GCDAMP Knowledge Assessment: Effects of Experimental & Management Actions										
Resource Topic:	Hydropower and energy									
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Resource Characteristic	Specific Measure	Management Action	Strength	Direction	Confidence	Rationale: Strength & Direction	Rationale: Confidence	Recommendations
Electric generation (energy	MW/h gaparated (upar	Spring HFEs ≤ 45,000 cfs in March or	Madarata	Negative	Lligh	Pumpers	Amount of hunges and its past can be massured	
production)	MWh generated/year	April	Moderate	Effect	High	Bypass	Amount of bypass and its cost can be measured	
Electric generation (energy	MWh generated/year	Proactive Spring HFEs ≤ 45,000 cfs in	Weak	Negative	High	Bypasses less water	Amount of bypass and its cost can be measured	
production)	www.generated/year	April, May, or June	WCak	Effect	111611		Amount of bypass and its cost can be measured	
Electric generation (energy	MWh generated/year	Fall HFEs ≤ 45,000 cfs in October or	Moderate	Negative	High	Bypass	Amount of bypass and its cost can be measured	
production)		November		Effect	5			
Electric generation (energy			C 1	Negative				Evaluate whether extended duration HFEs result in
production)	MWh generated/year	Fall HFEs > 96-hr duration	Strong	Effect	High	Bypasses more water	Amount of bypass and its cost can be measured	larger and longer-lasting sandbars in critical reaches
Electric generation (energy						Does not affect the amount of electrical generation (no		
production)	MWh generated/year	Trout management flows	Weak	No Effect	High	bypass)		
Electric generation (energy						Does not affect the amount of electrical generation (no		
production)	MWh generated/year	Macroinvertebrate production flows	Weak	No Effect	High	bypass)		
Electric generation (energy	MWh generated/year	Humpback chub translocation	Weak	No Effect	High	No effect to power production		
production)	www.generated/year		WCak					
Electric generation (energy	MWh generated/year	Mechanical removal of rainbow trout	Weak	No Effect	High	No effect to power production		
production)		from LCR reach Mechanical removal of invasive fish			-			
Electric generation (energy production)	MWh generated/year	species	Weak	No Effect	High	No effect to power production		
Electric generation (energy		Larval humpback chub head-start						
production)	MWh generated/year	program	Weak	No Effect	High	No effect to power production		
Electric generation (energy	MW/h gonorated (voar	Riparian vogetation restoration	Weak	No Effect	High	No effect to power production		
production)	MWh generated/year	Riparian vegetation restoration	Weak	NO ENect	півп			
Electric generation (energy value)	Market Price/MWh generated/year	Spring HFEs $\leq 45,000$ cfs in March or	Weak	No Effect	High	Bypass, moves water to an off-peak power month	Amount of bypass and costs associated with moving	
	indirect mee, in the generated, year	April					water between months can be measured	
Electric generation (energy value)	Market Price/MWh generated/year	Proactive Spring HFEs ≤ 45,000 cfs in	Weak	No Effect	High	Bypasses less water, moves water to an off-peak power	Amount of bypass and costs associated with moving	
		April, May, or June			-	month	water between months can be measured	
Electric generation (energy value)	Market Price/MWh generated/year	Fall HFEs ≤ 45,000 cfs in October or November	Weak	No Effect	High	Bypass, moves water to an off-peak power month	Amount of bypass and costs associated with moving water between months can be measured	
		November						
Electric generation (energy value)	Market Price/MWh generated/year	Fall HFEs > 96-hr duration	Weak	No Effect	High	Bypasses more water, moves water to an off-peak	Amount of bypass and costs associated with moving	Evaluate whether extended duration HFEs result in
					5	power month	water between months can be measured	larger and longer-lasting sandbars in critical reaches
						Depends on how TMFs are designed. Could be done in		
Electric generation (energy value)	Market Price/MWh generated/year	Trout management flows	Unknown	Unknown	Medium	coincidence to power production or could be	Depends on how TMFs are designed.	Design TMFs that are increase power value during the
						deleterious to power production.		prescribed release.
						Depends on how experiment is designed. Currently, the		Design Bug Flows that increase power value during the
Electric generation (energy value)	Market Price/MWh generated/year	Macroinvertebrate production flows	Weak	Unknown	Medium	design would increase weekday capacity which would	Depends on how Bug Flows are designed.	prescribed release.
						increase energy value.		
Electric generation (energy value)	Market Price/MWh generated/year	Humpback chub translocation	Weak	No Effect	High	No effect to power production		
		Mechanical removal of rainbow trout						
Electric generation (energy value)	Market Price/MWh generated/year	from LCR reach	Weak	No Effect	High	No effect to power production		
		Mechanical removal of invasive fish						
Electric generation (energy value)	Market Price/MWh generated/year	species	Weak	No Effect	High	No effect to power production		
		Larval humpback chub head-start			ur.t			
Electric generation (energy value)	Market Price/MWh generated/year	program	Weak	No Effect	High	No effect to power production		
Electric generation (energy value)	Market Price/MWh generated/year	Riparian vegetation restoration	Weak	No Effect	High	No effect to power production		
Licence generation (energy value)			VV Cak	INO LITECT	111811			
Electric generation (capacity)	Marketable Mw/peak power month	Spring HFEs ≤ 45,000 cfs in March or	Weak	No Effect	High	Water is not moved from peak power months to cover		
	(Jul/Aug)	April		-		HFEs		
Electric generation (capacity)	Marketable Mw/peak power month	Proactive Spring HFEs ≤ 45,000 cfs in	Weak	No Effect	High	Water is not moved from peak power months to cover		
	(Jul/Aug)	April, May, or June				HFEs		

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Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Fall HFEs ≤ 45,000 cfs in October or November	Weak	No Effect	High	Water is not moved from peak power months to cover HFEs		
Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Fall HFEs > 96-hr duration	Weak	No Effect	High	Water is not moved from peak power months to cover HFEs		
Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Trout management flows	Unknown	Unknown	Low	Depends on how TMFs are designed. Could be done in coincidence to power production or could be deleterious to power production.	Depends on how TMFs are designed.	Design TMFs that are increase power value during the prescribed release.
Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Macroinvertebrate production flows	Moderate	Positive Effect	High	Depends on how experiment is designed. Currently, the design would increase weekday capacity.	Depends on how Bug Flows are designed.	Design Bug Flows that increase weekday capacity during the prescribed release.
Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Humpback chub translocation	Weak	No Effect	High	No effect to power production		
Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Mechanical removal of rainbow trout from LCR reach	Weak	No Effect	High	No effect to power production		
Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Mechanical removal of invasive fish species	Weak	No Effect	High	No effect to power production		
Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Larval humpback chub head-start program	Weak	No Effect	High	No effect to power production		
Electric generation (capacity)	Marketable Mw/peak power month (Jul/Aug)	Mechanical removal of invasive fish species	Weak	No Effect	High	No effect to power production		
Electric generation (capacity)	Capital investment (\$) in new powerplant capacity construction	Spring HFEs ≤ 45,000 cfs in March or April	Weak	No Effect	High	Water is not moved from peak power months to cover HFEs		
Electric generation (capacity)	Capital investment (\$) in new powerplant capacity construction	Proactive Spring HFEs ≤ 45,000 cfs in April, May, or June	Weak	No Effect	High	Water is not moved from peak power months to cover HFEs		
Electric generation (capacity)	Capital investment (\$) in new powerplant capacity construction	Fall HFEs ≤ 45,000 cfs in October or November	Weak	No Effect	High	Water is not moved from peak power months to cover HFEs		
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Electric generation (capacity)	Capital investment (\$) in new powerplant capacity construction	Macroinvertebrate production flows	Moderate	Positive Effect	High	Depends on how experiment is designed. Currently, the design would increase weekday capacity.	Depends on how Bug Flows are designed.	Design Bug Flows that increase weekday capacity during the prescribed release.
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Load following capability	Annual MW available above/below WAPA customer demand	Spring HFEs ≤ 45,000 cfs in March or April	Moderate	Negative Effect	High	Bypass, moves water to an off-peak power month	Amount of bypass and costs associated with moving water between months can be measured	

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Load following capability	Annual MW available above/below WAPA customer demand	Proactive Spring HFEs ≤ 45,000 cfs in April, May, or June	Weak	Negative Effect	High	Bypasses less water, moves water to an off-peak power month	Amount of bypass and costs associated with moving water between months can be measured	
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Load following capability	Annual MW available above/below WAPA customer demand	Fall HFEs > 96-hr duration	Moderate	Negative Effect	High	Bypasses more water, moves water to an off-peak power month	Amount of bypass and costs associated with moving water between months can be measured	Evaluate whether extended duration HFEs result in larger and longer-lasting sandbars in critical reaches
Load following capability	Annual MW available above/below WAPA customer demand	Trout management flows	Unknown	Unknown	Low	Depends on how TMFs are designed. Could be done in coincidence to power production or could be deleterious to power production.	Depends on how TMFs are designed.	Design TMFs that are increase power value during the prescribed release.
Load following capability	Annual MW available above/below WAPA customer demand	Macroinvertebrate production flows	Weak	Positive Effect	High	Depends on how experiment is designed. Currently, the design would increase weekday capacity.	Depends on how Bug Flows are designed.	Design Bug Flows that increase weekday capacity during the prescribed release.
Load following capability	Annual MW available above/below WAPA customer demand	Humpback chub translocation	Weak	No Effect	High	No effect to power production		
Load following capability	Annual MW available above/below WAPA customer demand	Mechanical removal of rainbow trout from LCR reach	Weak	No Effect	High	No effect to power production		
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Load following capability	Annual MW available above/below WAPA customer demand	Larval humpback chub head-start program	Weak	No Effect	High	No effect to power production		
Load following capability	Annual MW available above/below WAPA customer demand	Mechanical removal of invasive fish species	Weak	No Effect	High	No effect to power production		
Emissions	Changes in emissions to compensate for energy losses resulting from changes in operations at Glen Canyon Dam (tons of CO2, SO2 and NOX emissions/year)	Spring HFEs ≤ 45,000 cfs in March or April	Weak	Negative Effect	Medium	Bypass, moves water to an off-peak power month	Amount of bypass and water moved between months can be measured	
Emissions	Changes in emissions to compensate for energy losses resulting from changes in operations at Glen Canyon Dam (tons of CO2, SO2 and NOX emissions/year)	Proactive Spring HFEs ≤ 45,000 cfs in April, May, or June	Weak	Negative Effect	Medium	Bypasses less water, moves water to an off-peak power month	Amount of bypass and water moved between months can be measured	
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Emissions	Changes in emissions to compensate for energy losses resulting from changes in operations at Glen Canyon Dam (tons of CO2, SO2 and NOX emissions/year)	Macroinvertebrate production flows	Weak	Positive Effect	High	Depends on how experiment is designed. Currently, the design would increase weekday capacity.	Depends on how Bug Flows are designed.	Design Bug Flows that increase weekday capacity during the prescribed release.
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Net firming purchases	\$/year (distinguish between hydrology and operational changes)	Spring HFEs ≤ 45,000 cfs in March or April	Moderate	Negative Effect	High	Bypass, moves water to an off-peak power month	Amount of bypass and costs associated with moving water between months can be measured	
Net firming purchases	\$/year (distinguish between hydrology and operational changes)	Proactive Spring HFEs ≤ 45,000 cfs in April, May, or June	Weak	Negative Effect	High	Bypasses less water, moves water to an off-peak power month	Amount of bypass and costs associated with moving water between months can be measured	
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Net firming purchases	\$/year (distinguish between hydrology and operational changes)	Macroinvertebrate production flows	Moderate	Positive Effect	High	Depends on how experiment is designed. Currently, the design would increase weekday capacity.	Depends on how Bug Flows are designed.	Design Bug Flows that increase weekday capacity during the prescribed release.
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Net firming purchases	\$/year (distinguish between hydrology and operational changes)	Mechanical removal of invasive fish species	Weak	No Effect	High	No effect to power production		
Hydro-mechanical equipment	\$/year (O/M and replacement)	Spring HFEs ≤ 45,000 cfs in March or April	Weak	Negative Effect	High	Use of the bypass tubes results in accelerated wear of the bypass tube coatings and valves.		
Hydro-mechanical equipment	\$/year (O/M and replacement)	Proactive Spring HFEs ≤ 45,000 cfs in April, May, or June	Weak	Negative Effect	High	Use of the bypass tubes results in accelerated wear of the bypass tube coatings and valves.		
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Hydro-mechanical equipment	\$/year (O/M and replacement)	Fall HFEs > 96-hr duration	Weak	Negative Effect	High	Use of the bypass tubes results in accelerated wear of the bypass tube coatings and valves.		Evaluate whether extended duration HFEs result in larger and longer-lasting sandbars in critical reaches
Hydro-mechanical equipment	\$/year (O/M and replacement)	Trout management flows	Weak	No Effect	High	No anticipated effect to hydro-mechanical equipment beyond	Flows fall within range of normal power operations, would not require bypass	
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