

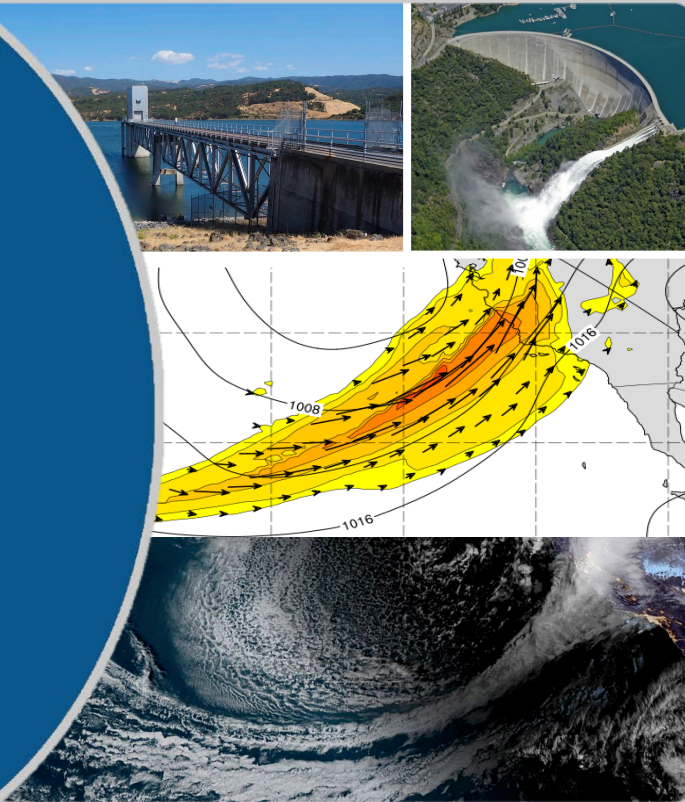


U.S. ARMY

FIRO Screening Process

9th Annual FIRO Workshop
August 3, 2022

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Scaling Up FIRO with the Screening Process

Purpose: FIRO Steering Committees have conducted analyses at several pilot sites that have led to successful Water Control Manual exemptions. The purpose of creating a FIRO Screening Process is to scale up the implementation of FIRO, while maintaining the same level of rigor and quality to the process as demonstrated at the original pilot sites. This will enable FIRO benefits to be accessible at more reservoir sites.

Goal: Develop a broadly usable tool for water management agencies to determine sites where FIRO may be appropriate, including evaluating entire portfolios of reservoirs. Produce an adaptable, easy-to-use process that empowers more local ownership over FIRO implementation.



Scaling Up FIRO with the Screening Process

How difficult would it be to implement FIRO at sites across USACE?

Which reservoirs in the USACE portfolio are not candidates for FIRO under current conditions?

Where is there stakeholder interest in assessing FIRO?

Where do we need additional research (atmospheric, hydrologic) in order to consider FIRO?



Dimensions of the FIRO Screening Process

Atmospheric	Hydrologic	Hydraulic	Environmental	Benefit	Cooperation	Policy	Site-specific
How variable is precipitation in the watershed?	What is the watershed response to precipitation?	Does this dam have a controlled outlet?	Are there environmental limits to inundation in the reservoir area (e.g., vireo nesting dates)?	How are the reservoir functions (drinking water, hydropower) affected by FIRO operations?	Are there interested parties willing to agree on a set of goals and metrics at the site?	Who has jurisdiction over the reservoir operations?	What challenges or opportunities are unique to this site?
How predictable is extreme precipitation? With what lead times and reliability?	How predictable or well-modeled is the hydrologic response of the watershed?	What is the downstream channel capacity flow rate?	Are there sensitive species in the downstream channel which require certain release flows?	Is there community use of the reservoir that might be impacted by changing pool elevation (e.g., campgrounds)?	Can the stakeholder organizations dedicate staff to participate in the Viability Assessment process?	Is there potential for a Water Control Manual update for the site?	What else needs to be considered specifically for this site?

Stage A: Initial Screening

“Weed Out” Criteria

High-level, expert panel assessment

If site passes
initial screening
by an expert
panel

Stage B: Suitability Ranking

Spectrum of Less → More Suitable for FIRO

Soliciting site-specific information from stakeholders

Low

Medium

High



If site has an overall
medium or high suitability
rank and stakeholders
decide to proceed

Stage C: Suitability Assessment & Dialogue

*High engagement between FIRO
experts and site stakeholders*

If FIRO experts determine site
is suitable and stakeholders
decide to proceed

**FIRO
Viability
Assessment**

Phase II: Test on
South Pacific Div.
Phase III: Screen
full USACE
portfolio

**Increasing effort and engagement
between experts and stakeholders**

Stage A: Initial Screening

“Weed Out” Criteria

High-level, expert panel assessment

**Various
possible
outcomes**

Stage B: Suitability Ranking

Spectrum of Less → More Suitable for FIRO

Soliciting site-specific information from stakeholders

Low

Medium

High



Stage C: Suitability Assessment & Dialogue

*High engagement between FIRO
experts and site stakeholders*

**FIRO less
feasible and
not beneficial
enough**

**More
research is
needed (e.g.,
forecast skill)**

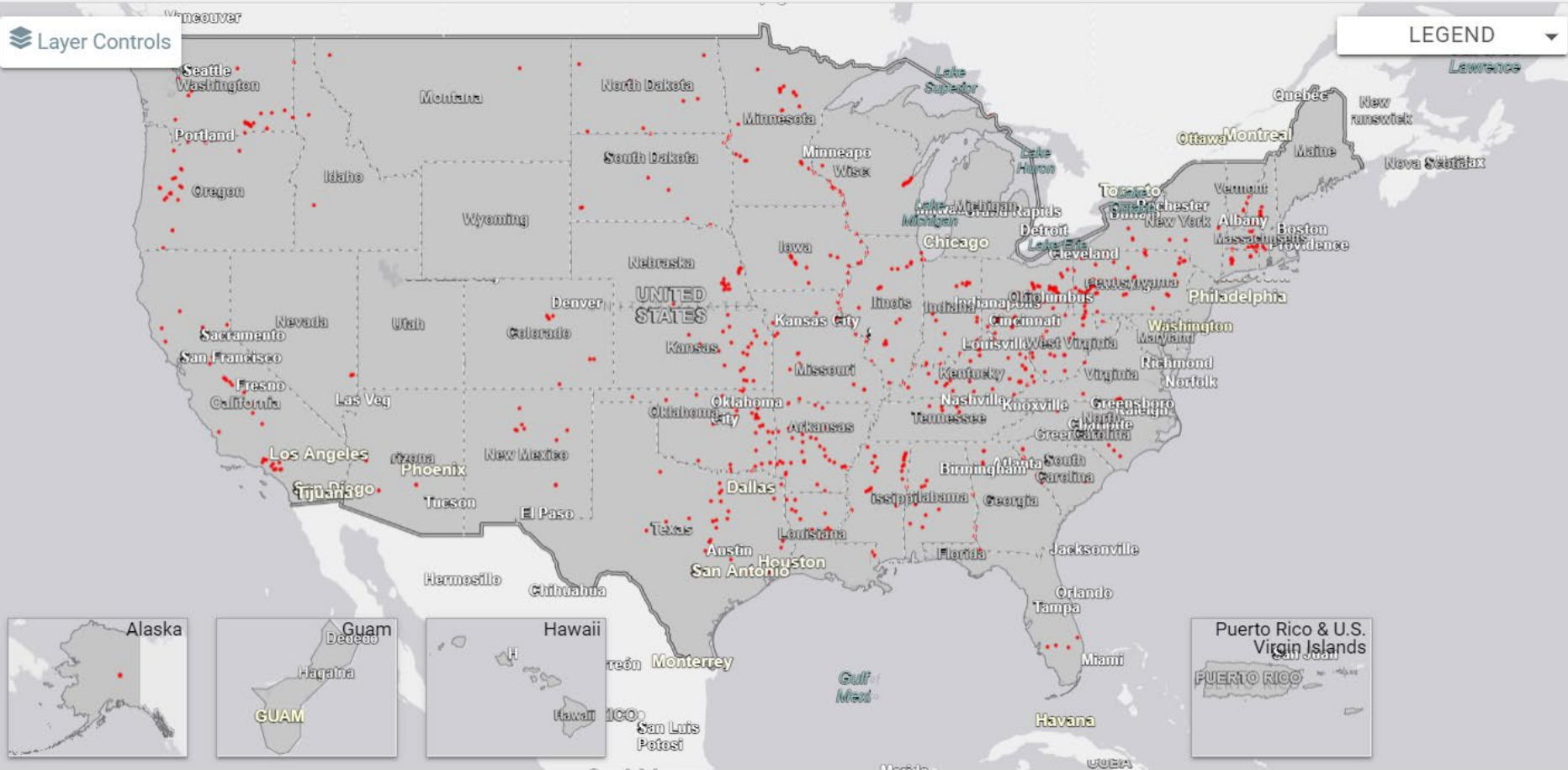
**In-depth
FIRO viability
study
needed**

**FIRO-
informed
WCM update
possible**



Layer Controls

LEGEND



USACE Dams: 742

Source: National Inventory of Dams

SOUTH PACIFIC DIVISION



- ## FIRO Phase II:
- Develop and beta test this process with the SPD reservoir portfolio
- 85 sites
 - High level of FIRO familiarity
 - AR-dominated extreme precipitation, but not exclusively

Phase II Timeline

Screening Process Development

Stage B: CW3E development of forecast skill assessment for 8-10 SPD selected Stage B reservoirs (spring-summer 2022)

Screening Process Framework finalized

Stage A: Developed criteria

Stage A: Finalized instrument

Stage A: Developed process to score results

Stage B: Formed subgroup; drafting instrument

Stage B: MCDA team develops framework to score input (spring-summer 2022)

Stage B: Finalize instrument by June

Stage A/B: Update instruments with beta feedback

September

November

January

March

May

July

September

2021

SPD agreed to serve as beta testers for the Screening Process

2022

Stage A: Met with SPD district contacts to intro process 1/10/22

Stage A: Provided SPD with results in April

Stage B: SPD Districts submit input for test reservoirs during July

We are here!

Stage C (FY23): Reports and dialogues with beta site stakeholders

Screening Process Beta Test

Stage A: SPD districts submitted completed instruments in March

Stage B: SPD Districts select 2-3 reservoirs and receive Stage B Questionnaire in June

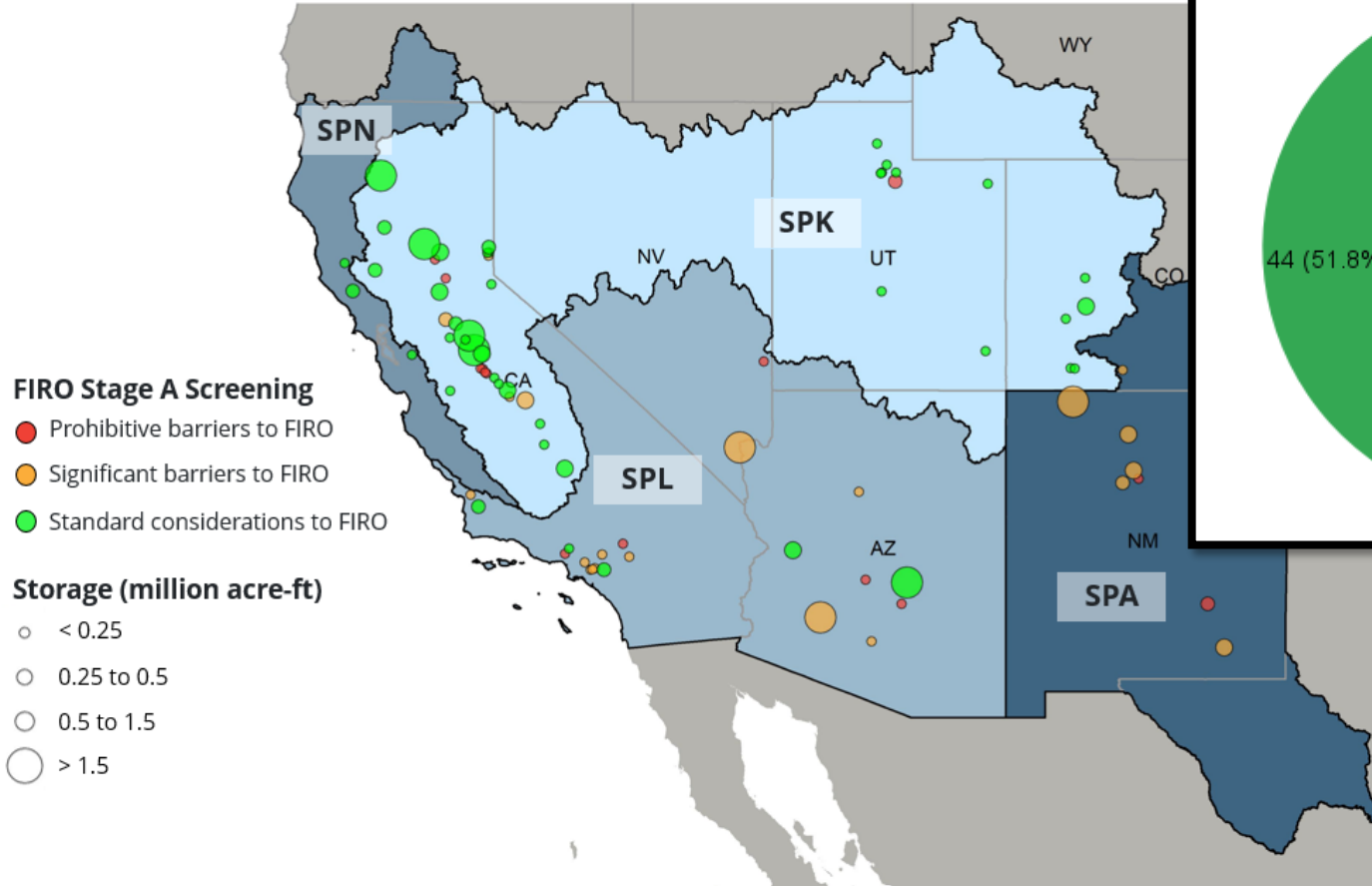
Stage B: Screening Process team scores 8-10 Stage B questionnaires in August and Sept.

Stage A Screening Criteria

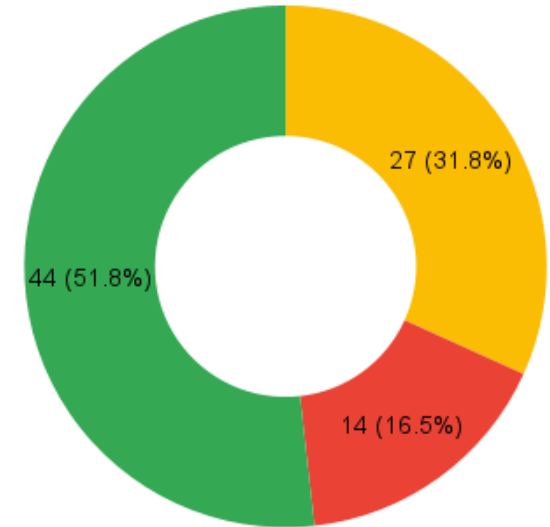
FIRO Stage A Screening Classification	Score	Q#	Reason
Prohibitive barriers to FIRO	1	Q1	No controlled outlet (including dams that cannot hold an impoundment)
		Q2	No Water Control Plan
Significant barriers to FIRO	2	Q3	Legal or technical barriers (including DSAC 1)
		Q4	No forecasted inflow
		Q5	Active litigation
		Q6	Stakeholder engagement barriers (score of 1 or 2)
Standard considerations to FIRO	3		Part of a system of reservoirs
			Section 7 Dam
			DSAC 2 or higher
			None of the barriers identified above

FIRO Screened Reservoirs

USACE South Pacific Division



SPD Stage A Screening Results

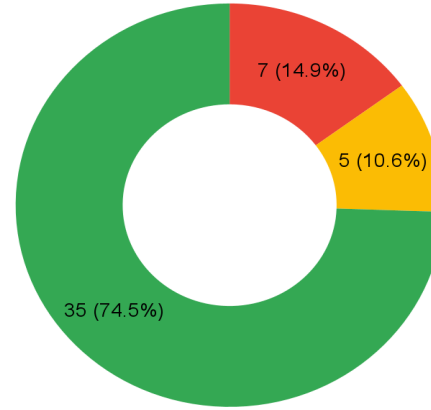


SPN Stage A Screening Results



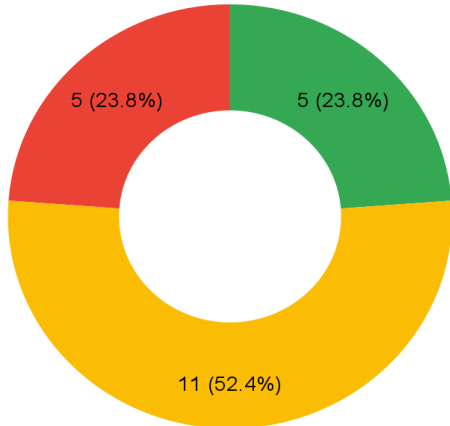
3 - Standard barriers to FIRO

SPK Stage A Screening Results



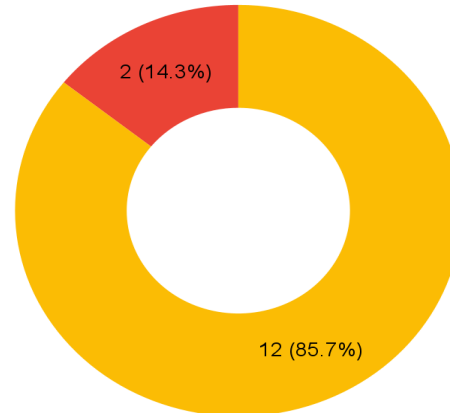
1 - Prohibitive barriers to FIRO
2 - Significant barriers to FIRO
3 - Standard barriers to FIRO

SPL Stage A Screening Results



3 - Standard barriers to FIRO
2 - Significant barriers to FIRO
1 - Prohibitive barriers to FIRO

SPA Stage A Screening Results



2 - Significant barriers to FIRO
1 - Prohibitive barriers to FIRO

Stage B Outcomes

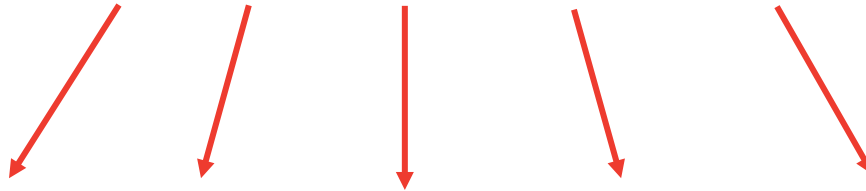
Enterprise-level ranking of FIRO suitability across a portfolio of sites; can inform investments and prioritization of FIRO studies/WCM updates

Scalable enterprise-level
(District, Division, USACE)



Stage B FIRO Screening Process Results

Individual site-level



Individual reservoir rating reports on FIRO suitability at a site; will inform Stage C Dialogues with site stakeholders, decision whether to pursue FIRO, and PVA

What is Stage B FIRO Suitability?

BENEFIT



- Need for improved supply reliability
- Additional objectives (groundwater recharge, recreation, etc.)
- Changing watershed conditions

DIFFICULTY



- Collaboration
- Forecast skill
- Model availability
- Operational constraints
- Environmental factors

High – FIRO seems possible with reasonable effort; yielding substantial benefit

Medium – FIRO may be possible with more effort; yielding moderate benefit

Low – FIRO seems less possible even with effort; may not yield benefits worth effort.

Stage B Selections

Los Angeles District (SPL)

- Hansen Dam
- Seven Oaks Dam
- Twitchell Dam

San Francisco District (SPN)

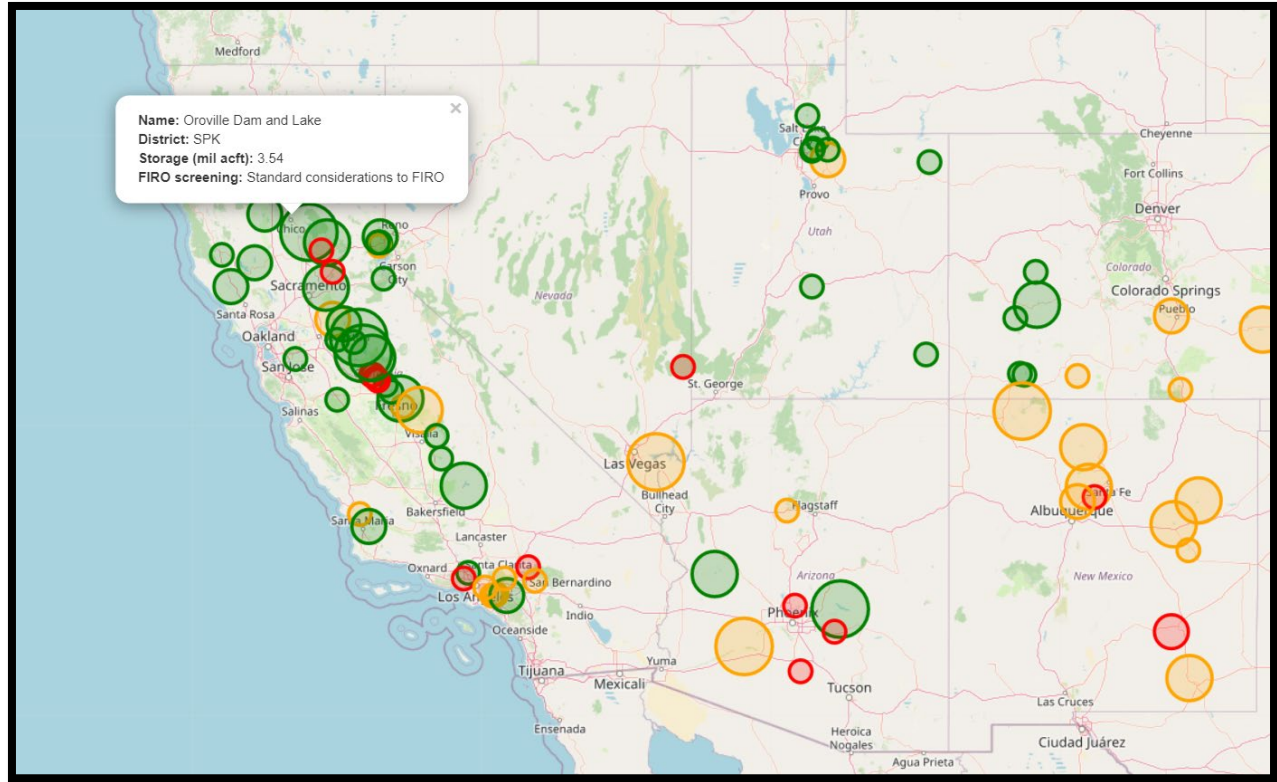
- Lake Del Valle Dam
- Lake Mendocino

Albuquerque District (SPA)

- Pueblo Dam
- John Martin Dam

Sacramento District (SPK)

- New Hogan
- Truckee
- Black Butte
- Terminus
- Hidden
- Pine Flat



Would FIRO be a benefit at this site? [Assessing need]

Conducting a full FIRO Viability Assessment and subsequent update to a Water Control Manual is a significant undertaking that requires technical expertise and work across many fields, and intensive communication and collaboration. FIRO is not guaranteed to be found viable at every site. It is important to weigh the potential benefits of FIRO against the scope of this effort. These questions assess the potential scale of benefit from FIRO for a site.

1. **What are the authorized purposes of the project?** (As described in the authorizing documents such as federal authorization (USACE, USBR, state water entity authorization, Federal Energy Regulatory Commission).

2. **Do site stakeholders have a very strong need to address a water supply availability or a flood protection issue?**
 - For example, are you failing to meet one or more water supply objectives or expecting to fall short in the near future? How often are you not meeting/expecting to not meet this objective? Is this need reflected in strategic/master planning, or other active projects?

Atmospheric/Hydrologic models and forecasting

FIRO requires that inflow forecasts are skillful enough at required lead times for operational needs at a specific site. Assessments of atmospheric forecast skill for this Screening Process are conducted by the Center for Western Weather and Water Extremes at Scripps Institution of Oceanography. These questions assess the ability to use forecasts at this site, and the operational forecast lead time requirements.

14. Do you have access to the following data? Please describe the specifications and sources.

- Archived historical and/or hindcast inflows that are representative of those used in reservoir release decisions (please not if these are for regulated and/or unregulated streams)

- Archived historical and/or hindcast precipitation forecasts and associated observations that are representative of those used in reservoir release decisions

15. Are you using forecasts now for context in decision-making? Please describe the source of these forecasts and how you use them.

Hydraulics/Operations

Successful application of FIRO requires changes to the site Water Control Manual, and supporting decision support tools to use forecasts in release decisions. These questions assess the availability of hydraulic operations characteristics that indicate suitability for FIRO.

21. In what year was the Water Control Manual (WCM) last updated in a way that impacted water control operations?

22. Is a WCM update currently in process, funded, or planned within the next five years?

23. What is the channel capacity (cfs) downstream of the dam?

24. What is the maximum volume (ac-ft) between Bottom of Flood Control and Gross Pool (rainflood)?

25. Under current operations, what percent encroachment in the flood control space must be reached before the dam operator releases at full downstream channel capacity?

26. Is there local stakeholder willingness to allow for flood control releases from the water conservation space for FIRO?

Panel Discussion – USACE

SPN:
Patrick
Sing

SPK:
Jenny
Fromm
&
Joe
Forbis

SPL:
Angela
Hogan

SPA:
Nabil
Shafike

