

GCDAMP Knowledge Assessment: Effects of Experimental & Management Actions

Resource Topic: Water quality
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Version Date: 2/13/2017

Resource Characteristic	Specific Measure	Exper or Mgt Action	Strength	Direction	Confidence	Rationale: Strength & Direction	Rationale: Confidence	Recommendations
GCD outflow temperature	degrees C	Spring HFEs ≤ 45,000 cfs in March or April	Unknown	Unknown	Low	Changes dependent on release volume from HFE and the time of year. Hueftle and Stevens 2001 and Vernieu 2010 report a temperature drop in the water exiting GCD when the bypass tubes were used for 1996 and 2008 spring HFEs.	Very little data has been collected in Lake Powell to determine the impact of HFEs on the reservoir.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.
GCD outflow temperature	degrees C	Proactive Spring HFEs ≤ 45,000 cfs in April, May, or June	Unknown	Unknown	Low	Changes dependent on release volume from HFE and the time of year. Hueftle and Stevens 2001 and Vernieu 2010 report a temperature drop in the water exiting GCD when the bypass tubes were used for 1996 and 2008 spring HFEs.	Very little data has been collected in Lake Powell to determine the impact of HFEs on the reservoir.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.
GCD outflow temperature	degrees C	Fall HFEs ≤ 45,000 cfs in October or November	Unknown	Unknown	Low	Changes dependent on release volume from HFE and the time of year. Hueftle and Stevens 2001 and Vernieu 2010 report a temperature drop in the water exiting GCD when the bypass tubes were used for 1996 and 2008 spring HFEs.	Very little data has been collected in Lake Powell to determine the impact of HFEs on the reservoir.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.
GCD outflow temperature	degrees C	Fall HFEs > 96-hr duration	Unknown	Unknown	Low	Changes dependent on release volume from HFE and the time of year. Hueftle and Stevens 2001 and Vernieu 2010 report a temperature drop in the water exiting GCD when the bypass tubes were used for 1996 and 2008 spring HFEs.	Very little data has been collected in Lake Powell to determine the impact of HFEs on the reservoir.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.
GCD outflow concentrations of dissolved oxygen	concentration, percent saturation	Spring HFEs ≤ 45,000 cfs in March or April	Moderate	Unknown	Medium	Changes dependent on release volume from HFE and especially the volume released via the river outlet works (bypass). Hueftle and Stevens 2001 and Vernieu 2010 report that oxygen concentrations in the dam tailwaters increased above saturation during the spring 1996 and 2008 HFEs due to reaeration caused by the bypass tube river outlet works. The dissolved oxygen concentration of the water exiting the dam will be supersaturated when the bypass tubes are used. In HFEs where the bypass tubes are not used, the dissolved oxygen concentration in the water exiting GCD will reflect the dissolved oxygen concentration of the water column above GCD.	Very little data has been collected in Lake Powell to determine the impact of HFEs on the reservoir.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.

WATER QUALITY

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GCD outflow salinity, TDS, specific conductance	concentration	Spring HFEs ≤ 45,000 cfs in March or April	Unknown	Unknown	Low	Changes dependent on release volume from HFE and time of year. Data are available for impacts from two HFEs. Hueftle and Stevens 2001 and Vernieu 2010 report enhanced freshening of hypolimnion during 1996 and 2008 spring HFEs and higher conductivity water exiting GCD when the bypass tubes were used.	Very little data has been collected in Lake Powell to determine the impact of HFEs on the reservoir.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.

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GCD outflow concentrations of nutrients (e.g., phosphorous, nitrogen)	concentration of various species of nitrogen and phosphorus as well as various micronutrients (Fe, SiO ₂ , K, Ca, etc.)	Spring HFEs ≤ 45,000 cfs in March or April	Unknown	Unknown	Low	Little to no data exist for the impact of HFEs on these parameters in Lake Powell or downstream in the Colorado River.	Little to no data exist for the impact of HFEs on these parameters in Lake Powell or downstream in the Colorado River.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.
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GCD outflow concentrations of phytoplankton, zooplankton, chlorophyll a	concentration and counts	Spring HFEs ≤ 45,000 cfs in March or April	Unknown	Unknown	Low	Little to no data exist for the impact of HFEs on these parameters in Lake Powell or downstream in the Colorado River.	Little to no data exist for the impact of HFEs on these parameters in Lake Powell or downstream in the Colorado River.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream.
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GCD outflow concentrations of metals (e.g., selenium, mercury, uranium, etc.)	concentration	Fall HFEs > 96-hr duration	Unknown	Unknown	Low	Little to no data exist for the impact of HFEs on these parameters in Lake Powell or downstream in the Colorado River.	Little to no data exist for the impact of HFEs on these parameters in Lake Powell or downstream in the Colorado River.	Collect data at sufficient locations and frequency to determine the impacts of HFEs on Lake Powell and downstream.

WATER QUALITY

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GCD outflow temperature	degrees C	Trout Management Flows	Unknown	Unknown	Low	No data are available for the impacts of trout management flows on Lake Powell and the outflow of Lake Powell because this experiment has not been conducted.	No data are available for the impacts of trout management flows on Lake Powell and the outflow of Lake Powell because this experiment has not been conducted.	Collect data at sufficient locations and frequency to determine the impacts of Trout Management Flows on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.
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GCD outflow temperature	degrees C	Macroinvertebrate Production Flows	Unknown	Unknown	Low	No data are available for the impacts of macroinvertebrate flows on Lake Powell and the outflow of Lake Powell because this experiment has not been conducted.	No data are available for the impacts of macroinvertebrate flows on Lake Powell and the outflow of Lake Powell because this experiment has not been conducted.	Collect data at sufficient locations and frequency to determine the impacts of Macroinvertebrate Production Flows on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.
GCD outflow concentrations of dissolved oxygen	concentration, percent saturation	Macroinvertebrate Production Flows	Unknown	Unknown	Low	No data are available for the impacts of macroinvertebrate flows on Lake Powell and the outflow of Lake Powell because this experiment has not been conducted.	No data are available for the impacts of macroinvertebrate flows on Lake Powell and the outflow of Lake Powell because this experiment has not been conducted.	Collect data at sufficient locations and frequency to determine the impacts of Macroinvertebrate Production Flows on Lake Powell and downstream. Utilize the results of an Protocols Evaluation Panel or Science Advisors Panel to determine location and frequency.
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