April 20, 2020

To: Glen Canyon Leadership Team for Implementation of Experiments under the Long Term Experimental and Management Plan (LTEMP)

From: LTEMP Planning/Implementation Team

Re: Final Recommendation to Implement Macroinvertebrate Production Flow (Bug Flows) Releases at Glen Canyon Dam May – August 2020

I. Introduction

The LTEMP Planning/Implementation Team (PI Team) recommends, by consensus,that experimental Macroinvertebrate Production Flows (Bug Flows) be implemented at Glen Canyon Dam beginning May 1 through August 31, 2020.

Bug Flows consist of steady weekend releases from Glen Canyon Dam and normal fluctuating releases for hydropower during the weekdays. The steady weekend flows are predicted to provide favorable conditions for aquatic insects to lay eggs along the Colorado River downstream from Glen Canyon Dam and are designed to be similar to daily minimum flows on the weekdays. This flow regime will decrease the amount of stage change in the river on the weekends, thus preventing aquatic insect eggs laid along the river margins from drying out. Technical experts at the U.S. Geological Survey's (USGS) Grand Canyon Monitoring and Research Center (GCMRC) and Western Area Power Administration (WAPA) have coordinated the design of the recommended experiment to optimize the benefits for aquatic insects throughout Glen, Marble, and Grand Canyons (the Canyon) while minimizing negative impacts to hydropower. The purpose of experimental Bug Flows is to identify whether this type of operation can improve the abundance, diversity, and stability of aquatic insect populations thereby increasing aquatic insect prey available for endangered humpback chub *(Gila cypha*), rainbow trout (*Oncorhynchus mykiss*), an important sportfish, as well as terrestrial wildlife like birds and bats. The experiment will also provide new scientific information that can be used in future decision making.

The purpose of this memorandum is to transmit this recommendation to the Glen Canyon Leadership Team for Implementation of Experiments (Leadership Team) under the LTEMP and to the Department of the Interior (Department) in accordance with the LTEMP Record of Decision (ROD). The PI Team includes technical representatives from the National Park Service (NPS), the U.S. Fish and Wildlife Service (FWS), the Bureau of Indian Affairs (BIA), USGS-GCMRC, the Bureau of Reclamation (Reclamation), WAPA, the Arizona Game and Fish Department (AGFD), and one liaison from each of the seven Colorado River Basin States (States) and the Upper Colorado River Commission (UCRC). The PI Team coordinated the potential implementation of the experiment and incorporated the latest data from agency experts and considered multiple issues, as summarized below, in making this final recommendation.

II. LTEMP Process for Implementing Experiments

The 2016 LTEMP ROD provides the framework for implementing flow experiments at Glen Canyon Dam when resource conditions warrant. The purpose of LTEMP experiments is to leverage adaptive management to better protect, mitigate adverse effects, and improve resources downstream of Glen Canyon Dam, while complying with relevant laws. Ongoing research and monitoring through the Glen Canyon Dam Adaptive Management Program (GCDAMP) ensures the best science and data are available for making decisions related to flow experiments.

Under the LTEMP ROD, the Department may conduct flow experiments, such as Bug Flows, at Glen Canyon Dam when resource conditions warrant and if it is determined that there will not be unacceptable adverse impacts to other resources. The process for recommending experiments under the LTEMP, which has been used for past experiments and has been followed here, involves outreach to GCDAMP partners through regular meetings and additional notification to Tribes inviting consultation. The process also involves coordination with the PI Team to plan for the possible experiment, evaluate the status of resources, and make the technical recommendation to conduct an experiment. The PI Team presents its recommendation to the Leadership Team, which makes a recommendation to the Department. The Assistant Secretary for Water and Science is the chair of the Leadership Team and makes the decision for the Department regarding the experiment, as delegated to him by the Secretary of the Interior (Secretary).

III. Recommended Experiment: Bug Flows

Purpose and Goal

The purpose of Bug Flows experimentation is to determine whether stable, low flows on weekends in late spring and summer months (May – August) can improve the abundance, diversity, and stability of aquatic insect populations in the Colorado River. Aquatic insects are the cornerstone of Colorado River food webs and they fuel growth of humpback chub, rainbow trout, and other desired fish and terrestrial wildlife species downstream of Glen Canyon Dam. By releasing stable and low flows every weekend, Bug Flows are expected to provide two days of ideal egg-laying conditions each week for aquatic insects that lay their eggs along river margins (see Figure 1, Kennedy and others, 2016). This year (2020) will be the third consecutive year of Bug Flows testing. Results from the first two years (2018 and 2019) were equivocal (see section IV. Monitoring Plan). The experiment was originally conceived by GCMRC's scientists as going at least three consecutive years to allow the populations of aquatic insects, which generally have one-year life cycles, to steadily grow over time. As such, a third consecutive year of Bug Flows is recommended.

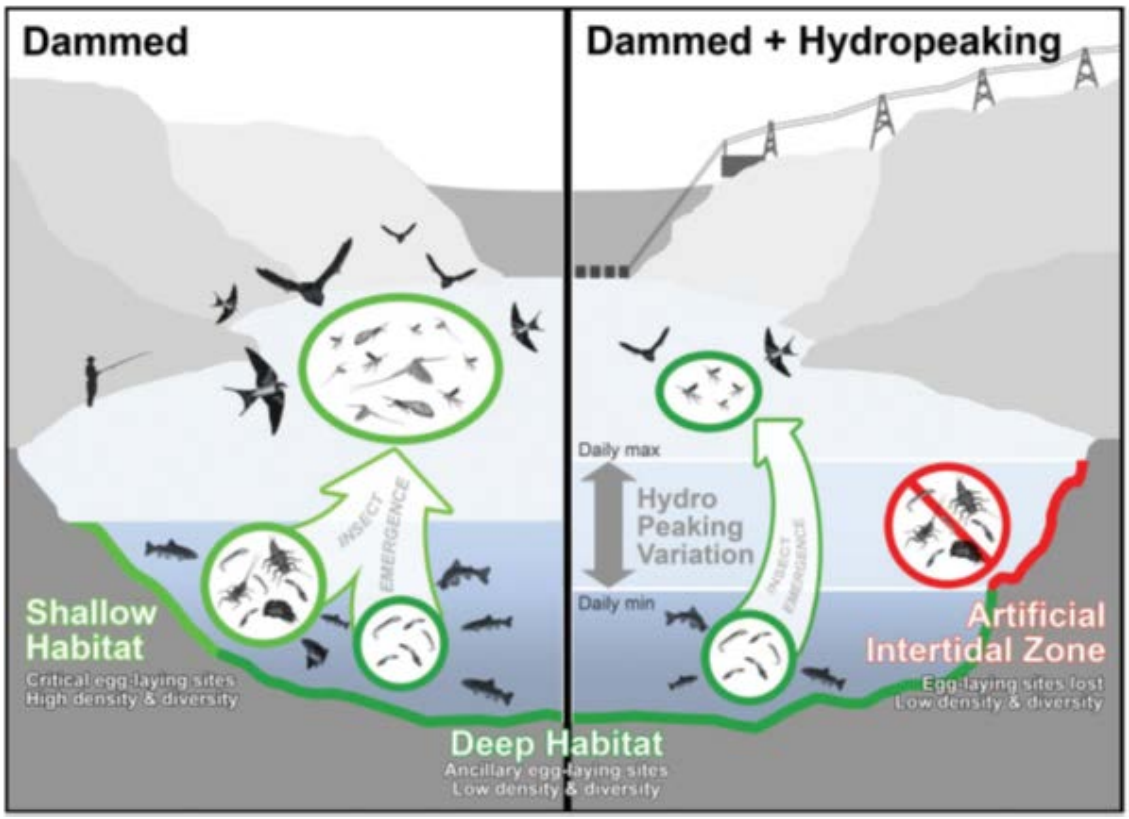

Figure 1. Aquatic insects are ubiquitous in freshwaters and play an essential role in river and riparian food webs as the primary prey for myriad species of wildlife living in and along rivers. Most aquatic insects cement their eggs along river-edge habitats, making them especially sensitive to dam water management practices for hydropower generation that dry these edge habitats daily (Kennedy and others 2016).

Experimental Design and Description

A Bug Flows hydrograph that incorporates weekend steady low flow releases that are 750 cubic feet per second (cfs) higher than weekday low flow releases in all months (May – August) is proposed for 2020 (see Figure 2). This is identical to the Bug Flows hydrograph in 2019 and similar to the hydrograph in 2018, when a 1000 cfs increase on weekends was implemented. To meet downstream water delivery requirements, the stable, low flows on weekends need to be offset by relatively higher peak flows during the week than would otherwise be achieved under normal operations. Weekend low-flow releases would begin after the normal down-ramp on Friday evening and would be steady throughout Saturday and Sunday (except for system regulation and use of reserves). Flows would then ramp up on Monday at the normal rate, then would follow typical hydropower operations for the remainder of Monday–Friday. Figure 2 is an illustration of a possible weekly pattern and is subject to change based on actual operations to follow electrical demands.The exact timing of each of these peaks and low flow troughs associated with hydropower operations varies from month to month according to scheduled release volumes.

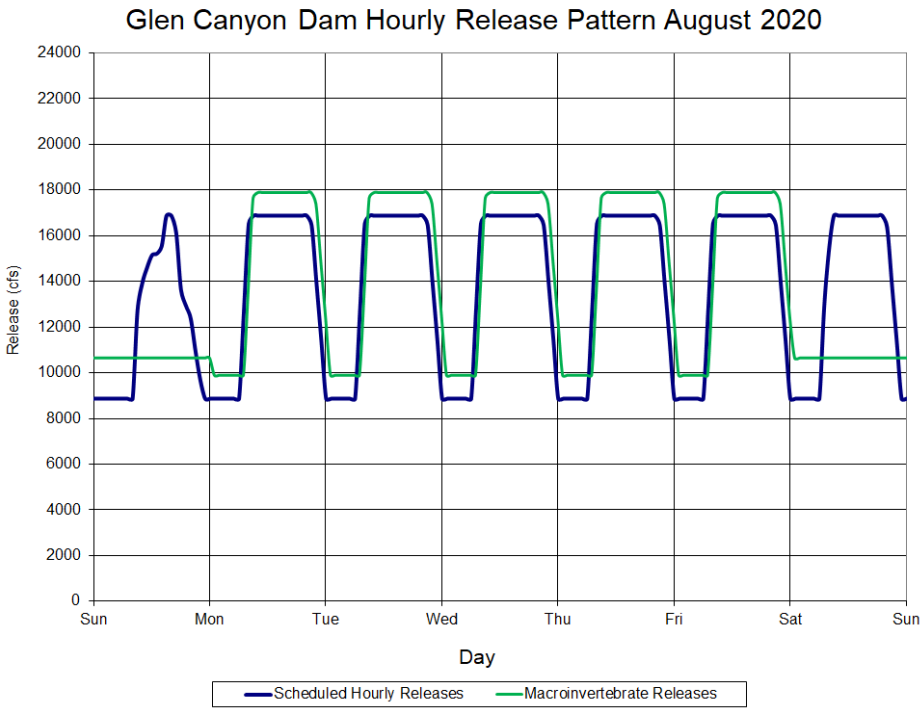

Figure 2. Proposed Bug Flows hydrograph for an example week in August under base operations (no Bug Flows) and Bug Flows scenarios.

Water delivery

The recommended Bug Flows experiment will not result in changes to the weekly, monthly, or annual release volumes from Glen Canyon Dam and Lake Powell, in compliance with the 2007 Interim Guidelines. Reclamation currently projects the annual release volume for water year 2020 will be 8.23 million acre-feet under the minimum, maximum, and most probable inflow scenarios. The LTEMP maximum ramp rates (4,000 cfs per hour when increasing and 2,500 cfs per hour when ramping down) will be adhered to throughout the experiment, as will the maximum daily fluctuations (see Table). The daily fluctuating range will not exceed 8,000 cfs. Minimum releases of 5,000 cfs (nighttime) and 8,000 cfs (daytime) will be maintained (see Table).

Implementation of Bug Flows would result in the following monthly release schedule at Glen Canyon Dam:

Month	Release Volume (af)	Maximum daily fluctuation	Weekday maximum (cfs)*	Weekday minimum (cfs)*	Weekend release (cfs)*
May	630,000	4,460	13,485	9,025	9,775
June	650,000	6,500	14,565	8,065	8,815
July	750,000	7,500	16,030	8,530	9,280
August	835,000	8,000	17,880	9,880	10,630

Although every effort will be made to match the design of the experiment described above, Reclamation will continue to exercise the operational flexibility described in the LTEMP ROD.

IV. Monitoring Plan

If Bug Flows are approved by the Secretary's Designee, GCMRC will monitor aquatic insect population response using standardized monitoring methods. As detailed below, these monitoring efforts may be curtailed to some extent by the limitations put in place to respond to the COVID-19 pandemic and will still yield statistically powerful data streams for monitoring a Bug Flows effect. Monitoring includes citizen science light trapping of adult aquatic insects throughout the Canyon, monthly aquatic invertebrate drift monitoring in Glen Canyon, and spatially intensive drift sampling throughout the Canyon.

Citizen Science Light Trapping

The principal mechanism for monitoring aquatic insect population response to Bug Flows will be through citizen science light trapping. This approach may be modified in 2020 and will still follow the general principle of citizen science. This citizen science project began in 2012 and comprises a group of river guides and student organizations that collect light trap samples of aquatic insects using standard methods every night in camp. This project yields around ~1000 samples per year throughout the Canyon, predominantly during the commercial river guiding season (April-October) when adult aquatic insects are most active. These citizen science light trap data will be used to test the following predictions concerning insect population response to Bug Flows:

1. Annual average midge and caddisfly catches in light traps are predicted to show year-over-year increases and to eventually be higher than annual average catches observed in any of the six years of light trap sample collection prior to Bug Flows. Initial responses to the first summer of Bug Flows experimentation in 2018 indicate strong, unexpected caddisfly population growth in 2018, followed by more muted response in 2019 (see Figure 3). Although mean midge catch rate increased slightly from 2018 to 2019, abundances were statistically similar to pre-Bug Flows years. However, none of these results can be definitively ascribed to Bug Flows. For instance, the caddisflies that emerged in 2018 actually derived from eggs that were laid in 2017, the year before Bug Flows started. Additionally, baseline environmental conditions that influence insect growth rates were also vastly different in 2018 versus 2019 (see Figure 4).

2. The overall baseline midge abundance is predicted to increase, and the “sine wave” pattern of variable midge abundance progressing downstream from Glen Canyon Dam (see Kennedy and others, 2016) is predicted to smooth out as midge abundance increases in areas where it is currently low.

3. On a seasonal timescale, the currently observed peak in light trap midge abundance occurs in June every year, then declines sharply through late summer and early autumn. Under Bug Flows, midge abundance is predicted to exhibit a less dramatic decline in late summer and early autumn, as favorable conditions for egg laying during Bug Flows in early summer result in more adult midges later in the summer. The differences in water conditions between 2018 and 2019 (see Figure 4), as measured by cumulative total suspended sediment (in mg/L) have confounded efforts to interpret any such changes in the seasonal timing of emergence due to Bug Flows, which will be ameliorated by an additional year of data from a 2020 Bug Flows experiment.

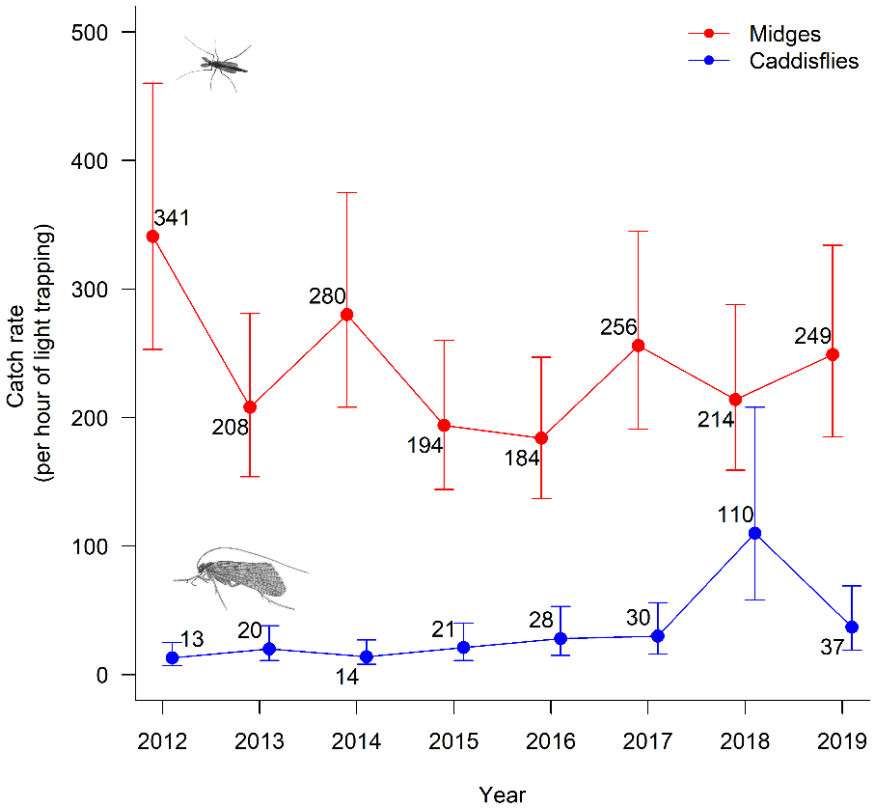

Figure 3. Mean midge and caddisfly abundance in citizen science light traps over time, including the first two years of Bug Flows experimentation in 2018 and 2019.Error bars represent one standard error. Annual mean values are estimated from a mixed-effects model that accounts for the underlying distribution of the data (negative binomial). These models also account for differences in the spatial or temporal extent of sampling across years.

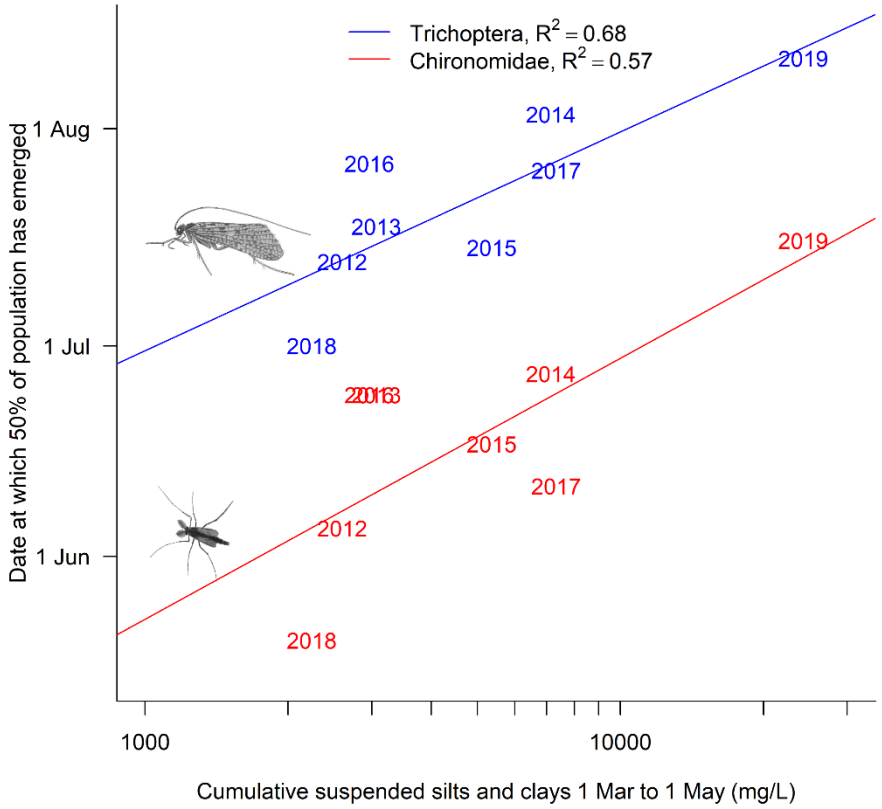

Figure 4. Relationship between midge and caddisfly adult activity (emergence) and springtime fine suspended sediments (Colorado River above National Canyon gage, aggregated 15-minute data, period of record March 1-May1). Both trend lines are significant ($p < 0.05$). Springtime sediment is inversely related to growing conditions for aquatic insects. Note that base environmental conditions were "good" in 2018 (low sediment) and "bad" in 2019 (high sediment,nearly 10X greater than in 2018), irrespective of the Bug Flows experiment.

Drift sampling

GCMRC staff will also monitor aquatic invertebrate drift monthly in Glen Canyon, and semi-annually throughout Glen, Marble, and Grand Canyons. The monthly sampling in Glen Canyon will be a continuation of monitoring that has been ongoing since 2007 and includes sampling at approximately 3-mile intervals from Glen Canyon Dam to the head of Badger Rapid, encompassing a total distance of 24 river miles. Invertebrate drift sampling will also be used to look at the variation in drift concentrations based on differences in flow velocities between weekday fluctuating flows and weekend steady releases. These data will allow determination of the extent to which Bug Flows result in weekly, seasonal, or inter-annual changes in the abundance of aquatic insects present in the drift. This monitoring effort will also be used to test predictions 1 and 3 in the Citizen Science Light Trapping section, above.

In addition, spring and fall river trips focused on quantifying invertebrate drift will be launched in 2020. Invertebrate drift will be collected at approximately 3-mile intervals throughout the Canyon to determine the extent to which spatial patterns in aquatic invertebrate drift respond to Bug Flows, complementary to prediction 2 in the Citizen Science Light Trapping section above. Although aquatic insect drift concentrations are correlated with adult abundances in light traps

that are deployed on land, in-river drift data are useful for more directly quantifying food availability for fish. These trips have been conducted since 2017 (the year prior to the first Bug Flows experiment), and thus allow comparison of seasonal and spatial patterns in aquatic invertebrate drift under conditions with and without Bug Flows.

COVID-19 contingencies

The evolving COVID-19 pandemic and response may affect GCMRC's ability to monitor the experiment to the full extent described above. Specifically, citizen science light trapping is likely to begin at least one month later than in prior years, and the spring Canyon-wide drift sampling trip is likely to be delayed.Even if these light trap and drift sampling activities begin later than usual, they will still provide valuable data to assess the efficacy of the experiment; the modeling approach used accounts for the seasonal timing of sample collection, so the loss of statistical power will be minimized. GCMRC is also proposing novel means of collecting light trap samples, which, if approved, would yield some sample coverage during this time. These approaches may include working with fishing guides at Lees Ferry and concessionaires stationed at Phantom Ranch.

Due to the one-year life cycle of aquatic insects, the principal means of assessing aquatic insect response to a 2020 Bug Flows experiment would also be via monitoring next year, in 2021. In this respect, reductions to the proposed monitoring in 2020 will therefore reduce GCMRC's efforts to report on the effects of the 2019 Bug Flows experiment more so than the experiment proposed for 2020.

V. Assessment of Resources

Consistent with the LTEMP modeling, expert resource assessment indicates that a Bug Flows experiment conducted May 1 through August 31, 2020 would not have sufficient potential adverse effects to other, non-target resources to justify foregoing the experiment. This section summarizes the assessment of resources and expected effects of a Bug Flows experiment.

Aquatic food base

Preliminary data on the aquatic food base is equivocal (see section IV). However, these years were climatologically very different, which somewhat confounded interpretation of the potential Bug Flows response. A 2020 experiment would provide a third year of data needed to identify the effect of Bug Flows on insect populations versus climatological effects.

Lees Ferry trout population

Analysis indicates a second year of Bug Flows testing does not pose a threat to the Lees Ferry trout population. Age-0 rainbow trout are the life stage of trout that are most vulnerable to stranding. A prior study of habitat use by age-0 trout found these young fish do not move in response to hourly flow variation (Korman and Campana 2009). This suggests there is minimal potential for stranding of these fish by Bug Flows, similar to base operations. The proposed stable weekend flow levels are very unlikely to cause any stranding of larger adult trout.

Lees Ferry fishery recreation experience quality

To assess whether the 2018-19 Bug Flows experiments had a significant effect on angler catch rates, AGFD analyzed data from boat angler surveys conducted from April to September for 2018 and 2019 to determine if angler Catch per Unit Effort (CPUE) was higher on days with low, steady flows (weekends). Stepwise model selection showed that Bug Flows explained most of the variance in angler catch with flows having a positive effect on boat angler CPUE (Rogowski 2018). However, the relationship was not straightforward. CPUE varied with time of year, with Bug Flows related to an increase in angler CPUE at the beginning of the Bug Flow experiment and no effect at the end of the Bug Flow experiment. Although AGFD's long term monitoring was not designed specifically to investigate whether flow experiments achieve their objectives, this survey data suggests Bug Flows may have enhanced the quality of the recreational fishing experience in Lees Ferry by initially improving angler catch rates on weekends (i.e., boat angler CPUE was higher on days with low, steady flows) for a portion of the Bug Flow season. Additionally, many anglers commented during interviews that they enjoyed fishing more during low, steady flows. Anglers reported that at weekend low flows experienced during the experiment (~8,900 cfs), gravel bars were shallow, and it was easier to place lures or flies where fish were holding. Conversely, guides and anglers felt that weekday high water levels made it difficult to get fishing gear into habitat where fish were located, and that fishing success declined when the water was rising or falling. Discharges below 8,000 cfs can inhibit or complicate navigation for boat anglers traveling upstream from Lees Ferry as gravel bars become more exposed; however, the proposed hydrograph for 2020 bug flows should provide enough discharge as to not impede navigation. Overall, we expect either positive or no unacceptable adverse impacts on recreational fishing from a 2020 Bug Flows experiment.

Endangered humpback chub and other native fish abundance

The adult humpback chub population in the Little Colorado River aggregation appears to be stable and above the Tier-1 threshold of 9,000 adults identified in the Biological Opinion for the LTEMP EIS (Van Haverbeke and others, 2020). Instability of nearshore environments arising from daily flow fluctuations has been identified as a potential risk factor for survival of larval native fish in the mainstem Colorado River (Robinson and others, 1998). More stable nearshore environments created by Bug Flows may reduce stranding risk for larval native fish. A long-term goal of Bug Flows is to have a positive indirect effect on native fish through increases in the aquatic insect food base available to these fish.

Invasive species

Warm-water invasive species are not predicted to benefit from the proposed Bug Flows experiment. Invasive warm-water fish are currently absent or maintained at low levels within the Colorado River in Glen, Marble, and Grand Canyons largely because of sub-optimal water temperatures for growth and reproduction. Minimizing the flow fluctuations of weekends will have the effect of making nearshore areas more stable on weekends, which may result in some slight warming of water within those shallow areas. However, Ross and Grams (2013) evaluated the effects of nearshore thermal gradients along margins of the Colorado River in Grand Canyon and concluded that warming was very minimal (< 0.2 C). Warming of this minimal magnitude only on weekends as a result of Bug Flows is unlikely to have population level effects on

invasive warm-water fish. Increases in abundance and diversity of aquatic insects are not likely to have population level effects due to the small numbers of invasive warm-water fish found in the system.

Riparian vegetation

There is no evidence that the Bug Flows experiment will significantly impact riparian vegetation resources. The primary impact will be to slightly extend the active channel, which is the zone of daily inundation, upslope on weekdays. This may slightly extend the suitable habitat for obligate wetland herbaceous species that respond positively to inundation, though longer-lived perennial species are unlikely to respond significantly to this short-term increase in inundation (Butterfield and others, 2018). Weekend low flows are also unlikely to have a significant impact, as sufficient water for plant metabolic activity is likely to be retained within sediments for the 2-day duration of the low flows.

Sediment resources

On the basis of the 2007–2017 suspended-sand data at the Colorado River above Little Colorado River near Desert View, AZ gaging station (61 river miles downstream from Lees Ferry), it was predicted that the 2018 Bug Flows experiment would export slightly more sand from Marble Canyon than normal operations. The Bug Flows experiment was predicted to export 2–7% more sand in every month of Bug Flows in 2018 relative to normal operations, consistent with predictions in the LTEMP. Due to similar release volumes it is expected that export arising from the 2020 Bug Flows experiment will be similar to the 2018 experiment.

Hydropower production and marketable capacity

WAPA has firm electric power contracts and must meet these contract obligations either with generation from Colorado River Storage Project powerplants or from purchases from the wholesale electrical market. During the Bug Flows experiment, low volume releases from Glen Canyon Dam during the weekend will require extra electrical purchases to meet WAPA's contract obligations. These expenses are offset with extra electrical production during the weekdays. The extent to which added weekend electrical expenses are offset by added electrical production during the week is a function of the difference in weekend and weekday prices. WAPA estimates that the expense of the 2020 Bug Flows experiment will be about $407,000, using current forecasted energy prices. However, summer energy prices are uncertain, and may be impacted by a reduction in baseload capacity in the West, as well as changes in electrical consumption patterns due to the COVID-19 pandemic response.

Water releases from GCD during the Bug Flows experiment may be affected by disturbances of the electrical system. Electrical system operations for these disturbances are required by Reclamation and WAPA under law, contracts, and other agreements. Changes in water releases at Glen Canyon Dam to assist in recovery from electrical system disturbances are of two types, regulation and contingency reserves, both of which are managed by WAPA's Western Area Colorado-Missouri (WACM) Balancing Authority. Regulation is used to respond to frequency deviations on the electrical system. Glen Canyon Dam is the only CRSP powerplant capable of the immediate responses required for regulation. These responses can either slightly increase or decrease Glen Canyon Dam water releases and can be as much as ±1,100 cfs (40 mw) for up to 1 hour and 59 minutes. Glen Canyon Dam is also normally selected to hold contingency reserves

(reserves) because it typically has available electrical capacity for response to electrical system emergencies. When reserves are called upon to assist in an electrical emergency, the response is only in the upward direction (increased release) and would result in an increase in Glen Canyon Dam water release up to 800 cfs (27 mw). Under certain circumstances, WAPA may be able to move these reserves to a different CRSP powerplant in order to minimize the impacts of electrical system operations on the experiment. A change in Glen Canyon Dam water release for both regulation and reserves at the same time, in the same direction, and up to the allowed limits would be extremely rare. However, the two potential responses combined in the upward direction could ramp GCD releases up by 1,900 cfs (67 mw) for up to 1 hour and 59 minutes.

WAPA estimates that the Colorado River Basin Fund will end the 2020 fiscal year with a balance of $138 Million. This does not meet WAPA's target for an end of year balance. The proposed Bug Flows experiment may reduce this balance by $407,000 but is not expected to have a substantial impact on the Basin Fund.

Cultural Resources

Impacts from Bug Flows are anticipated to be minimally beneficial to archaeological site condition and stability, because sand bars may have an opportunity to dry out and windy conditions may allow for the redistribution of sand from the bars to high elevation areas containing archaeological sites. The lower, slower steady weekend flows may also result in oar-power river runners spending more time on the water and less time on shore, reducing the potential for impacting archaeologist sites though visitation.

Grand Canyon Whitewater Recreational Rafting

Impacts to the whitewater rafting recreational experience are expected to be negligible. While the weekend steady flows may require boaters to spend slightly more time rowing and less time on shore, the slightly higher low flows on weekends and weekdays may improve the navigability of some rapids. Also, the steady, low weekend flows will enhance the size of campsites slightly during the weekend flow period, while minimizing the need to move and re-tie boats during the night.

VI. Safety Considerations

Potential, but minimal effects on public health and safety could occur in conjunction with the Bug Flows experiment, primarily impacting recreational river users. The proposed minimum flows are within the range experienced by recreational users in the past and those currently expected on a monthly basis. Reclamation and NPS coordinate to ensure that safety measures are implemented and will provide public notice about the timing and purpose of the experimental flows. The three affected parks (Glen Canyon—GLCA, Grand Canyon—GRCA, and Lake Mead—LAKE) have coordinated communications plans, medical plans, and resource capabilities for search and rescue responses. However, due to the COVID-19 pandemic, GRCA is closed entirely and no commercial or private river trips will be allowed to launch until May 22, 2020 at the earliest. When river trips begin launching again, flow and stage change information will be provided via public media, the individual park websites, and by on-site NPS staff at Lees Ferry and Phantom Ranch.

VII. Communications Plan

The communications/public affairs aspect of these experimental flows will not include a public/media event at Glen Canyon Dam but will include communications product development and media coordination.

Reclamation's Upper Colorado Basin – Interior Region 7 Public Affairs Office, in primary coordination with NPS, USGS, and WAPA public affairs contacts and the Department, will lead communications product development. If the Bug Flows experiment is approved, a detailed news release, for publication on or near the experimental Bug Flows start date, will be sent to convey the intent and timing of the experiment to media representatives and the public. This may be prepared for distribution by the Secretary's Office. Social media outlets will also be used to communicate with the public leading up to and during the event, including to share imagery of the experiment.

VIII. Monitoring and Coordination During Experiment Implementation

Members of the PI Team will continue to meet regularly throughout the implementation of the four-month experiment. This will occur through the regularly scheduled monthly Glen Canyon Dam operations coordination calls. Scientists conducting field surveys during the experiment and agency technical experts will report back on data collected and preliminary results to the Department and the GCDAMP at regularly scheduled meetings. Glen Canyon Dam operations will be adjusted accordingly in the event of unexpected impacts from Bug Flows.

IX. Post-Experiment Reporting and Feedback

The PI Team will coordinate to report findings at the 2020 GCDAMP Annual Reporting Meeting in early 2021 in Phoenix, AZ. In addition, the PI Team will report ongoing findings at meetings of the GCDAMP Technical Work Group (TWG) and Adaptive Management Work Group (AMWG). Reclamation has a commitment to provide an annual monitoring report to the FWS Arizona Ecological Services Office (AESO) in compliance with the 2016 Biological Opinion; this report will also include a summary of the effects of a Bug Flows experiment conducted under the LTEMP ROD. Reclamation will use the monitoring information and feedback from AESO and GCDAMP stakeholders to inform monitoring for future experiments, and to design and implement any measures necessary to address any adverse effects that may occur due to these flows.

X. Planning for Future Experiments

The PI Team will meet in early 2021 to review the implementation and results of any 2020 activities, and to begin coordination on the evaluation of resources and potential experiments that may be conducted in 2021. In accordance with the LTEMP ROD, the Department may make the decision to conduct future flow-based experiments (High Flow Experiments, Bug Flows, Trout Management Flows, and Low Summer Flows) at Glen Canyon Dam if it is determined that there are no unacceptable adverse impacts on other resource conditions. Information and data from this or other experiments will be considered in future recommendations and decisions.

XI. Consultation

Reclamation and GCMRC presented much of the information in this report that was available at that time to the AMWG at its regular meetings, and at the GCDAMP Annual Reporting Meetings. Notification of a potential 2020 Bug Flows experiment was emailed to GCDAMP stakeholders on April 13, 2020. Representatives of the Colorado River Basin States and the Arizona Game and Fish Department participated in the development of this recommendation and concur with it.

On March 31, 2020, the required 30-day advance notification and offer for consultation was emailed to the Tribes and parties to the LTEMP cultural Programmatic Agreement of the potential for a Bug Flows experiment beginning May 1, 2020. No requests for consultation were received. A follow-up notification will be sent electronically to the Programmatic Agreement signatories, including Tribes, following the Department's decision regarding the proposed Bug Flows experiment.

XII. Conclusion

Determining whether to recommend the Bug Flows experiment required coordination of many details and effective communication among technical staff of multiple agencies. The PI Team has thoroughly evaluated the issues discussed above and has taken into consideration the information and analysis included in the LTEMP EIS and ROD. The PI Team has reached a consensus recommendation to proceed with implementation of Bug Flows based on the careful assessment of resources and best available science.

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