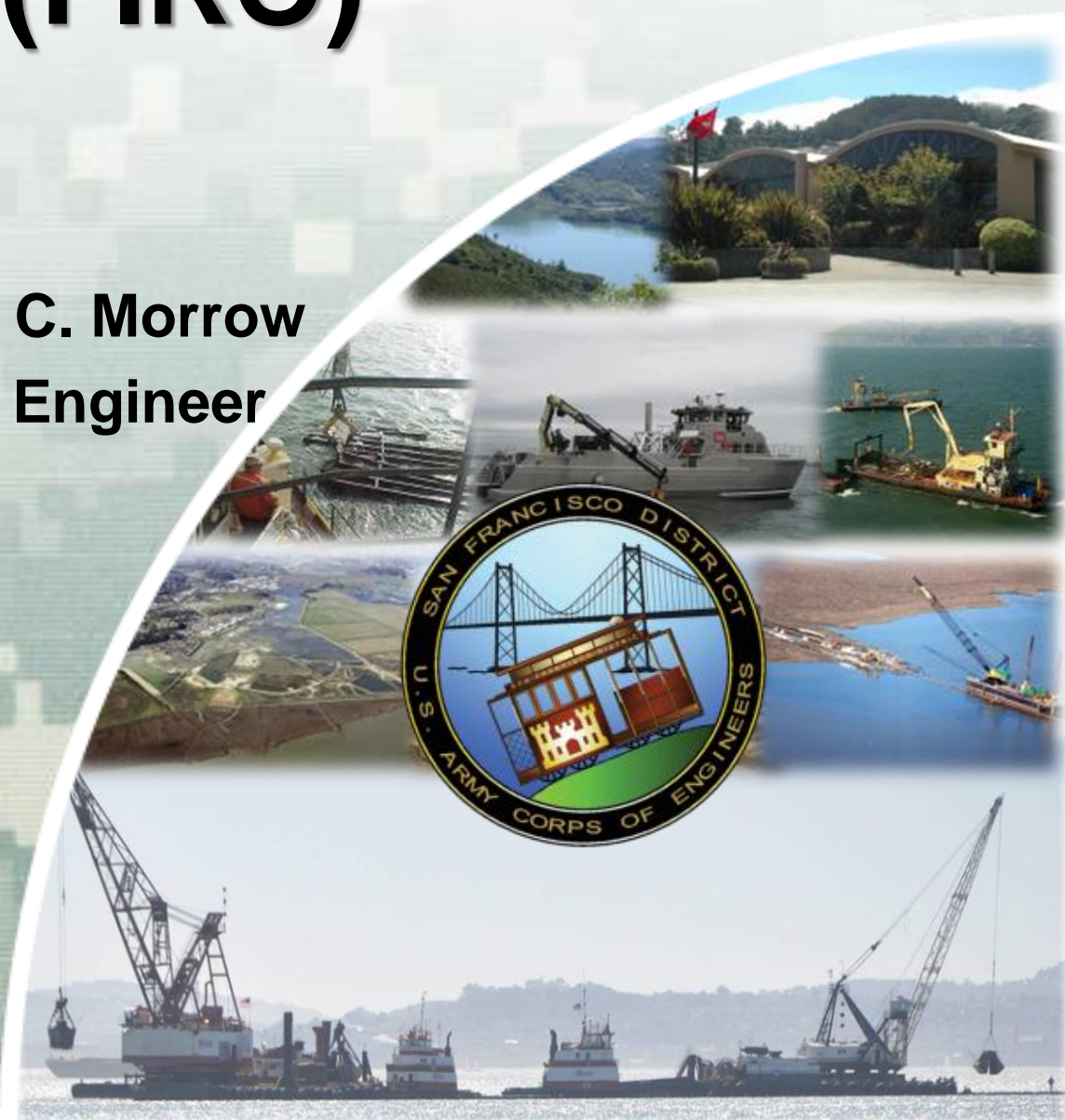


Forecast Informed Reservoir Operations (FIRO)

22 April 2016

Lieutenant Colonel John C. Morrow
Commander and District Engineer



®

US Army Corps of Engineers
BUILDING STRONG and Taking Care of People!
San Francisco District

Thank You for
Allowing Me to
Speak to You this
Afternoon!



San Francisco District – Overview

Oldest USACE district on the Pacific Coast

- Providing Value to the Nation since 1866

Strategically significant district

- **Navigation energizes the economy** – we support 22 Federal ship channels, SF Bay Area's \$70B annual maritime industry and \$585B GDP (22nd in world), and are the only government agency with debris removal mission in SF Bay (>1200 tons/yr)
- **Reducing disaster risk for 6.5 million people and economies of SF Bay Area, Silicon Valley, Sonoma, Napa, and Central Coast** – 99% chance of big earthquake in next 30 yrs (per USGS); additional risks of flooding, sea level rise, tsunamis, and wildfires
- **Largest wetlands restoration projects in California** – leading effort to beneficially reuse dredged material
- **District “owns” and is recovering the last viable population of an endangered species** - Coho salmon on Russian River (per 2008 NOAA-NMFS Biological Opinion); in 2012, recognized by NOAA as a “Habitat Blueprint for Success”
- **Large and influential U.S. Congressional delegation** – 4 Senators, 21 Representatives
- **Regulatory Actions for Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act**

Diverse, talented workforce with a culture of teamwork and innovation!

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U.S. Army
Corps of Engineers



Are We Still in a Drought?



California Drought Status – 12 April 2016

U.S. Drought Monitor California

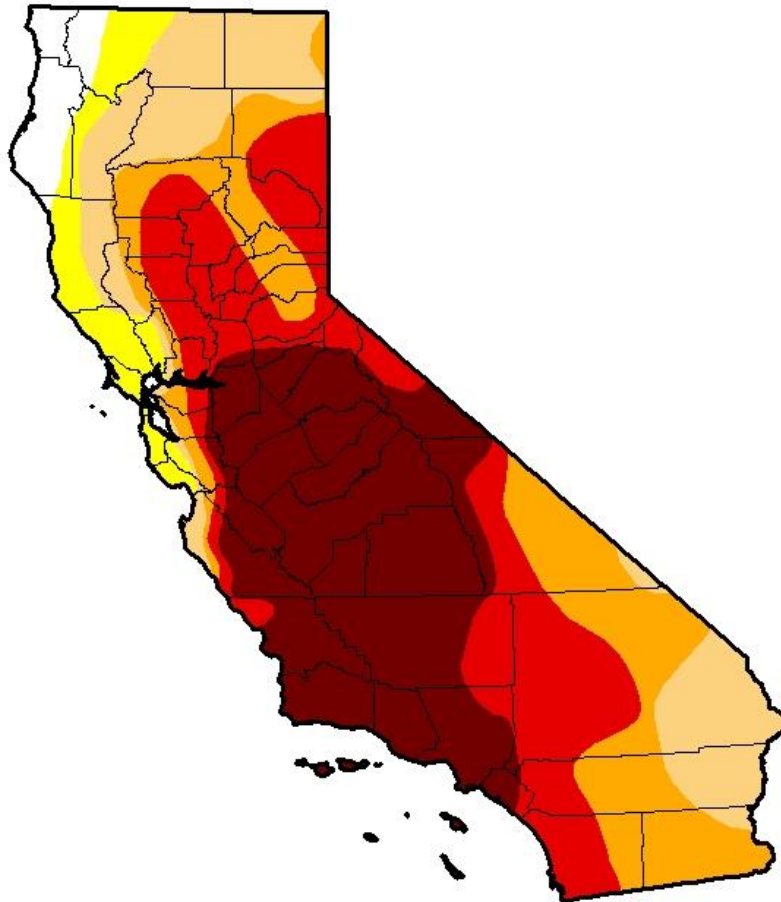
April 12, 2016

(Released Thursday, Apr. 14, 2016)

Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	3.55	96.45	90.58	74.37	55.25	31.68
Last Week <i>4/5/2016</i>	3.55	96.45	90.58	74.37	55.25	31.68
3 Months Ago <i>1/12/2016</i>	0.00	100.00	97.33	87.55	69.07	42.66
Start of Calendar Year <i>12/29/2015</i>	0.00	100.00	97.33	87.55	69.07	44.84
Start of Water Year <i>9/29/2015</i>	0.14	99.86	97.33	92.36	71.08	46.00
One Year Ago <i>4/14/2015</i>	0.14	99.86	98.11	93.44	66.60	44.32



Intensity:



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Richard Tinker
CPC/NOAA/NWS/NCEP



<http://droughtmonitor.unl.edu/>



We Are *Still in*
a Drought!

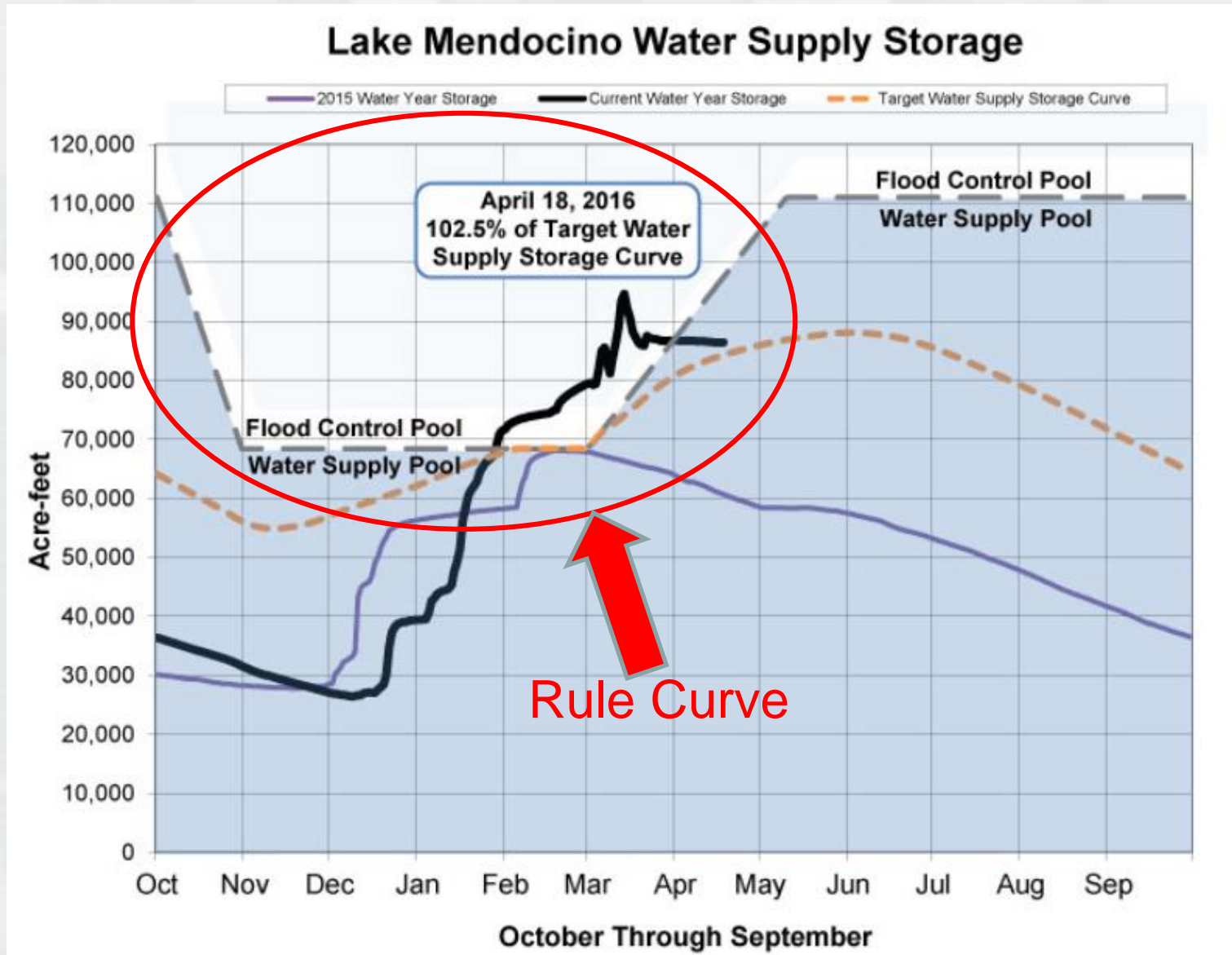


What is Forecast Informed Reservoir Operations (FIRO)?

- A concept for using advanced hydro-meteorological forecasting capability to inform water supply and flood control operations at reservoirs where atmospheric river events frequently and predictably occur.
- Purpose is to explore methods for better balancing flood storage capacity, water supply and ecological needs.
- FIRO has great potential and could be a “New Way of doing Business.”
- Several lakes throughout USACE and Bureau of Reclamation are being studied. San Francisco District’s project is Lake Mendocino.
- Water levels ARE NOT being adjusted based on the study. Only modeling and analysis of past and current data are being conducted for the next few years.

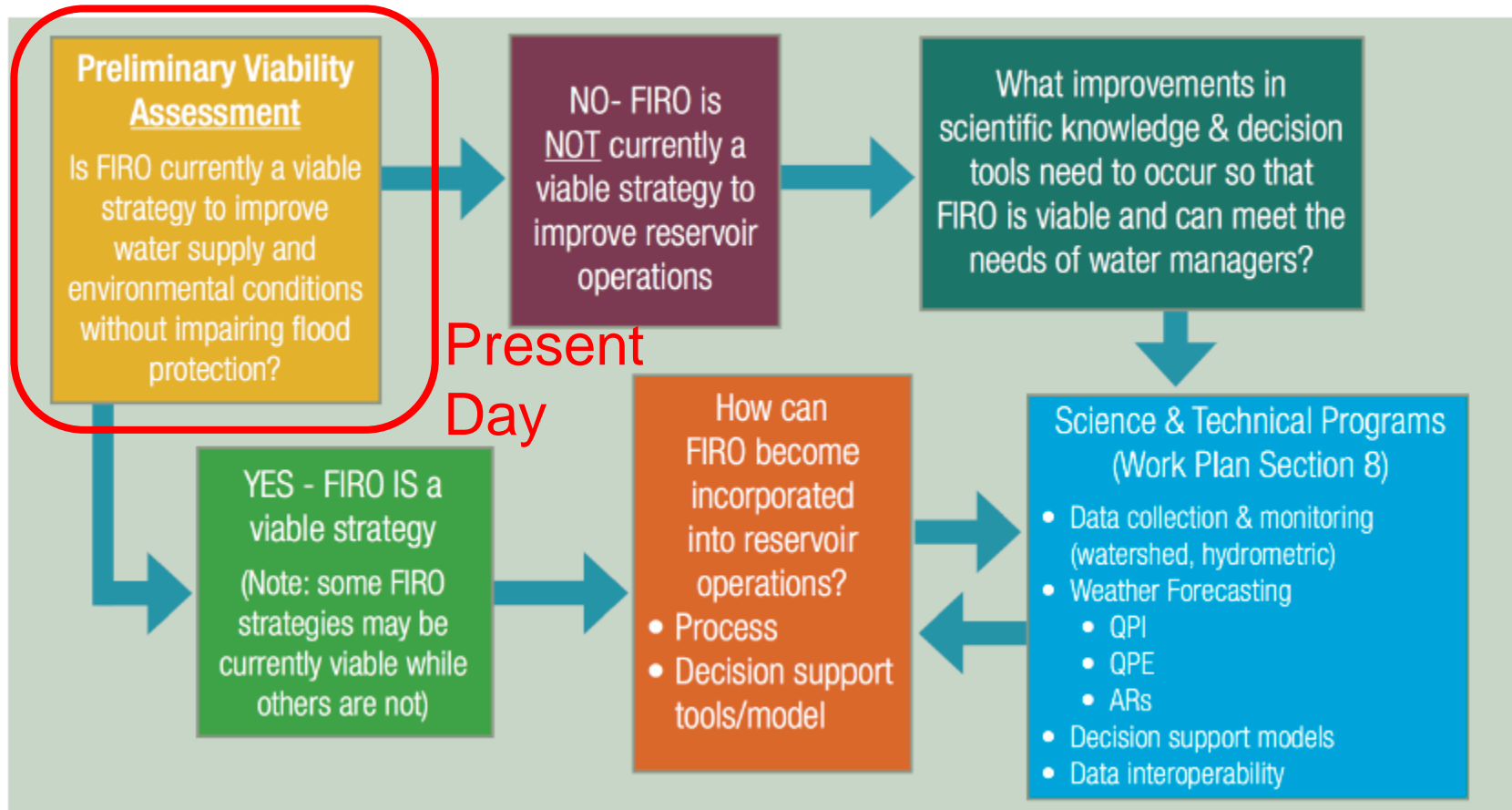


Lake Mendocino Status – Reason for FIRO



Forecast Informed Reservoir Operations (FIRO) Way Ahead

The flow chart below shows how the FIRO viability assessment decisions will be made:



Forecast Informed Reservoir Operations (FIRO) Way Ahead

The 5-year timeline for conducting the FIRO viability assessments and research activities are illustrated below:

July - September 2015	October - December 2015	January - March 2016	April - June 2016	July - September 2016	October - December 2016	2017 - 2020
<ul style="list-style-type: none"> • Complete work plan • Form task groups • Assess information • Identify monitoring sites • Develop evaluation criteria 	<ul style="list-style-type: none"> • Develop study strategy • Agree on scenarios, inputs • Convene modeling discussion • Develop evaluation scenarios • Evaluate past forecast performance 	<ul style="list-style-type: none"> • Assemble models • Develop policy scenarios • Install monitoring stations • Evaluate past reservoir operations 	<ul style="list-style-type: none"> • Preliminary model results available • Begin economic benefits analysis 	<ul style="list-style-type: none"> • Finalize modeling results • Conduct stress test • Continue economic benefits assessment • Synthesize atmospheric river advances 	<ul style="list-style-type: none"> • Complete preliminary FIRO viability assessment • Refine scenario testing for years 2-5 • Identify priority research activities 	<ul style="list-style-type: none"> • Full assessment of FIRO viability



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Questions

WE THE PEOPLE
insure domestic Tranquillity, provide for the common
and our Posterity, do ordain
this Constitution

