History of Humpback chub research –part 1

1990s
Prior to 1990s – primarily natural history work

Early 1990s
intensive work in LCR and mainstem CR – identification of “Aggregations” and pop estimates.

Late 1990s
shift in focus to defining habitat characteristics

2000
Low Summer Flow – not great data to estimate effectiveness

2000ish
Attempt to estimate populations size in LCR via depletion efforts – not possible

Spring 2001
FWS starts spring and fall mark recap (twice each season) in LCR.

Early 2000s
Modelling fit to LCR data only suggest significant population decline – retrospective bias (temporary emigration)

2003–2006
Mechanical removal, but no way to measure effectiveness

2009
Spring HFE – not great data to estimate impacts on HBC

May 2009
NSE (precursor to JCM) starts – skepticism about whether mark-recap can be done in mainstem CR. Electrofishing and hoopnetting.

History of Humpback chub research – part 2

2012–2016
Juvenile Chub Monitoring / Natal Origins

2012ish
NSE/JCM show that fall steady flows did not have huge impact.

2013–2014
HBC population estimates for LCR aggregation integrating LCR and JCM data suggest larger population – temporary emigration dealt with. Estimates play significant role in delisting.

2000s-2010s
suggestion that a 20-year experiment was needed to figure out impact of rainbow trout and water temperature on HBC

2018
JCM data used to estimate impacts of water temperature and RBT on HBC juvenile survival and growth and long-term HBC abundance.

2018
Beginning of JCM-west. Begin to integrate antenna into sampling design.

2018-2020 TWP
Combine LCR HBC and native fish elsewhere projects into a single project – then cut by 25%.

2019ish
Estimate effectiveness of chute falls translocation using mark-recap analysis of data being collected around LCR

2022
ish – beginning to estimate western GC wide abundance by integrating JCM-west and aggregation data. First estimates of vital rates.

Compliance (ESA, LTEMP ROD)

- G.1 (Humpback chub modeling)
- G.2 (USFWS lower LCR)
- G.3 (Juvenile chub monitoring [JCM] – East)
- G.7 (Chute Falls translocations)

Metrics

- G.1 (Humpback chub modeling)
- G.2 (USFWS lower LCR)
- G.3 (Juvenile chub monitoring [JCM] – East)
- G.5 (HBC aggregations)
- G.6 (JCM – West)

Fiscal Year 2025								
Project G Humpback Chub Population Dynamics throughout the Colorado River Ecosystem	Salaries	Travel & Training	Operating Expenses	Logistics Expenses	Cooperative Agreements	To other USGS Centers	Burden	Total
							14.00%	
G.1. Humpback chub population modeling	$156,134	$8,000	$5,000	$0	$0	$0	$23,679	**$192,813**
G.2. Annual spring/fall HBC abundance estimates in the lower 13.6 km of the LCR	$4,809	$0	$20,222	$102,192	$415,090	$0	$30,264	**$572,577**
G.3. Juvenile chub monitoring near the LCR confluence (JCM-East)	$191,807	$1,000	$26,156	$298,271	$0	$0	$72,413	**$589,647**
G.4. Remote PIT-tag array monitoring in the LCR	$22,557	$0	$4,500	$5,000	$0	$0	$4,488	**$36,545**
G.5. Monitoring humpback chub aggregation relative abundance and distribution	$3,615	$0	$12,436	$79,366	$142,984	$0	$17,648	**$256,049**
G.6. Juvenile chub monitoring - Western Grand Canyon (JCM-West)	$95,321	$1,000	$29,836	$171,400	$0	$0	$41,658	**$339,215**
G.7. Chute Falls translocations	$0	$0	$930	$15,877	$82,649	$0	$4,832	**$104,288**
~~G.8. Sampling of springs in the upper LCR~~	~~$0~~	~~$0~~	~~$620~~	~~$20,936~~	~~$54,240~~	~~$0~~	~~$4,645~~	~~**$80,441**~~
G.9. Movement in western Grand Canyon from system-wide antenna monitoring	$10,946	$0	$40,000	$0	$0	$0	$7,132	**$58,079**
Total Project G	**$485,189**	**$10,000**	**$139,700**	**$693,042**	**$694,963**	**$0**	**$206,759**	**$2,229,653**

Fiscal Year 2026

Project G Humpback Chub Population Dynamics throughout the Colorado River Ecosystem	Salaries	Travel & Training	Operating Expenses	Logistics Expenses	Cooperative Agreements	To other USGS Centers	Burden	Total
							14.50%	
G.1. Humpback chub population modeling	$167,063	$8,000	$5,000	$0	$0	$0	$26,109	**$206,173**
G.2. Annual spring/fall HBC abundance estimates in the lower 13.6 km of the LCR	$5,145	$0	$18,672	$105,220	$421,215	$0	$31,347	**$581,599**
G.3. Juvenile chub monitoring near the LCR confluence (JCM-East)	$205,683	$1,000	$26,156	$308,295	$0	$0	$78,464	**$619,598**
G.4. Remote PIT-tag array monitoring in the LCR	$24,136	$0	$4,500	$5,000	$0	$0	$4,877	**$38,514**
G.5. Monitoring humpback chub aggregation relative abundance and distribution	$3,868	$0	$13,986	$104,859	$184,416	$0	$23,326	**$330,456**
G.6. Juvenile chub monitoring - Western Grand Canyon (JCM-West)	$102,118	$1,000	$29,836	$177,153	$0	$0	$44,966	**$355,072**
G.7. Chute Falls translocations	$0	$0	$930	$16,347	$83,697	$0	$5,016	**$105,990**
G.8. Sampling of springs in the upper LCR	$0	$0	$0	$0	$0	$0	$0	**$0**
G.9. Movement in western Grand Canyon from system-wide antenna monitoring	$11,712	$0	$15,000	$0	$0	$0	$3,873	**$30,586**
Total Project G	**$519,726**	**$10,000**	**$114,080**	**$716,874**	**$689,328**	**$0**	**$217,978**	**$2,267,987**

Fiscal Year 2027								
Project G Humpback Chub Population Dynamics throughout the Colorado River Ecosystem	Salaries	Travel & Training	Operating Expenses	Logistics Expenses	Cooperative Agreements	To other USGS Centers	Burden	Total
							15.00%	
G.1. Humpback chub population modeling	$178,758	$8,000	$5,000	$0	$0	$0	$28,764	**$220,521**
G.2. Annual spring/fall HBC abundance estimates in the lower 13.6 km of the LCR	$5,505	$0	$18,672	$108,272	$427,461	$0	$32,691	**$592,602**
G.3. Juvenile chub monitoring near the LCR confluence (JCM-East)	$220,081	$1,000	$26,156	$318,373	$0	$0	$84,841	**$650,451**
G.4. Remote PIT-tag array monitoring in the LCR	$25,826	$0	$4,500	$5,000	$0	$0	$5,299	**$40,625**
G.5. Monitoring humpback chub aggregation relative abundance and distribution	$4,139	$0	$12,436	$84,512	$147,083	$0	$19,576	**$267,746**
G.6. Juvenile chub monitoring - Western Grand Canyon (JCM-West)	$109,266	$1,000	$29,836	$182,936	$0	$0	$48,456	**$371,494**
G.7. Chute Falls translocations	$0	$0	$930	$16,820	$84,764	$0	$5,205	**$107,720**
G.8. Sampling of springs in the upper LCR	$0	$0	$0	$0	$0	$0	$0	**$0**
G.9. Movement in western Grand Canyon from system-wide antenna monitoring	$12,532	$0	$15,000	$0	$0	$0	$4,130	**$31,662**
Total Project G	**$556,107**	**$10,000**	**$112,530**	**$715,913**	**$659,309**	**$0**	**$228,962**	**$2,282,821**

- Is there data that does not need annual collection?
  - I don’t think so – this would lead to very imprecise estimates
- Can monitoring trips be combined with others?
  - G.5 does include an extra boat for seining (replacing the seining trip)
  - Same trip samples JCM-East & JCM-West (G.3 & G.6)
- If we had to cut 10% or 15%:
  - Reduction in trips would cause loss of precision in abundance, survival, and growth estimates.
  - Probably would shorten mainstem trips, reduce to 1 camp for June/July LCR trip, and maybe drop a LCR fall trip.
  - Could try to offset by cutting salary for analysis, reduce scope of modelling, and find outside work.