



Defining Metrics for the Long-Term Experimental and Management Plan: Concept, Plan, and FY21 Accomplishments

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Presentation Outline

- **Project overview**
- **What are metrics?**
 - **Definitions**
 - **Metrics as management tool**
 - **Performance Metrics vs. Other Metrics**
- **Selecting performance metrics for LTEMP**
- **Project timeline and accomplishments**
- **Next Steps**

Project Overview (Purpose and Need)

- **LTEMP defines 11 Goals**
 - **How do we know if Goals are being achieved?**
 - **Need metrics!**
- **Section 6.1(c) of the LTEMP ROD* states:**

“The DOI, in consultation with the AMWG, will develop monitoring metrics for the goals and objectives using those in Appendix C as a starting point.”

(Note: Appendix C = performance metrics developed by Runge et al. (2016) to help select the preferred LTEMP alternative.)
- **FY 21-23 TWP, Reclamation Project C.12**

* Department of Interior, 2016, Record of Decision for the Glen Canyon Dam Long Term Experimental and Management Plan Final Environmental Impact Statement, December 2016. Bureau of Reclamation, Upper Colorado River Region, Salt Lake City, Utah and National Park Service, Intermountain Region, Lakewood, Colorado.

What are metrics?



What are metrics?

- Metrics are measurements
- Used to assess performance or condition
 - “figures and data representative of an organization’s actions, abilities, and overall quality” (www.asq.org/quality-resources/metrics)
 - “measures of quantitative assessments commonly used for assessing, comparing, or tracking performance or production” (From www.Investopedia.com)
 - “quantifiable measures used to gauge performance or progress” (From www.grow.com)
 - “numbers that tell you important information about a process under question.” (www.managementstudyguide.com)

Monitoring & Metrics

Monitoring serves a variety of useful purposes. Principal types and reasons for monitoring include:

- **Effectiveness (or Performance) Monitoring**

1. To assess effectiveness of policy, plan, or legislation
2. To evaluate progress towards achieving management objectives or regulatory standards

- **Surveillance Monitoring**

3. To detect incipient trends (“early warnings system”)
4. To determine resource status in order to decide appropriate management actions

- **Validation Monitoring**

5. To increase our understanding of resource dynamics
6. To develop and refine models or predictions

LTEMP Metrics Project

- **Focus is on defining metrics for Effectiveness Monitoring (“Phase 1”)**
 - “To assess effectiveness of policy . . .” and
 - “ track progress towards achieving management objectives . . .”
- **LTEMP defines 11 specific goals**
 - How do we know if the goals are being achieved?
Need to define performance metrics!
 - Performance metrics tell us “achieved/ not achieved” -
- but not why
- **NOT a Core Monitoring Plan**

LTEMP Goals (Fundamental Objectives)

■ LTEMP Goals (from 2016 LTEMP FEIS and ROD)

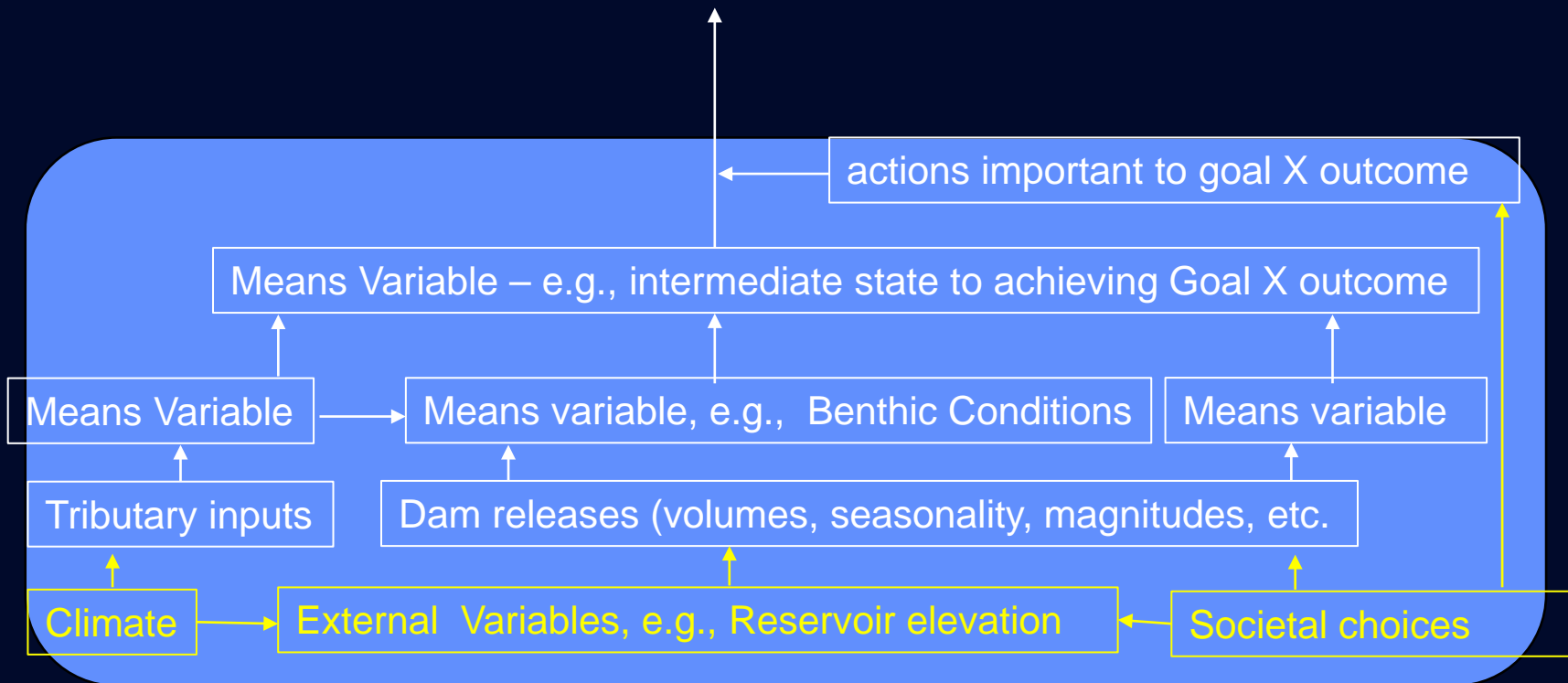
- 1. Archaeological and Cultural Resources. Maintain the integrity of potentially affected NRHP-eligible or listed historic properties in place, where possible, with preservation methods employed on a site-specific basis.
- 2. Natural Processes. Restore, to the extent practicable, ecological patterns and processes within their range of natural variability, including the natural abundance, diversity, and genetic and ecological integrity of the plant and animal species native to those ecosystems.
- 3. Humpback Chub. Meet humpback chub recovery goals, including maintaining a self-sustaining population, spawning habitat, and aggregations in the Colorado River and its tributaries below the Glen Canyon Dam.
- 4. Hydropower and Energy. Maintain or increase Glen Canyon Dam electric energy generation, load following capability, and ramp rate capability, and minimize emissions and costs to the greatest extent practicable, consistent with improvement and long-term sustainability of downstream resources.
- 5. Other Native Fish. Maintain self-sustaining native fish species populations and their habitats in their natural ranges on the Colorado River and its tributaries.
- 6. Recreational Experience. Maintain and improve the quality of recreational experiences for the users of the Colorado River Ecosystem. Recreation includes, but is not limited to, flatwater and whitewater boating, river corridor camping, and angling in Glen Canyon.
- 7. Sediment. Increase and retain fine sediment volume, area, and distribution in the Glen, Marble, and Grand Canyon reaches above the elevation of the average base flow for ecological, cultural, and recreational purposes.
- 8. Tribal Resources. Maintain the diverse values and resources of traditionally associated Tribes along the Colorado River corridor through Glen, Marble, and Grand Canyons.
- 9. Rainbow Trout Fishery. Achieve a healthy high-quality recreational rainbow trout fishery in GCNRA and reduce or eliminate downstream trout migration consistent with NPS fish management and ESA compliance.
- 10. Nonnative Invasive Species. Minimize or reduce the presence and expansion of aquatic nonnative invasives.
- 11. Riparian Vegetation. Maintain native vegetation and wildlife habitat, in various stages of maturity, such that they are diverse, healthy, productive, self-sustaining, and ecologically appropriate.

Fundamental Objectives vs. Means

LTEMP Goals are Fundamental Objectives of LTEMP

Goal X: “Increase and maintain Resource X with y & z conditions”

Fundamental Objective: “Increase and maintain Resource X...”



LTEMP Goals = “fundamental objectives”

- “Fundamental objectives, as distinguished from means objectives, are objectives that are important in their own right—they are the desired outcomes of the decision, not because they lead to something else of importance but because of their inherent value.

Means objectives are pursued as a pathway to fundamental objectives but are not themselves of inherent value to the decision maker”

Runge et al. 2015, p.5

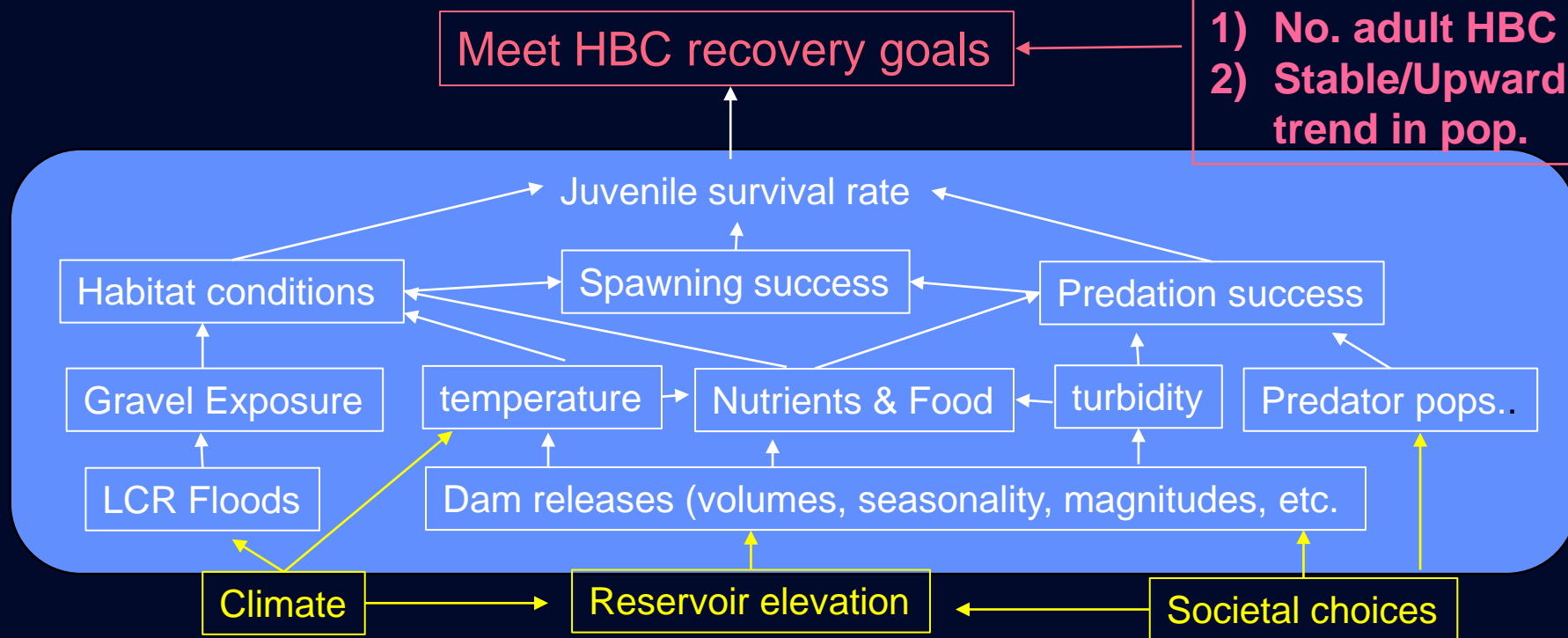
- **Fundamental objectives \neq Means objectives**
- **Fundamental obj. metrics \neq Means obj. metrics**

Example: HBC

“high juvenile survival rate of HBC is important as a means to achieving a sustainable population of HBC ... but juvenile survival is not itself the objective that the decision maker fundamentally cares about.” Runge et al. 2015, p. 5

Goal 3. Meet humpback chub recovery goals, including maintaining a self-sustaining population, spawning habitat, and aggregations in the Colorado River and its tributaries below the Glen Canyon Dam.

Goal 3 Metrics:
1) No. adult HBC
2) Stable/Upward trend in pop.



LTEMP Metrics Project: Objectives

- Determine technically feasible, sustainable metrics to provide objective measures of progress towards attaining the 11 LTEMP resource goals.
- Track the selected metrics to periodically evaluate and report status of 11 LTEMP goals relative to pre-LTEMP (pre-2016) condition and LTEMP projections.
 - Improve annual/cyclical reporting by distilling large amounts of scientific information into a set of standardized metrics that can be communicated to DOI managers and GCDAMP stakeholders via standardized methods and graphics on a regular (annual?) basis.
 - Inform other planning efforts (e.g., identify knowledge gaps).

LTEMP Metrics: Key Points

- Initial focus on LTEMP Fundamental Objectives metrics
 - metrics for other objectives & purposes come later
- Focus is on defining performance metrics for *assessing & tracking achievement of LTEMP Goals (as described in the ROD)*
 - *Performance Metrics measure how Goal X is doing, NOT why Goal X is increasing or decreasing*
- Metrics for other purposes, e.g., “early warning” metrics, metrics for predictive models, TBD.

Performance Metrics: Definitions

■ Key Performance Indicators (KPI)

“A performance indicator or key performance indicator (KPI) is a type of performance measurement [used to] evaluate the success of an organization or of a particular activity (such as projects, programs, products and other initiatives) in which it engages.” (from Wikipedia)

■ Definition in Metric Plan

“objective, quantified measurements collected using standardized protocols that are indicative of resource condition so as to provide a measurement of how well the AMP is doing at attaining the established LTEMP goals”

Metrics design & selection

Some basic tenets of metrics design and selection (from metrics literature) include:

- Prioritize quality of metrics over quantity
- Design metrics that are easy to understand
- Design metrics that are easy to compare
- Prioritize metrics that are actionable*

* Depending on intended purpose of the metrics

LTEMP Performance Metrics: Criteria

- Reflects the expected performance outcome of each LTEMP goal or measures a performance outcome that triggers a legal compliance action or experiment
- **Quantifiable (metric = measurable)**
- Technically and financially feasible to measure
- **Relevant to metrics used to select LTEMP preferred alternative**

LTEMP Metrics Project: Initial Steps

- GCMRC scientists inventoried existing metrics in current monitoring projects
- Existing metrics sorted into bins, e.g.,
 - Is it well suited for tracking desired goal outcomes?
 - Is it needed to trigger compliance/experimental actions?
 - Is it a performance metric (i.e., “Metric of Success”) or a “means metric” (i.e., ecological system driver)?
- Internal discussion re: suitability of specific metrics for tracking LTEMP goal outcomes
 - Does it directly measure a stated desired goal outcome?
 - Technically feasible? Affordable? Other considerations?

Project Timeline: FY21

- **April-May 2021: Kickoff presentations to TWG and AMWG**
 - “Metric” defined for the purposes of this project.
 - Project objectives identified; current inventory and assessment process and general timeline described.
- **June 2021 TWG:**
 - GCMRC presented draft process and timeline document for evaluating and selecting metrics, including draft criteria.
 - General comments on definitions, criteria, etc. solicited from TWG
- **July 2021:**
 - GCMRC and Reclamation brief Secretary’s Designee and other Department of the Interior managers regarding project and progress.
 - General comments on objectives, process, and timeline solicited.
- **August 2021 AMWG:**
 - GCMRC presented revised draft process and timeline document for evaluating and selecting metrics, including draft criteria.
 - General comments/ feedback on process, criteria solicited from AMWG
- **July-August 2021:**
 - GCMRC met with Tribes; began drafting metrics descriptions

FY21 Comments & Feedback Received

- **During and following June TWG meeting**
 - Oral input (TWG chair, AZGF, GCWC, WAPA, NPS, Zuni, Navajo)
 - Written input from GCWC, Zuni, Hualapai, State of CA, Anglers, WAPA
- **Post-AMWG** – no new comments received
- **Post-October TWG** – CREDA commented on draft hydropower metrics
- **Post-Tribal w/ GCMRC meetings (7/14/21, 8/2/21)** – written comments received from Hopi, Navajo

Summary of Stakeholder Comments

- Sounds good so far - please continue
- Consider KA, existing plans as a source of metrics
- Need to clarify goals before we can define metrics
- LTEMP Goals too general; need more explicit targets and some additional or different (new) goals
- Quantified metrics do not and can not adequately or appropriately reflect Tribal perspectives
- Tribes would like traditional knowledge to guide metrics selection
- Goal-specific metrics are contrary to Tribes' interest in having a more holistic, integrated, ecosystem-based approach to studying and managing Co. R.

FY22 Planned Project Timeline

- **October 2021 TWG:**
 - **First draft of metric descriptions for 3-4 LTEMP goals**
 - **GCMRC presents draft LTEMP metrics (sample) to TWG**
 - **GCMRC seeks input on metrics description format & how best to graphically represent metrics to meet stakeholder needs.**
 - **Additional Input from TWG due Oct. 31, 2021**
- **December 2021:**
 - **GCMRC pilots a sample of metrics in the FY2021 Annual Report, including sample graphics**
- **January 2022 (ARM and TWG):**
 - **GCMRC solicits feedback from the TWG regarding the sample reporting of metrics in the FY2021 Annual Report.**
- **February 2022:**
 - **GCMRC solicits feedback from the AMWG and from DOI regarding the sample of metrics in the FY2021 Annual Report.**

Next Steps

- **Today:** Seek additional TWG input (project focus, definitions, criteria, revised process & timeline)
- **February-March 2022:** internal (DOI) meetings
- **April 2022:** Present examples of performance metrics for 5-7 LTEMP goals to TWG
- **June 2022:** present draft metric descriptions (all goals) at June 2022 TWG
- **June-August 2022:** GCMRC revises and finalizes draft metrics descriptions for all LTEMP goals
- **September 2022:** final draft metric descriptions (all goals); to be presented at October 2022 TWG

Questions?



Upper 103-Mile Camp, River mile 103.5, left bank