

**REVISITING AMP GOAL 3:
ISSUES AND A PRELIMINARY ANALYSIS OF
EXTIRPATED OR AT-RISK SPECIES
IN THE COLORADO RIVER ECOSYSTEM
DOWNSTREAM FROM GLEN CANYON DAM**

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- **Legal issues, guidance**
- **Species lists**
- **Case studies**
- **How to address Goal 3**

AMWG VISION AND MISSION

Adopted by the Glen Canyon Dam Adaptive Management Work Group

July 21, 1999

The Grand Canyon is a homeland for some, sacred to many, and a national treasure for all. In honor of past generations, and on behalf of those of the present and future, we envision **an ecosystem where the resources and natural processes are in harmony** under a stewardship worthy of the Grand Canyon.

We advise the Secretary of the Interior on how best to protect, mitigate adverse impacts to, and improve the integrity of the Colorado River ecosystem affected by Glen Canyon Dam, including natural biological diversity (emphasizing native biodiversity), traditional cultural properties, spiritual values, and cultural, physical, and recreational resources through the operation of Glen Canyon Dam and other means.

We do so in keeping with the federal trust responsibilities to Indian tribes, in compliance with applicable federal, state, and tribal laws, including the water delivery obligations of the Law of the River, and with due consideration to the economic value of power resources.

This will be **accomplished through our long-term partnership utilizing the best available scientific and other information through an adaptive ecosystem management process.**

AMP GOAL 3

***Restore populations of extirpated species,
as feasible and advisable.***

The only IN for Goal 3 is RIN 3.1.1:

What information (including technical, legal, economic, and policy issues) should be considered in determining the feasibility and advisability of restoring pikeminnow, bonytail, roundtail chub, river otter, or other extirpated species?

Restoration Perspectives: What can be restored in the CRE?

- “Past Nature” – stewardship of the pristine condition
- “Present Nature” – management of a naturalized ecosystem (*sensu* Schmidt et al. 1998)
- “Future Nature” – ecosystem develops in the absence of future human intervention

Management for “Future Nature” may yield a “Silent Forest” – high quality habitat with low faunal biodiversity

BIODIVERSITY CONSERVATION IN THE CRE

- **~ 800 plant species**
- **~ 10,000 invertebrate species**
- **~ 350 vertebrate species**

EXTIRPATED OR DECLINING SPECIES

- **Which species have been lost in post-dam time and why ?**
- **Which are declining and why ?**
- **Is there potential for restoring missing populations ?**

Grand Canyon MIA or Declining Plant Species

NPS Rare or Extirpated Species List	FWS Endangered Species List	GCWC Focal Species
	7 plant species of special concern (formerly category 2 species) 26 vascular plants are of management concern due to their limited distribution	7 plant species of special concern (formerly category 2 species) 26 vascular plants are of management concern due to their limited distribution
Bear Valley sandwort		Bear Valley sandwort
MacDougall's Flaveria		MacDougall's Flaveria
25 other rare or endemic vascular plants		Numerous cacti and other plants
		Salix gooddingii
	Sentry Milkvetch	Sentry Milkvetch
		Yerba-mansa

(Text in bold are extirpated or declining species in the CRE; other species are species of concern elsewhere in GRCA)

McDougall's Flaveria: a rare springs plant



Goodding's Willow (*Salix gooddingii*)



Once relatively common along wide reaches of the Colorado River in Grand Canyon; now gone from 7 of 18 post-dam sites, with most plants in dire health and no recruitment; losses due to increased beaver attack and possibly flow alteration.

Coming Soon to Grand Canyon Tamarisk Leaf Beetle



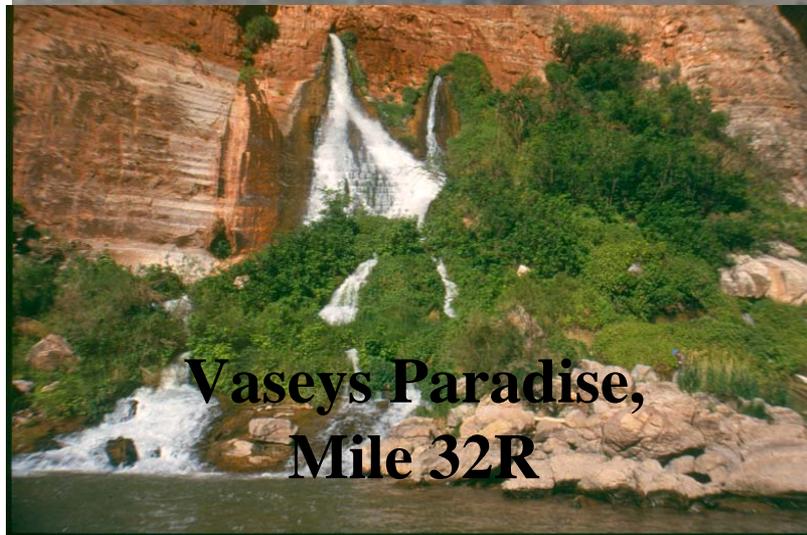
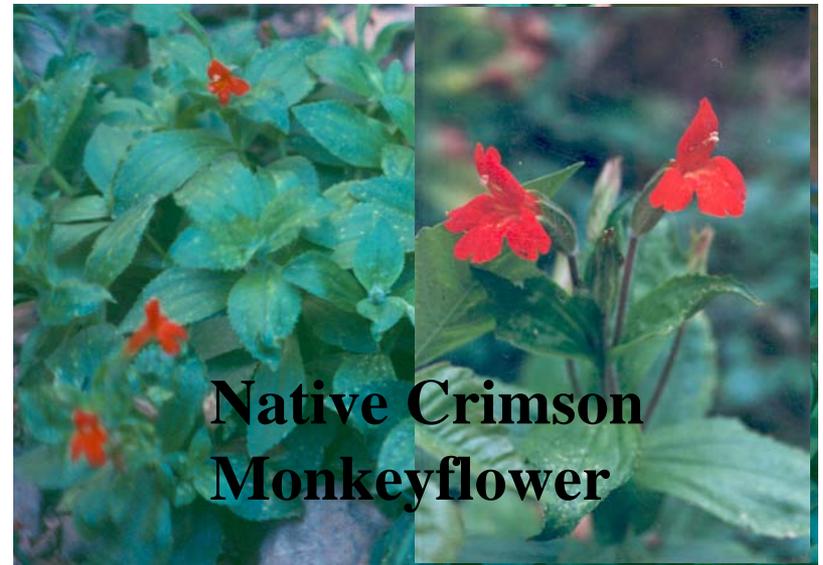
Tamarisk defoliation in the CRE will be unsightly, may increase fire frequency and erosion, and warrant management planning emphasizing revegetation with Goodding's Willow

Invertebrates

NPS Extirpated Species List	FWS Endangered Species List	GCWC Focal Species
	Kanab ambersnail E	Kanab ambersnail E
		Arizona Wetsalts Tiger Beetle (endemic)
		Grand Canyon Ringlet Butterfly
		Kaibab Indra Swallowtail
		Masked Club-skimmer (endemic)
		Viceroy Butterfly
		Vulcans Well Waterbug (endemic?)
		Many rare species

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A SPRING, A SNAIL, A COMPLEX STORY



RARE OR ENDEMIC CRE BUTTERFLIES



Papilio indra kaibabensis



Extirpated from GC?

Limenitis archippus



*Cyllopsis pertepida
dorothea*



*Agathymus alliae
piute*

ENDEMIC, SMALL POPULATIONS, NO MONITORING, STATUS UNCERTAIN



“Masked Clubskimmer
(LIBELLULIDAE: *Brechmorhoga pertinax*)”
Stone Creek to Nankoweap Creek.



Wetsalts Tiger Beetle
(CICINDELIDAE:
Cicindela haemorrhagica arizonae)
Stone Creek to Nankoweap Creek.



Vulcans Well Giant Waterbug
(BELOSTOMATIDAE:
Belostoma flumineum new ssp?)
One spring along river, taxonomy?

FISH

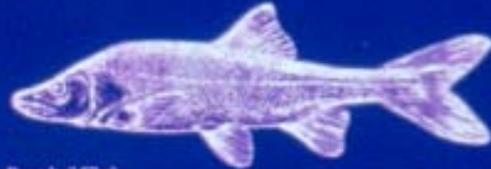
NPS Extirpated Species List	FWS Endangered Species List	GCWC Focal Species
Bonytail chub E		Bonytail chub E
Colorado pikeminnow E		Colorado pikeminnow E
	Humpback Chub	Humpback Chub
	Little Colorado River Spinedace	Little Colorado River Spinedace
Razorback sucker E	Razorback sucker E	Razorback sucker E
Roundtail chub		Roundtail chub

**(Text in bold are extirpated or declining species in the CRE;
other species are species of concern elsewhere in the GC region)**

NATIVE FISH OF THE COLORADO RIVER IN GRAND CANYON



Bonytail Chub



Roundtail Chub



Colorado Squawfish



Razorback sucker

Extirpated



Humpback Chub



Flannelmouth Sucker



Bluehead Sucker



Spotted Dace



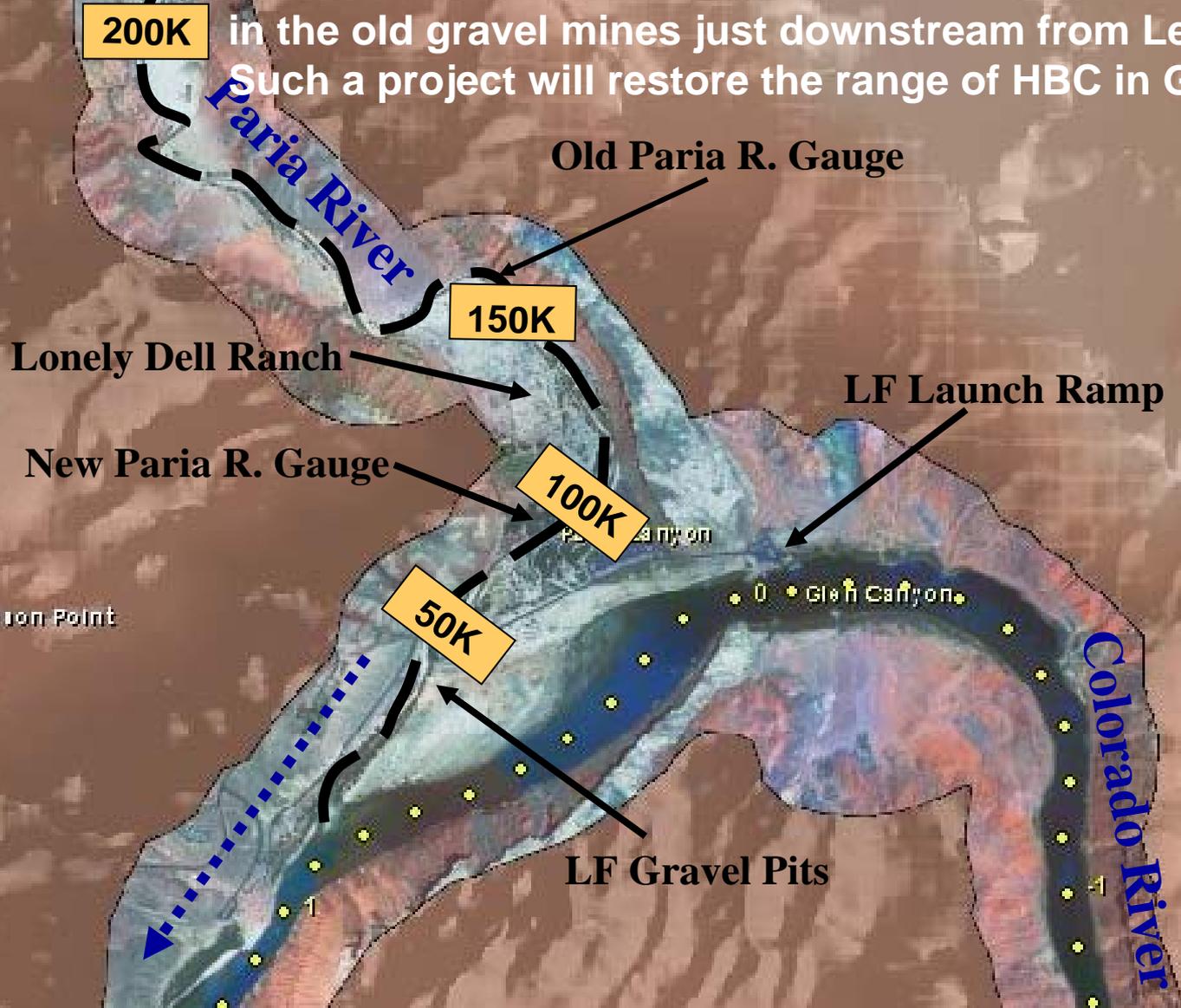
Extant

Endangered Humpback Chub
(Cyprinidae: *Gila cypha*)





Ponding of the Paria River tributary mouth supports the second largest pre-dam HBC population downstream of Glen Canyon Dam. GCWC has suggested a project to restore suitable HBC and other native fish habitat in the old gravel mines just downstream from Lees Ferry. Such a project will restore the range of HBC in Grand



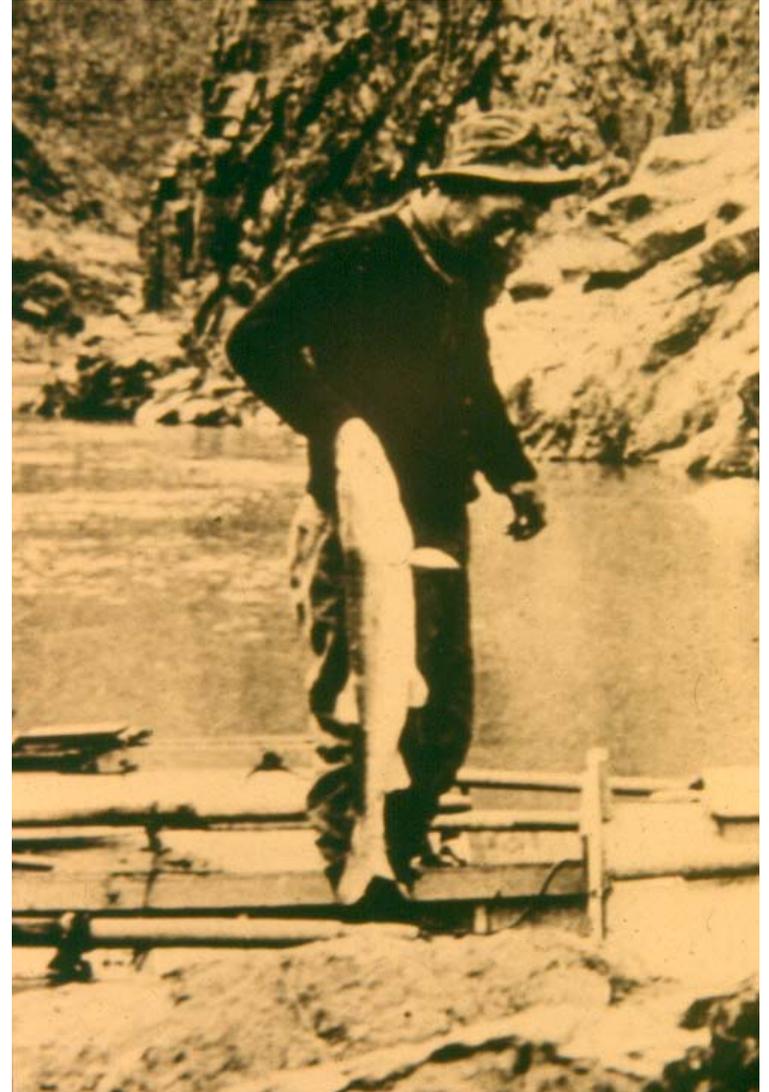
OTHER FISH SPECIES MISSING FROM GRAND CANYON



Bonytail Chub



Razorback Sucker



Colorado Pikeminnow

Other Species of Management Concern



HERPETOFAUNA

NPS Extirpated Species List	FWS Endangered Species List	GCWC Focal Species
Northern Leopard Frog		Northern leopard frog
		Lowland Leopard Frog
	Desert Tortoise	Desert Tortoise
		Zebra-tailed lizard
		Western Blind Snake

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Grand Canyon Pink Rattlesnake



**Northern Leopard Frog
-9 Mile Spring and Cardenas Marsh**



Lowland Leopard Frog at 248R



BIRDS

NPS Extirpated Species List	FWS Endangered Species List	GCWC Focal Species
	Yuma Clapper Rail	
	Bald Eagle	Bald Eagle
		Brown Pelican E
		Burrowing owl
	California condor E*	California condor E*
	Mexican Spotted Owl	Mexican Spotted Owl
		Peregrine Falcon
		Pileated woodpecker
		Sage grouse
	Southwestern willow flycatcher E	Southwestern willow flycatcher E & Extptd
		Yellow-billed cuckoo

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Southwestern Willow Flycatcher

- One of ~ 30 nesting neotropical migrant bird spp. in GC
- Extirpated from historic range
- BH Cowbird brood parasitism
- Commonly nest in non-native tamarisk

CALIFORNIA CONDOR



Reintroduced into the Grand Canyon region,
now common along the Colorado River

Bald Eagle

- Winter along CR in GC upstream from LCR and at several tribs downstream
- Feed on trout
- Feeding aided by fluctuating flows
- Easily disturbed by passing boats
- Present status in GC?



Peregrine Falcon

- Largest breeding population on any land management unit in the 48 states
- 90 % of prey biomass is waterbirds, mostly related to post-dam clearwater flow



MAMMALS

NPS Extirpated Species List	FWS Endangered Species List	GCWC Focal Species
		Black Bear
Black-footed Ferret	Black-footed Ferret	Black-footed Ferret
Grizzly Bear	Grizzly Bear	Grizzly Bear
Jaguar	Jaguar	Jaguar
		Miriam Elk
		Muskrat
Gray Wolf	Gray Wolf	Plains Gray Wolf
		Prairie Dog
		River otter
		Badger

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MISSING MAMMALS



**Colorado River Otter
Extinct? Role as mammalian
fish predator**



Badger

Muskrat: status in CRE?



A PROPOSED PLAN TO ADDRESS GOAL 3: Employing an ecosystem approach requires understanding the changing distribution and status of ecologically important species

- Evaluate extent of knowledge (overview) – add task to GCMRC 5-yr MRP, with work to be conducted in 2010
- TWG review report; assess potential for reintroduction of extirpated species--TWG Ad Hoc and AMWG-GCMRC-SA discussions
- Address information gaps, reintroduction strategies, responsibilities: TWG Ad Hoc and AMWG-GCMRC-SA discussions
- Acquire funding and implement restoration activities
 - From AMP if relevant and advisable
 - And/or from other agencies and other sources