

**GCDAMP Knowledge Assessment: Effects of Experimental & Management Actions**

Resource Topic:	Humpback chub
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Resource Characteristic	Specific Measure	Exper or Mgt Action	Strength	Direction	Confidence	Rationale: Strength & Direction	Rationale: Confidence	Recommendations
Adult chub population in western Grand Canyon	CPE (relative abundance)	Humpback chub translocation	Moderate	Positive Effect	Medium	Effect in tributaries like Navajo could be moderate because of low initial populations. Mainstem	Ongoing monitoring in Navajo suggests high growth and survival, as well as reproduction. There is high	
Adult population that spawns in the LCR	Abundance	Humpback chub translocation	Moderate	Positive Effect	Medium	Effect is currently either weak/moderate because of large populations in the LCR, but it could accumulate over time and/or be more important if future abundances are lower.	several translocations have occurred. Survival and survival of chub above chute falls is higher than elsewhere in the system, however with a large natural population these effects are currently modest on a population scale.	
Adult population that spawns in the LCR	Abundance	Larval humpback chub head-start program	Weak	Positive Effect	Low	Strength near LCR may be weak because population is currently large and potential density dependence.	This form of translocation has never been tried (N=0).	
Juvenile chub population in CR near LCR	Abundance	Macroinvertebrate production flows	Unknown	Unknown	Low	Short term may be more food (positive); long term may be more trout (negative)	Poor understanding of bug flows (N=0)	
Juvenile chub population in CR near LCR	Abundance	Mechanical removal of rainbow trout from LCR reach	Weak	Positive Effect	High	rainbow trout are believed to have a modest effect on humpback chub survival, although direct predation does occur on an individual basis (i.e., population effects are modest)		
Juvenile chub population in CR near LCR	Abundance	Proactive Spring HFEs $\leq$ 45,000 cfs in April, May, or June	Unknown	Unknown	Low	Short term may be more food (positive); long term may be more trout (negative)	Poor understanding of spring HFEs (N=1)	
Juvenile chub population in CR near LCR	Abundance	Spring HFEs $\leq$ 45,000 cfs in March or April	Unknown	Unknown	Low	Short term may be more food (positive); long term may be more trout (negative)	Poor understanding of spring HFEs (N=1)	
Juvenile chub population in CR near LCR	Abundance	Trout management flows	Weak	Positive Effect	Low	Rainbow trout are believed to have a modest effect on humpback chub survival, and mostly originate in Glen and upper Marble canyons. TMFs may lower immigration to near the LCR.	Poor understanding of TMFs (N=0)	
Juvenile chub population in western Grand Canyon	CPE (relative abundance)	Fall HFEs > 96-hr duration	Unknown	Positive Effect	Low	HFEs could be improving habitat in the western GC, specifically backwaters. (see drivers and constraints)	We still have a poor understanding of the importance of backwaters to humpback chub and other native fishes. (See drivers and constraints)	
Juvenile chub population in western Grand Canyon	CPE (relative abundance)	Fall HFEs $\leq$ 45,000 cfs in October or November	Unknown	Positive Effect	Low	HFEs could be improving habitat in the western GC, specifically backwaters. (see drivers and constraints)	We still have a poor understanding of the importance of backwaters to humpback chub and other native fishes. (See drivers and constraints)	
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