

RECLAMATION

Managing Water in the West

Non-native Fish Control EA and Biological Opinion

Bureau of Reclamation
Glen Canyon Dam
Adaptive Management Program
Adaptive Management Work Group
February 23, 2012



U.S. Department of the Interior
Bureau of Reclamation

Overview

- **What are the objectives for humpback chub, and what aspects of humpback chub life history matter?**
- **What has the GCDAMP been doing to achieve objectives for humpback chub?**
- **How does non-native fish control help? Why an EA for non-native fish control? How did we do it?**
- **Does this all make sense in light of where we have been and what we have learned? Are we continuing to use adaptive management to build on where we have been and the successes we have had?**

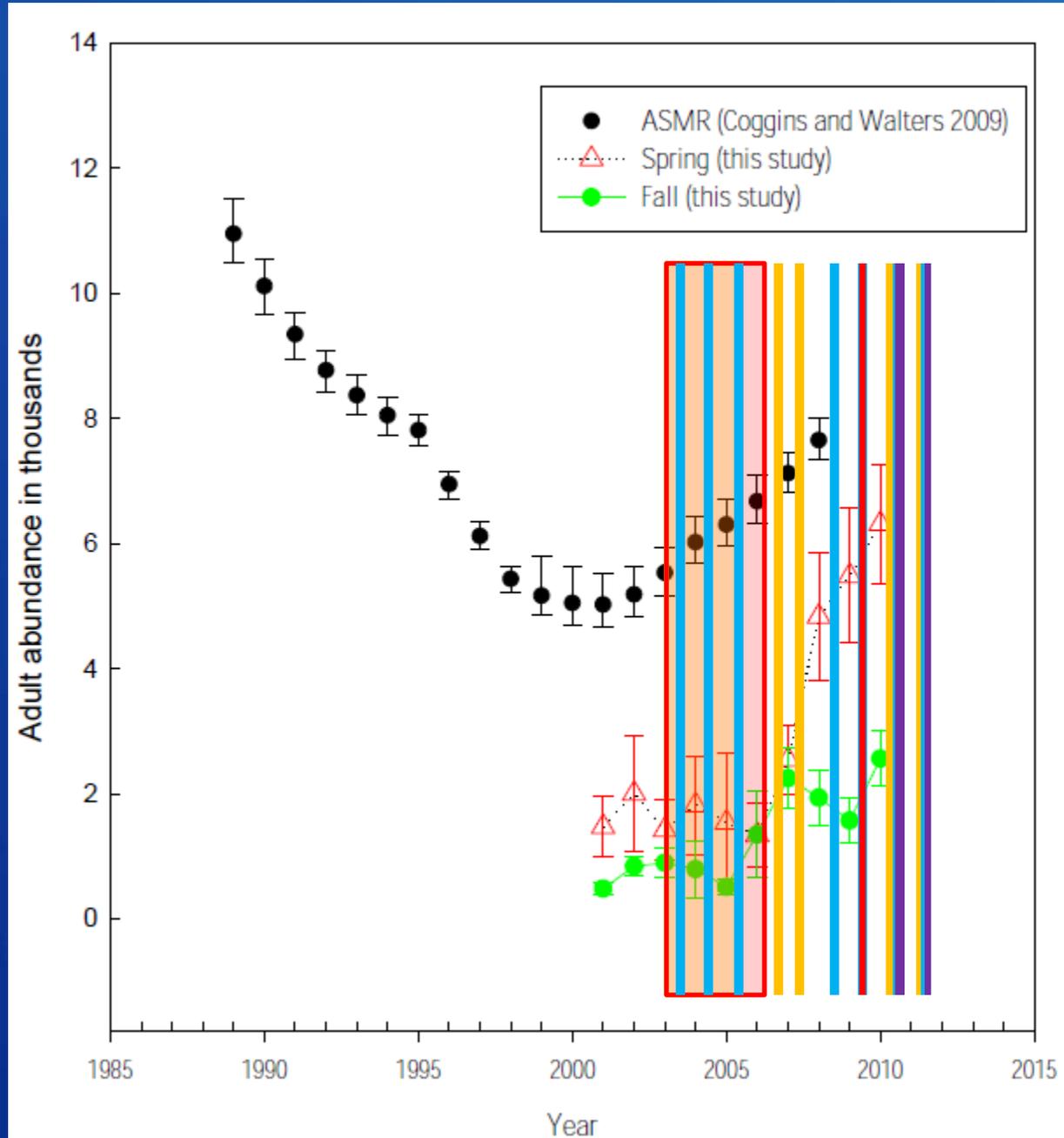
Long lived 40 years+

Fecundity, lots of young



What caused this?

- Trout suppression flows 2003-5
- Mechanical Removal in mainstem 2003-6 (n=23,266 non-native fish removed, 9,326 humpback chub were eaten by trout)
- Mechanical removal in tributaries 2006-7, 2010-12
- Translocation in LCR 2003-5, 2008-11
- Translocation to other tributaries 2010-11



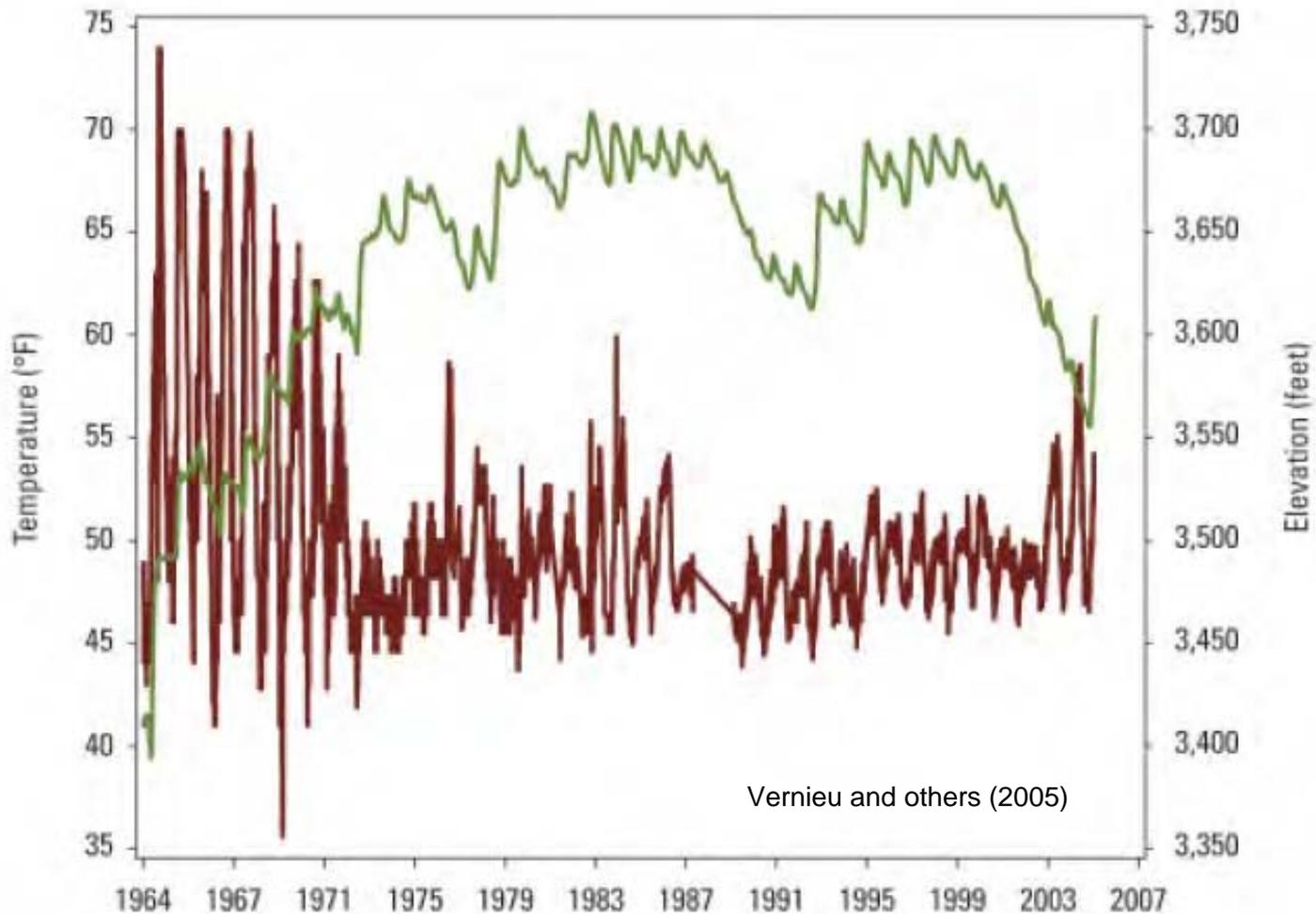
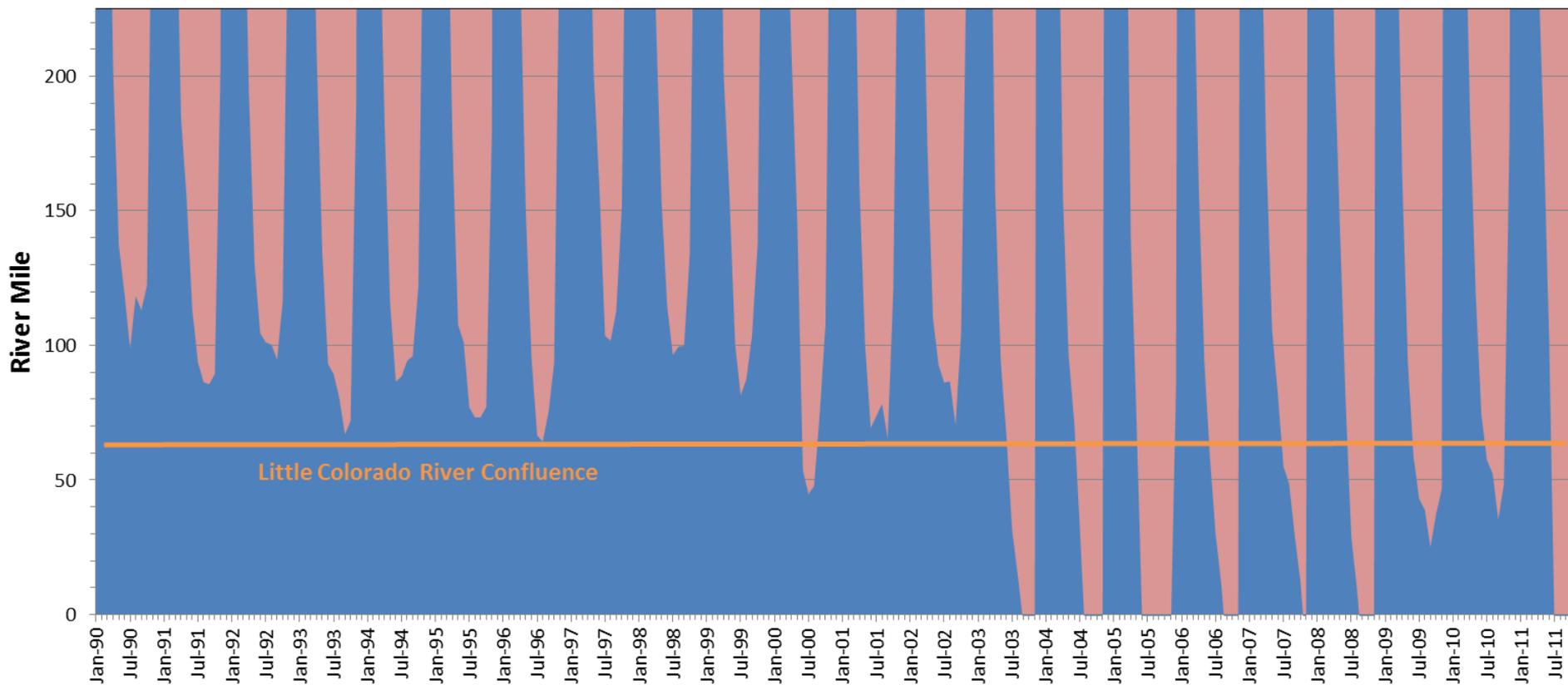


Figure 6. Daily water temperature (red line) at Lees Ferry as affected by changes in Lake Powell's elevation (green line).

Colorado River Water Temperature Below Glen Canyon Dam

Location Where Mainstem Temperature Exceeds 12 degrees Celsius



Non-native Fish Control EA History

- **2002** - AMP tribes express concern about 2003-2006 removal experiment , killing of fish impacting spiritual values, resulting mitigation program uses fish as fertilizer Hualapai tribal gardens.
- **February 2008** - Non-native fish control via mechanical removal is conservation measure of 2008 biological opinion.
- **February 2009** - 2010-11 GCDAMP Annual Work Plan includes two non-native fish removal trips in 2010-11.
- **June 2009** - The Pueblo of Zuni letter to Reclamation in which Zuni Governor Norman Coeeyate expressed the Zuni Tribe's concerns with the "taking of life" associated with mechanical removal, and the failure of Reclamation and FWS to consult with the Zuni Tribe concerning this management action.
- **March 2010** - Government to Government tribal consultation in 2009 results in DOI cancellation of two planned removal trips in March 2010, reinitiation of consultation with the FWS.
- **June 2010** - Reclamation begins Non-native Fish Control EA.

<http://pubs.usgs.gov/of/2011/1012/>

<http://www.usbr.gov/uc/envdocs/ea/gc/nafc/Appdx-A-SDMreport.pdf>



Non-Native Fish Control below Glen Canyon Dam— Report from a Structured Decision-Making Project

Open-File Report 2011-1012

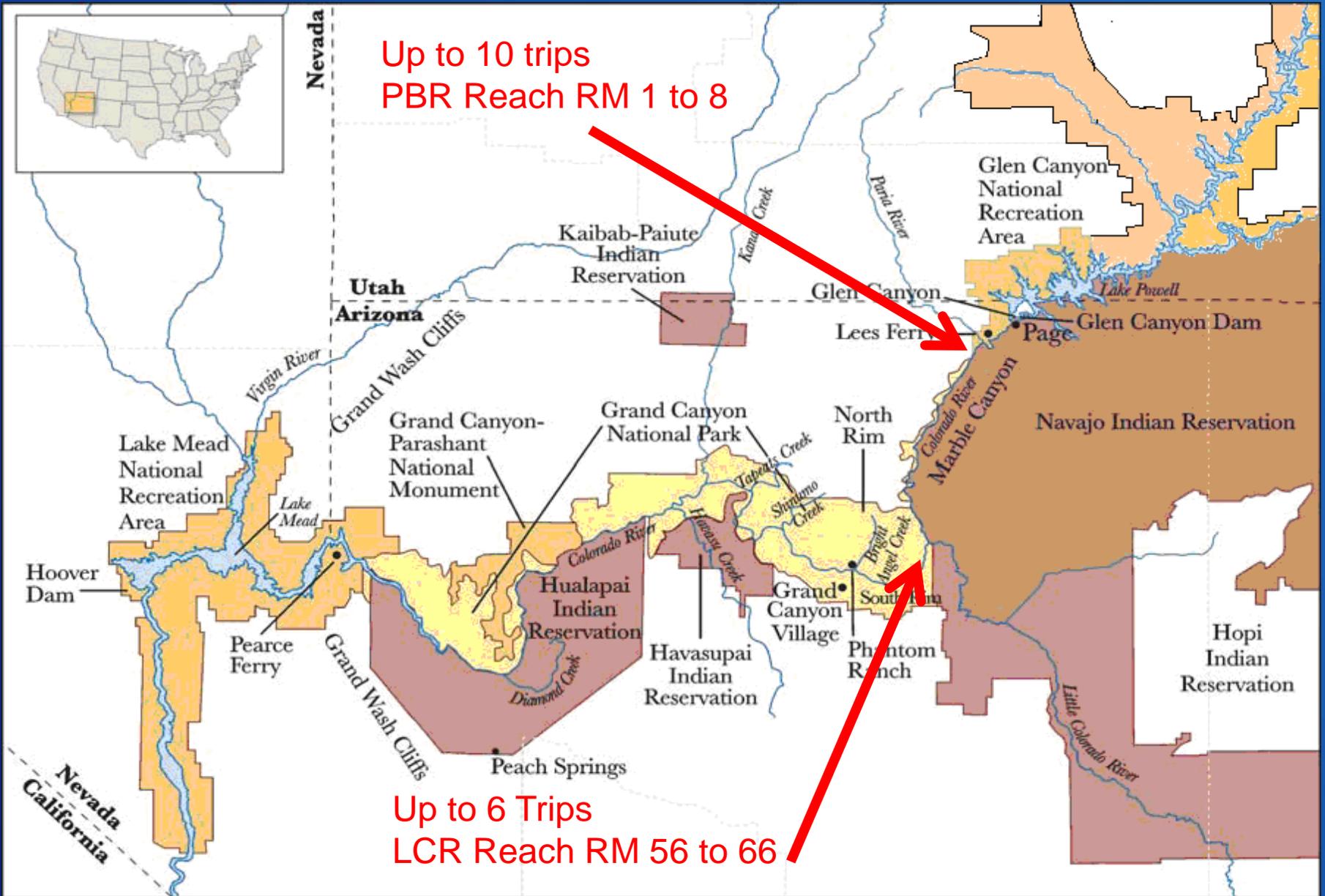
U.S. Department of the Interior
U.S. Geological Survey

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SDM Results

Hybrid portfolio	AZGF	BoR	FWS	Hopi	Navajo	NPS	WAPA	Zuni	Average
A	0.598	0.527	0.497	0.563	0.498	0.647	0.432	0.462	0.501
C ₂	0.505	0.418	0.418	0.450	0.428	0.474	0.308	0.314	0.402
C ₃	0.427	0.380	0.373	0.419	0.397	0.443	0.280	0.267	0.361
C ₄	0.478	0.440	0.428	0.545	0.458	0.512	0.353	0.370	0.437
C ₅	0.444	0.404	0.397	0.527	0.433	0.483	0.326	0.366	0.411
D ₁	0.672	0.589	0.649	0.571	0.648	0.629	0.557	0.504	0.606
D ₂	0.584	0.538	0.596	0.525	0.610	0.598	0.519	0.457	0.554
D ₃	0.610	0.578	0.623	0.618	0.645	0.651	0.565	0.558	0.603
J ₁	0.522	0.496	0.567	0.586	0.553	0.503	0.501	0.519	0.539
J ₁ '	0.610	0.525	0.583	0.528	0.537	0.508	0.523	0.481	0.545
J ₂	0.439	0.452	0.519	0.559	0.522	0.474	0.472	0.471	0.497
J ₂ '	0.524	0.479	0.532	0.497	0.503	0.473	0.491	0.433	0.500
K	0.365	0.387	0.426	0.459	0.436	0.472	0.293	0.346	0.390
Rank									
1	D ₁	D ₁	D ₁	D ₃	D ₁	D ₃	D ₃	D ₃	D ₁
2	J ₁ '	D ₃	D ₃	J ₁	D ₃	A	D ₁	J ₁	D ₃
3	D ₃	D ₂	D ₂	D ₁	D ₂	D ₁	J ₁ '	D ₁	D ₂
4	A	A	J ₁ '	A	J ₁	D ₂	D ₂	J ₁ '	J ₁ '
5	D ₂	J ₁ '	J ₁	J ₂	J ₁ '	C ₄	J ₁	J ₂	J ₁

D1 – Removal curtain – includes PBR Removal to test limiting emigration of trout from Lees Ferry to reduce trout numbers at LCR, and LCR removal as a means to directly address the threat of predation and competition if needed. Mitigation of freezing fish removed for beneficial use to address tribal concerns.



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SDM Project Outcomes

- SDM selected the Removal Curtain because it provided the most certainty with regard to protecting endangered humpback chub, it had the best track record, but:
 - **Learning was undervalued** - reducing uncertainty was not considered a fundamental objective, but rather a means objective, i.e. the effect of non-native fish predation was considered known, and learning the degree of this threat was undervalued.
 - **Cultural objectives were undervalued** - “Because of the difficulty this framework posed for defining and scoring cultural objectives, the importance of cultural objectives to the selection of top portfolios might not be appropriately captured in this analysis” (Runge et al. 2011).

EA History Cont.

- **January 28, 2011 – First Draft of the EA**
- **Comment period January 28 –March 18, 2011**
- **Second Public Comment Period July 5-July 26, 2011**
- **Finalized December 30, 2011**

Proposed Action

As a result of these concerns, revised proposed action:

Non-native fish would be removed alive to other waters for sport fishing.

Non-native fish control is now a research effort as opposed to a management action:

Removal in LCR Reach ONLY IF Trigger defined in FWS Biological Opinion is met, i.e. there is a decline in the status of humpback chub.

- a. Is Lees Ferry the source? Lees Ferry rainbow trout marking with PIT tags (fall) and increased Marble Canyon trout monitoring (summer).
- b. Can PBR and live removal work? Two PBR removal Trips initially in 2012.
- c. Do non-native fish have a population-level effect on hbc? FWS Trigger.
- d. Is mainstem habitat important to hbc? Increased marking and monitoring of young HBC in the LCR and Mainstem (Nearshore Ecology – Natal Origins).
- e. Are other NNFC methods better? Begin 1-2 year process with stakeholder involvement to develop and test feasibility of flow and non-flow options.
- f. Safety Valve: In 2014 Reclamation and in the future will undertake science review workshop with scientists to assess first two years of non-native fish control.

US Fish and Wildlife Service

Dec 23, 2011 Biological Opinion

- Evaluates Reclamation's proposed action of implementing the Modified Low Fluctuating Flow, the HFE Protocol and Non-native Fish Control through 2020.
- Non-jeopardy biological opinion.
- Continues program of monitoring, research, and conservation measures that has likely contributed to improvement in humpback chub status since 2003.

2011 Biological Opinion cont.

Conservation Measures

1. Re-Evaluation Points
2. Humpback Chub Translocation – LCR and Humpback Chub Translocation – Other Tributaries
3. Humpback Chub Nearshore Ecology Study (Natal Origins)
4. Humpback Chub Refuge
5. Humpback Chub Monitoring and Mainstem Aggregation Monitoring
6. Bright Angel Creek Brown Trout Control
7. High Flow Experiment Assessments
8. Dexter National Fish Hatchery Genetic Study
9. Monitoring of Kanab Ambersnail
10. Conservation of Mainstem Aggregations

2011 Biological Opinion cont.

Reclamation will undertake development, with stakeholder involvement, of **additional non-native fish suppression options** for implementation, and Reclamation will complete development of such options **within the first two years of the proposed action** to assist efforts to reduce recruitment of non-native rainbow trout at, and emigration of those fish from, Lees Ferry. Options will include **both flow and non-flow non-native fish suppression experiments** focused on the Lees Ferry reach, which would reduce the recruitment of trout in Lees Ferry, lowering emigration of trout. Additional environmental compliance may be necessary for implementation of these experiments. **In full cooperation with the NPS**, as co-lead for the LTEMP Process, Reclamation will **assess whether and how the LTEMP may provide a mechanism for analysis and implementation of future experimental suppression flows.**

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Conclusion

- **The Non-Native Fish Control EA proposed action balances the need to protect humpback chub from non-native fish predation and competition with the need to learn the degree of this threat, and to resolve the tribal concerns of effects of control on tribal spiritual values.**
- **Through the biological opinion, Reclamation will continue a legacy of monitoring and research that has proved invaluable in understanding the recovery needs of the species.**
- **The biological opinion also continues a suite of conservation measures, many of which were first proposed by the AMWG in 2003 that have undoubtedly contributed to the improvement in the status of humpback chub in Grand Canyon.**

Next Steps

The FEA is available on the Reclamation website at:

<http://www.usbr.gov/uc/envdocs/ea/gc/nafc/index.html>

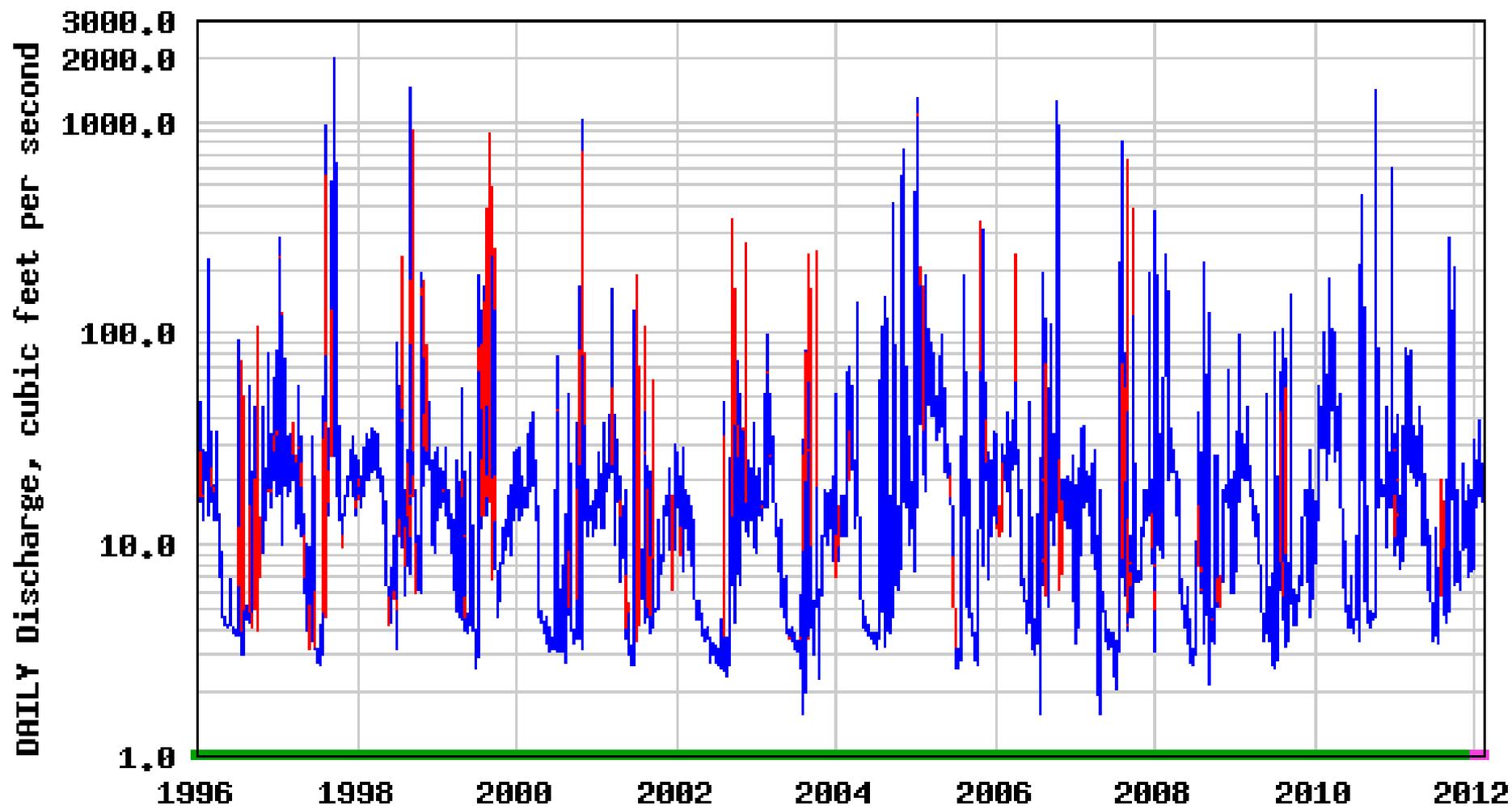
Need to complete NHPA compliance, continue to work towards resolving adverse affects to cultural resources.

Draft Memoranda of Agreement documents have been preliminarily agreed to, and we are working to get these signed to complete the NHPA S. 106 process and then consider final decision.

For more information contact **Glen Knowles** at **(801) 524-3781**
gknowles@usbr.gov

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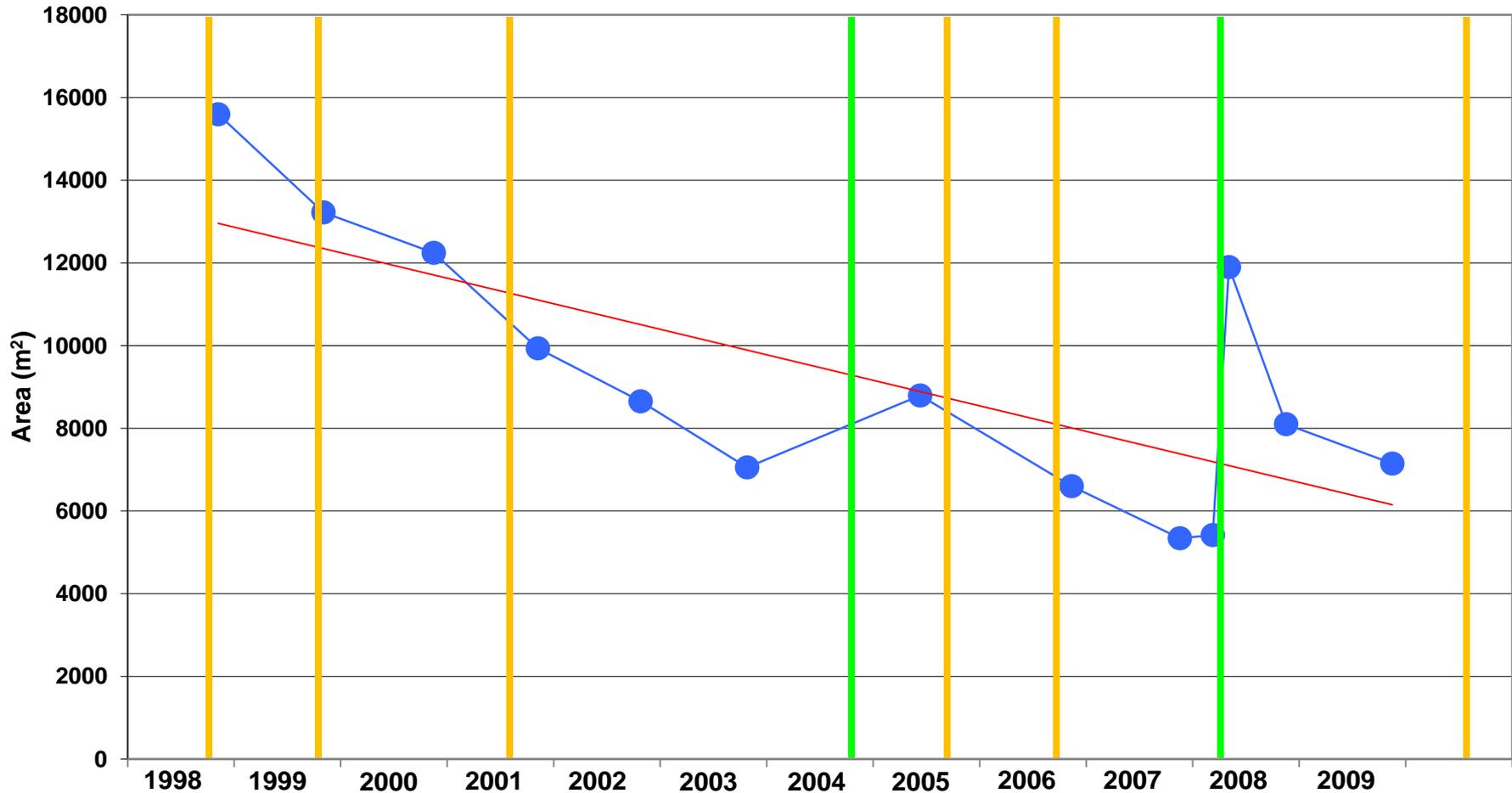
USGS 09382000 PARIA RIVER AT LEES FERRY, AZ



- Daily mean discharge
- Period of approved data
- Estimated daily mean discharge
- Period of provisional data

Why do an HFE Protocol?

Total amount of campsite area all sites above 25k



Removal Trigger

Removal of non-native fish at the LCR reach would only occur if 1) rainbow trout abundance estimates in the portion of the reach from RM 63.0-64.5 exceeds 760 fish, and 2) if the brown trout abundance estimate for this reach exceeds 50 fish (evaluated each calendar year in January); and 3) the abundance of adult humpback chub declines below 7,000 adult fish based on the ASMR. This model estimate will be conducted every 3 years.

OR

The above conditions 1 and 2 for trout abundance are met, and all of the following three conditions are also met:

In any 3 of 5 years during the proposed action using data extending retrospectively to 2008, the abundance estimate of humpback chub in the LCR between 150-199 mm (5.9-7.8 inches) TL within the 95 percent confidence interval drops below 910 fish (evaluated each calendar year in January); and

Temperatures in the mainstem Colorado River at the LCR confluence do not exceed 12 degrees 12° C in two consecutive years (evaluated each calendar year in January); and

Annual survival of young humpback chub (40-99 mm [1.6-3.15 inches]TL) in the mainstem in the LCR Reach drops 25 percent from the preceding year (evaluated each calendar year in January).

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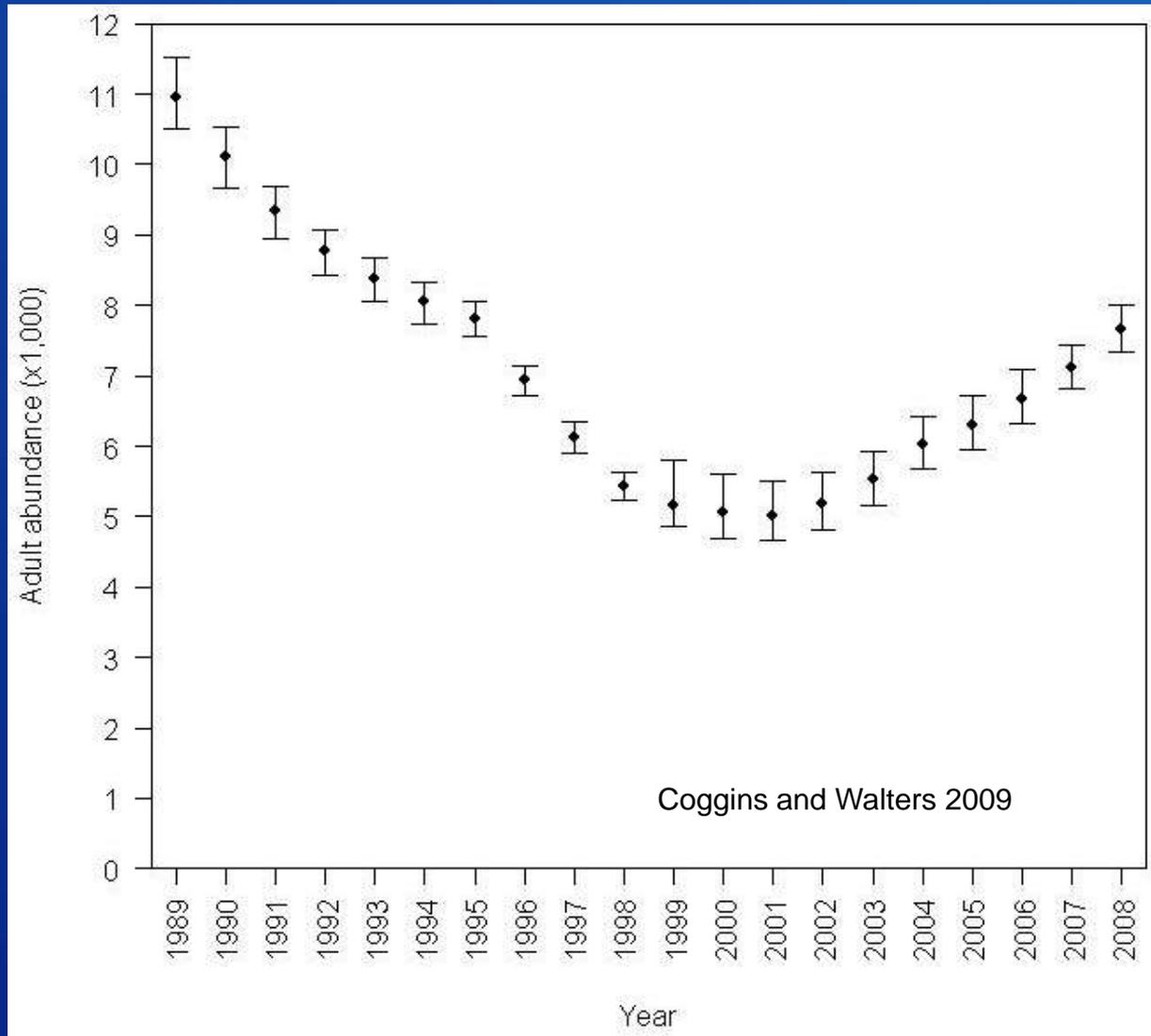
Structured Decision Making Project

- Evaluated non-native fish control alternatives performance against a suite of objectives (cultural and spiritual values, native ecology, recreational values, local economies, legal responsibilities).
- Evaluated 13 possible alternatives, including no action, sediment augmentation, mechanical removal, changes in fishing regulations, humpback chub population augmentation, and fish management flows.
- Used several models to evaluate effectiveness of treatments to reduce predation losses of humpback chub, as well as other objectives.

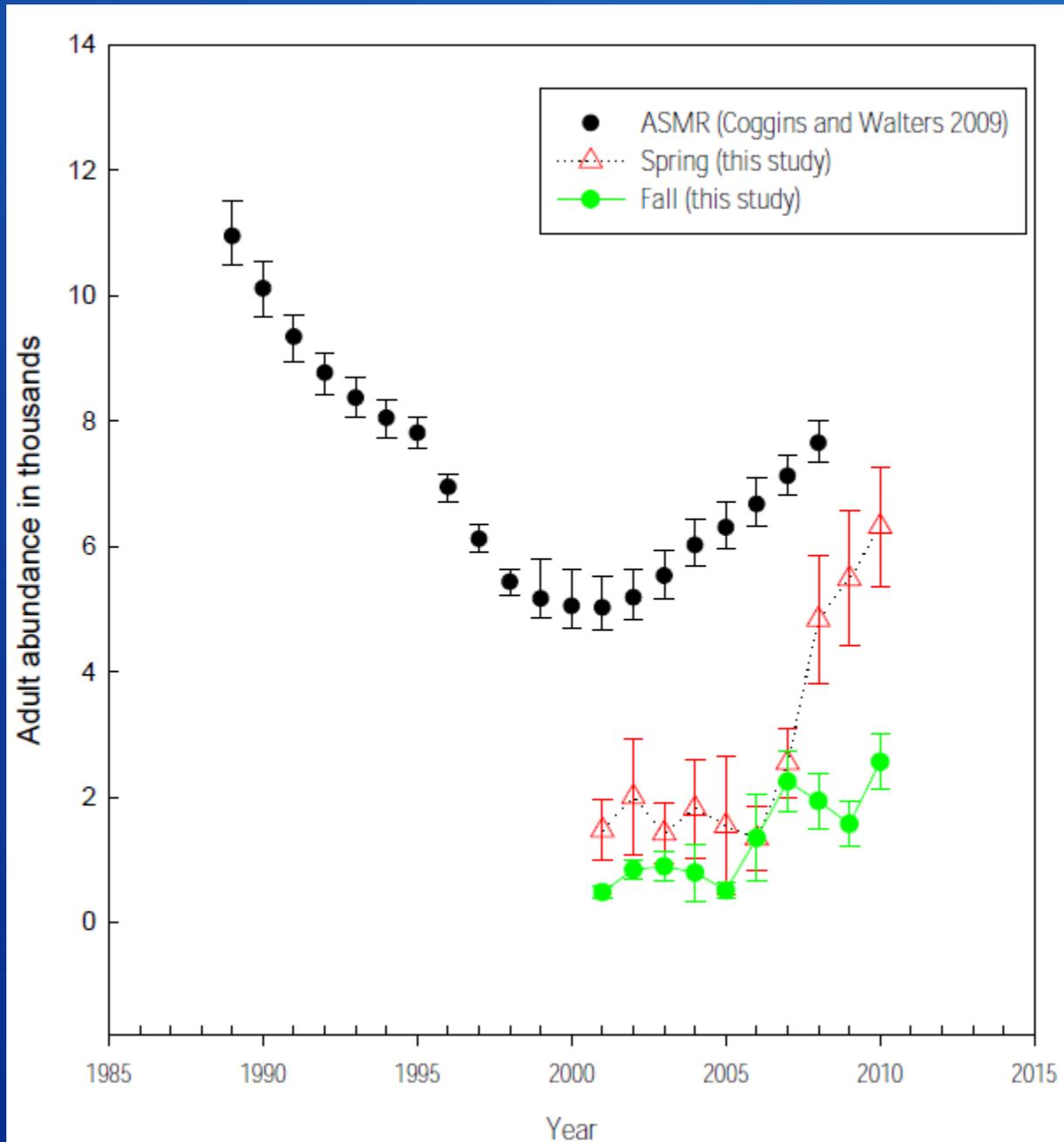
- Six populations of humpback chub in the canyons of the Colorado River.
- Grand Canyon is the largest and most stable population.



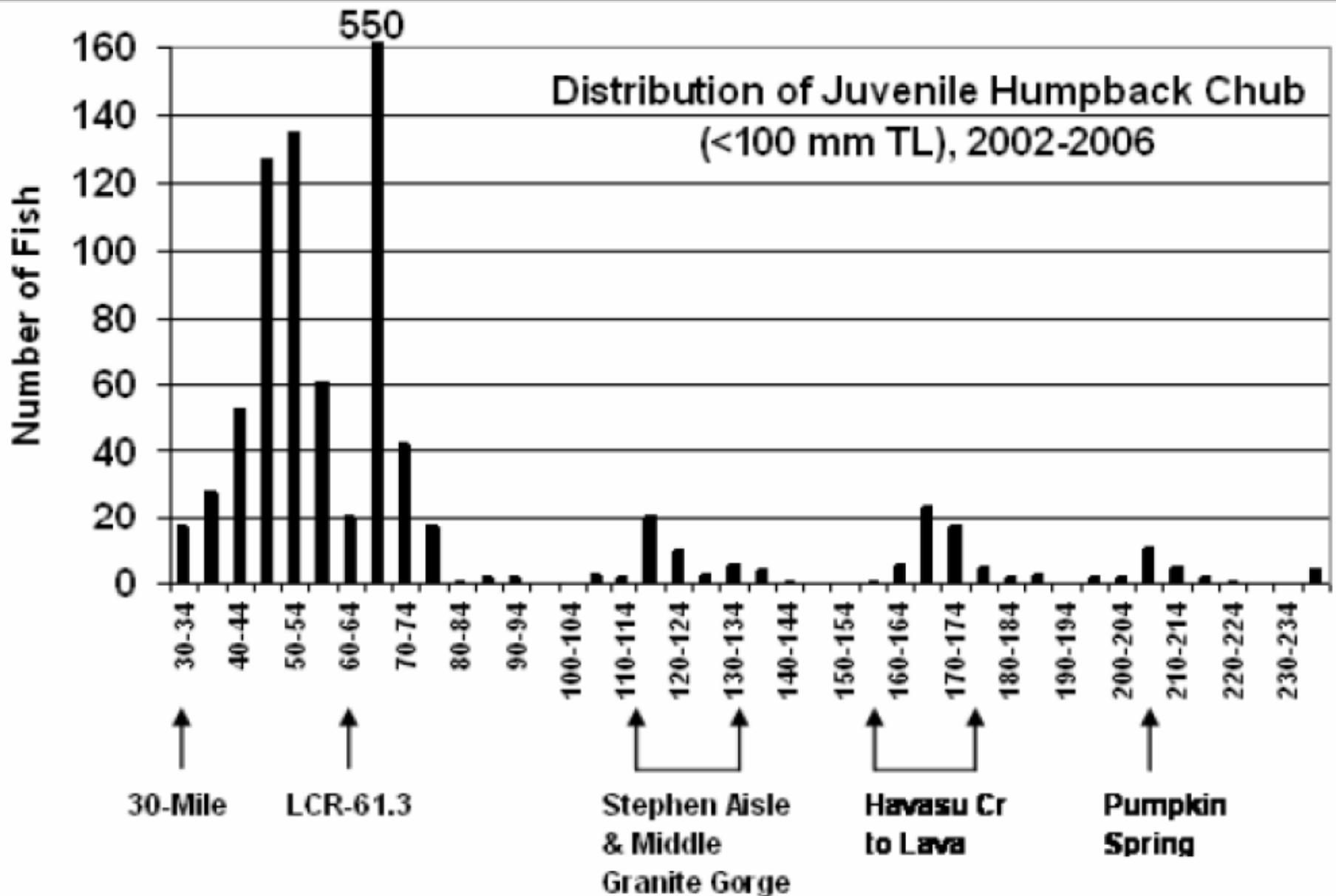
Grand Canyon Humpback chub abundance ASMR Model



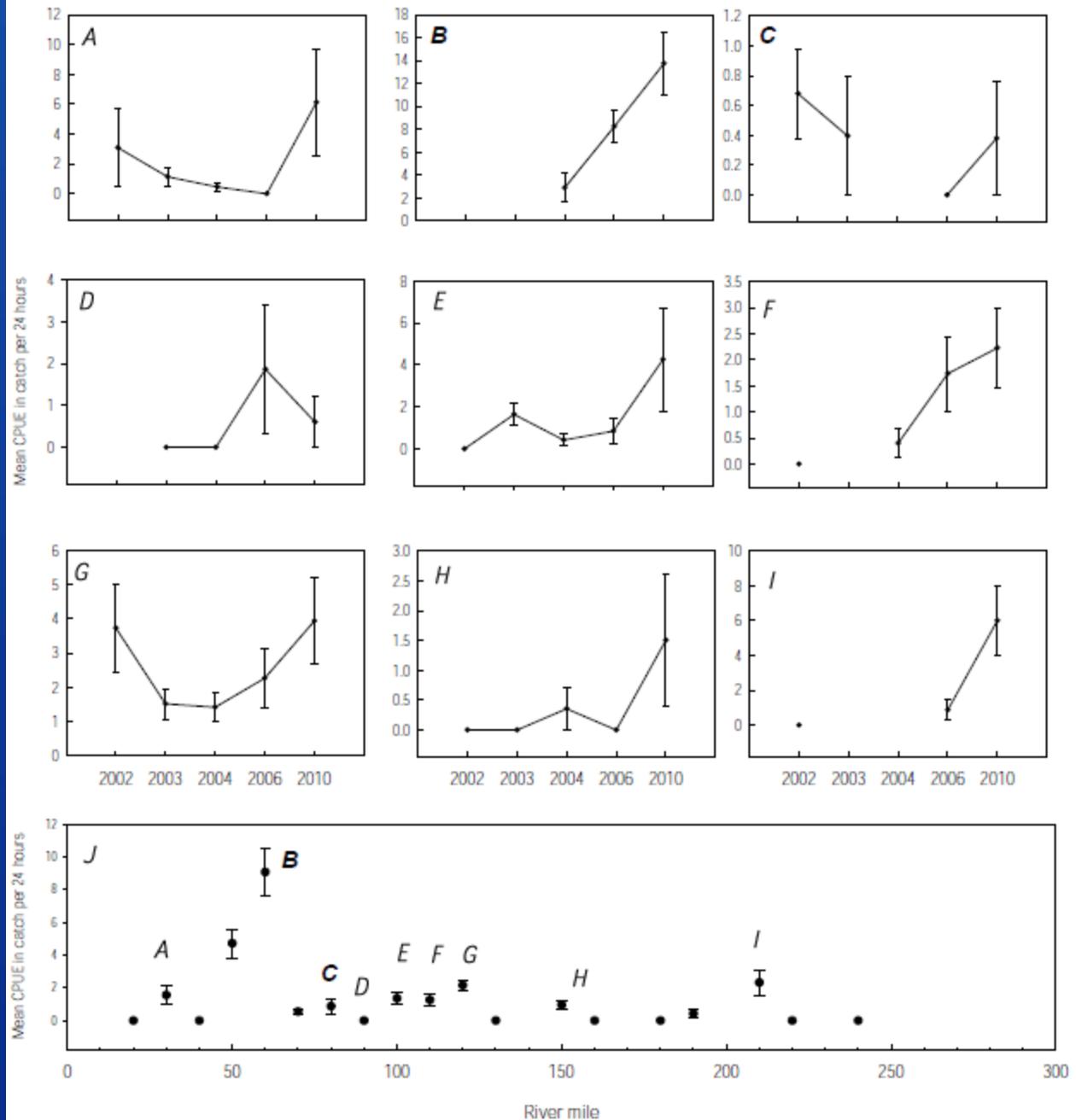
- **Closed population estimates of FWS also show recent increase in population numbers**



Grand Canyon Humpback Chub Mainstem Aggregations



- **Nine humpback chub aggregations in Grand Canyon.**
- **RM 30 to RM 209.**
- **Also appear to be increasing but limited data.**





Cooperating agencies

Federal:

National Park Service, Intermountain Region

Bureau of Indian Affairs

U.S. Fish and Wildlife Service

U.S. Geological Survey, Pacific Southwest Area

Western Area Power Administration

State:

Arizona Game and Fish Department

American Indian Tribes:

Hualapai Tribe

Pueblo of Zuni

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Tribal Consultation

- **Government-to-government tribal consultation meetings were held with the Zuni Tribe at the Pueblo of Zuni at Zuni, New Mexico, on September 15, 2009, and on March 24 and June 4, 2010; with the Hopi Tribe (March 4 and April 22 2010, January 27, 2011), Navajo Nation (June 9, 2010, and January 26, 2011), Hualapai (March 6, 2010, and January 8, 2011), Havasupai (March 15, 2010), Kaibab Paiute Tribe (March 18, 2010, and January 20, 2011), and the Paiute Indian Tribe of Utah (December 13, 2010);**
- **Reclamation served on a discussion panel about this issue at the 2010 Native American Fish and Wildlife Society Southwest Conference;**
- **Assistant Secretary Anne Castle and DOI representatives met with the Zuni Governor and Tribal Council, Zuni Cultural Resource Advisory Team, and the Zuni public at Zuni, New Mexico, on August 5, 2010.**
- **The Pueblo of Zuni sent Reclamation the Zuni Tribal Council Resolution No. M70-2010-C086 regarding their concerns with mechanical removal and the request that Grand Canyon be included as a TCP eligible for listing on the National Register. This resolution was given to Assistant Secretary Castle at the August 5, 2010 meeting.**
- **A CA and tribal meeting was held in Flagstaff on August 20, 2010; and,**
- **CA conference calls were conducted on September 2, 9, 16, 23, 30, and November 4 and 21, 2010, and on January 5, 2011. These often included the tribes that participated as cooperating agencies, the Pueblo of Zuni and Hualapai Tribe.**
- **Tribes participated in SDM Workshops, October 18-20, and November 8-10.**
- **More recent tribal consultation meetings with the Pueblo of Zuni were held on January 25, August 5, and December 13, 2011.**