

Native Fish Work Group Update

AMWVG Meeting
January 2002

NFWG Activities

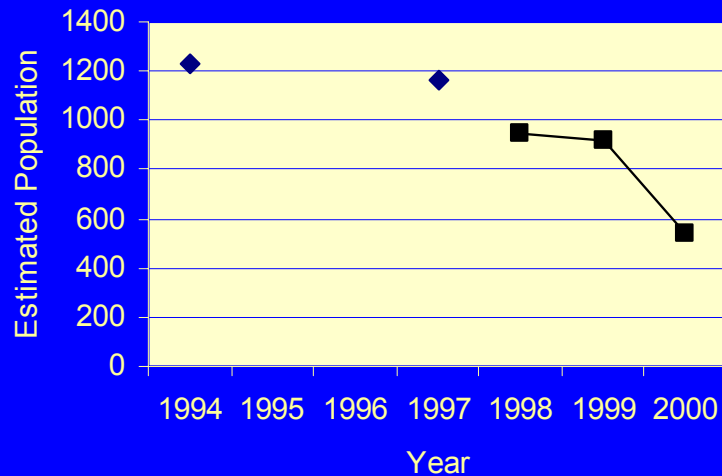
- Meet in conjunction with TWG and AMWG meetings
- Evaluate proposed and ongoing activities potentially affecting native fish in Grand Canyon region
- Contribute to development of the program of experimental flows
- Provide technical input and comment to agencies and organizations, including GCDAMP

NFWG Activities: Examples

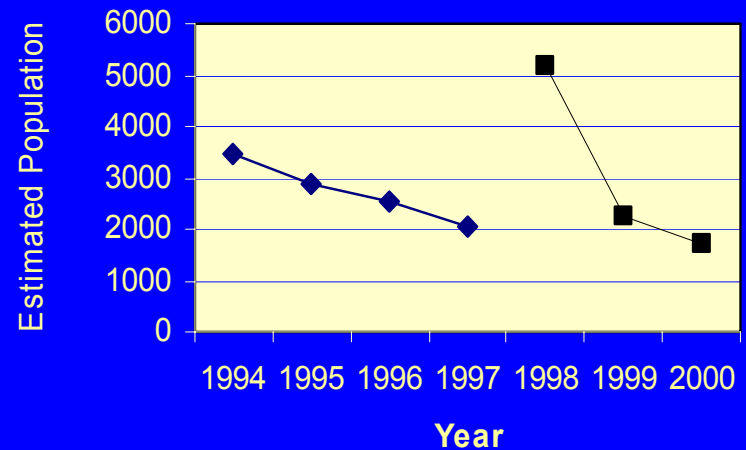
- Arizona Game and Fish Commission: Rules Revision on Possession, Transport, and Use of Crayfish
- Arizona Game and Fish Department: Review of Watershed-based Fisheries Management Documents
- Summary of Comments: Recovery Goals for Colorado River Endangered Fishes

Upper Colorado River Basin Humpback Chub Population Estimates

Black Rocks



Westwater



Desolation/Gray Canyons

Sampling since 1985 with trammel nets, hoop nets and electrofishing

First mark/recapture for population estimates in 2001

No population estimate available

Yampa Canyon

Collections 1998-2000

Estimated population in 2000 approximately 100-2000 individuals

Reliable population estimate seems out of reach for reasonable effort

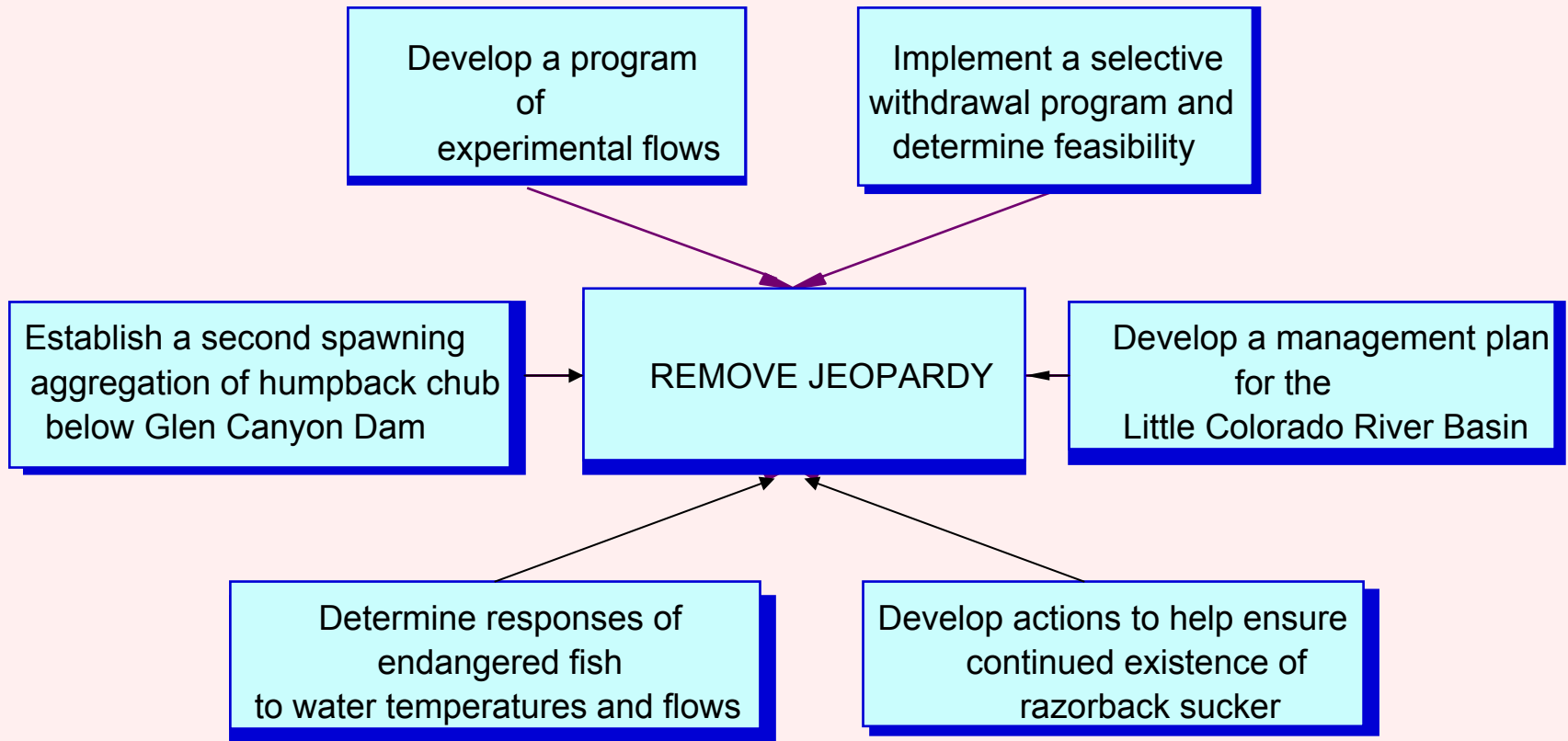
Cataract Canyon

Sampling since 1979 (14 of 22 years), but no population estimate

Perhaps 500 HBC

Only 138 HBC of all size classes collected 1979-1999

Elements of the Reasonable and Prudent Alternative



Other Threats to Endangered Fish in Grand Canyon

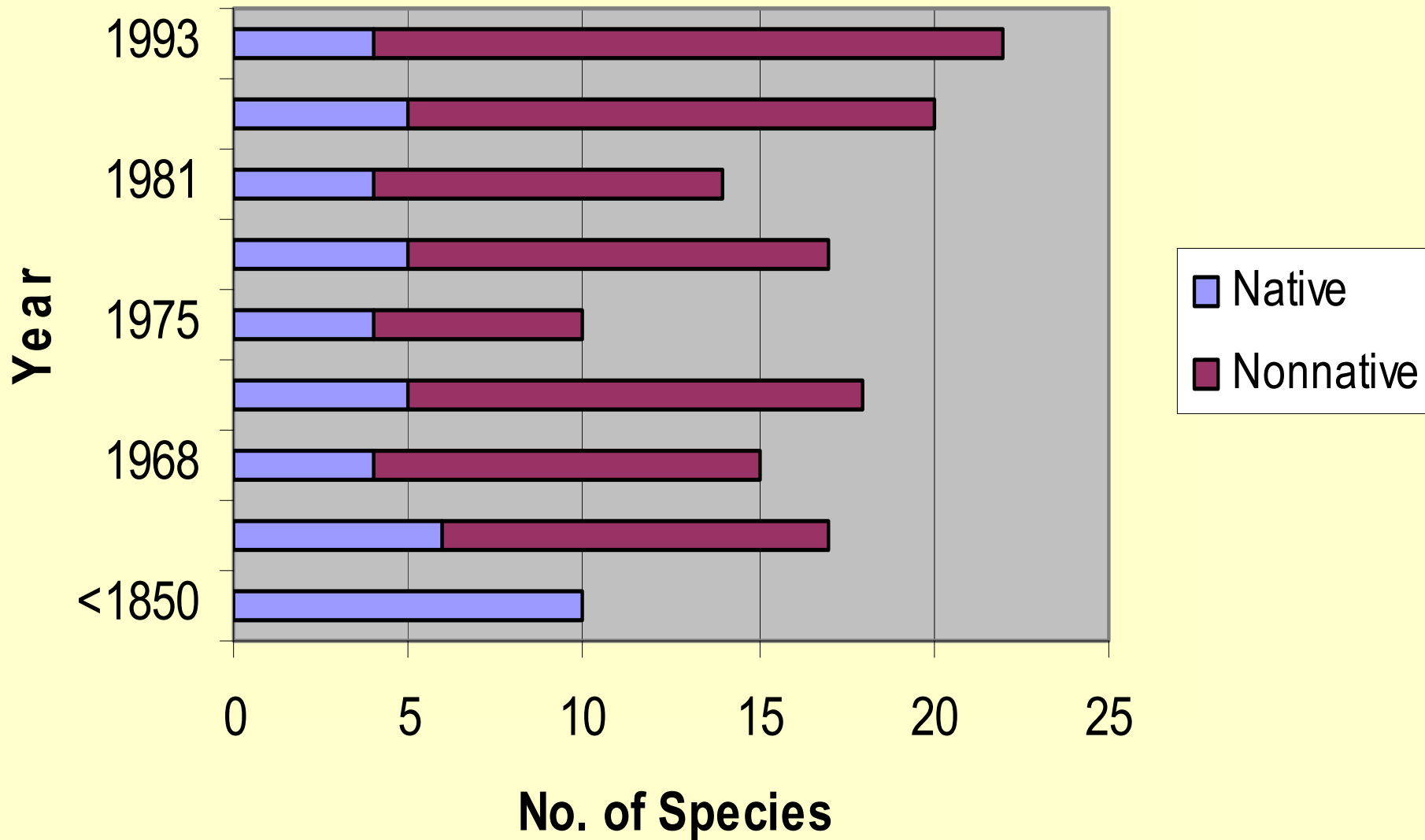
Existing exotic fish,
parasites, and disease
organisms

New invading exotic fish,
parasites, and disease
organisms

Surface water and
groundwater diversions
and depletions

Catastrophic events such
as toxic spills

Fishes of Glen and Grand Canyons



Grand Canyon Region Nonnative Fish



Common carp



Red shiner

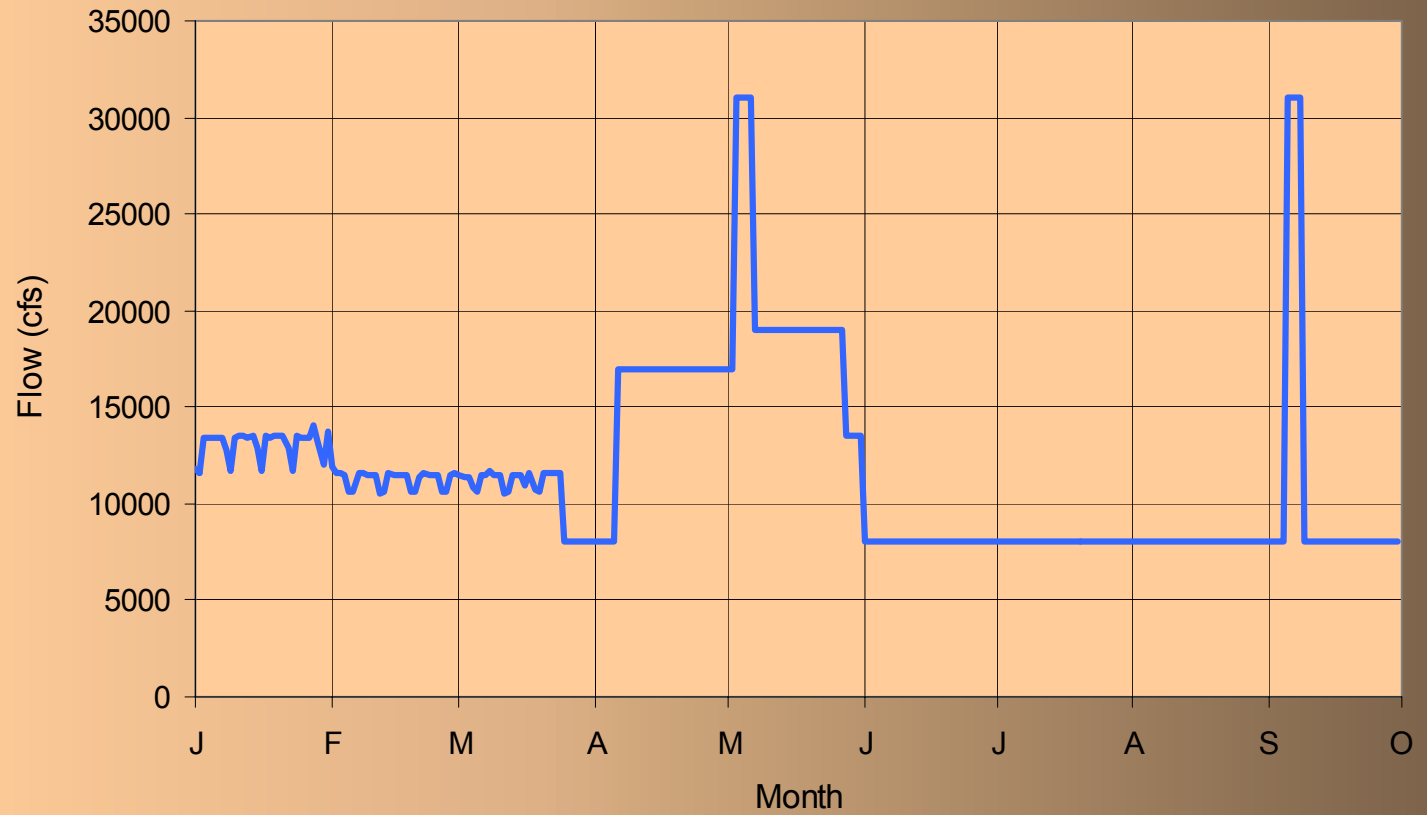


Brown trout



Channel catfish

Year 2000 Experimental Releases from Glen Canyon Dam



Fish of Lake Powell

Striped bass

Threadfin shad

Largemouth bass

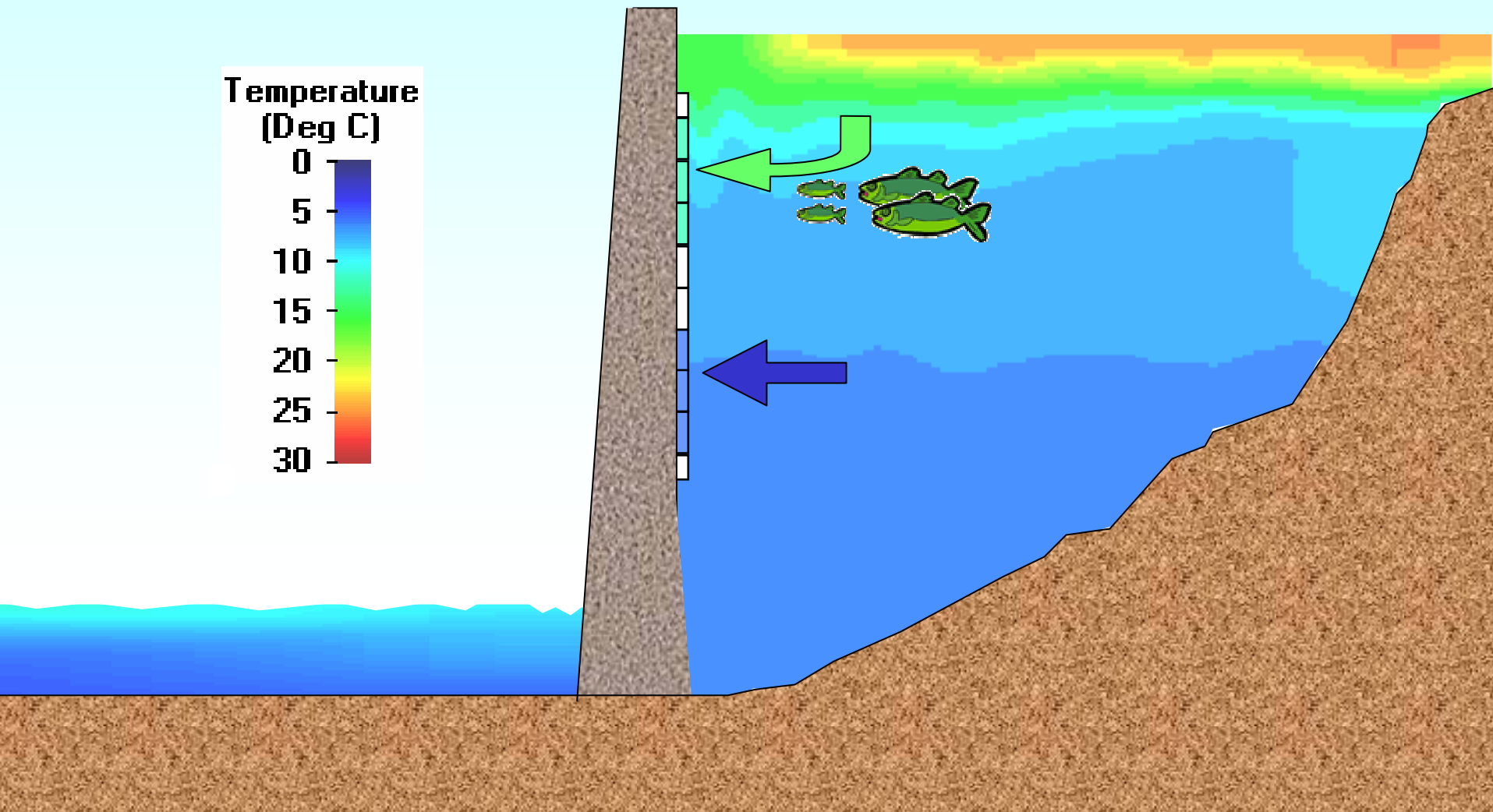
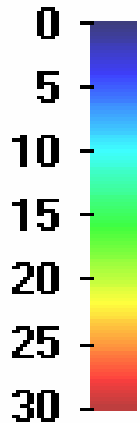
Walleye

Carp

Red shiner

Crappie

Temperature
(Deg C)



What Could go Wrong?

- Cold water temperatures suppress important diseases, parasites, competitors, and predators of the native fish
- Therefore, warming the water could result in negative impacts to native fish, including the endangered humpback chub

Upper Colorado River Basin Recovery Implementation Program

- Developed a non-native fish control strategic plan
- Conducting mechanical removal of non-native fish
- Evaluated and modified non-native fish stocking policies
- Developing tributary basin management plans

Non-native Control: Basic Themes

- Prevent non-natives from entering the system
- Remove non-natives from areas occupied by native fish
- Exclude non-natives from interactions with larval and juvenile native fishes

Strategic Approach to Non-native Control

- In what geographic areas would control measures have the most benefit?
- Which life history stages of endangered fishes are most susceptible?
- Which non-native species pose the most serious threats?
- Which control methods will be most effective?

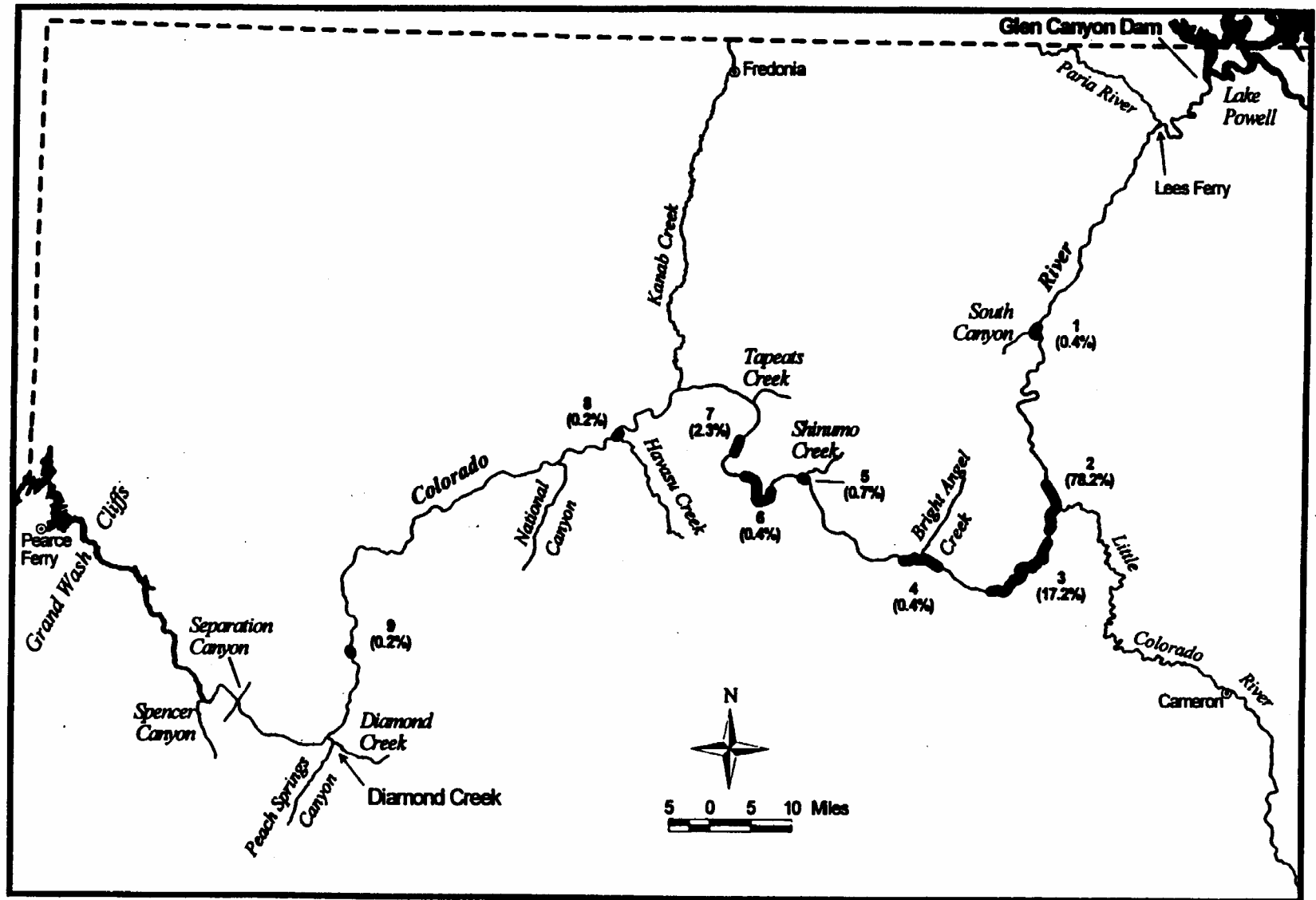


Figure 18. Locations of nine aggregations of humpback chub in the Colorado River through Glen and Grand Canyons. Percentage of total captures are indicated for 1990–1993. (Valdez and Ryel 1995)

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Native Fish Susceptibility

- In general, highest susceptibility to predation is in larval to juvenile stages
- Higher susceptibility in confined habitats, such as nearshore rearing habitats and tributaries
- Higher susceptibility during periods of foraging

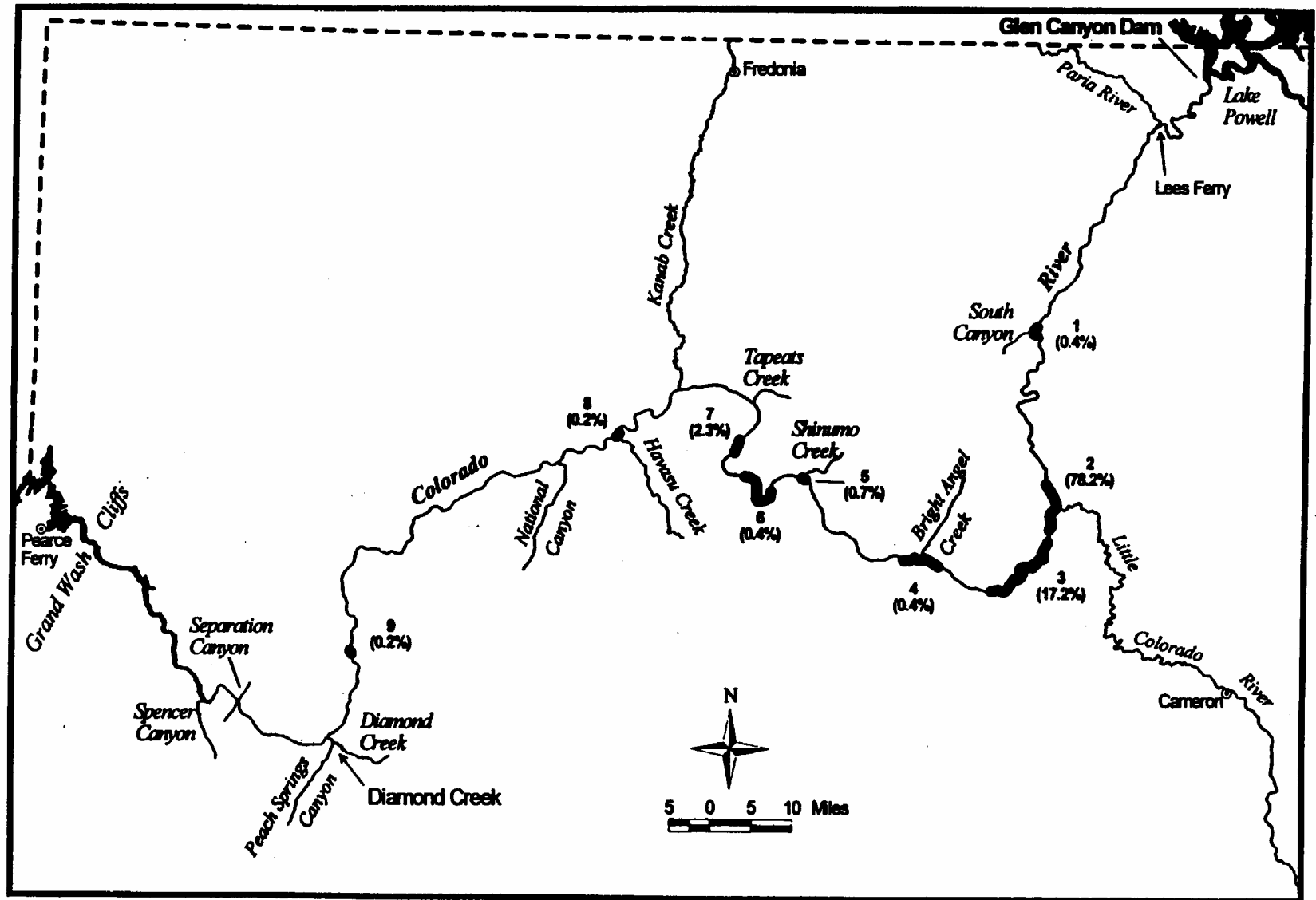


Figure 18. Locations of nine aggregations of humpback chub in the Colorado River through Glen and Grand Canyons. Percentage of total captures are indicated for 1990-1993. (Valdez and Ryel 1995)

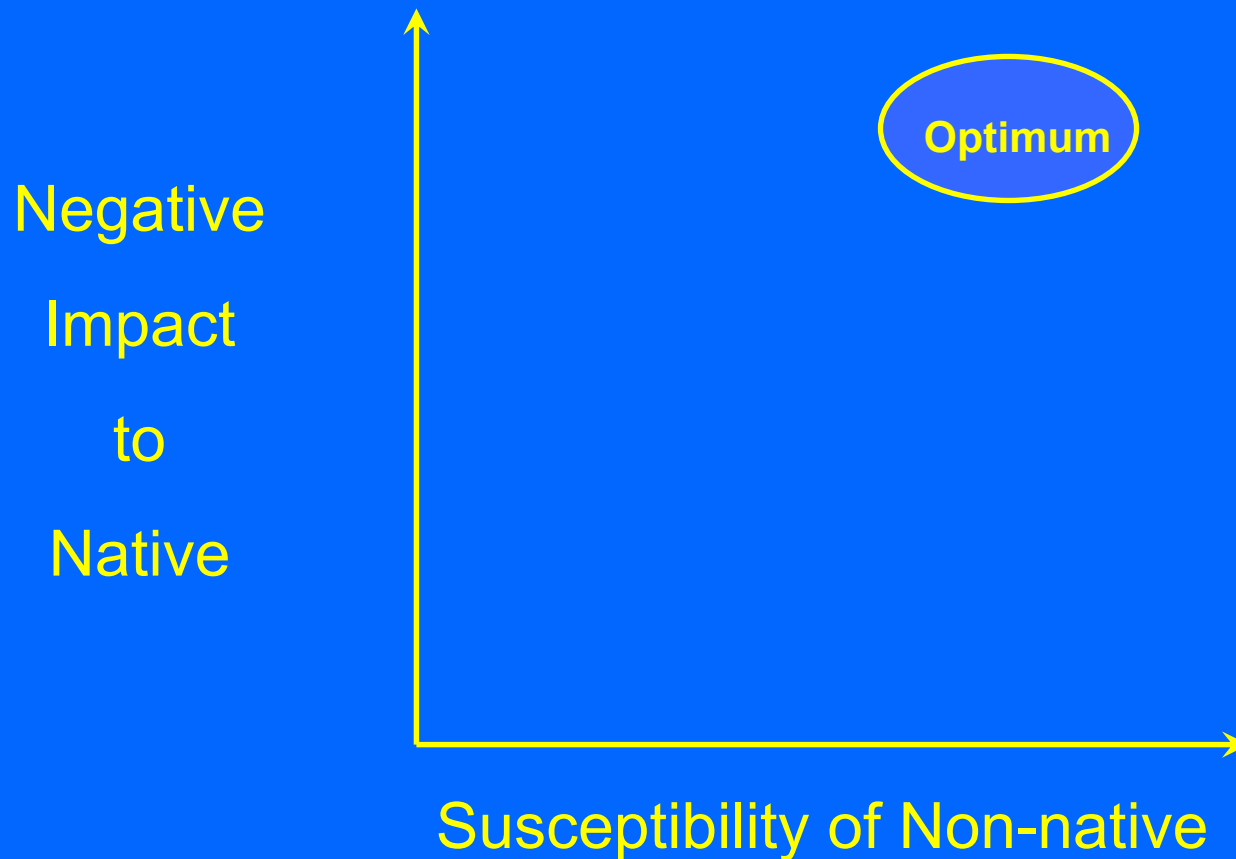
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Nonnative fish species listed as presenting problems for native fish fauna in the Colorado River Basin and southwestern United States.

<u>Species</u>	<u>Common Name</u>	<u>Rank</u>
1. <i>Ictalurus punctatus</i>	channel catfish	1
2. <i>Cyprinella lutrensis</i>	red shiner	2
3. <i>Esox lucius</i>	northern pike	3
4. <i>Cyprinus carpio</i>	common carp	4
5. <i>Lepomis cyanellus</i>	green sunfish	5
6. <i>Pimephales promelas</i>	fathead minnow	5
7. <i>Notropis stramineus</i>	sand shiner	6
8. <i>Micropterus salmoides</i>	largemouth bass	7
9. <i>Ameiurus melas</i>	black bullhead	7
10. <i>Gambusia affinis</i>	mosquitofish	8
11. <i>Morone saxatilis</i>	striped bass	8
12. <i>Catostomus commersoni</i>	white sucker	8
13. <i>Stizostedion vitreum</i>	walleye	9
14. <i>Pylodictus olivarius</i>	flathead catfish	9
15. <i>Oncorhynchus clarki</i>	cutthroat trout	9
16. <i>Oncorhynchus mykiss</i>	rainbow trout	9
17. <i>Salmo trutta</i>	brown trout	9
18. <i>Salvelinus fontinalis</i>	brook trout	9
19. <i>Ameiurus natalis</i>	yellow bullhead	10
20. <i>Richardsonius balteatus</i>	redside shiner	10
21. <i>Micropterus dolomieu</i>	smallmouth bass	10

Which non-natives to control in Grand Canyon?



Suspected and Known Interactions between Native and Non-native Fishes of the Colorado River in Glen Canyon and Grand Canyons					
Non-native species	Humpback chub	Razorback sucker	Flannelmouth sucker	Bluehead sucker	Speckled dace
Brown trout	P	P?	P	P	P
Rainbow trout	P		P?	P?	P
Channel catfish	D, P	P	D, P	D, P	D, P
Black bullhead	P		P	P	P
Largemouth bass	P?	P?	P	P?	P?
Striped bass	P?	P?	P?	P?	P
Walleye	P?	P?	P?	P?	P?
Black crappie	P?	P?	P?	P?	P?
Green sunfish	P?	P?	P?	P?	P?
Bluegill	P?	P?	P?	P?	P?
Red shiner	D, P?	P?	D, P?	D, P?	D, P?
Fathead minnow	P?,C?	P?	P?,C?	P?,C?	P?, D,C?
Common carp	P?,D	P?,D	P?,D	P?,D	P,D,H
Plains killifish	D, C?	C?	C?	C?	D, C?
Mosquitofish	C?	C?	C?	C?	C?
P = Predation; D = Disease and Parasites; C = Competition; H = Habitat Alteration					

Estimates of Humpback Chub Predation in Grand Canyon					
Study	% of predators	Predator(s)	# chub consumed	# assumed predators	Annual predation
Douglas and Marsh (1996)	3.0%	Channel catfish, rainbow trout combined	2.3/week	1,000	3,588
Valdez and Ryel (1995)	10.4%	Brown trout, rainbow trout, channel catfish	2.0/day	3,000	227,760
	1.5%		1.0/day	5,000	27,373
	1.5%		1.0/day	500	<u>2,738</u> 257,871
Valdez and Ryel(1995) transformed	10.4%	Brown trout, rainbow trout, channel catfish	2.0/week	333	3,602
	1.5%		1.0/week	333	260
	1.5%		1.0/week	333	<u>260</u> 4,122
Douglas and Marsh (1996), Valdez and Ryel (1995)	4.0%	Channel catfish	2.75/week	500	2,860
	10.4%	Brown trout	2.0/week	500	<u>5,408</u> 8,286

Strategic Approach to Non-native Control

- In what geographic areas would control measures have the most benefit?
- Which life history stages of endangered fishes are most susceptible?
- Which non-native species pose the most serious threats?
- Which control methods will be most effective?

Potential Nonnative Fish Control Actions

- Develop a nonnative fish control strategic plan
- Conduct mechanical or chemical control of more problematic and more susceptible species
- Evaluate control techniques for more problematic, but less susceptible species
- Investigate, and where appropriate, modify regulations to increase take (bag limits, gear)
- Take actions to prevent entry into the system
- Integrate dam management with other control mechanisms

Upper Colorado River Endangered Fish Recovery Program

“The objective is not to remove all nonnatives, as that is infeasible, but to reduce nonnative populations to a level where recovered endangered fish can co-exist.”

Source: Tom Pitts, Colorado Water Rights Vol. 20(2):3-5