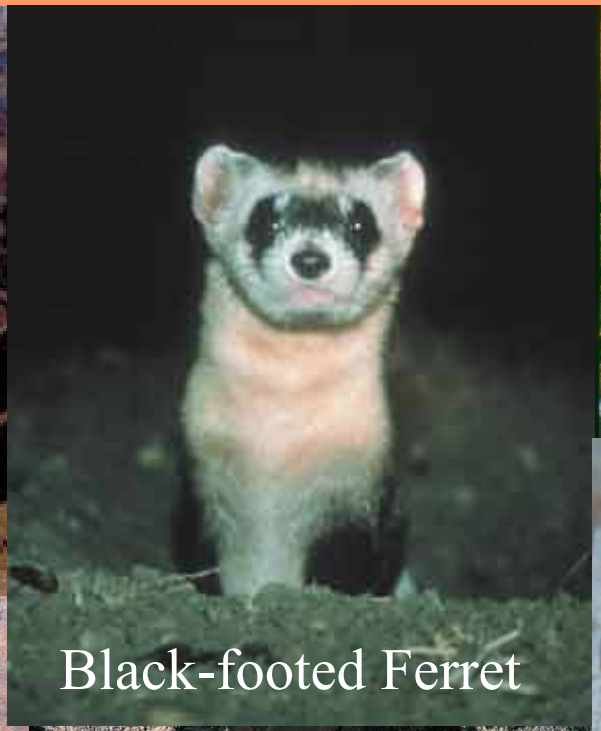
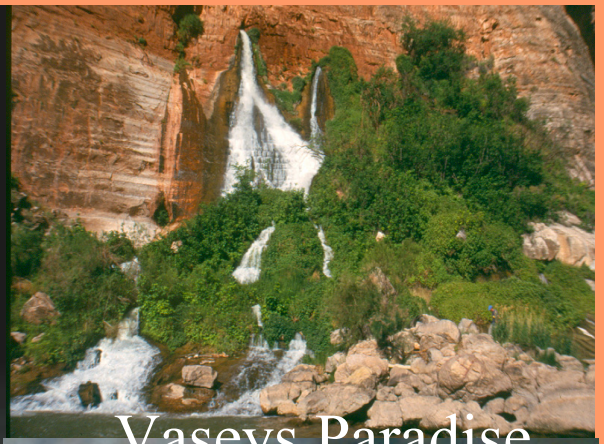
HUMPBACK CHUB TRANSLOCATION IN GRAND CANYON:

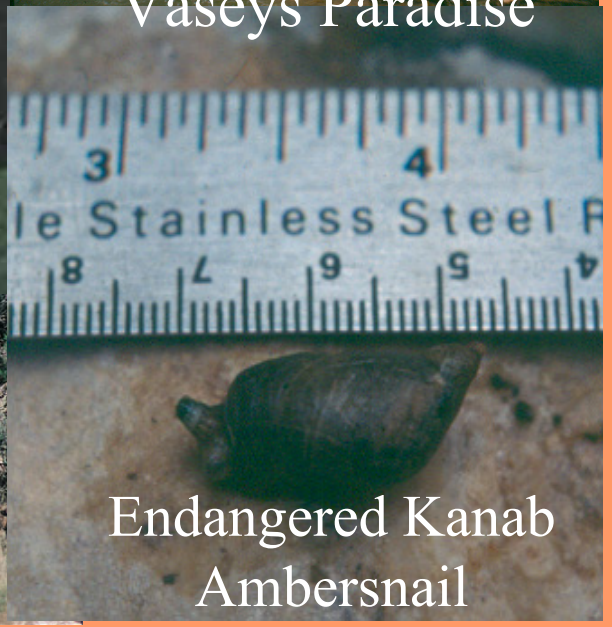
BACKGROUND, FEASIBILITY, EXPERIMENTAL DESIGN, AND COMPLIANCE CONSIDERATIONS

Grand Canyon Wildlands Council, Inc.
SWCA Environmental Consultants, Inc.
Grand Canyon National Park

GRAND CANYON
SENSITIVE SPECIES POPULATION RECOVERY







WHY IN-CANYON HBC TRANSLOCATION?

- **NPS mandate and within scope of GRCA mgt.**
- **Reintroducing T&E fish into historic range is often an effective recovery strategy**
- **Recommended measure in 1995 EIS and ROD (1 of 7 conservation measures to alleviate 1994 Jeopardy Opinion developed jointly by Reclamation, FWS, AGFD, GRCA, and the Navajo Nation Nat. Herit. Program)**
- **Contribute to protecting HBC, improve AEM**
- **Learn how to establish second HBC population**
- **Avoid catastrophic loss of LCR population due to a HAZMAT spill**
- **One of many needed actions / experiments**

OBJECTIVES

Inform TWG of NPS progress on translocation

- **SWCA habitat restoration study**
- **GCWC synopsis of translocation planning**

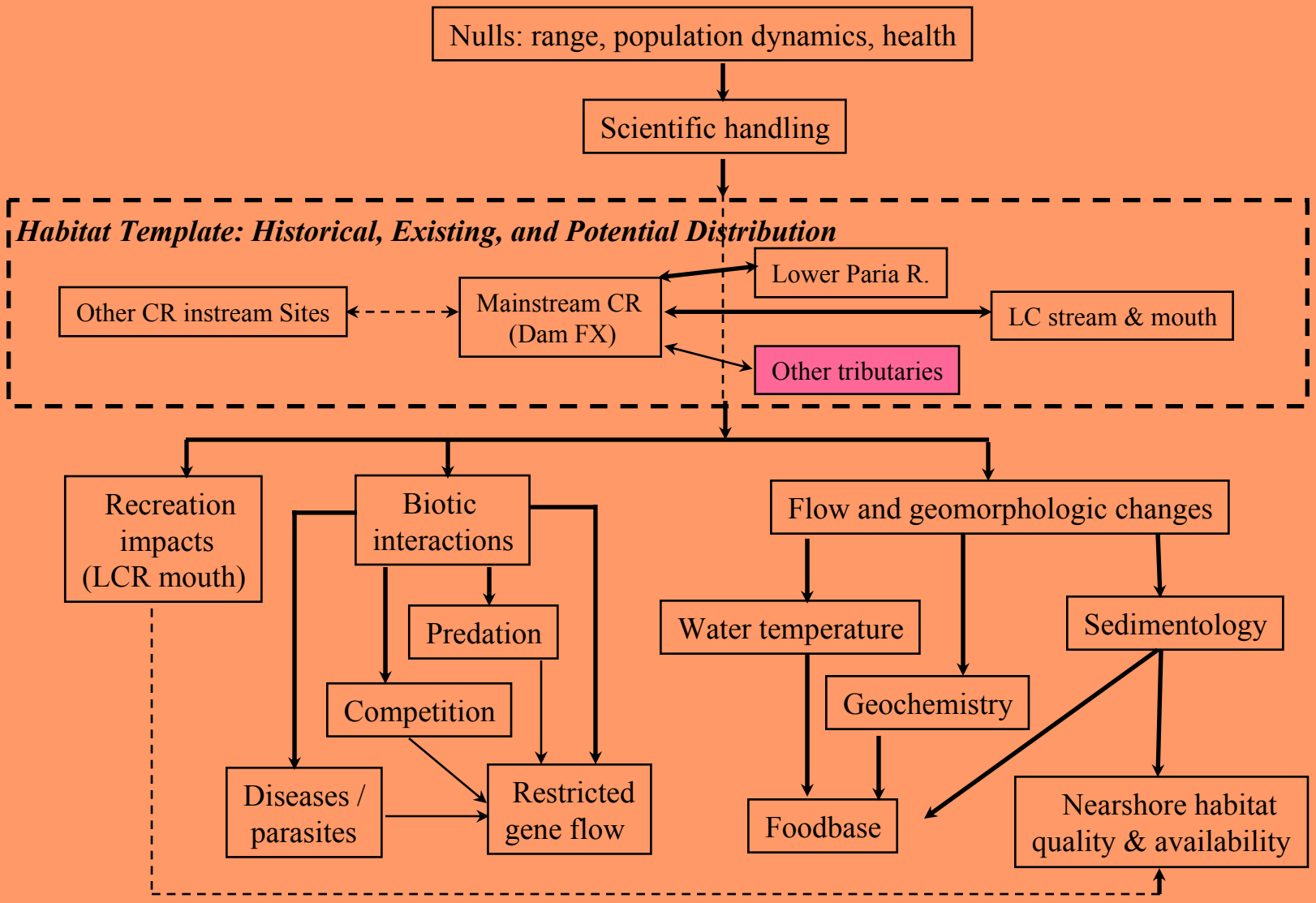
Specifically

- **Life history synopsis, threats, conserv. strategies**
- **Translocation rationale in relation to HBC mgt.**
- **Habitat information studies and implications**
- **Preliminary recommendations**
- **Finalization, FWS, NEPA compliance**

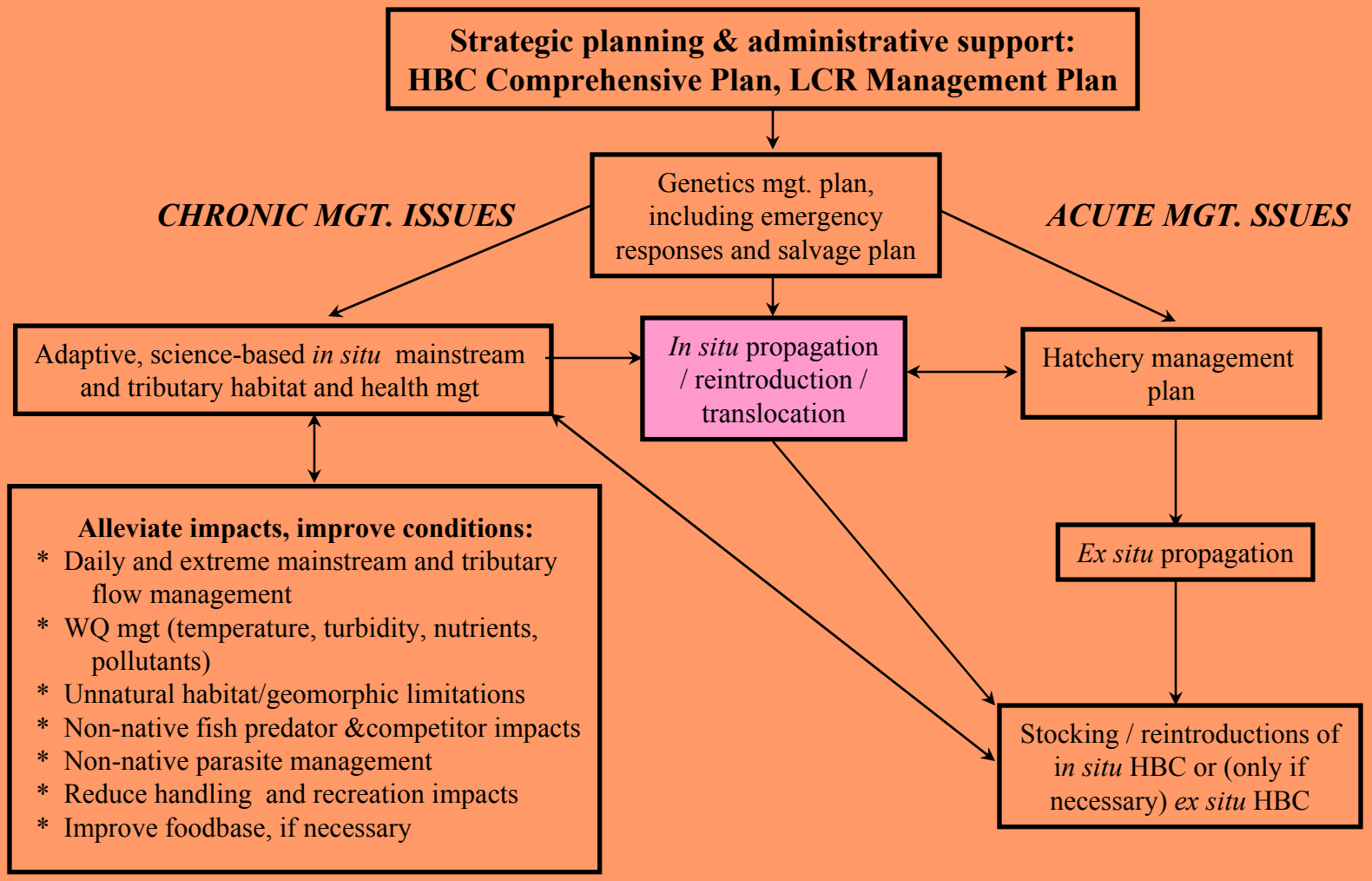
TWG feedback is welcome

HBC LIFE HISTORY CHARACTERISTICS (Valdez et al. 2000).

Variable	Habitat Needs
Population estimates	Mainstem (1990-1993)[a]: 3,750 (>200mm TL) LCR (1992)[b]: 4,346 (>150mm TL)
Peak time of spawning condition	Mainstream[a] = Mar- Jul; LCR[b] = Feb- May
Spawning temp. range (optimal)	11.5- 23°C (16- 22°C)[a,b,c]
Incubation temp. range (optimal)	12- 22°C (72 hr @ 19- 22°C)[h]
Larval survival temp. (optimal)	12- 22°C (21- 22°C)[h]
Optimal growth temp.	16- 22°C [d,f,h,I]
Eggs/female	2,523/female
Eggs/kg bbody weight	5,262/kg[h]
Egg diameter	2.6- 2.8mm[h]
Size at hatching	7mm[d]
Maximum size	480mm TL; 1165 g[a]
Maximum age	22 annular rings[g]
Sex ration (M:F)	49:51[a]
Age at maturity	males = 3-4 years; females = 3-4 years[a]
Size at maturity (TL)	males = 202mm; females= 200mm[a]
Size at annulus (TL)	1= 96 mm; 2= 144 mm; 3= 186 mm[a]
Length-weight relationship	log W = -4.564 +2.816 log TL, R^2= 0.92[a]
Condition factor (TL)	Mainstream[a]: males= 0.783-1.023; females= 0.883-1.092
Growth rates	LCR[a]: TL = 114.43* $\log_e$(age+1) + 14.921, R^2= 0.97
	YOY in Lab[f]: ; 10.63mm/30 d @ 20°C; 2.30mm/30 d @ 10°C
	Scale back calculations[a;] YOY in LCR: 10.30 mm/30; YOY in Mainstem: 3.50-4.00mm/ 30 d
Survival	Age 1-3 = 0.01/yr ; age 3+ = 0.67-0.896, ave. = 0.755[a]



Logical interactions that account for humpback chub (HBC) population status. Each box should be considered in the context of the habitat template and in relation to the various life stages of HBC.



Linked elements of conservation planning for HBC in Grand Canyon.

In situ propagation / reintroduction / translocation

*** *In situ* Propagation: Improve recruitment success by managing mainstream flows and predators**

*** *In situ* Reintroduction: Stocking fish back into historic range**

*** In-Canyon Translocation:**

- **Elsewhere in lower LCR (FWS effort)**
- **Other tributaries, as "insurance" population(s)**
  - **No reproduction necessary**
  - **Monitoring, research, and learning**
  - **Short-term to long-term time frame**
- **Fully self-sustaining second HBC population**
  - **Where – river is present assumption**
  - **Long-term – mulidecadal**

SITE SELECTION

Paria River
Clear Creek
Bright Angel Creek
Shinumo Creek
Tapeats Creek
Deer Creek
Kanab Creek
Havasu Creek
Spencer Creek

HABITAT SUITABILITY

Native Fish Habitat Restoration in Selected Tributaries of the Grand Canyon

A Potential Recovery Effort for Native Fishes

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Kara Hilwig

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SWCA Environmental Consultants,

and

Dr. Jeffrey Cross

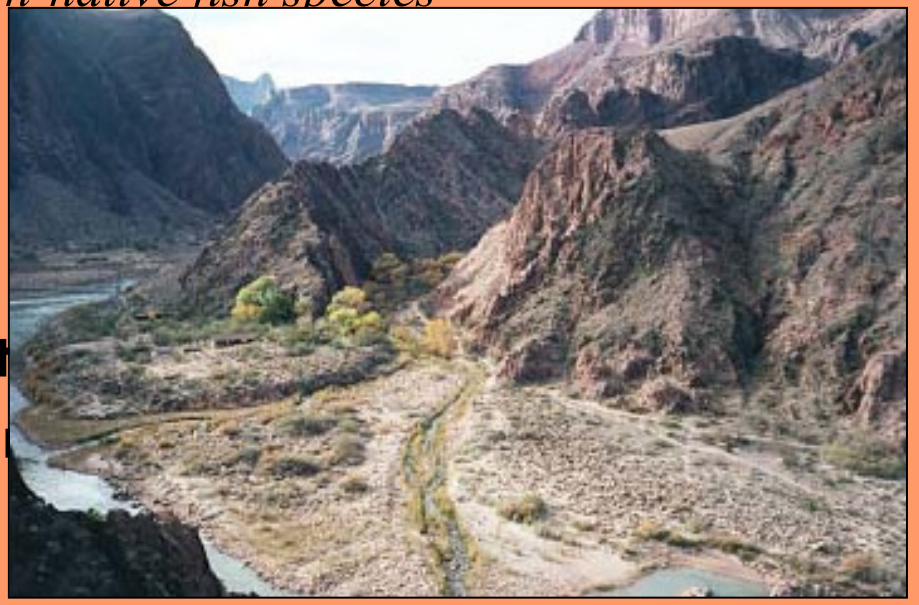
Grand Canyon National Park

Purpose

- **The National Park Service is charged with preserving and protecting the natural resources within Grand Canyon.**

In tributaries of the Grand Canyon, the native fish community has been impacted by a host of non-native fish species

- **Removing non-native fish may provide an opportunity for recovery the native fish communit in tributaries of the Colo**

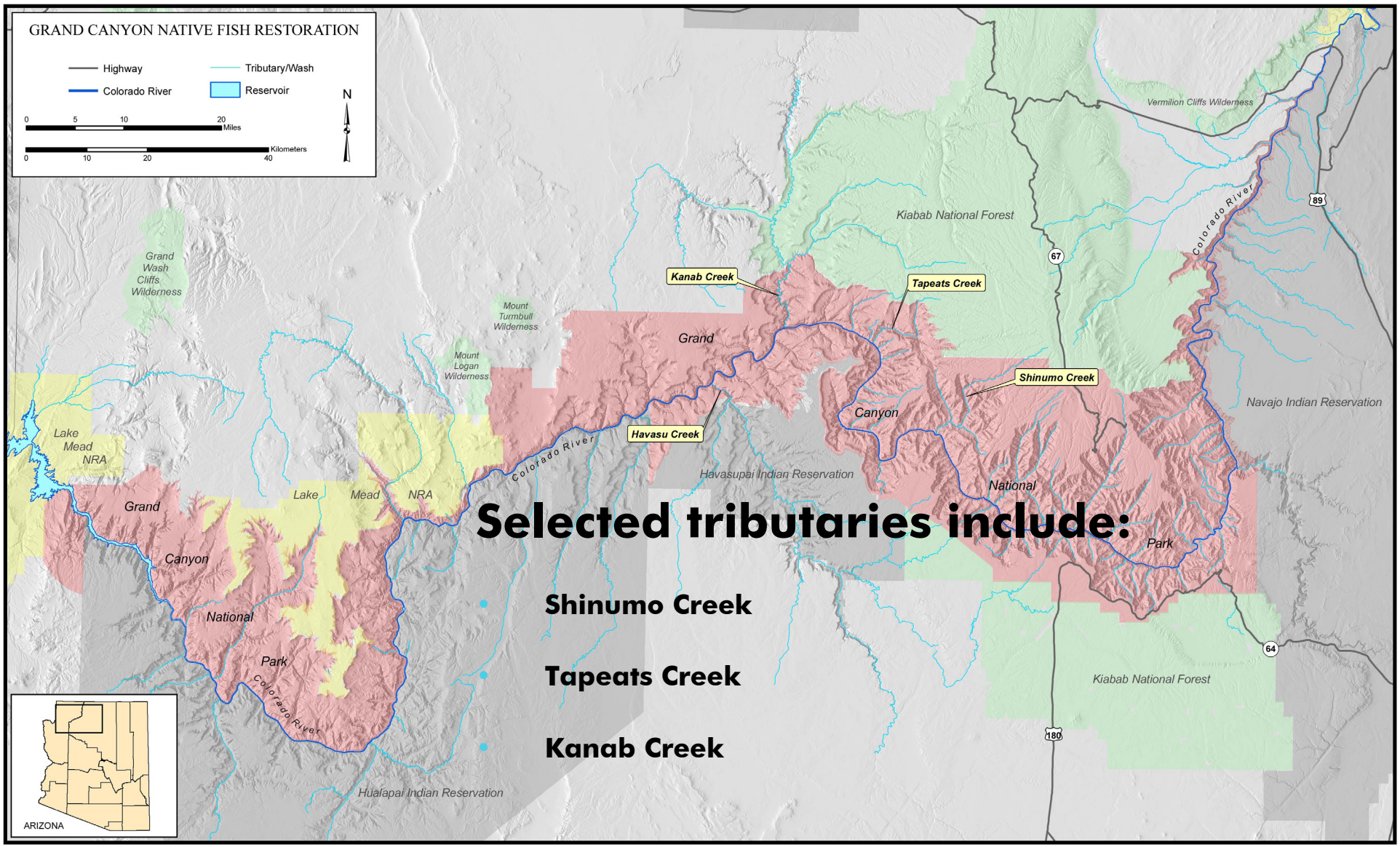


Goals for Native Fish Habitat Restoration Efforts

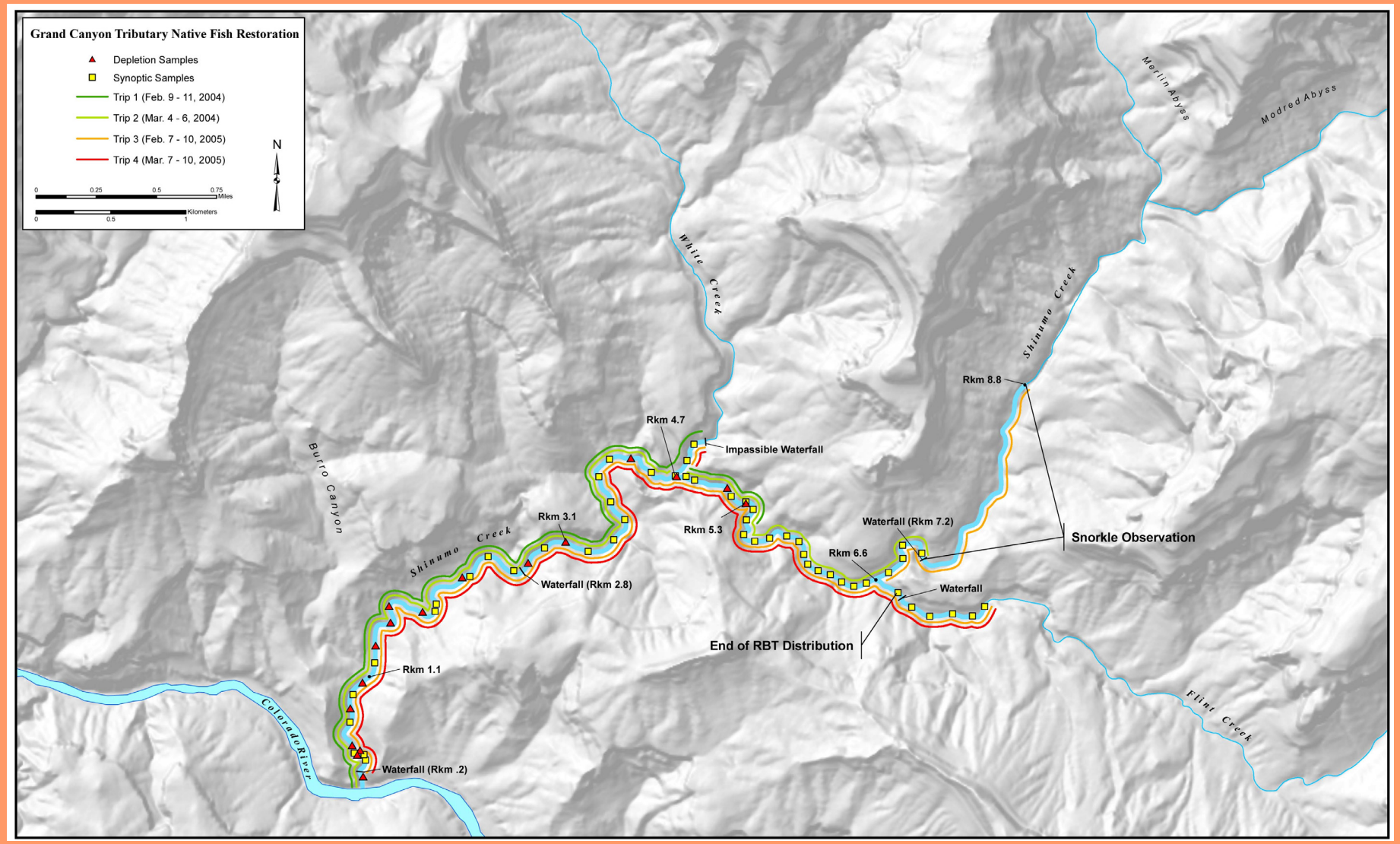
- **Determine the feasibility of reducing non-native fishes in Grand Canyon tributaries.**

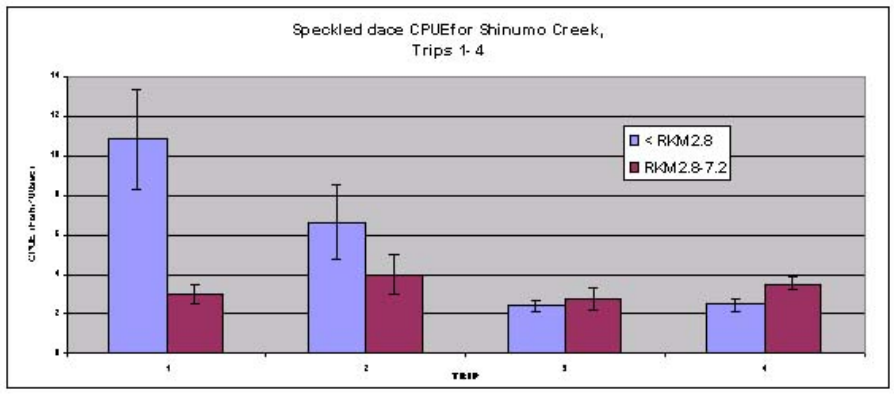
Develop a long-term action plan for controlling and managing non-native fishes in tributaries of the Grand Canyon.

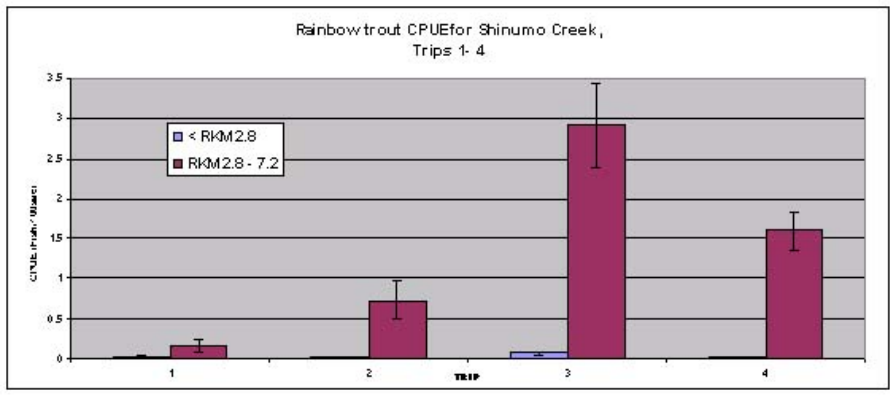
Native Fish Habitat Restoration in Selected Grand Canyon Tributaries

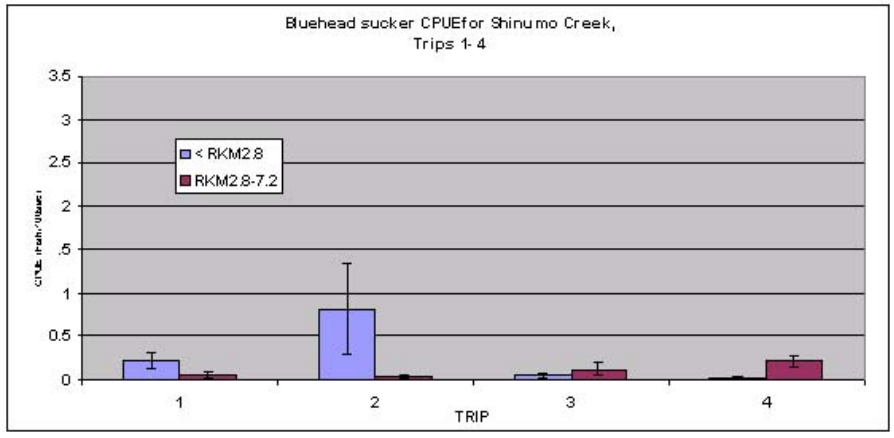


Shinumo Creek Fish Sampling Effort

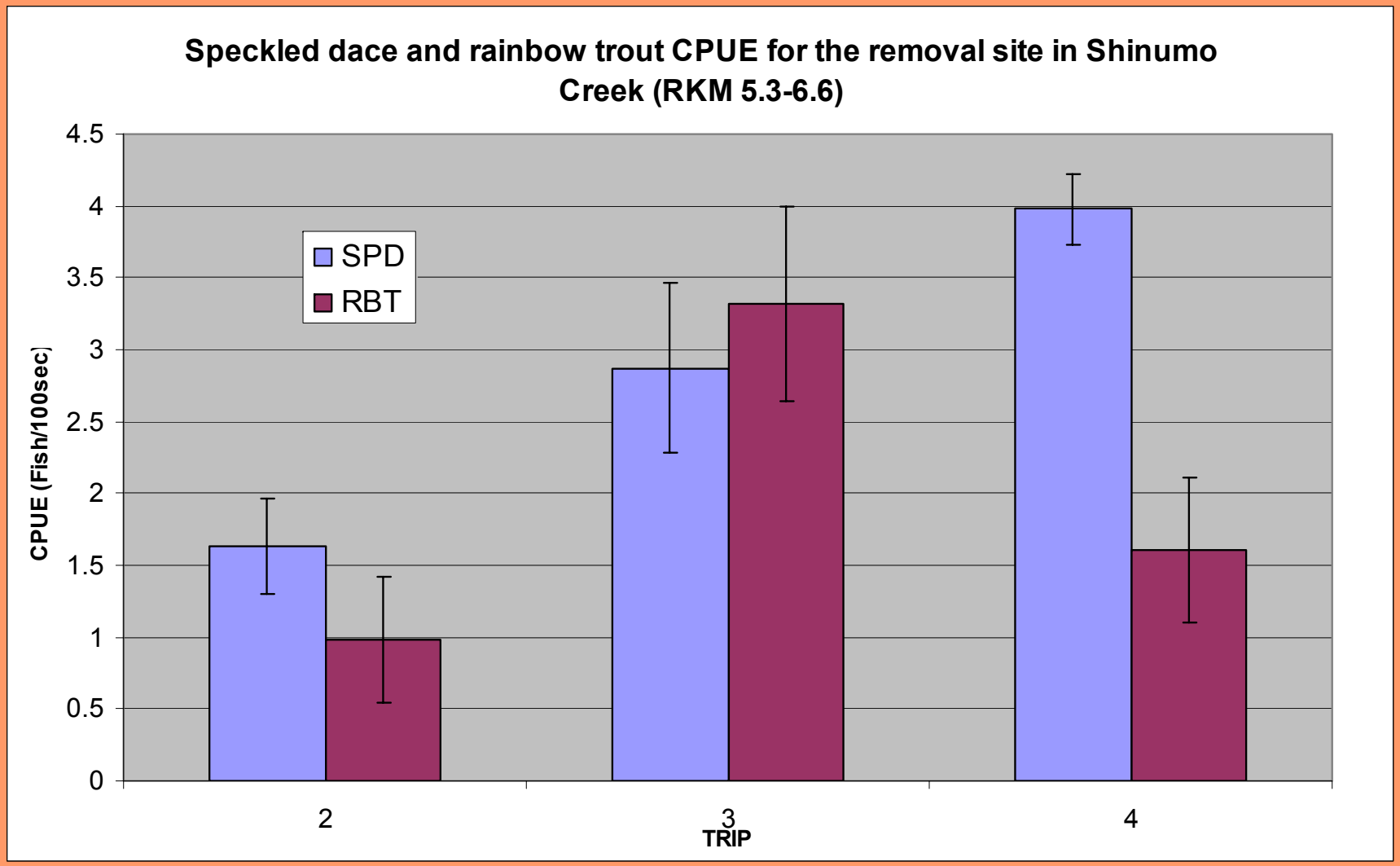








CPUE (mean N/100 sec ± S.E.) for speckled dace, rainbow trout, and bluehead suckers in Shinumo Creek, February and March 2004 and February and March 2005.



CPUE (Mean N/100 Sec ± S.E.) for speckled dace and rainbow Trout for a removal site located in Shinumo Creek (RKM 5.3-6.6) that was sampled March 2004 and February and March

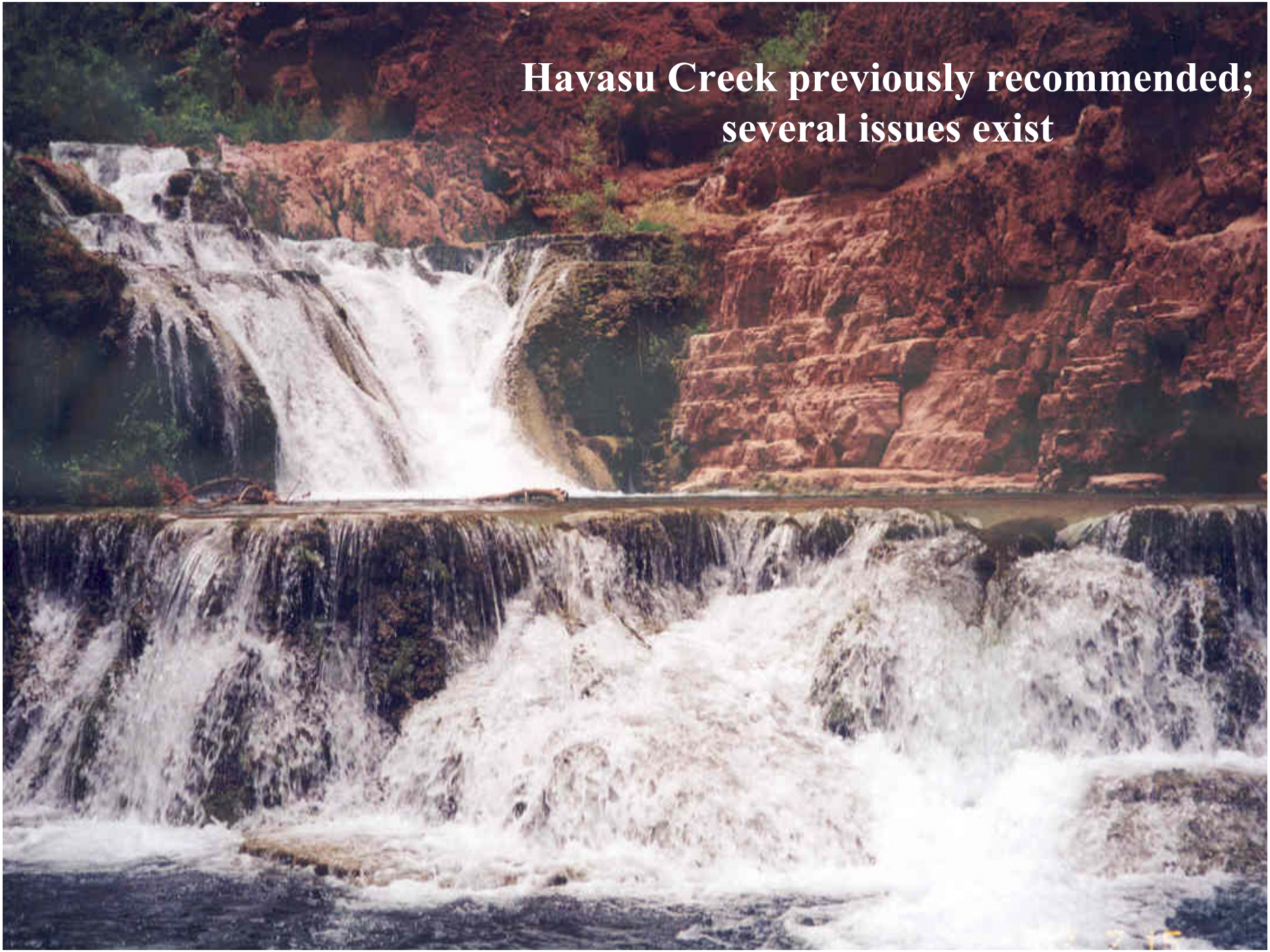
Evaluation Criteria

- **Presence of barriers to fish movement**
- **Non-native predator load**
- **Native fish abundance and suitable habitat, including temperature**
- **Effectiveness of non-native removal**
- **NPS jurisdictional limits**

TRIBUTARY EVALUATION

Criteria	Paria R.* 1 R	LCR 61 L	Clear Cr. 84 R	BA Cr. 88 R	Shinomu Cr. 109 R	Deer Cr. 136 R	Tapeats Cr. 133 R	Kanab Cr. 144 R	Havasu Cr. 157 L	Spencer Cr. 246 L
Habitat Suitability	1	3	2	3	3	2	2	2	3	2
Water Quantity	1	3	1	3	3	1	2	1	3	1
Water Quality	3	3	3	3	3	3	3	3	3	3
Water Temp.	1	3	3	3	3	3	2	2	3	3
Fish Barrier	1	2	3	2	3	3	1	2	3	1
Fishes	2	2	2	2	2	2	2	2	2	2
Human Disturbance	2	2	3	2	3	3	3	3	2	3
Access	3	2	1	2	1	1	1	1	1	2
Adjacent Mainstream Rearing Habitat	3	3	1	2	1	2	2	1	1	3
Shared Mgt. Responsibilities	3	2	3	3	3	3	3	2	1	2
Total	***20***	***25***	***22***	***25***	***25***	***23***	***21***	***19***	***22***	***22***
Individual %	**67**	**83**	**73**	**83**	**83**	**77**	**70**	**63**	**73**	**73**
% Rel to LCR	**80**	**100**	**88**	**100**	**100**	**92**	**84**	**76**	**88**	**88**

KEY:		
Bad	**So-so**	**Good**


Havasu Creek previously recommended;
several issues exist

PARIA MOUTH POND
REARING POND DEVELOPMENT

Suggestion:

Consider developing experimental native fish rearing ponds in the gravel mine at the mouth of the Paria

Fence to keep out non-natives and cool in summer with mainstream water

Justification:

Historical population concentration, now gone

Ponding during pre-dam floods was habitat that supported HBC at Paria R.

Need opportunity to do detailed, *in situ* experiments

Suitable, replicated site

Ease of access

Limited impact on public

PRELIMINARY RECOMENDATION

- Complete assessment of upper BA Creek
- Complete consultation and compliance
- Move 300 or more young-of-the-year (YOY; ≤100mm in length) HBC humpback chub from mouth of LCR in late summer to Shinumo Cr. (above barrier falls), and perhaps other tributaries
- Conduct this action as a collaborative agency experiment
- Continue to consider other actions, e.g., Paria mouth

GENERAL SCHEDULE

- Finalization of translocation plan
- FWS Section 7 consultation
- NEPA compliance, incorporate public comments
- Implement action(s)
- Seasonally monitoring using efficient and non-stressful means, their health and survivorship
- Assessment of results to inform management of the implications for additional translocation efforts and second HBC population establishment