



Long-Term Experimental and Management Plan (LTEMP) Biological Opinion Conservation Measures update:

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Incidental Take Parameters and Action Triggers:

TIER 1 – Early Intervention

	TRIGGER	2015	2016	2017
1A. Combined adult Humpback Chub (HBC) mainstem Little Colorado River (LCR) aggregation and juvenile HBC in LCR	≤ 9000	$> 9,000^1$	$> 9,000^1$	ND*
OR				
1B. Recruitment of sub-adult HBC does not equal or exceed estimated adult mortality				
Sub-adult in spring estimates	$\leq 1,250$ for 3 years	921 ²	749 ²	3,146 ²
OR				
Sub-adult in mainstem in Juvenile Chub Monitoring (JCM) Reach	≤ 810 for 3 years	ND*	ND*	ND*



¹ USGS, preliminary data, do not cite
² USFWS, preliminary data, do not cite
 * Not determined, results forthcoming



Incidental Take Parameters and Action Triggers: TIER 2 – Mechanical Removal

	TRIGGER	2015	2016	2017
	HBC decline to <7,000	N/A	N/A	N/A
Terminate mechanical removal	Predator index is 60 rainbow trout (RBT)/km	-	-	-
	Immigration rate	-	-	-
OR				
HBC population estimates	Exceeds 7,500	-	-	-
Survival rates of sub-adult chub	Exceeds adult mortality for at least 2 years	-	-	-

Conservation Measures

Conservation Measure		Activity that addresses it	Who is doing the work
Humpback Chub			
<i>Translocations</i>	Mainstem tributaries (Shinumo, Havasu Upper Havasu)	NPS -Humpback Chub Tributary Translocations and Associated Monitoring and Nonnative Fish Control; GCMRC - Project C	NPS/GCMRC
	Chute falls	GCMRC - Project G	GCMRC/FWS
	Explore other tribs	GCMRC - Project G; NPS - Humpback Chub Tributary Translocations and Associated Monitoring and Nonnative Fish Control; FWS - coordination with Havasupai Tribe on translocations	GCMRC/NPS/FWS
	Nonnative removal in tribs	NPS -Humpback Chub Tributary Translocations and Associated Monitoring and Nonnative Fish Control	NPS/GCMRC
<i>Mainstem</i>	LCR	GCMRC Project G	GCMRC/FWS
	Mainstem augmentation	GCMRC Project G	GCMRC/FWS
<i>LCR Monitoring</i>	Spring and Fall Population estimates	GCMRC Project G	GCMRC/FWS
	LCR mainstem aggregation monitoring	GCMRC Project G	GCMRC/FWS
	Multistate model	GCMRC Project G	GCMRC
<i>Mainstem monitoring</i>	Aggregations	GCMRC Project G	GCMRC/NPS/FWS
	New populations & outside aggregations	GCMRC Project G; NPS/BioWest/FWS	GCMRC/NPS/BioWest/FWS
	Parasite monitoring	GCMRC Project I	GCMRC
<i>Refuge</i>	Fund FWS Humpback Chub refuge (SNARRC)	Reclamation	FWS / Reclamation
Razorback Sucker			
	Habitat use	GCMRC -Project F; NPS/BioWest -Razorback Sucker Monitoring and Adaptive Management, Larval and Small-bodied Fish Sampling	GCMRC/NPS/BioWest
	Determine effects of dam operations-TMFs	GCMRC - Project H; NPS -Razorback Sucker Monitoring and Adaptive Management, Larval and Small-bodied Fish Sampling	NPS/GCMRC
	Determine extent of hybridization	Reclamation funded masters degree project	Reclamation

Conservation Measures

Conservation Measure		Activity that addresses it	Who is doing the work
<i>Benefit Native Aquatic Species</i>			
	Remove brown trout from Bright Angel, inflow & and other areas	GCMRC- Project F ; NPS- Humpback Chub Tributary Translocations and Associated Monitoring and Nonnative Fish Control	GCMRC/NPS
	Evaluate use of piscicide or other tools to renovate Bright Angel and Shinumo		NPS
	Evaluate TMFs for brown trout	GCMRC- Project H	GCMRC
	Rapid Response	GCMRC- Project I; NPS- Invasive Species Monitoring & Management	NPS/GCMRC
	Evaluate temperature control methods	Reclamation Project C.9	Reclamation
	Evaluate means to prevent fish passage through the dam	Reclamation Project C.8	Reclamation
	Backwater slough	NPS- Invasive Species Monitoring and Management	NPS/Reclamation
<i>Southwest Willow Flycatcher</i>			
	monitor every 2 years	Reclamation Project C.10	NPS
<i>Yuma Ridgway's Rail</i>			
	monitor every 3 years	Reclamation Project C.10	NPS