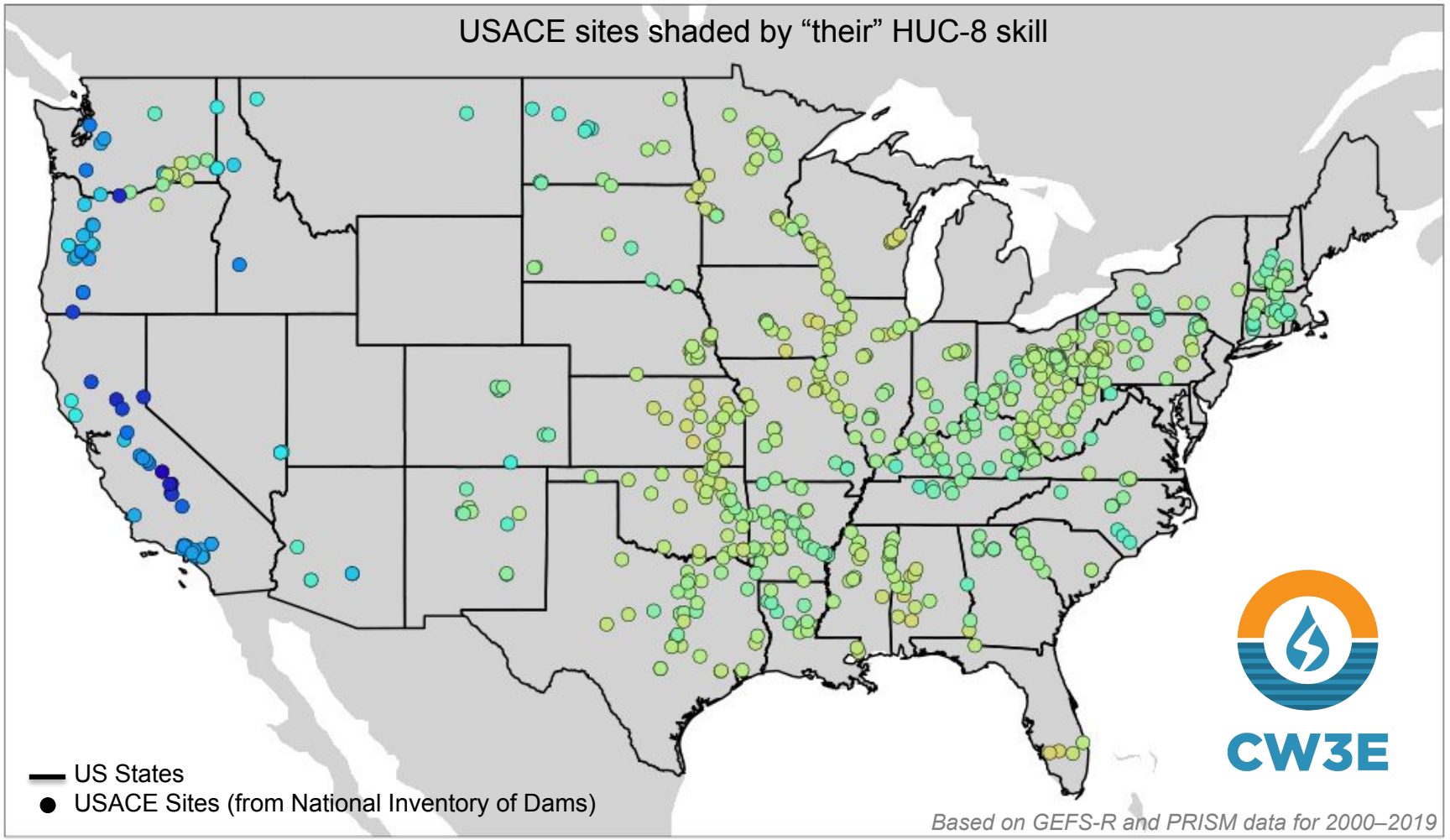

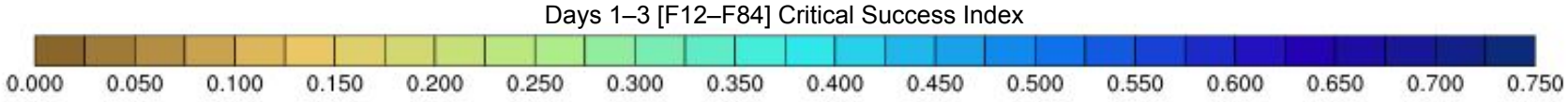

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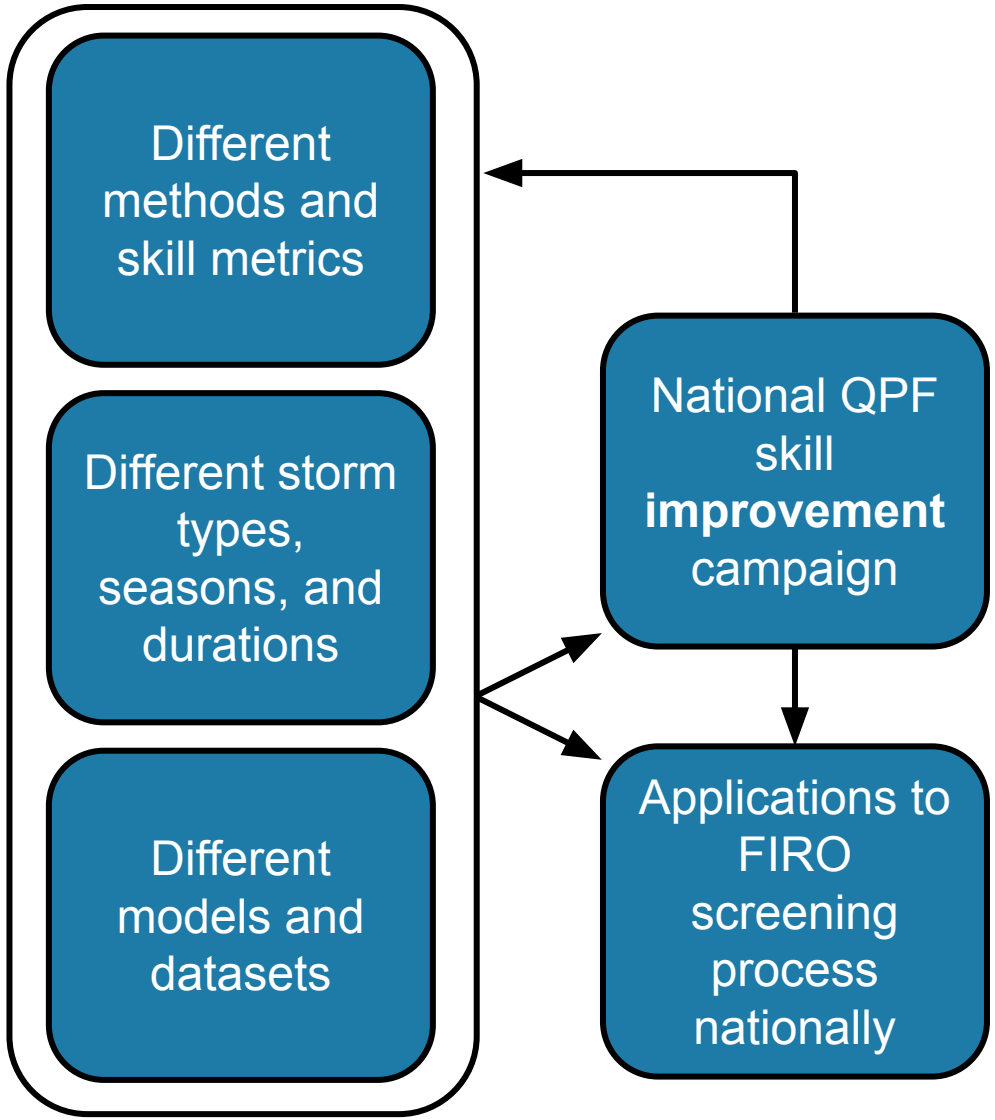
Collaborative Ongoing and Future Work



Collaborative Ongoing and Future Work

Different methods and skill metrics

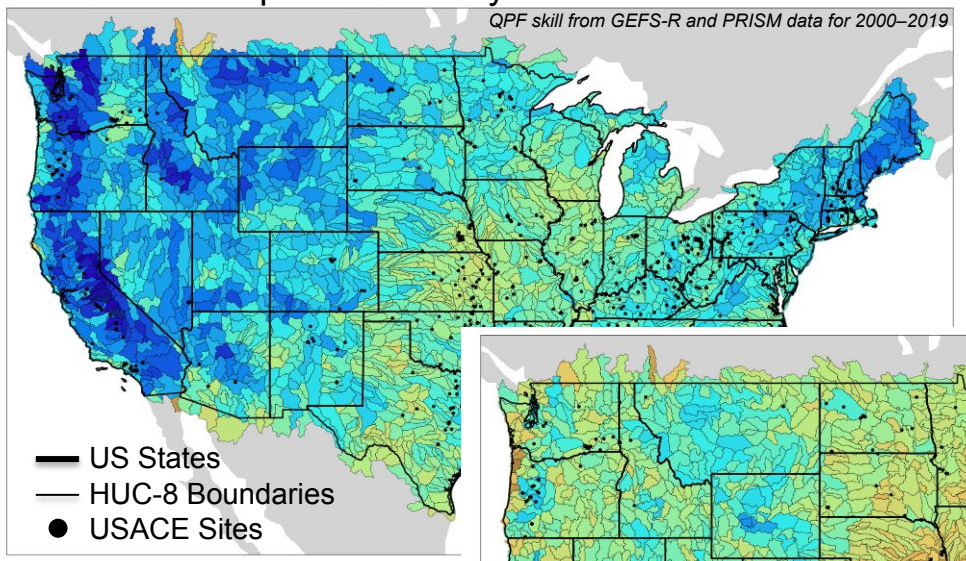
Different **storm types**, seasons, and durations

Different models and datasets

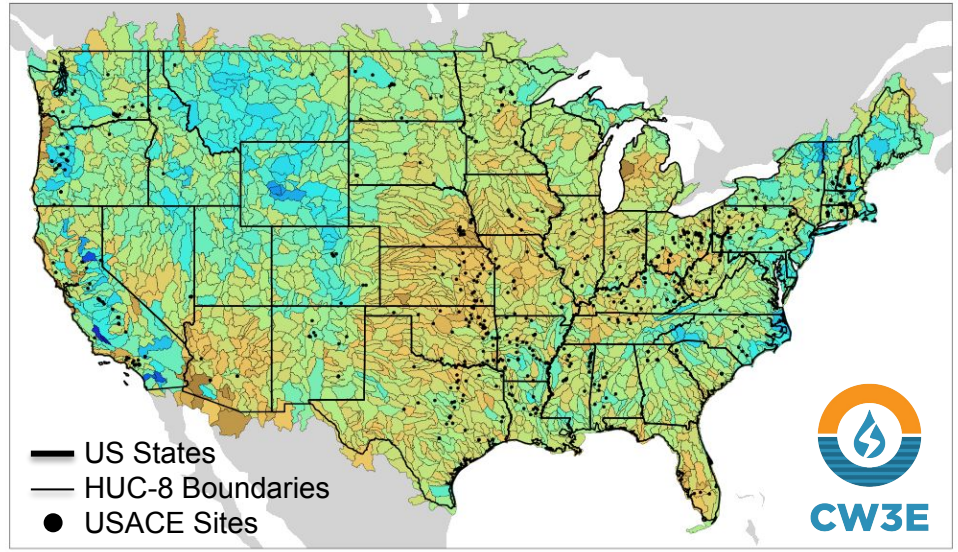
National QPF skill **improvement** campaign

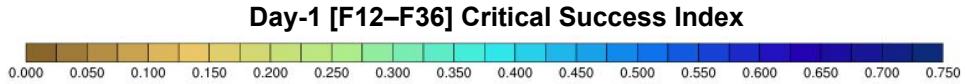
Applications to FIRO screening process nationally

a. QPF skill top-5% QPE days with **AR events**



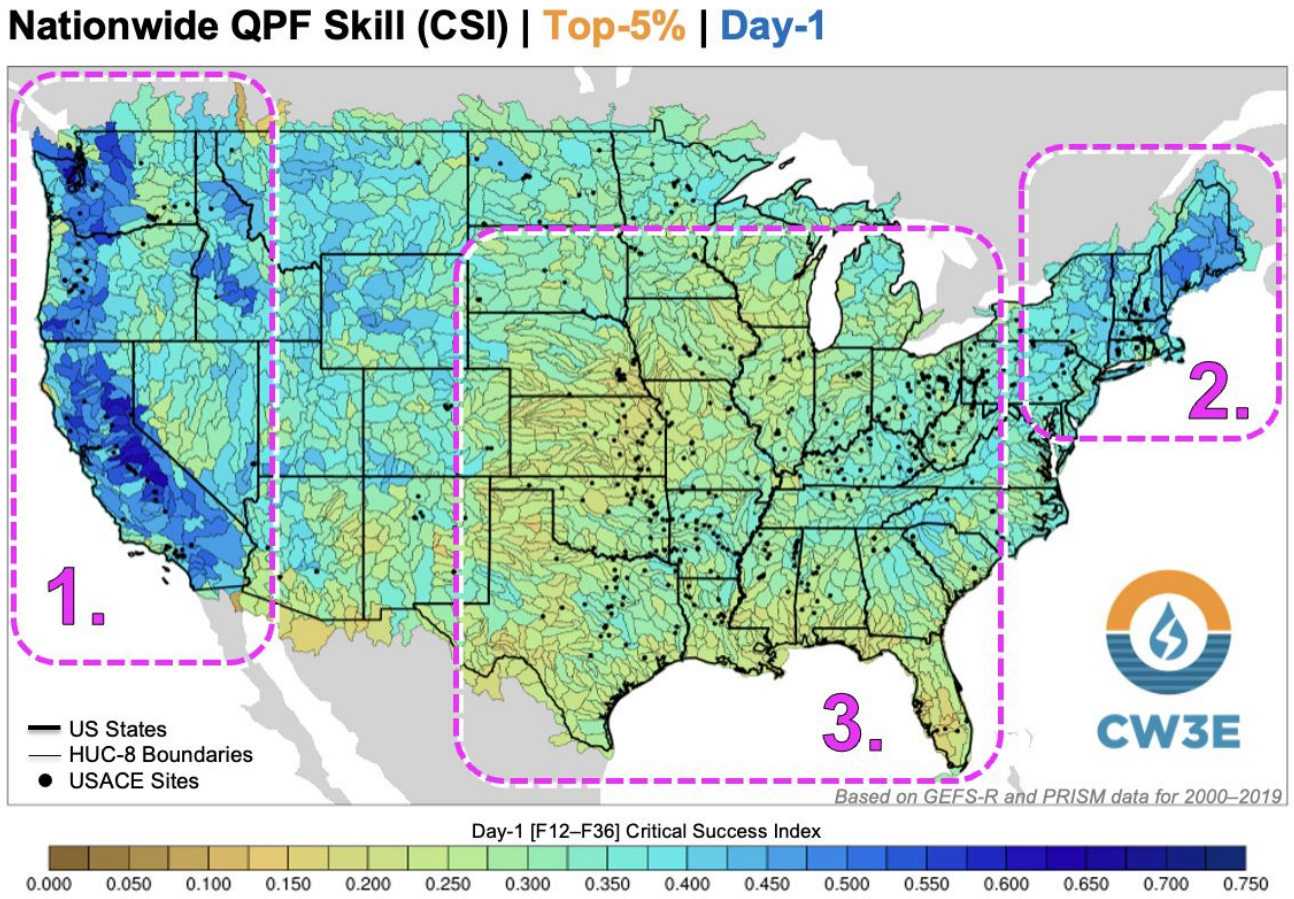
b. QPF skill top-5% QPE days with **non-AR event types**





Number of watersheds with Day-1 CSI >0.33:
ALL □ 837 (39%), AR □ 1295 (61%), Non-AR □ 238 (11%)

Thank you for listening. Are there any questions?



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Jay Cordeira, Precip Science and Prediction Lead This is me.
jcordeira@ucsd.edu