Breakout Group Summary – Detailed Structured Report

Note: Breakout Summary was produced by AI and subject to errors

Prepared for: GCDAMP TWG stakeholders
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Executive Summary

Stakeholders across multiple breakout groups report that the Colorado River Ecosystem (CRE) is undergoing rapid, compounding change—outpacing the cadence of monitoring, analysis, and decision-making. Conflicts among resource objectives (native fish, hydropower, sediment/beaches, vegetation, cultural and archaeological resources, recreation) make it difficult to express a single "overall health" status, especially given inconsistent metric frameworks and varying levels of clarity and thresholds across resources. Participants emphasized urgent risk management, flexible planning, and proactive scenario analysis (including worst-case hydrologic conditions) while highlighting the importance of stakeholder engagement, visitor education, and a reassessment of desired conditions to align with the new paradigm.

Recommendation Suggestions:

1. **Codify clear, comparable metrics** with thresholds and targets across resources to improve synthesis and communication.
2. **Advance scenario planning** (e.g., low-release years, power pool, run-of-river operations via river outlet works), integrating operational constraints and timing (e.g., dam maintenance windows for spring HFEs).
3. **Act promptly on triggers** for High Flow Experiments (HFE) and other interventions to avoid missed opportunities.
4. **Revisit desired conditions and goals** for vegetation, cultural resources, and natural processes to reflect post-dam realities and climate-driven change.
5. **Strengthen visitor education and NPS–tribal collaboration**, including potential mandatory pre-trip educational modules for private boaters.
6. **Mitigate budget and staffing constraints** through selective focus on high-risk resources, contracting, and exploring shared positions with partner agencies.

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1. Context and Method

This report synthesizes notes from multiple breakout group discussions focused on CRE conditions, trends, and management priorities. It organizes insights by resource area, articulates cross-cutting challenges, and proposes actionable recommendations drawn directly from stakeholder observations.

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2. Overarching Observations & Challenges

2.1 Pace of Change and Uncertainty

Participants consistently noted the CRE is changing faster than monitoring and reporting cycles, making it challenging to "know where we are" at decision time. Rapid shifts (warming, invasive plants/animals, hydrologic variability) exacerbate management burdens and strain budgets.

Implications:

- Traditional triennial cycles may miss narrow windows for impactful actions (e.g., HFEs).
- Greater operational flexibility and rapid-update data systems are needed to maintain situational awareness.

2.2 Integration Across Competing Objectives

Breakout groups emphasized that some resources are "doing better," while others are "doing worse," making it difficult to deliver a coherent assessment of overall ecosystem health. Inconsistent metric types (e.g., counts/thresholds for humpback chub vs. dollar values for hydropower) hinder synthesis and communication.

Implications:

- Program should align metrics around clear targets and thresholds—and explicitly define trade-offs—to support integrated decision-making and transparent communication.

2.3 Stakeholder Engagement & Communication

Participants recommended inviting stakeholders to help develop and refine metrics posters and create safe spaces where diverse perspectives (including tribal perspectives) are actively encouraged and recorded.

Implications:

- Co-development of materials increases legitimacy and clarity; structured stakeholder forums can surface previously unheard insights valuable to management decisions.

2.4 Budget & Staffing Constraints

Groups expressed concern about budget reductions, staff turnover, and data lags affecting timely recommendations. They suggested examining contracting options, shared positions with other agencies, and a closer look at project-level allocations to maintain critical monitoring and targeted research.

Implications:

- Focus limited resources on high-risk, high-impact efforts while sustaining core monitoring sufficient for trend detection.

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3. Resource-Specific Findings, Challenges, and Recommendations

3.1 Native Fish: Humpback Chub (and Other Natives)

Condition & Trends:

- Humpback chub trends are currently positive (clear threshold-based metrics noted), but participants fear looming risks from non-native fish (e.g., smallmouth bass), warming waters, and changing mainstem conditions. They emphasized incorporating lower-end populations into management decisions and evaluating the balance between mainstem reproduction and translocations.

Key Challenges:

- Rising predation pressure from non-natives; variable mainstem temperature/flow regimes.
- Uncertainty over resilience and whether current positive trends can withstand anticipated pressures.

Recommendations:

1. Formalize risk thresholds for non-native incursion and temperature/DO stress, aligned to chub life stages and habitats.
2. Scenario-test population responses under low-flow, warm-water regimes and power-pool conditions; pre-plan adaptive responses.

3. Evaluate translocation vs. mainstem reliance strategies with explicit trade-offs and triggers for shifting effort.
4. Conduct a risk assessment exercise to determine what threats pose the lowest and highest potential jeopardy to the Humpback Chub population.

3.2 Hydropower

Condition & Trends:

- Hydropower is under severe stress due to low reservoir elevations, aging infrastructure, and reduced head pressure at Glen Canyon Dam. Stakeholders warned of devastating conditions and called for worst-case contingency planning, including power pool and potential run-of-river operations via river outlet works.

Key Challenges:

- Hydropower revenues fund critical program infrastructure and actions (e.g., relining river outlet works used to enable "cool mix" operations), creating a feedback loop between power viability and ecosystem management capability.
- Need to consider hydrologic cycles (e.g., potential El Niño-driven wet years) and international experience (South Africa, Australia) to inform planning.

Recommendations:

1. Develop a dual-path hydropower plan: (a) sustained low-elevation/power-pool scenario; (b) recovery during wet cycles—each with operational playbooks.
2. Commission a program-level economic valuation of hydropower (beyond MW output) to inform cost–benefit analyses for long-term investments. Determine resource wide trade-off analysis to help inform GCDAMP of operational guidelines exceed trade-off limitations.
3. Engage international expertise (South Africa/Australia) to review crisis management solutions applicable to Glen Canyon operations.

3.3 Sediment, Beaches, and Campsites

Condition & Trends:

- Stakeholders report erosion, campsite loss, and risks from debris flows (e.g., Dragon Fire footprint tributaries) that may reshape the river. There is broad agreement on the need for

HFEs, with attention to spring timing for multiple benefits and to avoid missed opportunities when triggers are met.

Key Challenges:

- Coordinating HFEs with dam maintenance schedules; managing uncertainty and communicating targets for sediment outcomes.

Recommendations:

1. Establish HFE trigger protocols with pre-authorized decision steps when sediment conditions are favorable; include spring-timing guidance and maintenance coordination.
2. Define sediment/beach targets (e.g., campsite availability indices) to guide action timing and post-HFE evaluation.
3. Monitor post-fire tributary dynamics and develop contingency dredging or geomorphic interventions where feasible.

3.4 Vegetation (Riparian & Corridor)

Condition & Trends:

- Vegetation conditions are declining and often underrepresented in program focus. Spring HFEs may prevent tamarisk establishment, yet could increase non-native plant establishment later in the season (May–June), creating trade-offs. Participants sought clearer vegetation goals (e.g., pre-dam diversity vs. functional, climate-resilient assemblages).

Key Challenges:

- Ambiguity around desired conditions and limited integration with other resource goals (e.g., shade for camps vs. native plant diversity).

Recommendations:

1. Revise vegetation objectives to reflect functional outcomes (shade, habitat quality, invasives control) under post-dam hydrology and warming climate.
2. Pair spring HFEs with targeted invasive plant management (timing windows for tamarisk/cane) and native revegetation strategies.
3. Integrate visitor-use patterns (encroaching vegetation pushing campers upslope) into vegetation and campsite planning; initiate a visitor behavior study to inform management.

3.5 Cultural & Archaeological Resources

Condition & Trends:

- Several groups asserted cultural sites are not meeting goals—with visitor impacts increasing and loss of protective HFEs exacerbating erosion. Tribes indicated questions posed to them are too simplistic and not aligned with tribal perspectives; enhanced collaboration with NPS is noted, but broader agency alignment is needed.

Key Challenges:

- Reconciling public access with site protection, and integrating tribal values and knowledge in planning and metrics.

Recommendations:

1. Implement mandatory pre-trip education (e.g., video modules) for private boaters focused on cultural site etiquette and protection.
2. Pilot on-site stewardship presence at high-risk locations within staffing limits; consider volunteer/partner models.
3. Co-develop a tribal-informed metrics framework for cultural resource protection, ensuring nuanced, non-simplistic goals and indicators.

3.6 Recreational Fisheries: Rainbow Trout (Lees Ferry)

Condition & Trends:

- The rainbow trout fishery is in poor condition with concerns about temperature (>23°C) and dissolved oxygen, threatening survival and fishery viability. Stakeholders emphasized the fishery's economic and cultural importance and the need for management solutions compatible with warming trends.

Key Challenges:

- Aligning trout goals with native fish protection and warm-water invasive control; balancing flow/temperature management with competing needs.

Recommendations:

1. Develop a thermal and DO risk matrix for trout, connecting dam operations (e.g., cool mix, outlet works use) to fishery thresholds.

2. Evaluate operational synergies where actions limiting warm-water invasives also benefit tailwater trout (e.g., temperature management windows).
3. Establish contingency stocking or habitat interventions aligned with native fish safeguards.

3.7 Non-native Species (Warm-water Fish, Crayfish)

Condition & Trends:

- Information on crayfish is alarming; warm-water fish pressures are rising. “Cool mix” appears to provide benefits but requires long-term strategic planning and operational reliability.

Key Challenges:

- Sustaining effective temperature management under low-elevation constraints; integrating invasive control with native fish goals and hydropower realities.

Recommendations:

1. Implement a long-term invasive control plan with temperature management triggers, monitoring efficacy against smallmouth bass/crayfish recruitment.
2. Coordinate multi-resource operations (sediment HFEs, cool mix periods) to minimize non-native advantages while protecting native fish and trout.

3.8 Natural Processes & Ecosystem Function

Condition & Trends:

- Stakeholders found the definition of “natural processes” lacking, noting that current discussions overly focus on invertebrates and omit other elements (e.g., microbial life, wildlife including birds, bats, herps). Interest in reframing toward “ecosystem function” was expressed.

Key Challenges:

- Lack of a comprehensive, accessible conceptual model connecting flows, sediment, temperature, biota, and human use.

Recommendations:

1. Develop an ecosystem function framework (with indicators beyond invertebrates) and align monitoring priorities accordingly.
2. Revisit bug flow concepts with updated data needs; clarify conditions where they provide measurable benefits.

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4. Programmatic Recommendations (Planning, Metrics, and Governance)

4.1 Plan Ahead, Remain Flexible

- Maintain flexibility to avoid locking into an undesirable steady state; plan future research and monitoring with horizon scanning while acknowledging influences beyond program control (e.g., compact-driven releases).

4.2 Avoid Missed Opportunities

- Participants highlighted missed HFEs when triggers were met and suggested vigilant, pre-authorized action pathways to capitalize on conditions.

4.3 Improve Communication, Education, and Stakeholder Inclusion

- Encourage all voices; integrate tribal perspectives more deeply; expand visitor education and create structured safe spaces to surface actionable insights.

4.4 Revisit Desired Conditions and Goals

- Align vegetation, cultural resources, and natural processes goals with realistic post-dam, climate-changed futures; define targets and thresholds suitable for cross-resource comparison.

4.5 Scenario Planning & Modeling

- Invite reclamation modeling teams to present flow scenarios (e.g., 6 MAF release cases), identifying pinch points and trade-offs. Examine run-of-river feasibility and resource impacts under extended river outlet works use.

4.6 Economic Analysis & Budget Strategy

- Commission an economic analysis of hydropower's program-level value; triage monitoring/research toward high-risk areas; explore contracting and shared positions with agencies to sustain capacity amid budget constraints.

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5. Governance, Engagement, and Data

- Create safe stakeholder spaces to ensure diverse inputs (tribal, recreation, hydropower, conservation) are heard and documented; rotate facilitation to avoid dominance.
- Accelerate data delivery through improved platforms (e.g., SharePoint enhancements) and pre-meeting information packets to reduce decision lag.
- Clarify inter-agency roles and explore shared functions (split positions) to maintain continuity despite staffing changes.

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6. Conclusion

The CRE faces urgent, systemic risks across hydropower, sediment dynamics, vegetation, native fish, cultural resources, and recreational fisheries. Stakeholders underscore the need for clear, comparable metrics, proactive scenario planning, timely HFEs, and inclusive engagement—with a pragmatic reassessment of desired conditions under the modern hydrologic and climatic regime. Targeted investments in economic analysis, education, and operational flexibility can position the program to navigate near-term hazards while sustaining long-term ecosystem functions and values.