Glen Canyon Dam Adaptive Management Work Group
Agenda Item Information
February 20-21, 2013

Agenda Item

Long-Term Experimental and Management Plan (LTEMP) EIS

Action Requested

✓ Information item only.

Presenter

Rob Billerbeck, Environmental Protection Specialist and LTEMP Project Manager, National Park Service (NPS)

Glen Knowles, Chief, Adaptive Management Group, Environmental Resources Division, Upper Colorado Region, Bureau of Reclamation (Reclamation)

Dr. Mike Runge, U.S. Geological Survey, Patuxent Wildlife Research Center

Previous Action Taken

✓ Other

December 2009: Secretary of the Interior Ken Salazar announced that the development of a Long-Term Experimental and Management Plan (LTEMP) for Glen Canyon Dam was needed. The Secretary emphasized the inclusion of stakeholders, particularly those in the Glen Canyon Dam Adaptive Management Program (GDAMP), in the development of the LTEMP.

November 2011: Public scoping meetings were held in Phoenix, Flagstaff, Page, Salt Lake City, Las Vegas, and Denver. A webcast was also held to capture participation from those that could not attend in person.

April 4-5, 2012: A public workshop was held in Flagstaff, AZ to receive feedback on the preliminary alternative concepts.

April 30, 2012: The Secretary of the Interior responded to a recommendation from the AMWG by stating, "With respect to the report of the Socioeconomic Ad Hoc Group, I appreciate the comprehensive nature of the program and plan proposed, and the support of the AMWG for the implementation of these socioeconomic impact assessment studies. I am directing the interagency team for the Department of the Interior to communicate to the AMWG the specific studies and activities that should be prioritized for utilization as part of the ongoing National Environmental Policy Act process to develop a Long Term Experimental and Management Plan (LTEMP) for Glen Canyon Dam. The Technical Work Group can then identify information needs and research priorities not addressed through the LTEMP process so that the [Grand] Canyon Monitoring and Research Center can refine and develop a work plan."

August 30, 2012: Motion (moved by Larry Stevens and seconded by Ted Rampton): AMWG requests that the February 2013 AMWG meeting agenda include a detailed description of the LTEMP alternatives; time for discussion and identification of issues, questions, and concerns; and possible development of a recommendation from non-DOI AMWG members.

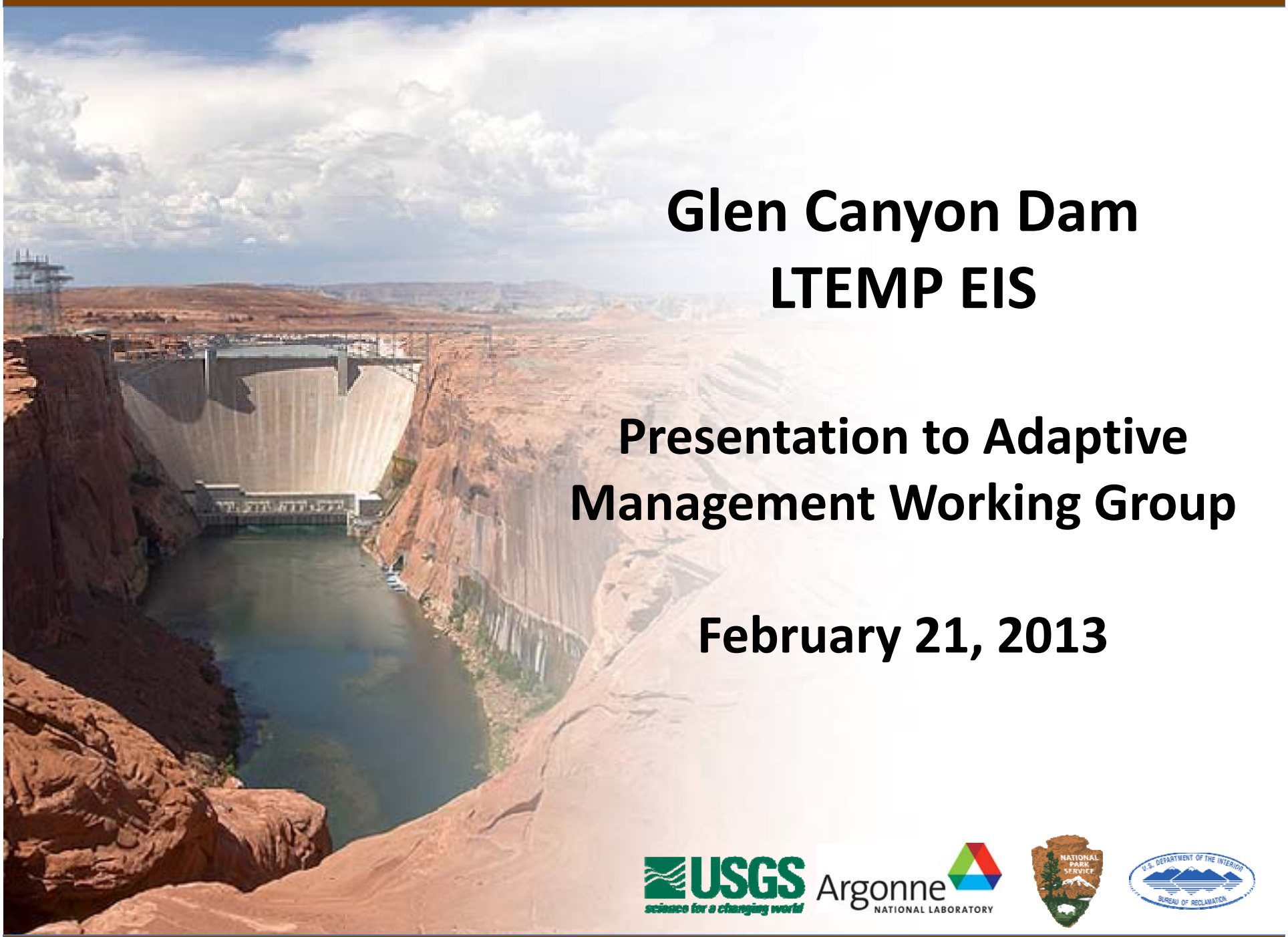
Relevant Science

Science and research completed since the GCDMP was established will be used in the development of the EIS and assessment of impacts.

Background Information

The Department of the Interior (Department), through Reclamation and NPS, is preparing a draft EIS for adoption of the LTEMP for the operation of Glen Canyon Dam. The purpose of the proposed LTEMP is to utilize current, and develop additional, scientific information to better inform Departmental decisions and to operate the dam in such a manner as to improve and protect important downstream resources while maintaining compliance with the GCPA, the Law of the River, and the Endangered Species Act, among others, and to fully evaluate dam operations and identify management actions and experimental options that will provide a framework for adaptively managing Glen Canyon Dam over the next 15 to 20 years, consistent with the GCPA and other provisions of applicable Federal law.

The LTEMP EIS Team have partnered with Dr. Mike Runge of USGS to assist us in evaluating alternatives with decision analysis. Dr. Runge will lead an introduction to decision analysis, a review of the current set of alternatives, and a review of the current set of resource goals and performance metrics, as well as a description of the assessment process, and future work and next steps. Further input will also be solicited from Tribes and other stakeholders through a future cooperating agency trade-off analysis workshop this summer. NPS and Reclamation will also provide an update on recent activities, progress to date, upcoming planned meetings, and the current schedule for completion of the EIS.



Glen Canyon Dam
LTEMP EIS

Presentation to Adaptive Management Working Group

February 21, 2013

USGS science for a changing world

Argonne NATIONAL LABORATORY

NATIONAL PARK SERVICE

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

LTEMP EIS Process Update and Schedule

Update on the LTEMP EIS Process

- Alternatives development is continuing
- Structured Decision Analysis process led by USGS
- Joint-lead agencies with participation by tribes, USFWS, BIA, USGS, Western Area Power Administration, and Argonne with public and Cooperating Agency feedback

Update on the LTEMP EIS Process (Cont.)

- Structured Decision Analysis Process
  - Development of performance criteria (measurable attributes)
  - Articulation of critical uncertainties and associated hypotheses
  - Use of models and/or expert elicitation to assess performance of alternatives under different conditions
  - Tradeoff analysis including Tribal and Cooperating Agency involvement in June
- Public meeting to present science and alternatives tentatively scheduled for June
- Draft EIS planned for issuance at end of 2013

Current EIS Schedule

- Preliminary Assessment – Phase I (February-April)
- Tradeoff analysis I
  - Stakeholders Workshop(June)
- Alternative refinement and experimental design
- Additional assessment – Phase II (Jun-Aug)
- Tradeoff analysis II (August)
- Draft EIS (December)

LTEMP EIS

Preliminary Alternatives

History of Alternative Development Process

- Series of workshops starting in March 2012
- Developed objectives and resource goals based on DFC's
  - Synthesized to finite number of statements
  - Tailored to the scope of this EIS
  - Reviewed by Cooperating Agencies
- Identify preliminary draft alternatives
  - Public release of newsletter, March 2012
  - Public workshop in April 2012
- Cooperating agency review

History of Alternative Development Process (cont)

- Revision and refinement of alternatives
  - Preliminary modeling
  - Screening of alternatives
  - SDM process
  - Subject matter expert workshops
- One-on-one discussions with stakeholders

Alternatives Caveats

- Not in priority order
- These alternatives are still preliminary and will undergo refinement after initial modeling and assessment
- The alternatives descriptions are by necessity brief and do not include all details of experiments or all conditions.
- “Focus” statements are not an evaluation of the performance of the alternatives, but rather reflect the intention of the design. Though the design focus of an alternative may be on one resource, that does not mean other resources were not part of the design or would not benefit.
- Experimental design and conditional triggers will be further developed using Structured Analysis processes after initial modeling and assessment

Alternatives Under Consideration

1. No-action (MLFF with HFE and NNFC protocols expiring in 2020)
2. Modified low fluctuating flows (MLFF) with extension of high flow experiment (HFE) and non-native fish control (NNFC) protocols for entire LTEMP period
3. Seasonal fluctuations with low summer fluctuations
4. Seasonally adjusted steady flows (modification of 1995 EIS SASF)
5. Year-round steady flows
6. Condition-dependent adaptive strategy
7. Resource-targeted condition-dependent alternative (Submitted by the Basin States)
8. Balanced resource alternative (Submitted by the Colorado River Energy Distributors Association)

Elements Potentially Common to all (or most) Alternatives

- High flow releases for sediment conservation using the HFE protocol (modified in some alternatives)
- Appraisal study of a temperature control device (TCD) (e.g., an impeller system)
- Non-native fish control actions as analyzed and described in the Non-Native Fish Control Environmental Assessment and Finding of No Significant Impact (modified in some alternatives)

Elements Potentially Common to all (or most) Alternatives

- Conservation measures discussed in the 2011 Biological Opinion (BO) on operations of Glen Canyon Dam
- Continued adaptive management that includes a resource monitoring program
- Determination of whether to establish a Recovery Implementation Program for endangered fish species below Glen Canyon Dam
- Annual volumes determined by 2007 ROD on Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead (until 2026)

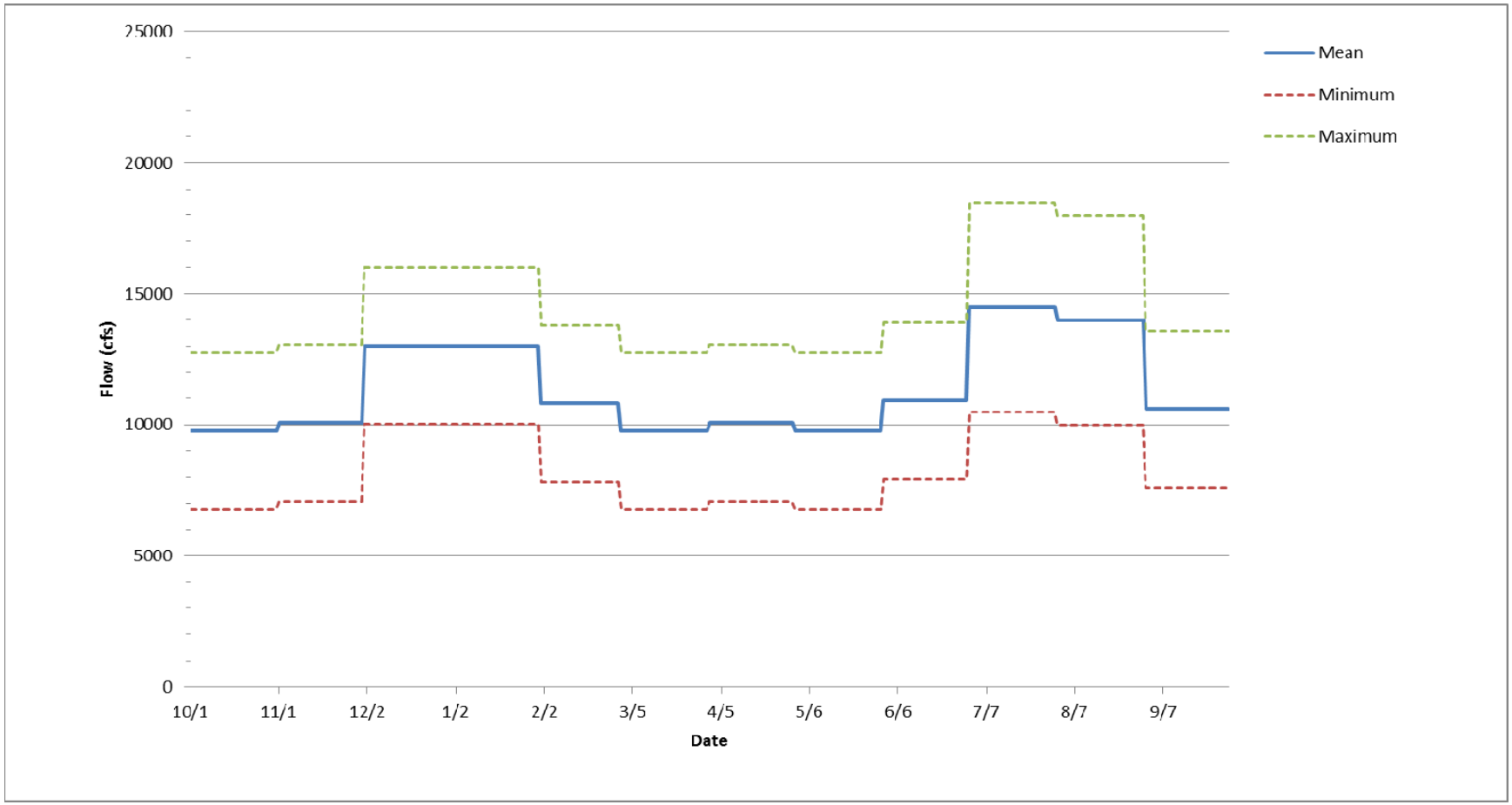
No-Action

- Required in all EIS documents
- Continued operations of Glen Canyon Dam as guided by 1996 ROD and modified by recent Departmental decisions and ongoing or planned NPS activities:
  - Modified low fluctuating flows
  - HFE protocol, NNF control, and experimentation per EAs (expire in 2020)
  - 2007 ROD on Colorado River Interim Guidelines for Lower Basin Shortages and Coordinated Operations for Lakes Powell and Mead (until 2026)
  - NPS management activities (durations as specified in management documents)

MLFF with Extension of HFE and NNFC Protocols

- Same as no-action alternative except HFE protocol, NNF control, and experimentation per EAs would be extended until end of 20-year LTEMP period
- Model to determine if should be carried forward as an action alternative

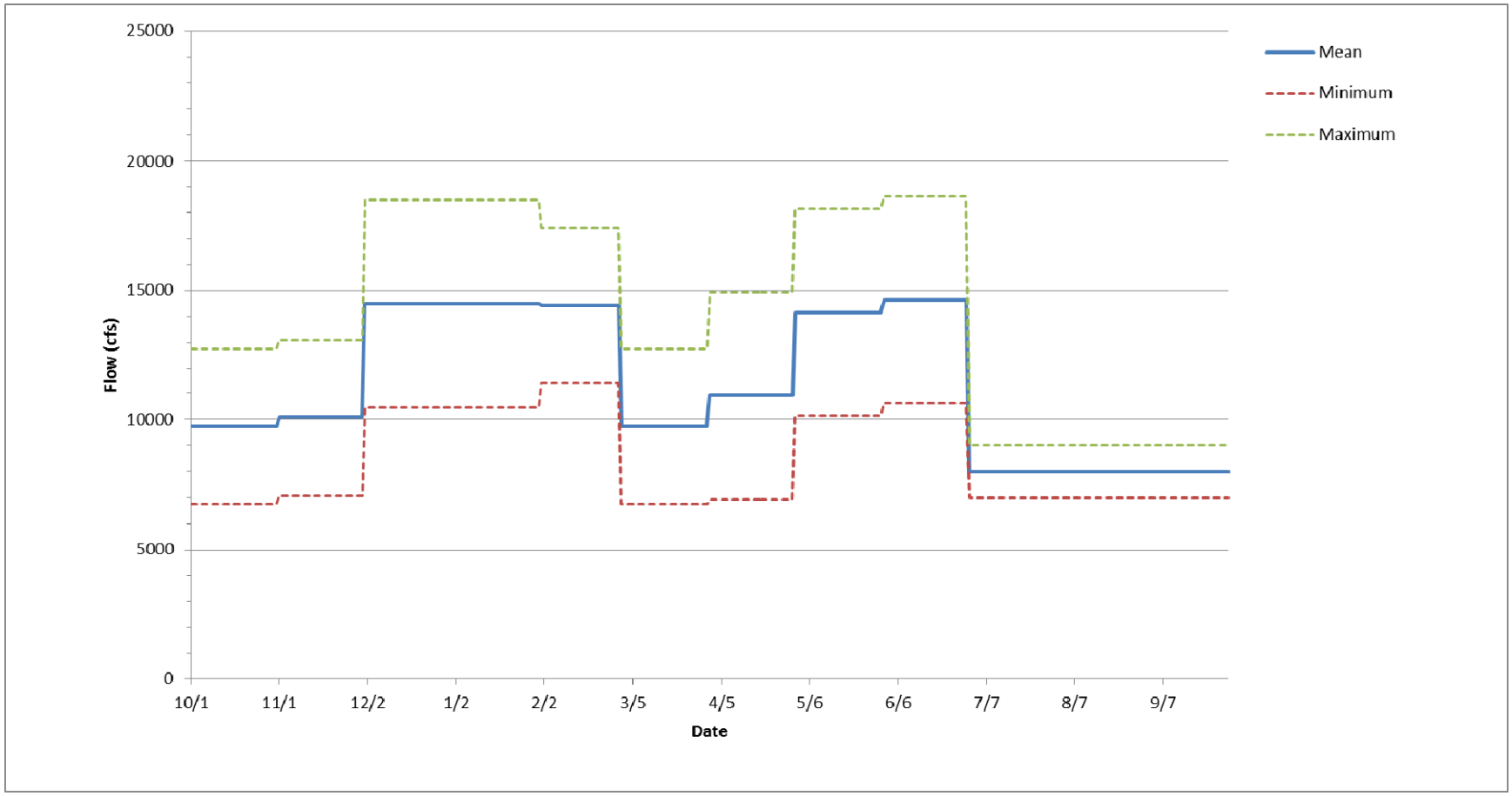
No-Action and MLFF+ Hydrograph



Seasonal Fluctuations with Low Summer Fluctuations

- Focuses primarily on providing relatively warm stable habitats for native fish in summer
- Low volume summer fluctuating flows (July through September)
  - 2,000 cfs daily range
  - Not temperature dependent, i.e., low flows would occur even if release temperatures were too low to achieve target temperatures near the LCR
- MLFF fluctuations in other months
- Low summer volume results in higher flows in remaining months (not condition dependent for first assessment phase)

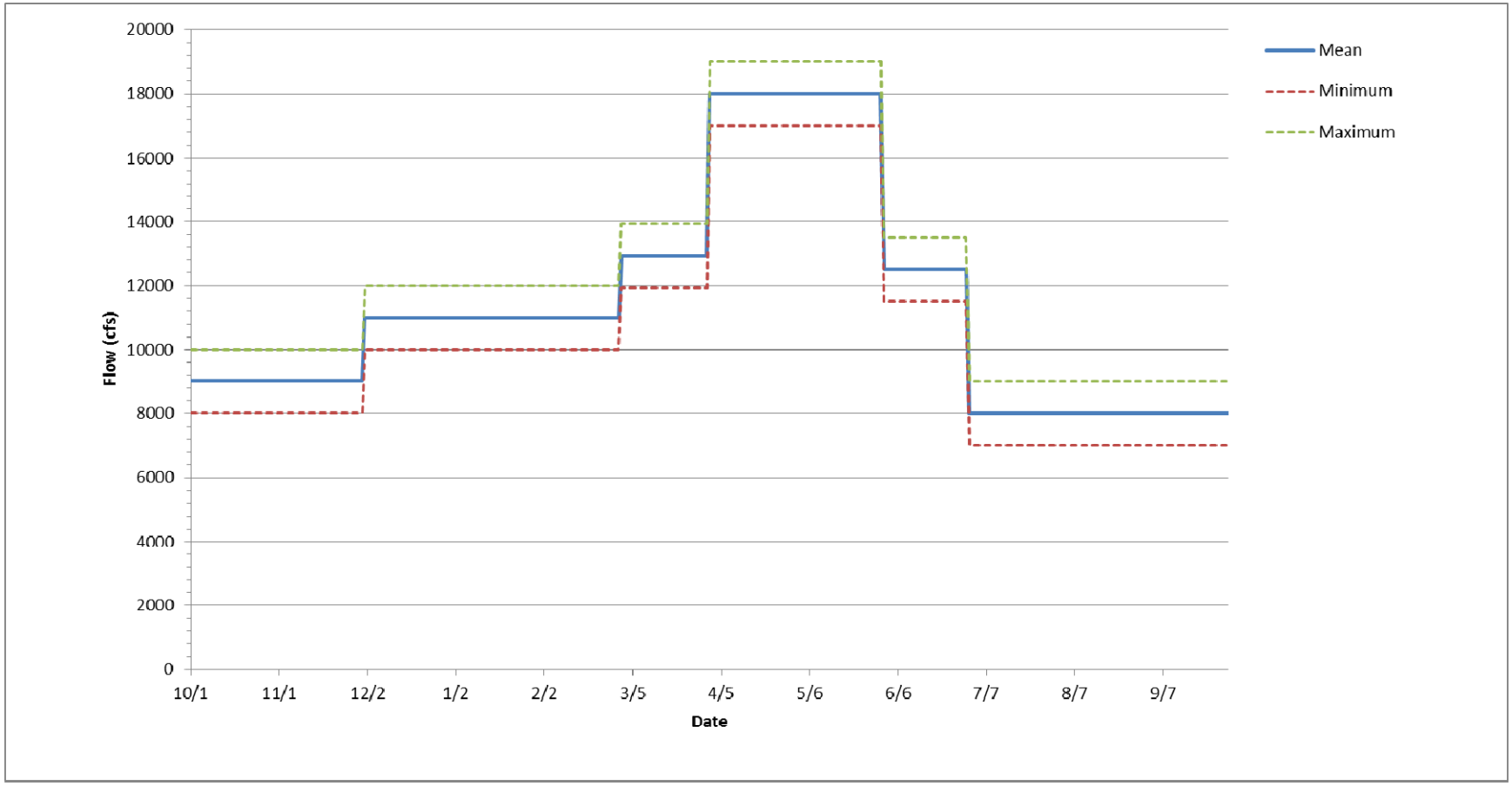
Seasonal Fluctuations with Low Summer Fluctuations



Seasonal Adjusted Steady Flow (95 EIS mod)

- Focuses on a “natural pattern” of hydrology
- Includes aspects of the naturally patterned flow alternative and SASF from 95 EIS
- Monthly volumes patterned to provide a “natural pattern,” relatively low volumes in winter, volume increases toward a peak volume in April and May, then decreases to relatively low summer and autumn volumes
- Daily range of 2,000 cfs in all months
- Adjust timing of annual peak release to allow for low volume flows from July-Sept to achieve warming

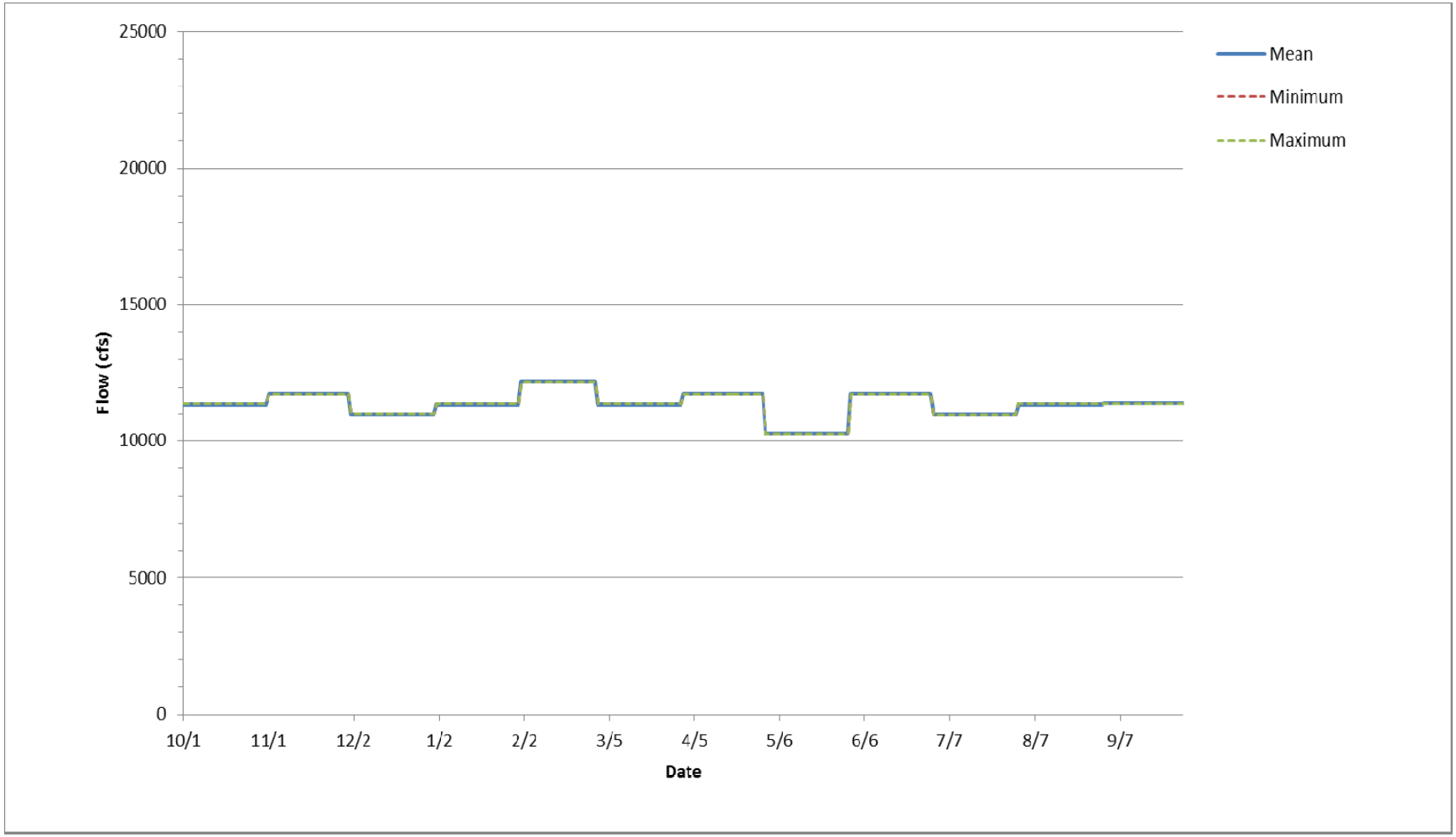
Seasonally Adjusted Steady Flows—1995 EIS mod



Year-Round Steady Flows

- Focuses primarily on sediment conservation
- Steady flow with no variation between months other than in response to changes in forecast and other operating requirements such as equalization
- Maximum sediment conservation for given flow volume
- HFE protocol modified trigger based on multi-year accumulation of sand supply
- Potential experimental evaluation of a spring high flow release in high-volume equalization years

Year-Round Steady Flow



Condition-Dependent Adaptive Strategy

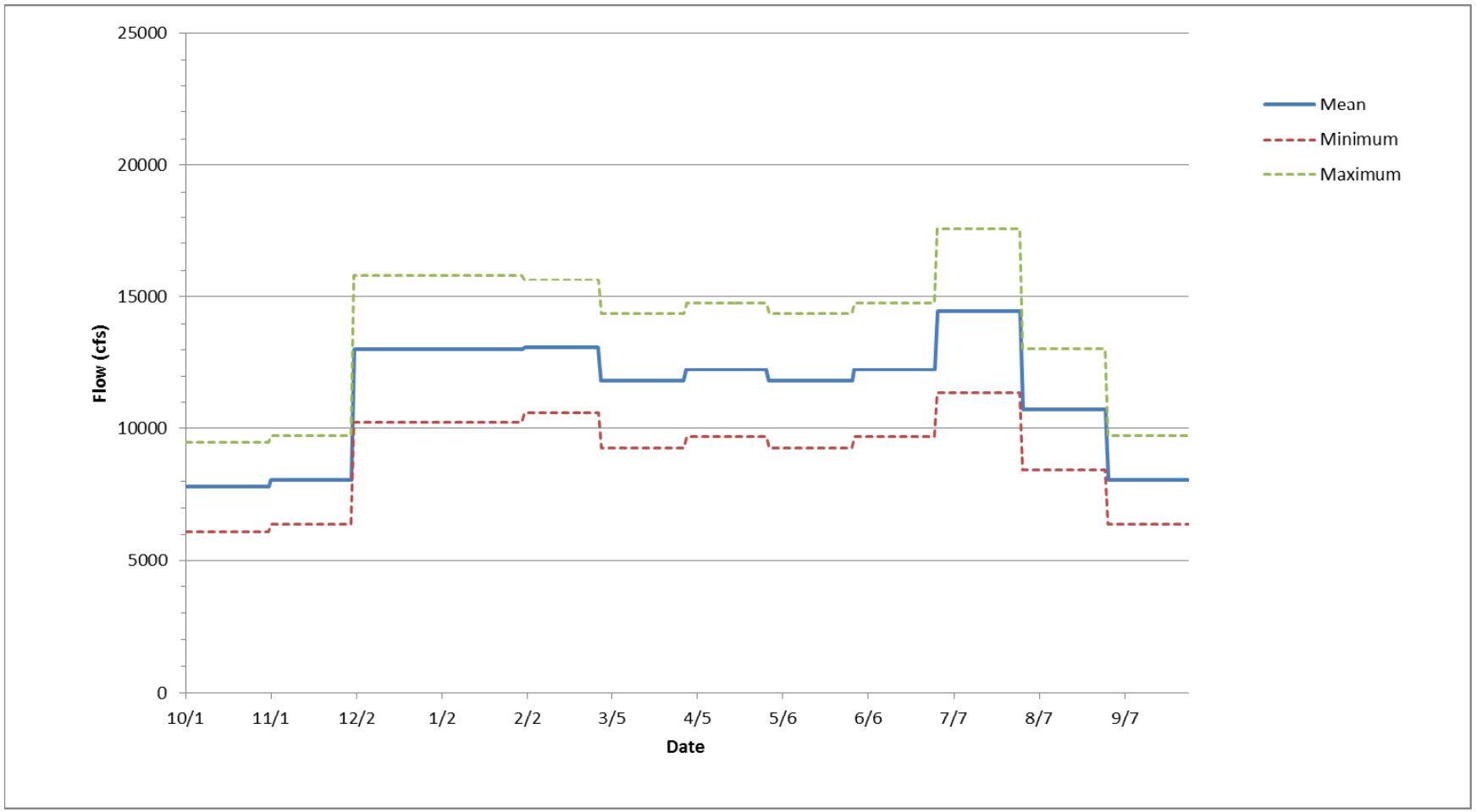
- Focuses on adjusting flow regime in response to annual hydrological conditions and multiyear resource trends with a focus on sediment, humpback chub, and trout.

- The CDAS alternative uses a decision tree that formalizes identification of:
  - Base operations
  - HFEs
  - Sediment conservation actions (two tiers)
  - Actions to favor humpback chub including flow-based temperature warming and trout management actions

Condition-Dependent Adaptive Strategy

- Base operations similar to the current operations of MLFF, but modified for particular resource objectives:
  - No change to MLFF volumes in peak hydropower months of December, January (in 8.23 MAF yr, 800 kaf), and July (in 8.23 MAF yr, 890 kaf),
  - Reduction in August volume to 660 kaf
  - Decreased volume from September 1-November 30 (sediment conservation benefits) (target 480 kaf).
  - Daily range (cfs) equal to 7*KAF in all months to provide sediment benefit relative to MLFF (ex. In Dec/Jan daily range of 5600 cfs vs. MLFF 6000 cfs)
  - Increase down ramp rates from MLFF value of 1,500 cfs/hr to 2,500 cfs/hr

Condition-Dependent Adaptive Strategy (Base Operations)



Condition-Dependent Adaptive Strategy—Modified HFE Protocol

- Significant input of sediment from the Paria River in August and September would trigger curtailment of load-following until an HFE in October or November
- Reduced fluctuations (e.g. 2,000 cfs daily range) would occur after fall HFEs until December 1, and after spring HFE's for three months after spring HFEs.
- Timing of HFE in > 10 MAF years would occur more quickly in response to significant sediment input to the extent practical (e.g., early in HFE window)
- Timing in < 10 MAF years would follow existing protocol to allow store and release
- Potential experimental evaluation of a spring high flow release in high-volume equalization years

Condition-Dependent Adaptive Strategy—Sediment Tiers

- Tier 1: If the sandbar area or volume above 8,000 cfs declines below tier 1 trigger (to be determined):
  - Same monthly volume distribution as base operations
  - Daily range (cfs) equal to 5*KAF in all months to provide sediment benefit relative to base operations (e.g. in a 800 KAF month, fluctuation range would be 4000 cfs)
- Tier 2: If the sandbar area or volume above 8,000 cfs declines below tier 2 trigger (to be determined):
  - Same monthly volume distribution as base operations.
  - Daily range (cfs) equal to 2*KAF in all months to provide sediment benefit relative to base operations and Tier 1 operations (e.g. in a 800 KAF month, fluctuation range would be 1600 cfs)

Condition-Dependent Adaptive Strategy—Chub Tiers

- Tier 1: If number of adult and juvenile chub decline below tier 1 triggers (to be determined)
  - Actions dependent on water temperature and trout numbers in Glen Canyon and LCR reaches:
    - Temperatures have been cold, attempt warming to 13C with low summer flows, if feasible (dependent on release temperature)
    - If trout numbers high, trout management flows and removal in GC or LCR reaches
- Tier 2: If number of adult and juvenile chub decline below tier 2 triggers (to be determined)
  - Actions dependent on water temperature and trout numbers in Glen Canyon and LCR reaches:
    - Temperatures have been cold, attempt warming to 14C with low summer flows, if feasible (dependent on release temperature)
    - If trout numbers high, trout management flows and removal in GC or LCR reaches

Resource-targeted condition-dependent alternative

- Focuses on the recovery of the humpback chub, but addresses other resources including sediment, the rainbow trout fishery at Lees Ferry, and the aquatic food base

- Experimental science design that uses decision trees with triggers that are based on resource conditions. Experiment over 20 years to look at trout management flows and HFEs (store and release and rapid response).

Resource-targeted condition-dependent alternative (Cont.)

- Base operational regime similar to MLFF, but with modifications that include:
  - Maximum daily range in flows proportional to monthly volume (12*KAF in high electricity demand months of December, January, February, June, July, and August, and 10*KAF in lower electric demand months)
  - Increase hourly downramp rate from 1,500 cfs to 2,500 cfs
  - Targeted lower monthly water volumes in August, September, and October to conserve sediment
  - Curtailment of load-following operations following substantial sediment inputs from the Paria River between July and October

Resource-targeted condition-dependent alternative (Cont.)

- Base operational regime similar to MLFF, but with modifications that include:
  - Maximum daily range in flows proportional to monthly volume (12*KAF in high electricity demand months of December, January, February, June, July, and August, and 10*KAF in lower electric demand months)
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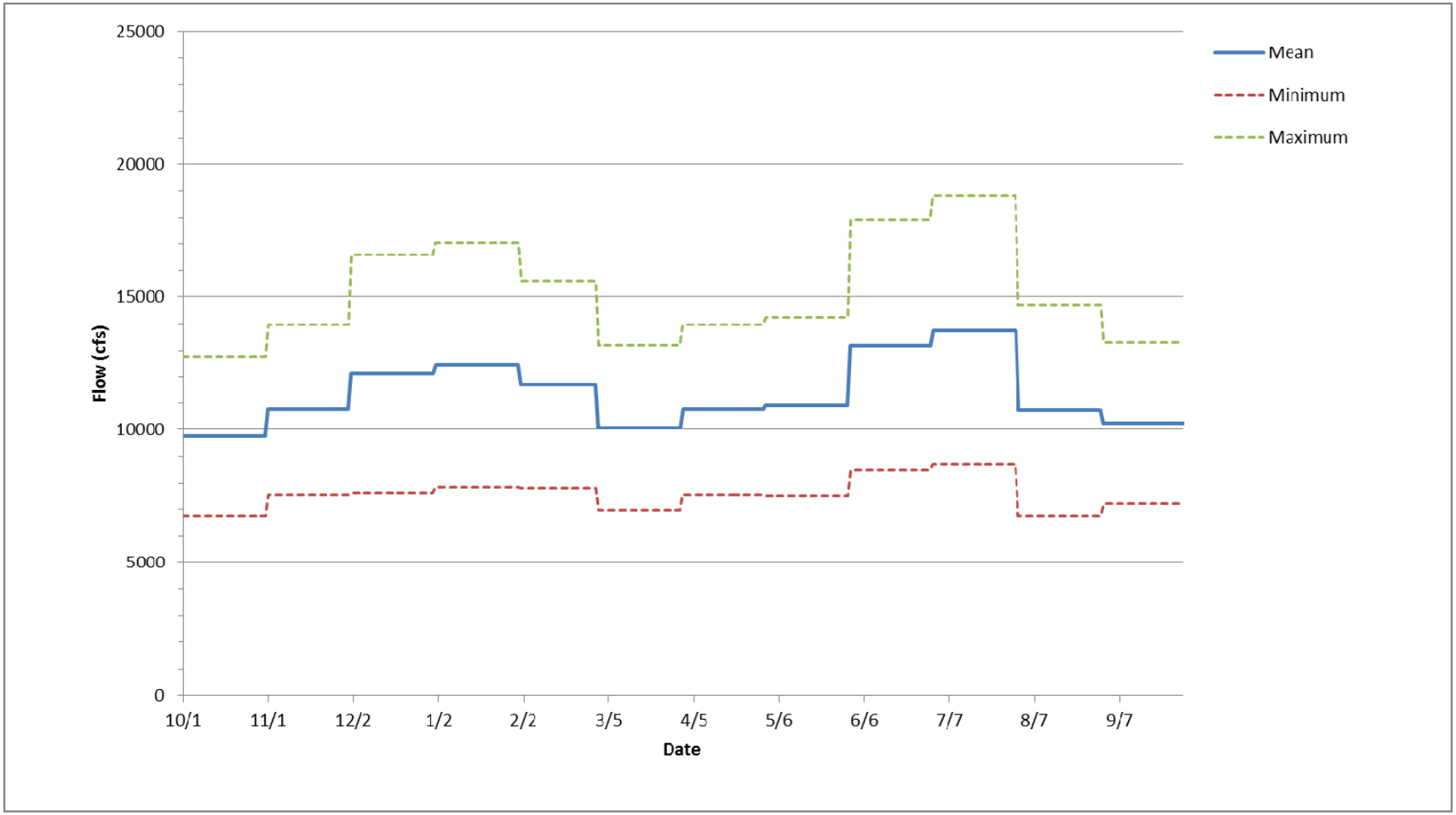
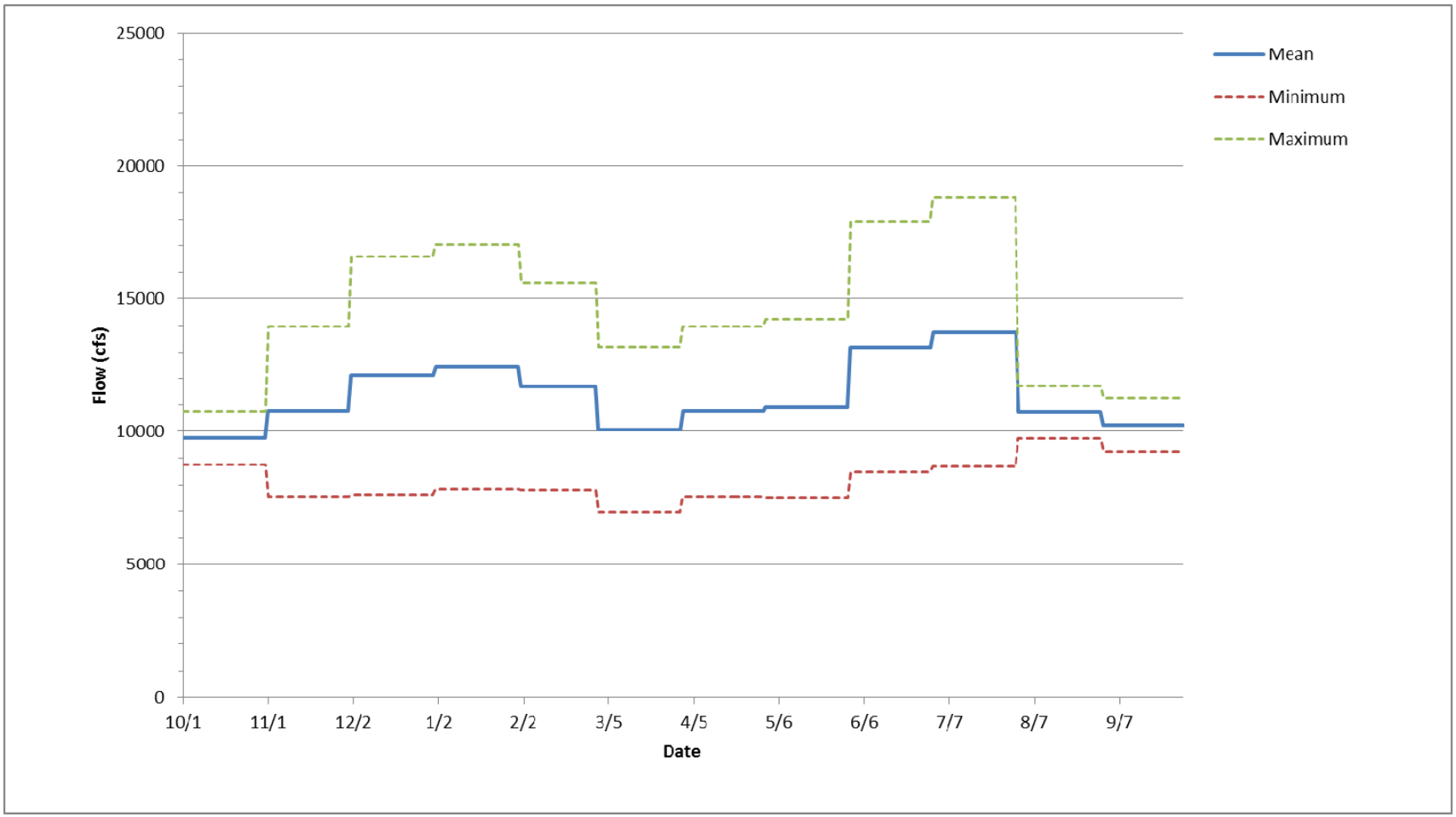
Resource-targeted condition-dependent alternative (Cont.)

- Curtailment of load-following operations following substantial sediment inputs from the Paria River between July and October
- HFE trigger based on effectiveness, cost, and release goals.
- No Spring HFEs for the first 10 years
- Testing of Rapid Response HFEs

Resource-targeted condition-dependent alternative (Base)



Resource-targeted condition-dependent alternative (after sediment input)



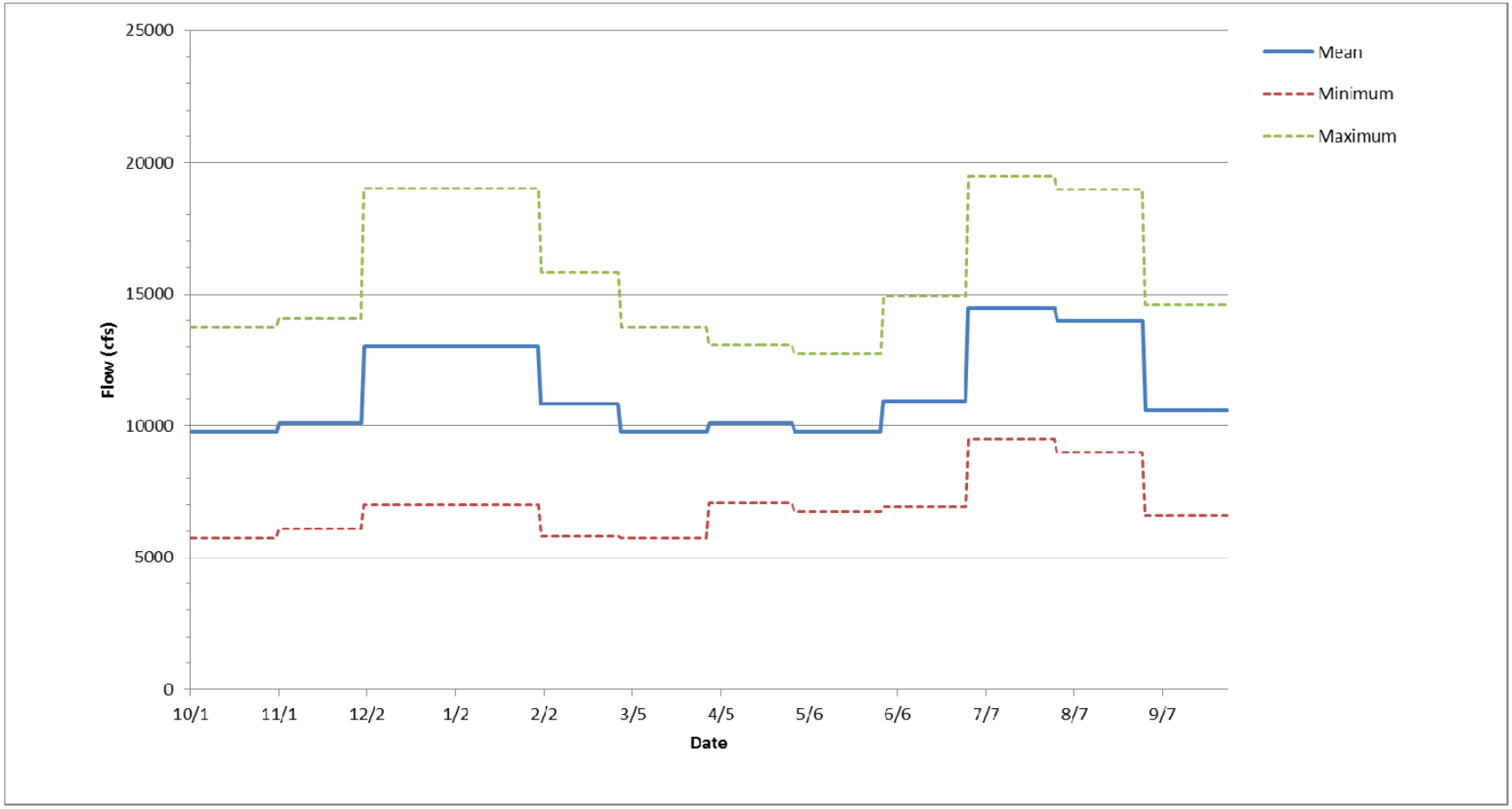
Balanced resource alternative

- Focuses on increased hydropower
- MLFF monthly pattern
- Increased fluctuations in 10 months
  - February: 66% increase,
  - December and January: 50% increase,
  - March, June-November: 25% increase
- Increased downramp rates in all months
  - November-March: 4,000 cfs/hr
  - Other months: 3,000 cfs/hr

Balanced resource alternative (cont)

- Follows HFE protocol, but HFEs would not exceed one every other year
- Testing of rapid response HFEs
- Testing of additional increases to fluctuations beyond base

Balanced resource alternative (Base)



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LTEMP EIS

Performance Metrics

Performance Metrics/Criteria

- Different from Objectives and Resource Goals. The goals and objectives were constructed using the DFC language and they provide broad guidance that clarifies the purpose and need.

- Performance metrics are primarily model outputs or quantitative estimates and are technical expressions of the goals and objectives.

- They will be used to compare the predicted performance of alternatives for structured analysis.

Feedback on Performance Metrics/Criteria

- Seeking input or comments on these by March 15.
- Additional meetings with tribes will be held through April.