Highlights of Winter 2004 Mechanical Removal of Non-Native Fishes From the Colorado River

Southwest Biological Science Center

Grand Canyon Monitoring and Research Center

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U.S. Geological Survey

Preliminary Data Subject to Review and Revision 8/9/2004

Objectives

- Effect of Adult RBT and BNT on the Population Dynamics of the LCR HBC Population.
  - Will humpback chub recruitment increase as a result of non-native removal?
- Efficacy of Mechanical Removal of Adult RBT and BNT from the LCR Inflow Reach.
  - To what extent can we remove non-native fishes from a large reach of the Colorado River?
- Rainbow and Brown Trout Diet Analysis and Predation.
  - What are non-native fish eating?

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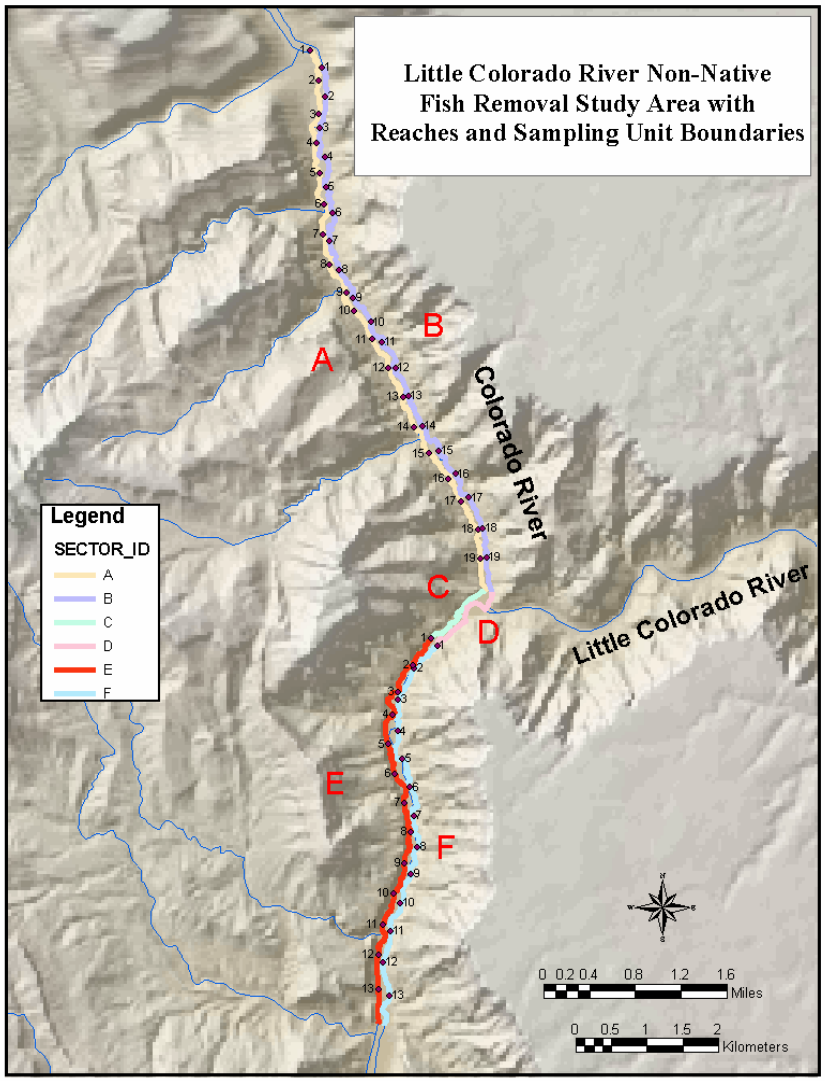
Mechanical Removal Reach: Original Experimental Design



- **January 2003 Trip:**
  - **5 pass depletion in original reach (A-F)**
- **February 2003 Trip**
  - **5 pass depletion in original reach (A-F)**
- **March 2003 Trip:**
  - **5 pass depletion in original reach (A-F)**

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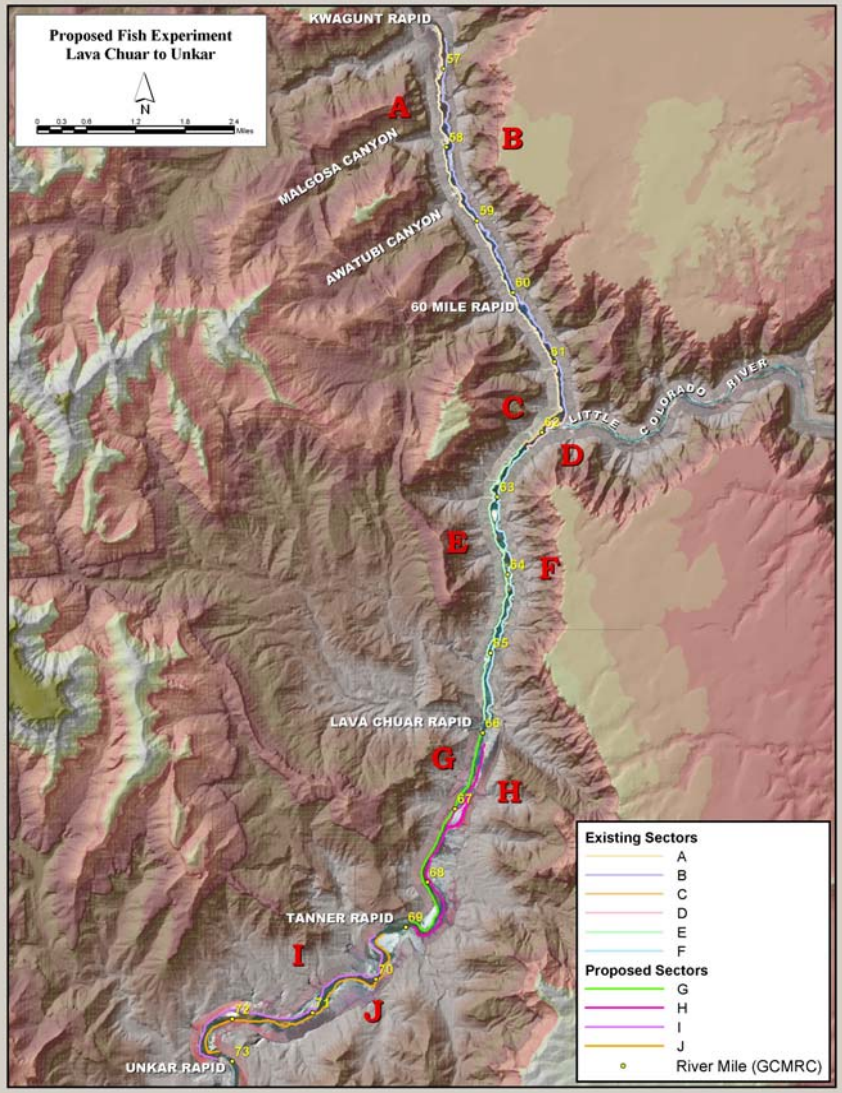
Mechanical Removal Reach: Modified Experimental Design



- **July 2003 Trip:**
  - **5 pass depletion in original reach (A-F)**
- **August 2003 Trip:**
  - **2 pass depletion in original reach (A-F)**
  - **3 pass depletion in Lava Chuar to Tanner Reach (G-H)**
  - **3 pass depletion in Tanner to Unkar Reach (I-J)**
- **September 2003 Trip:**
  - **3 pass depletion in original reach (A-F)**
  - **3 pass depletion in Lava Chuar to Tanner Reach (G-H).**

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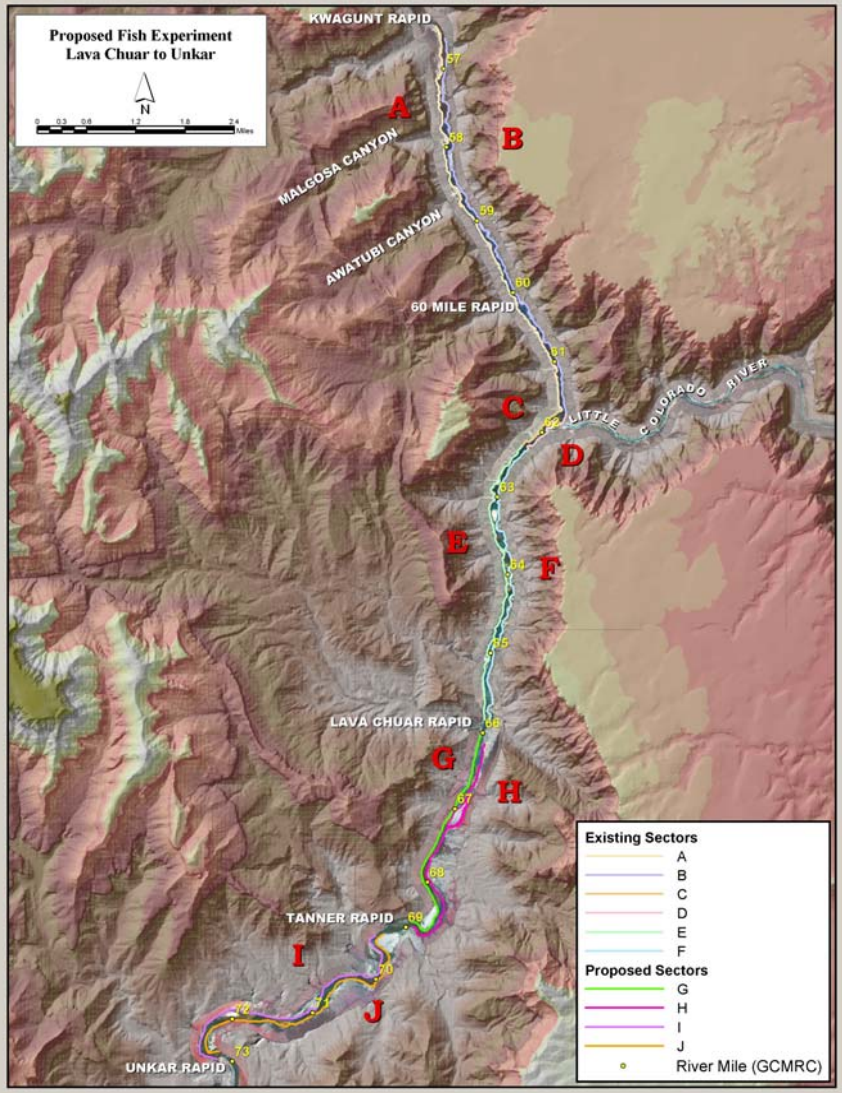
Mechanical Removal Reach: Modified Experimental Design



- **January 2004 Trip:**
  - 4 pass depletion in original reach (A-F)
  - 4 pass depletion in Lava Chuar to Tanner Reach (G-H)
- **February 2004 Trip:**
  - 4 pass depletion in original reach (A-F)
  - 4 pass depletion in Lava Chuar to Tanner Reach (G-H)
- **March 2004 Trip:**
  - 5 pass depletion in original reach (A-F)
  - Trip cut 2 days short due to logistical problems

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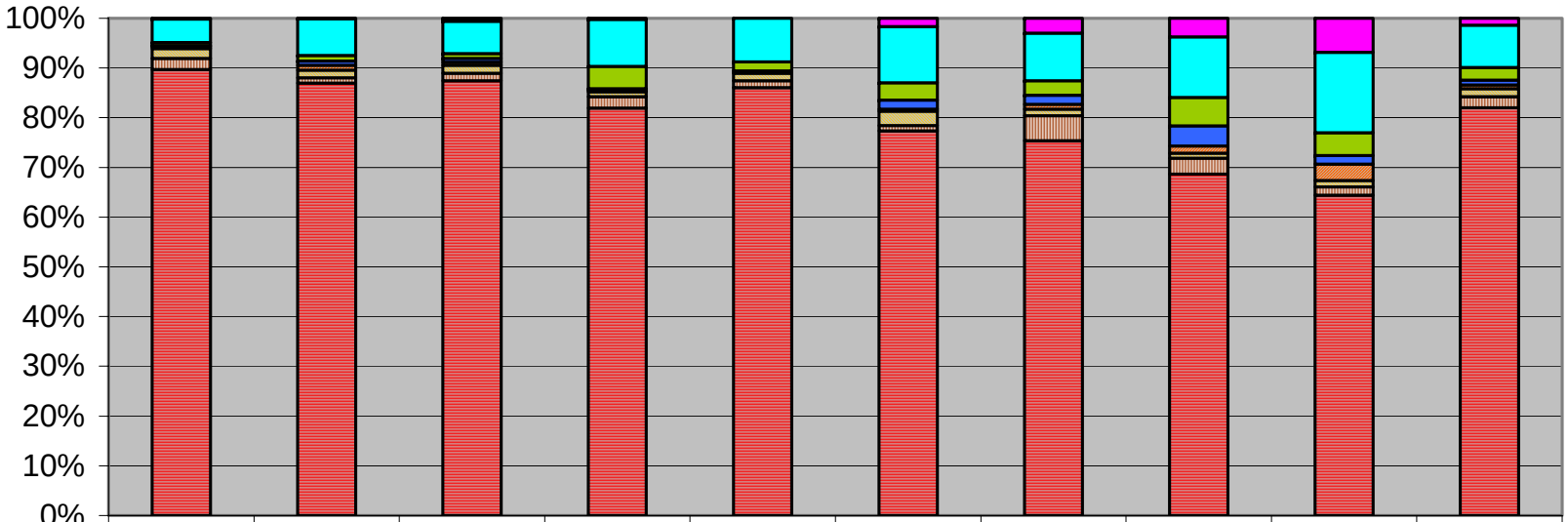
Little Colorado River Removal Reach Results

Electrofishing Catch by Species and Month within the Little Colorado River Removal Reach



	Jan-03	Feb-03	Mar-03	Jul-03	Aug-03	Sep-03	Jan-04	Feb-04	Mar-04	2003 & 2004 Total
Speckled Dace	7	2	8	6		18	53	34	92	220
Flannelmouth Sucker	188	161	89	266	79	119	169	110	218	1399
Humpback Chub	26	26	13	126	17	37	51	52	61	409
Bluehead Sucker	8	18	11	12	4	19	32	37	24	165
Fathead Minnow	17	21	8	4		4	18	13	44	129
Common Carp	80	33	22	29	14	31	23	9	18	259
Brown Trout	87	24	21	63	12	11	88	29	22	357
Rainbow Trout	3605	1900	1195	2298	779	818	1330	622	867	13414

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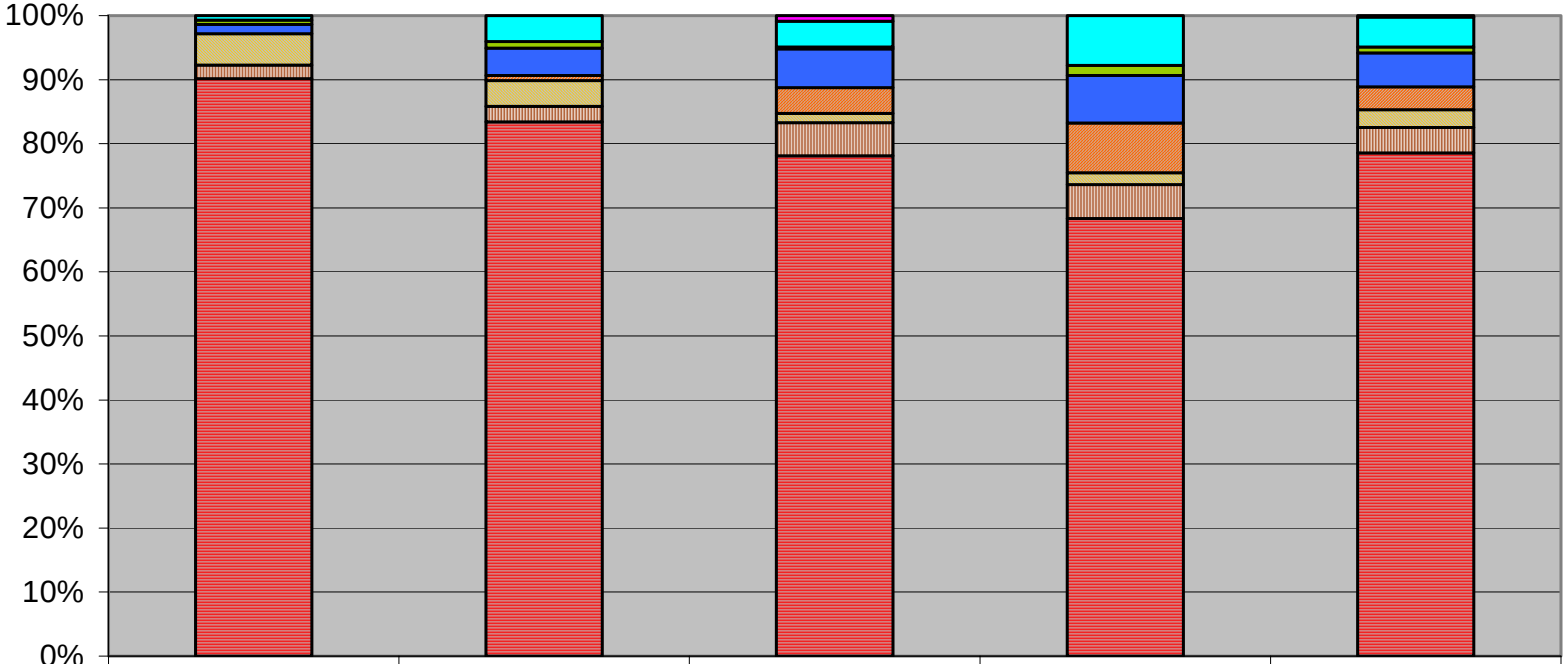
Lava-Chuar to Tanner Removal Reach Results

Electrofishing Catch by Species and Month within the Lava Chuar to Tanner Removal Reach



	Aug-03	Sep-03	Jan-04	Feb-04	2003 & 2004 Total
Speckled Dace			3		3
Flannelmouth Sucker	1	15	14	25	55
Humpback Chub	1	4	1	5	11
Bluehead Sucker	2	16	21	24	63
Fathead Minnow		3	14	25	42
Common Carp	7	15	5	6	33
Brown Trout	3	9	18	17	47
Rainbow Trout	128	312	271	220	931

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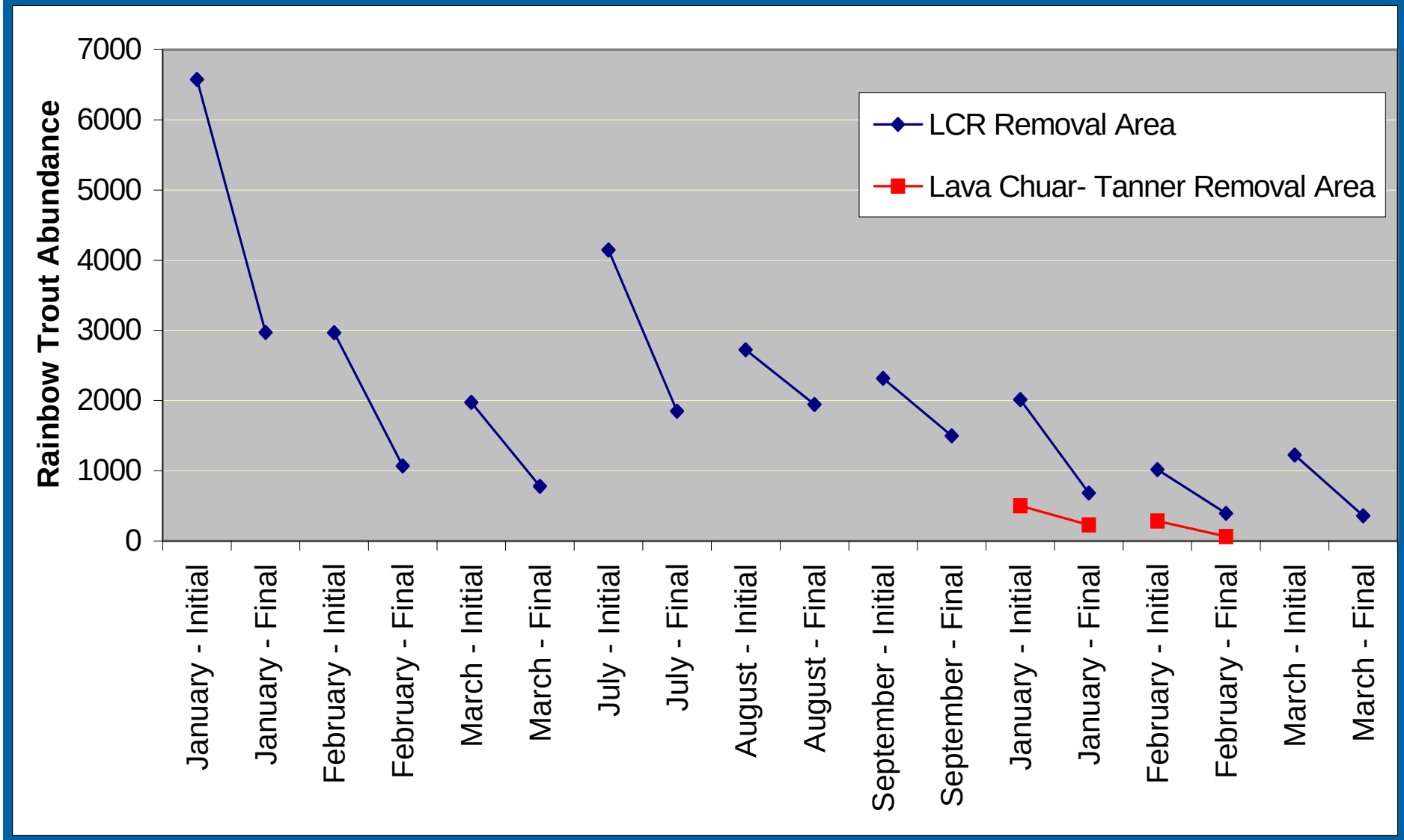
Little Colorado River Removal Reach Results
Rainbow Trout Abundance



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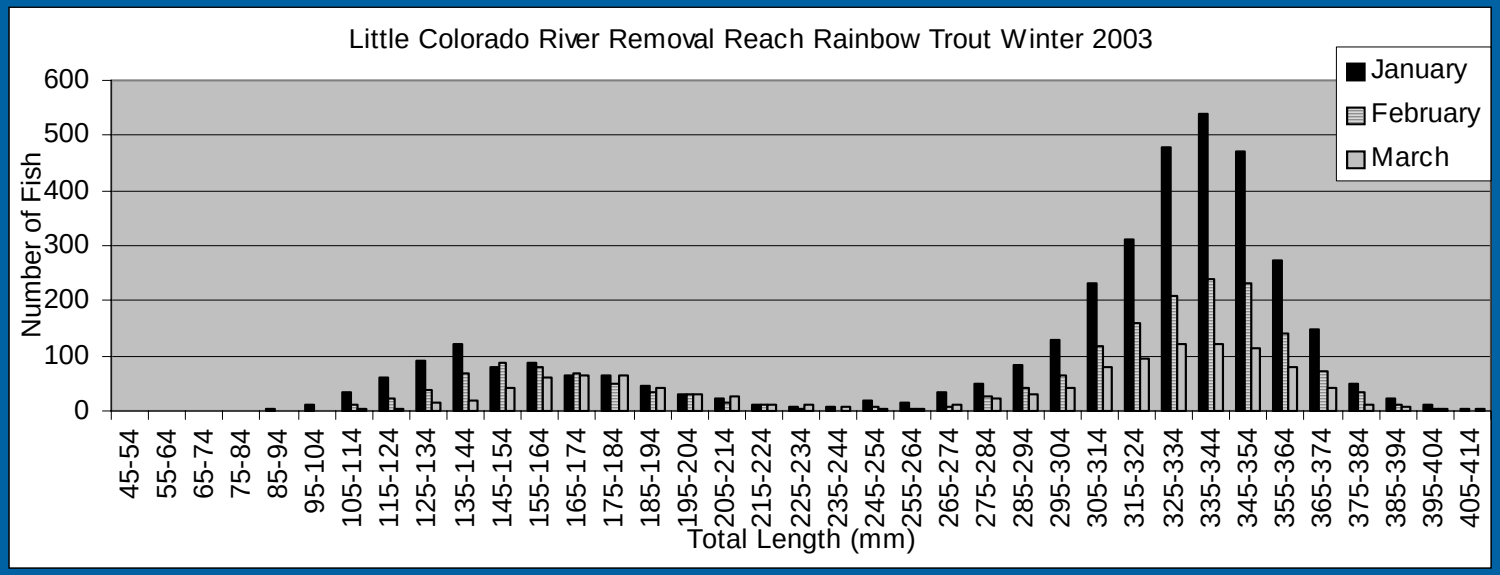
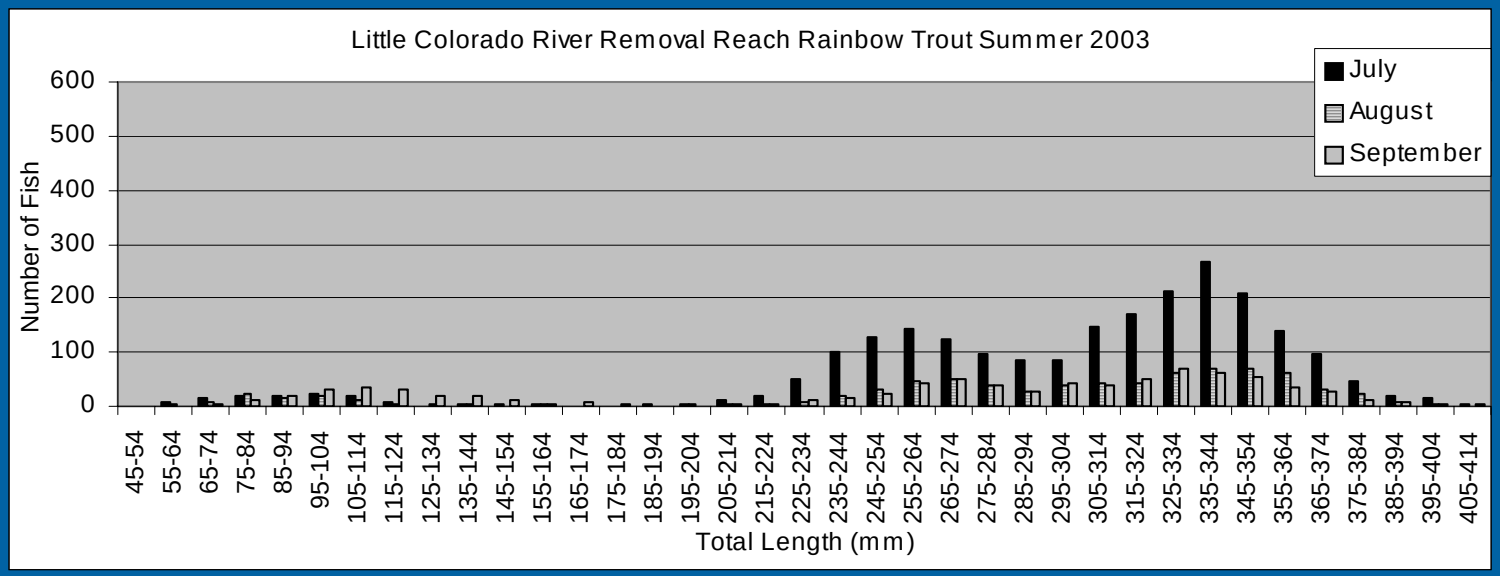
Little Colorado River Removal Reach Results
Rainbow Trout Length Frequency Distribution





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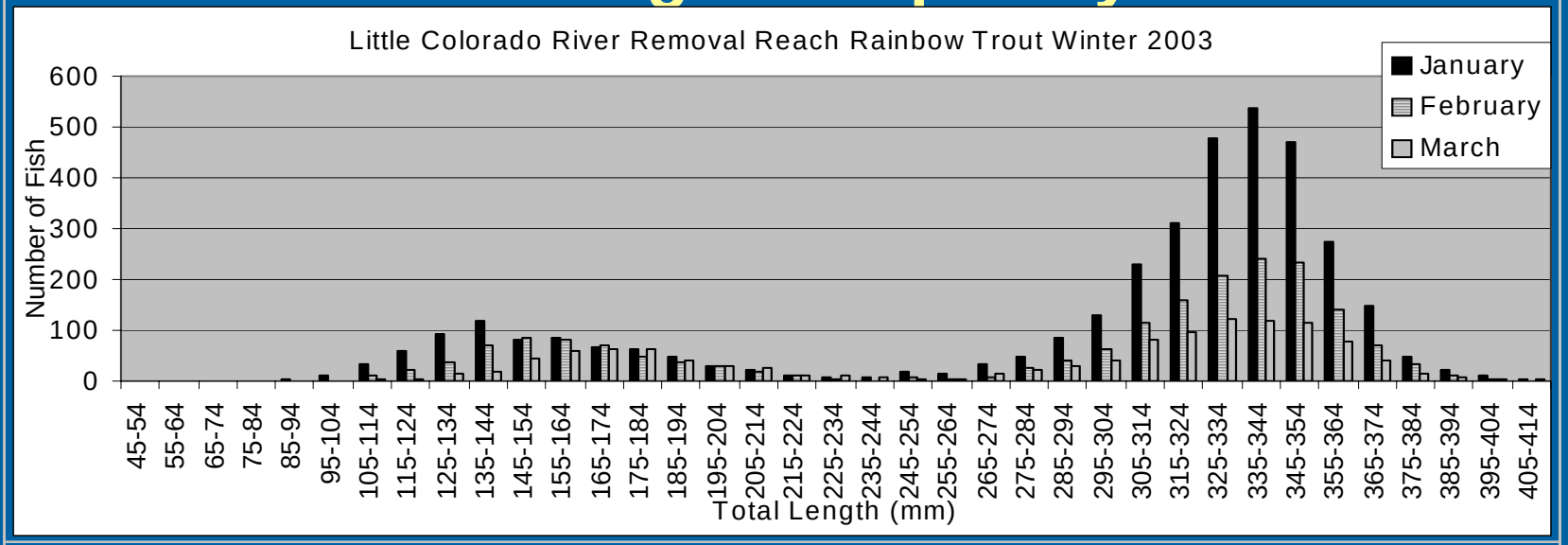
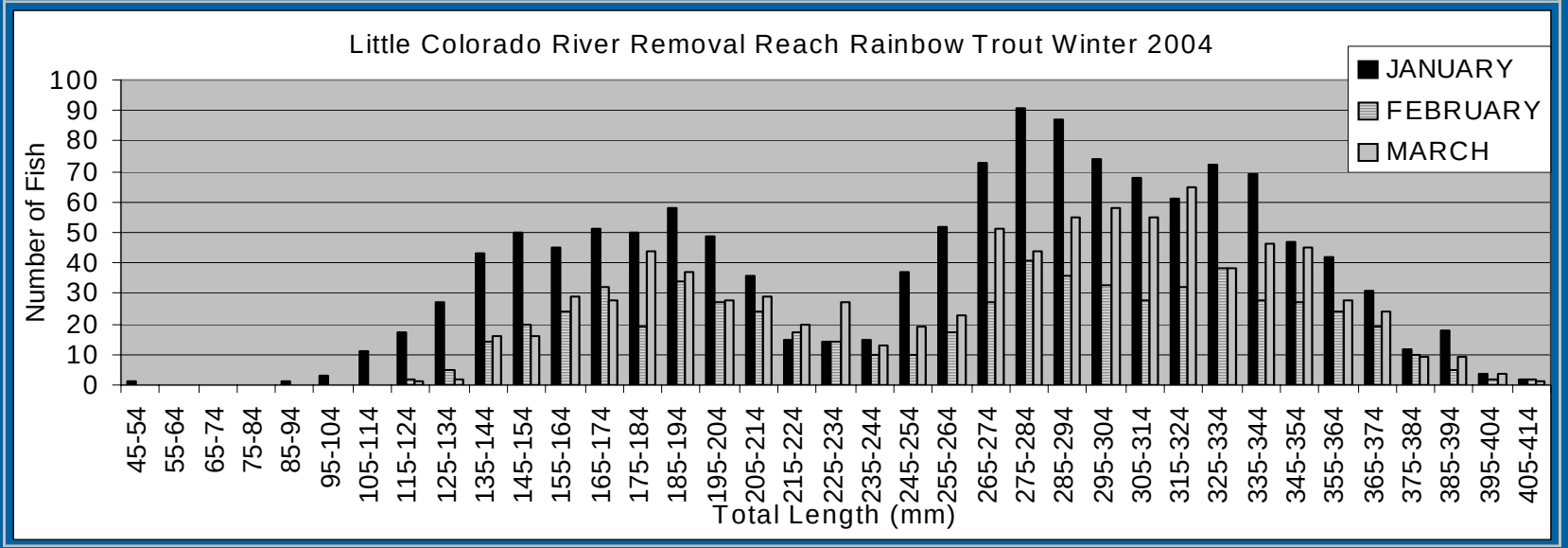
Rainbow Trout Length Frequency Distribution





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Control Reach Length Frequency

- Control Reach (RM 44-52)
  - Purpose is to evaluate changes in trout abundance and size distribution that are a result of factors other than mechanical removal (e.g. fluctuating flows)
  - Each trip, 24 500m sampling units are randomly selected and electrofished to estimate catch-rate.
  - All RBT and BNT >= 200mm are fitted with a floy-tag to assess movement and estimate abundance.

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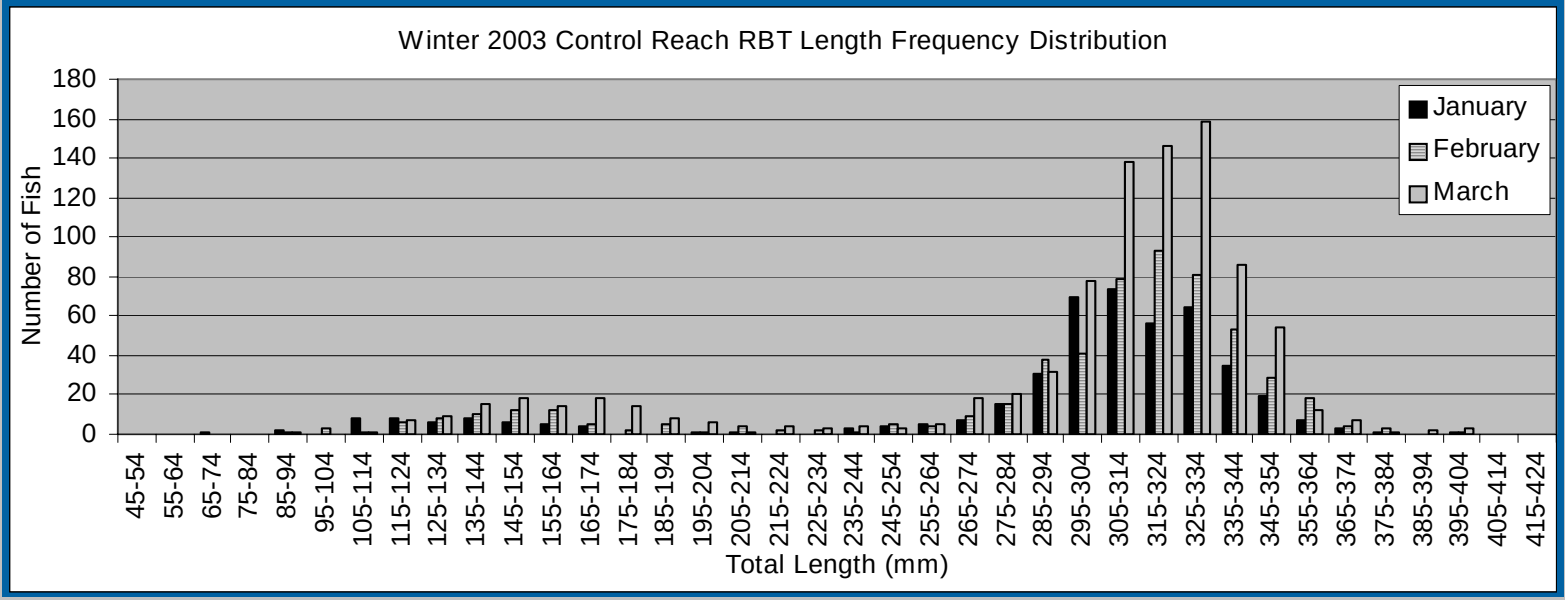
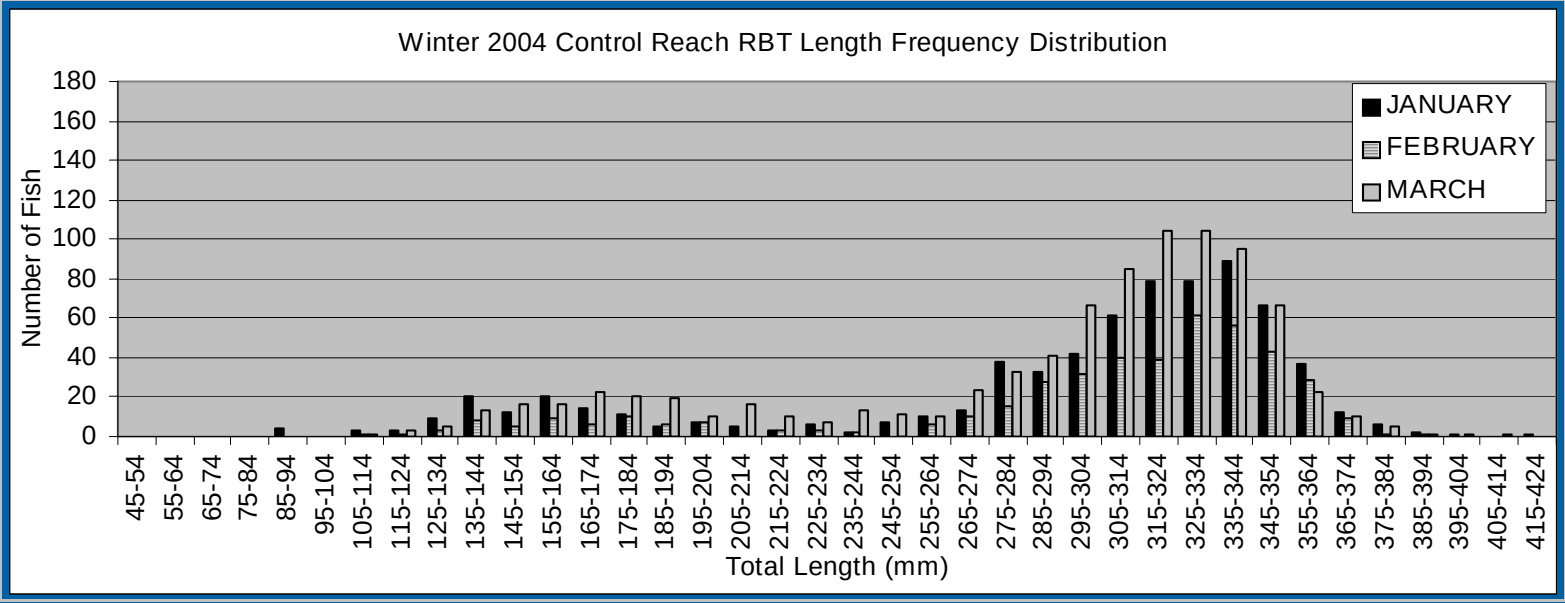
Control Reach Length Frequency





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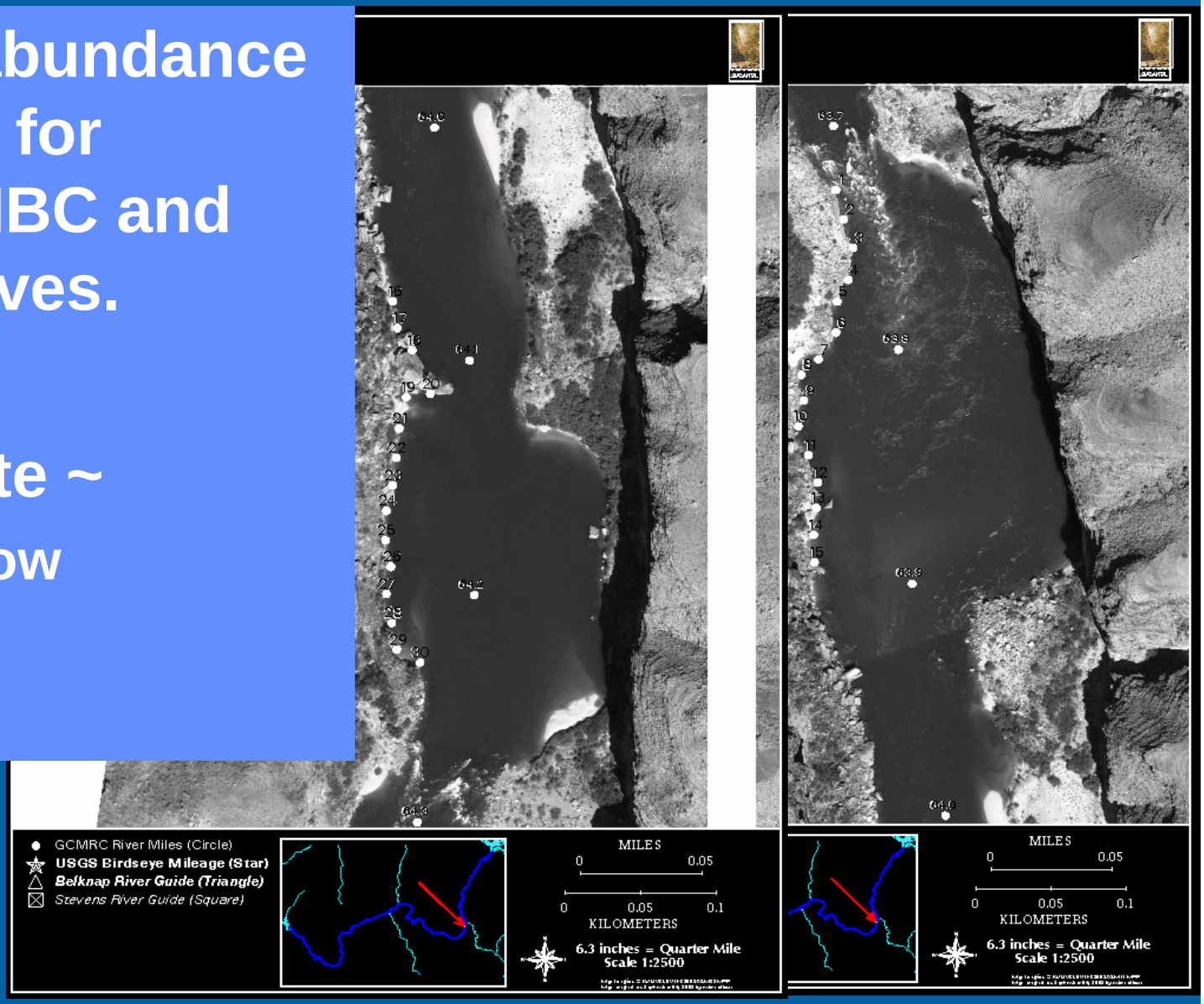
Hoopnetting

- Relative abundance estimates for juvenile HBC and other natives.
- 30 sets/site ~
  - LCR Inflow
  - Tanner
  - Unkar



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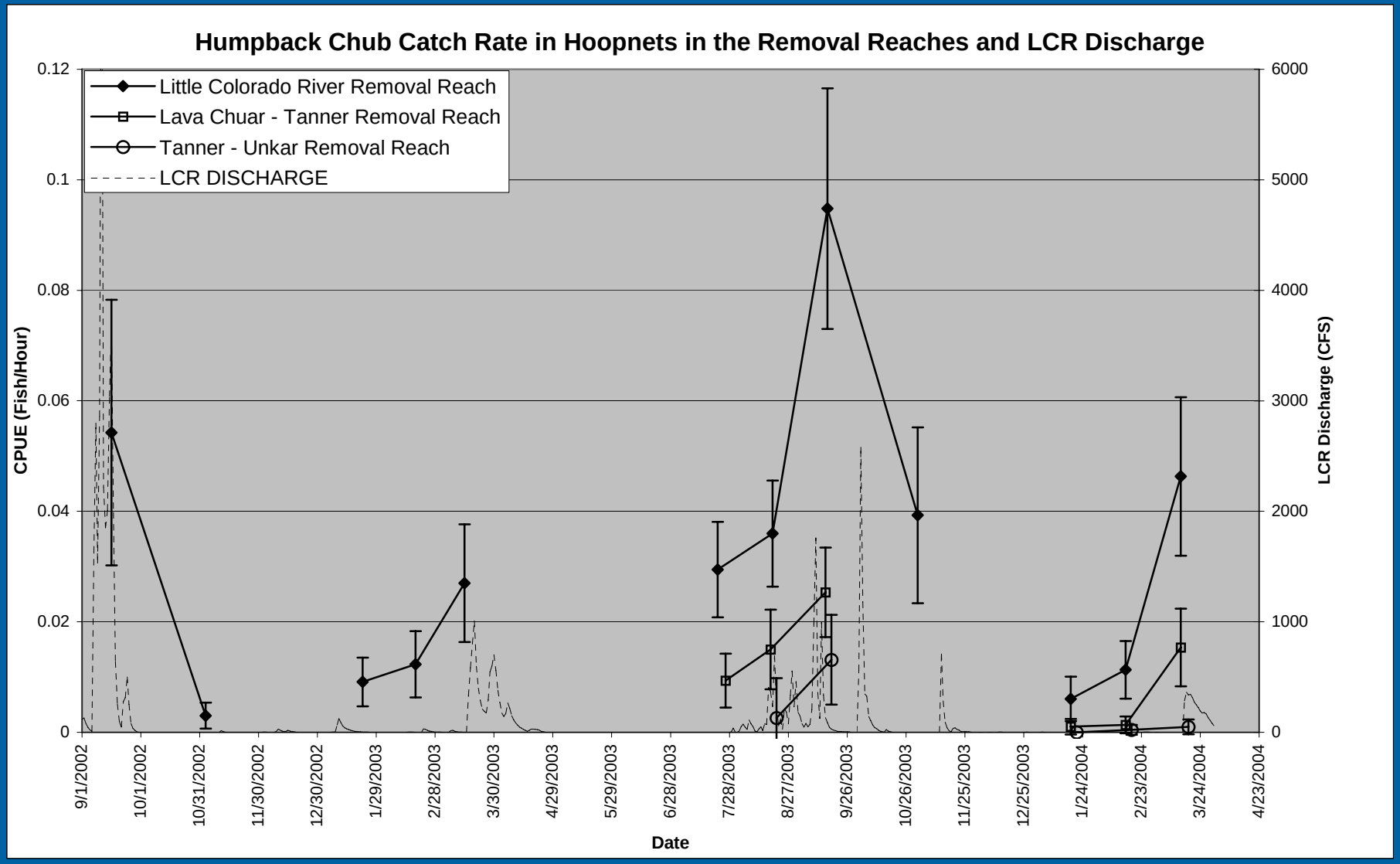
Hoopnetting Results



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2003-04 Preliminary Conclusions

- Non-native removal efforts more effective than anticipated. > 50% removal efficiency for Rainbow Trout.
- Immigration rate >800 fish/month in the LCR Inflow Reach. Immigration rate may differ among months.
- 2003-2004 data suggest persistent annual effect on RBT abundance, not so for BNT.
- Differences in overall RBT length frequency distribution may indicate variable immigration rates as a function of size. Small fish possibly more likely to move, result is smaller average size in removal areas.
- Hoopnet catches of HBC provide contradictory information relative to increased survival of HBC.
- Rigorous assessment of whether mechanical removal is affecting (improving) HBC population dynamics will not be available until at least 2006 and likely 2007.

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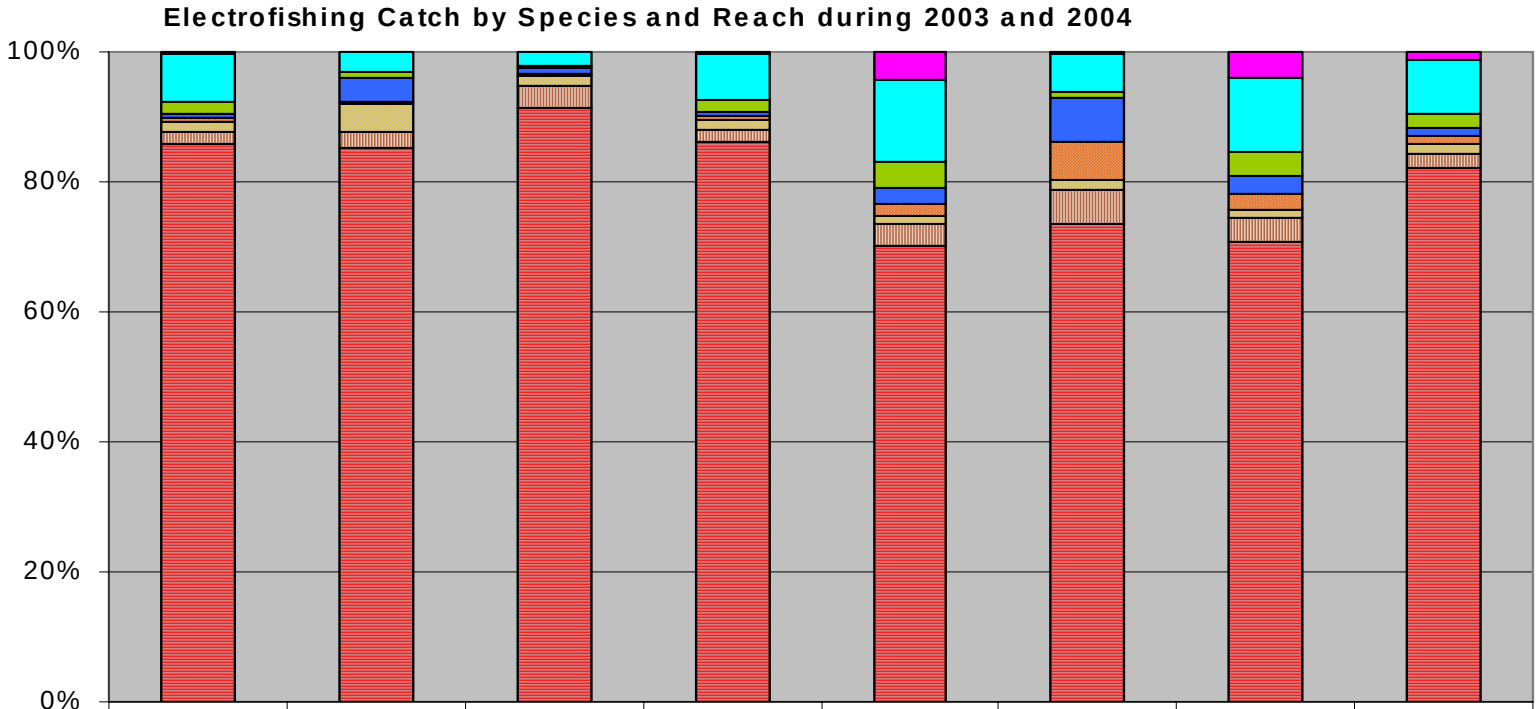
MOHAVE
COUNTY
FAIR
FIRST
PLACE

All Removal Reach Results 2003 & 2004



	LCR	Lava Chuar - Tanner	Tanner - Unkar	2003 Total	LCR	Lava Chuar - Tanner	2004 Total	2003 & 2004 Total
Speckled Dace	41	0	0	41	179	3	182	223
Flannelmouth Sucker	902	16	8	926	497	39	536	1462
Humpback Chub	245	5	2	252	164	6	170	422
Bluehead Sucker	72	18	3	93	93	45	138	231
Fathead Minnow	54	3	2	59	75	39	114	173
Common Carp	209	22	6	237	50	11	61	298
Brown Trout	218	12	13	243	139	35	174	417
Rainbow Trout	10595	440	364	11399	2819	491	3310	14709

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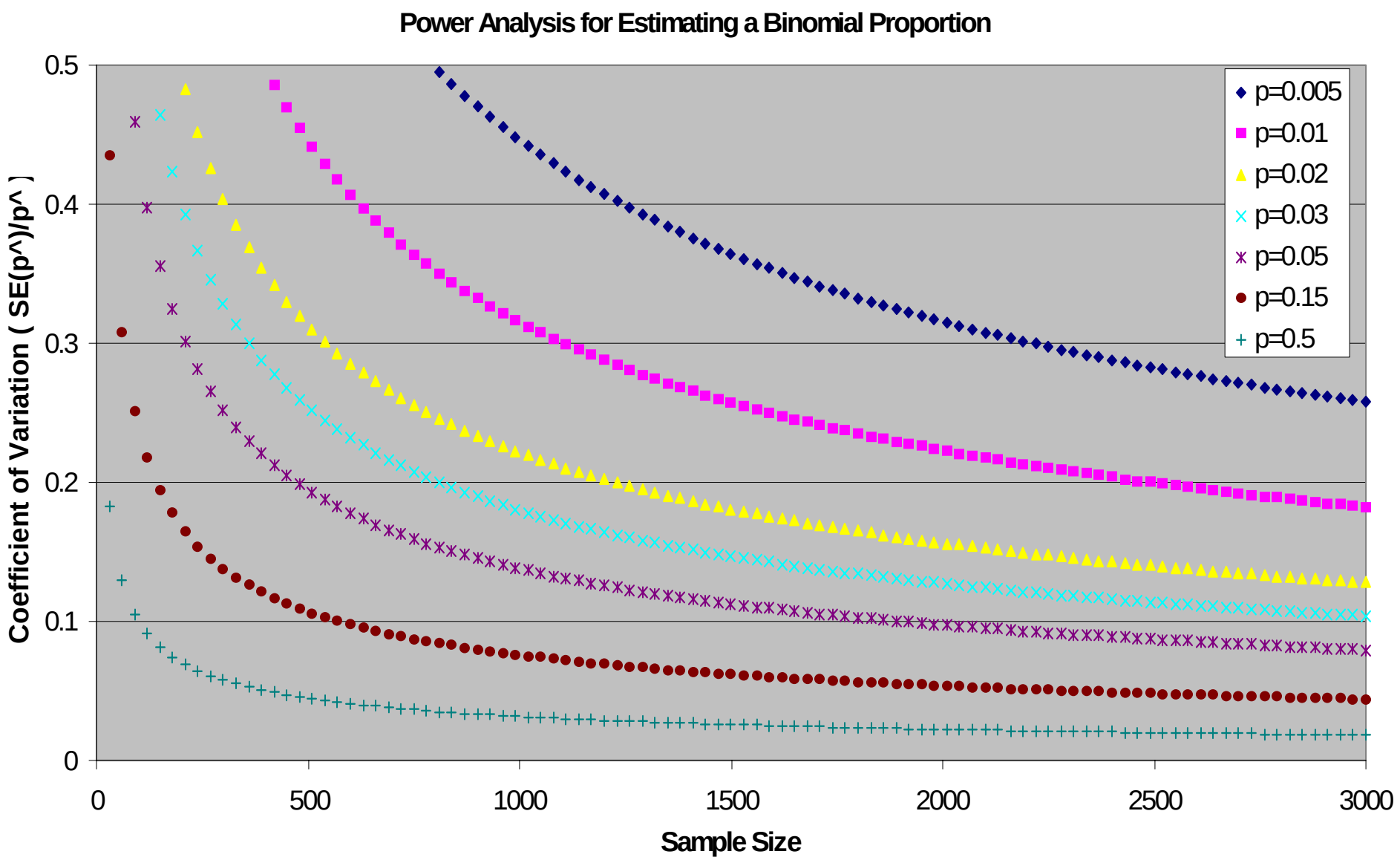

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