Monitoring for humpback chub (*Gila cypha*) above Chute Falls, Little Colorado River

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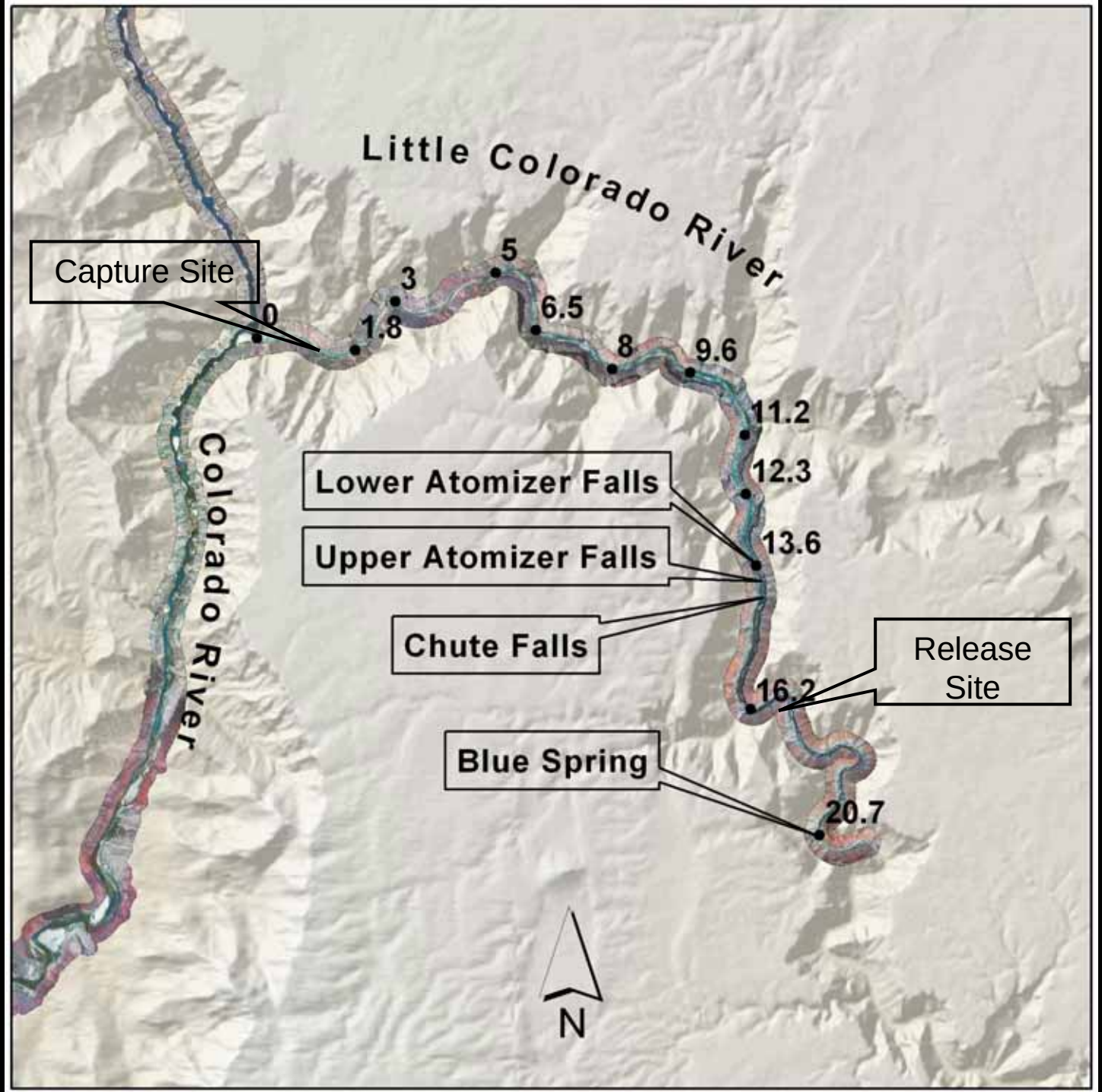

Little Colorado River
Capture Site
0
1.8
3
5
6.5
8
9.6
11.2
12.3
13.6
16.2
20.7
Lower Atomizer Falls
Upper Atomizer Falls
Chute Falls
Release Site
Blue Spring
Colorado River
N

HBC distribution

- Physical Barrier: Chute Falls
  - Robinson (1996)
- Chemical Barrier: CO_2 levels
  - Mattes (1993); Strength (1997)
- Do migrate but are pushed downstream via floods and/or rising CO_2 concentrations
- Lack of imprinting

Water Quality

	Temp (°C)	pH	Conductivity (💻S)	DO (mg/L)	CO_2 (mg/L)
Above Chute Falls	25.2±0.4	7.8±0.06	4529.0±39.5	9.8±0.2	216.5 ±0.4
Below Chute Falls	22.7±0.01	7.2±0.01	4634.0±8.0	7.4±0.02	86.5 ±0.2

Chute Falls Project

- December 2002 Biological Opinion “to increase survival from floods, reduce predation…”
  - **Up to 300 fish**
- November 2004 Biological Opinion “increase survival from high mortality area to good nursery area”
  - **Up to 600 fish**

Objectives

- 1) Determine if transplanted humpback chub can survive and remain above Chute Falls
- 2) Determine if humpback chub will grow above Chute Falls
- 3) Determine if any transplanted YOY humpback chub will recruit to adulthood above Chute Falls
- 4) Determine if a humpback chub spawning population will develop above Chute Falls

Translocations

- August 2003 and 2004
- Collect 50-100mm HBC near confluence
- Implanted with visible elastomer tags
- Released 582 HBC above Chute Falls

2003 Monitoring

- November 2003
- 42 captured HBC were PIT tagged and released
- 9 HBC had no VIE tag

2004 Monitoring

36 HBC were captured in May

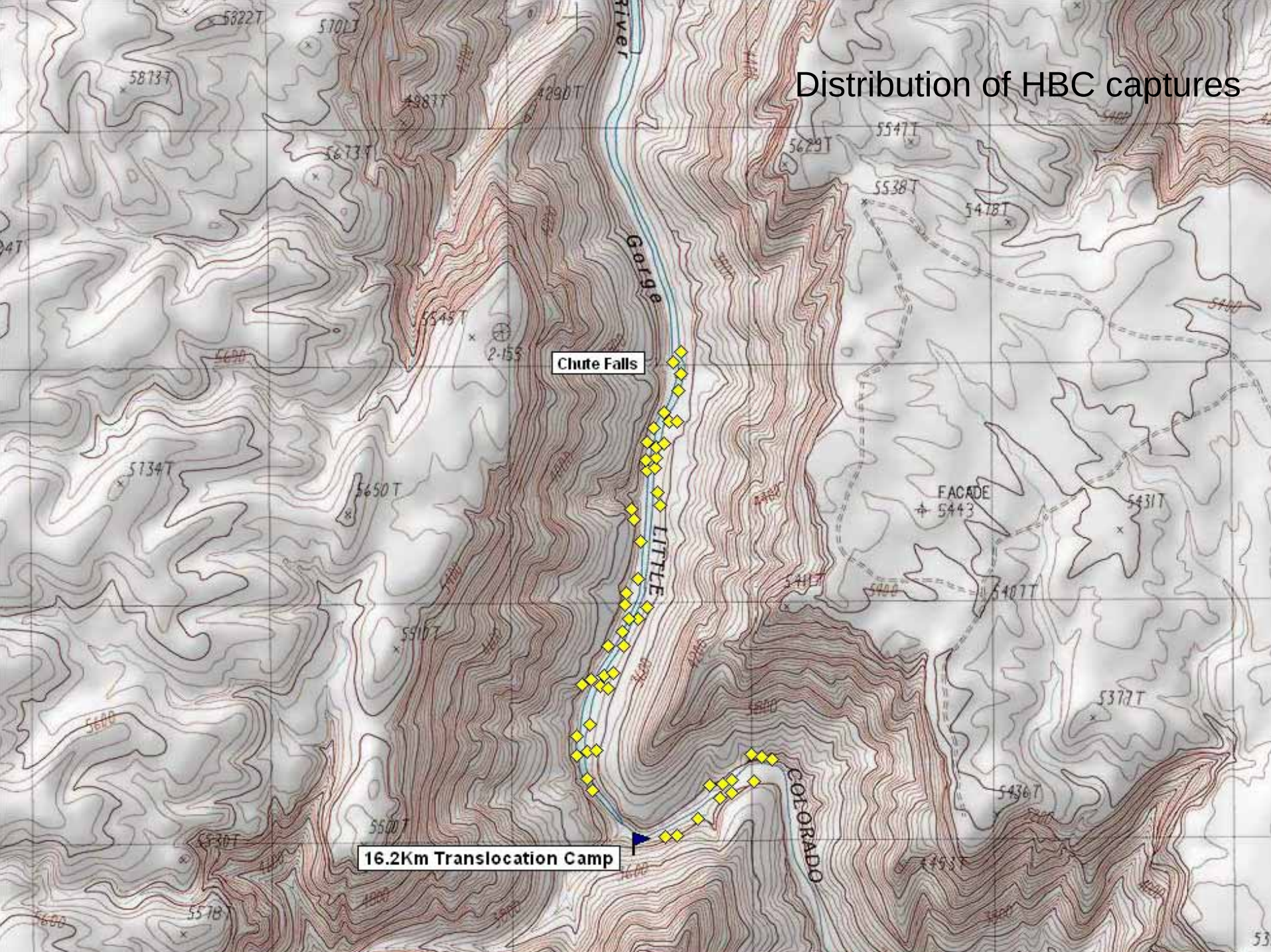
- 18 recaptures were from November 2003 monitoring
- 17 were new captures
- 78% retention of yellow VIE tags

73 HBC were captured in November

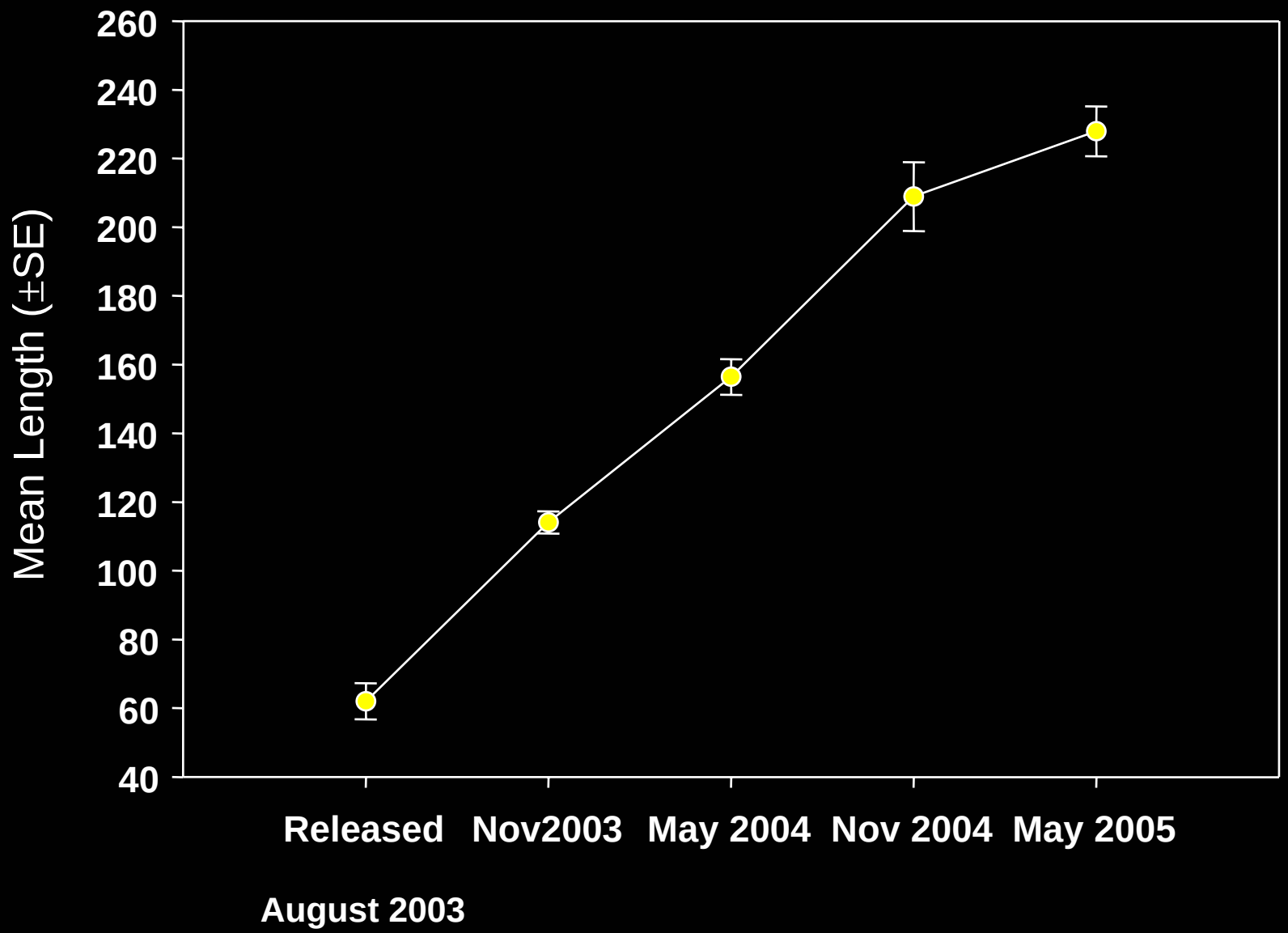
- 27 recaptures were from 2003 translocation
- 46 were new captures with a pink VIE tag
- 95% retention in pink VIE tags

2005 Monitoring

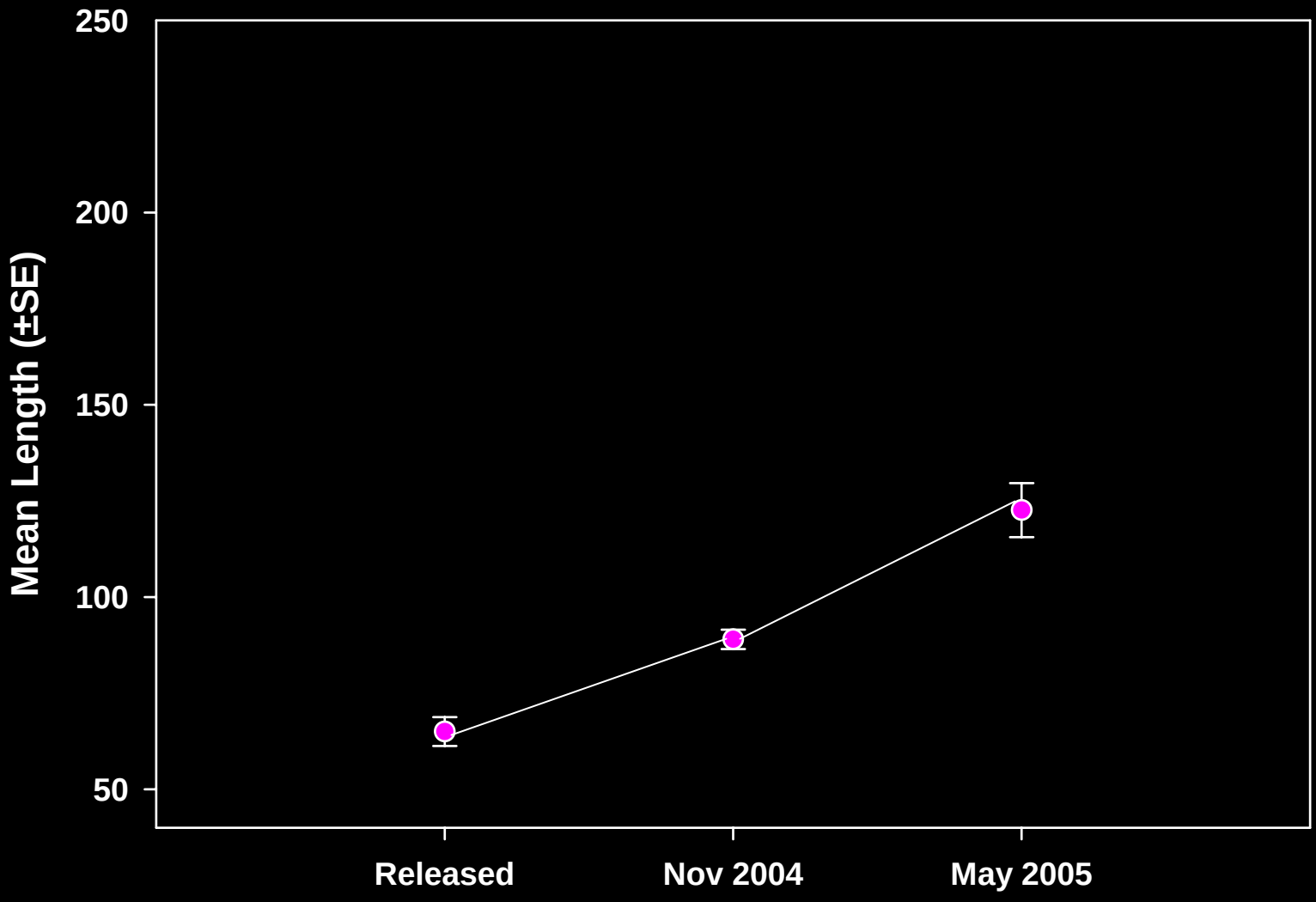
- 48 HBC were captured
  - 20 recaptures were from 2003 translocation
  - 28 were new captures with a pink VIE tag
  - Several fish had color and were ripe


Distribution of HBC captures
Chute Falls
16.2Km Translocation Camp
Gorge
LITTLE
COLORADO
River
FACADE
5443
5822T
5707T
5873T
4987T
4290T
5673T
5629T
5547T
5538T
5418T
5545T
2-153T
5134T
5650T
5431T
5411T
5407T
5516T
5377T
5436T
5500T
5530T
5453T
5578T

2003 Translocation

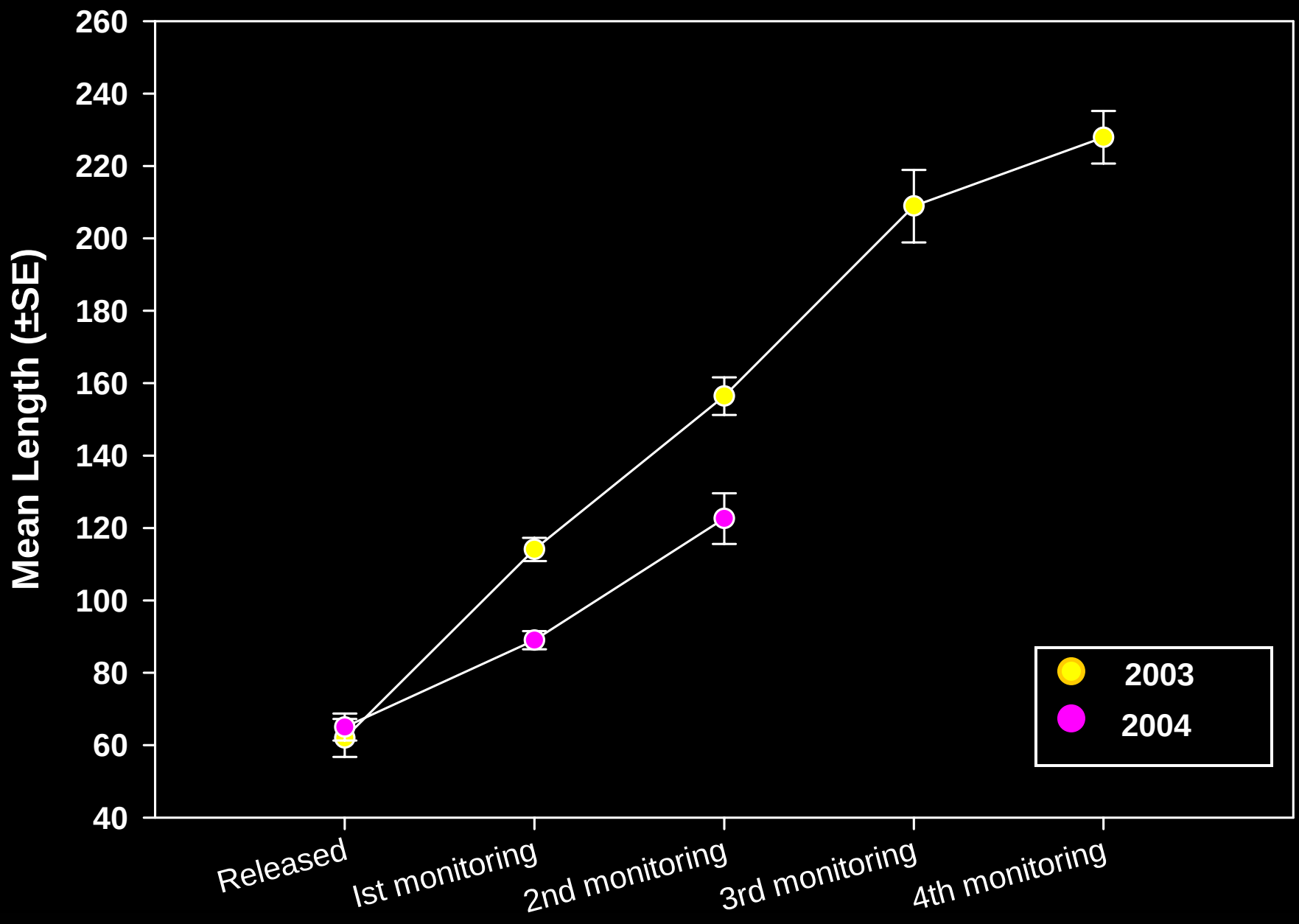


2004 Translocation



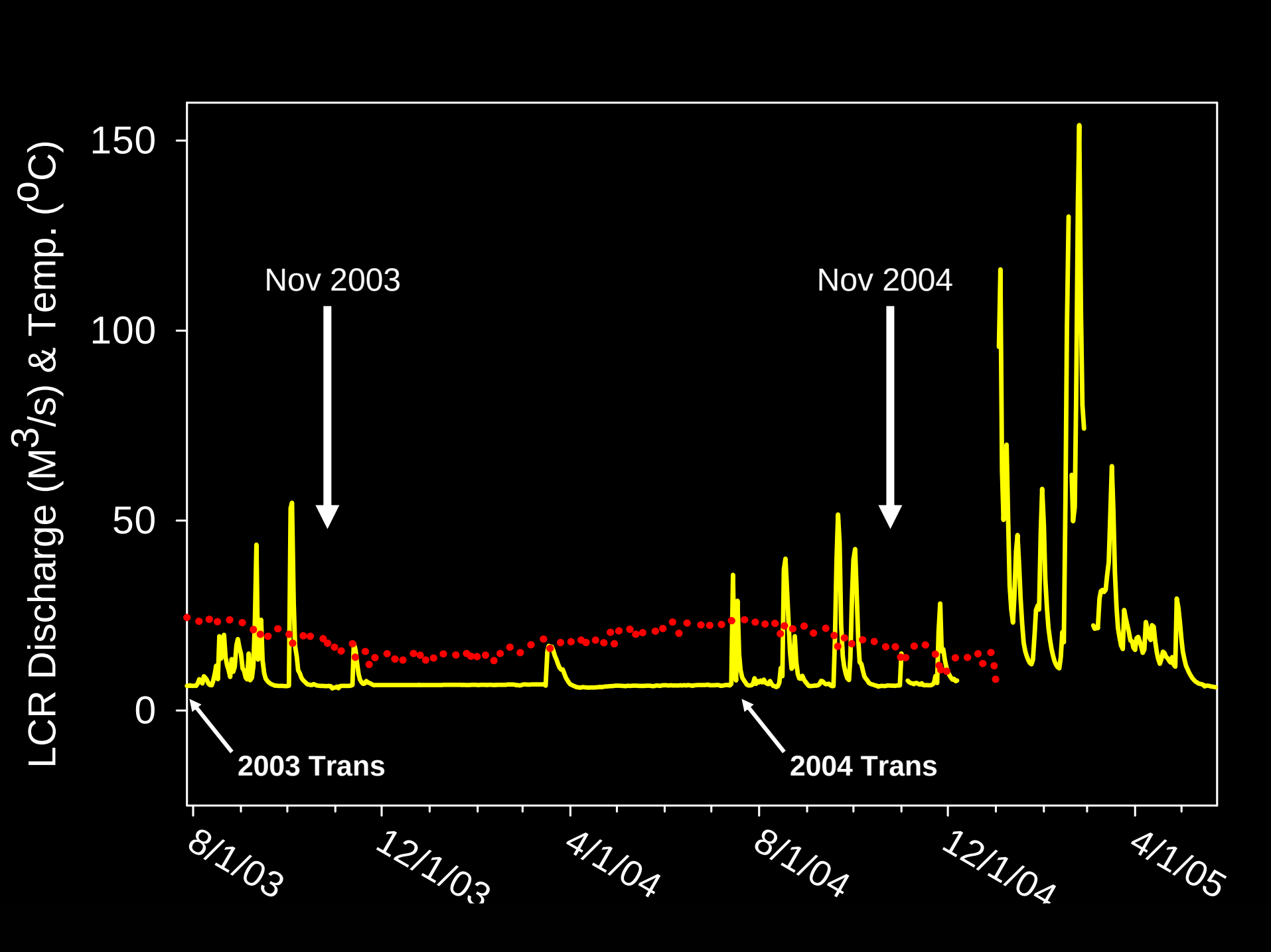
August 2004

Growth Comparison

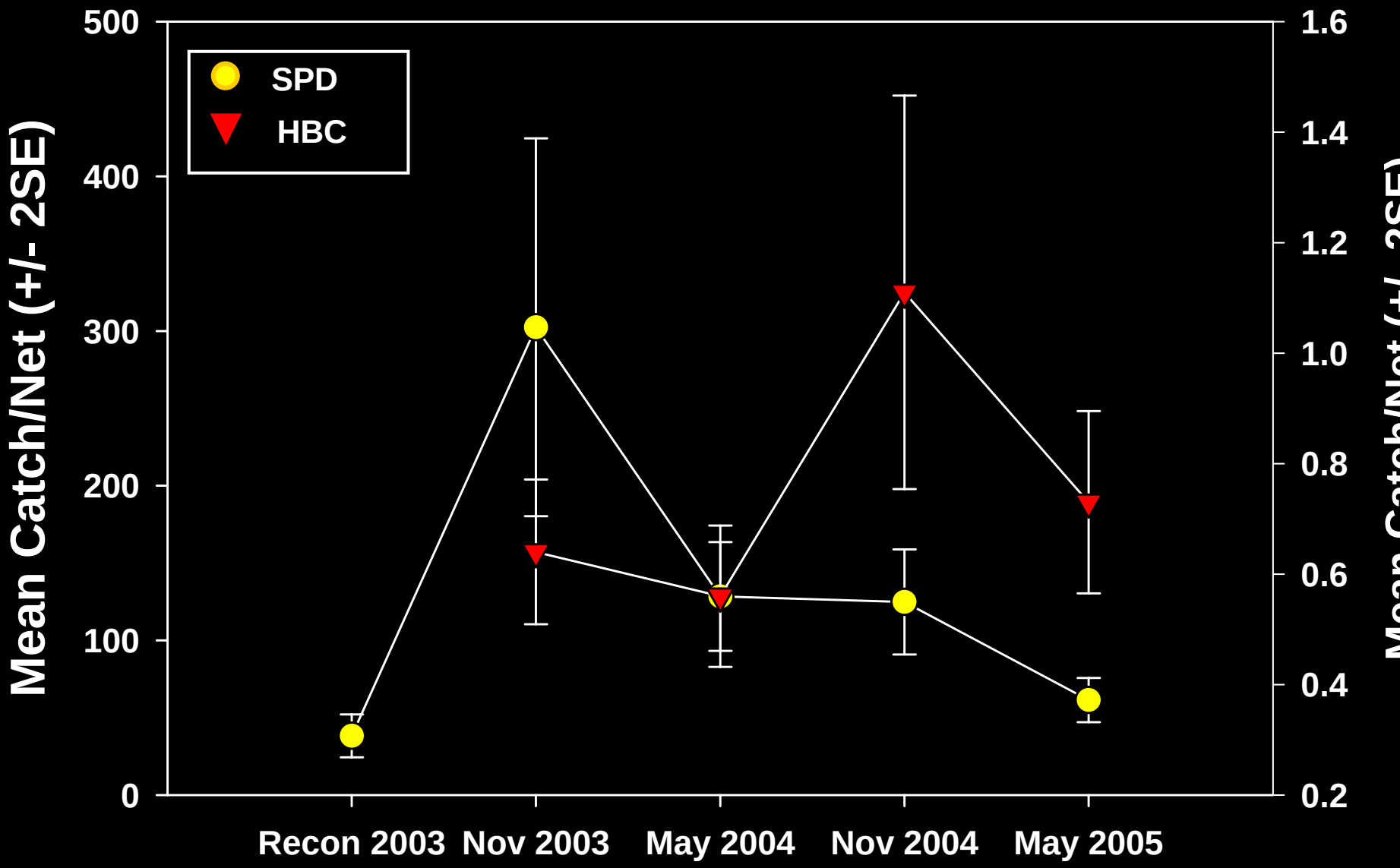


Potential Reasons for slower growth….

- River temperature
- Hydrology
- Density dependant factors
- Food resources
- Individual variability


LCR Discharge (M3/s) & Temp. (oC)
150
100
50
0
Nov 2003
Nov 2004
2003 Trans
2004 Trans
8/1/03
12/1/03
4/1/04
8/1/04
12/1/04
4/1/05

SPD and HBC Catch Rates



Growth Rates

Species	Temp	Food	Growth rate	Study
HBC	11-21/C	No	6.01-10.4mm/month	Chute Falls
BTC	0-20 /C	No	0.83mm/month July-July	Paukert et. al 2005
HBC	24/C	Yes	6.88mm/month Jan-Sept	Gorman and VanHoosen 2002
HBC	8-24/C	No	4.12mm/month Sept-April	LCR Native Fish Monitoring

Benefits of Chute Falls Project

- Increased abundance of HBC
- 2yr old fish >200mm
- Reduced mortality of YOY chubs
- Increased demographic range by 4km
- Better understanding of life history

Recommendations

- Develop a management plan that directs future action
  - Evaluate benefits/disadvantages of additional translocations
  - F1 genetics monitoring in cooperation with CSU
- Initiate population estimates in Spring 2006
- Confirm presence of F1 offspring: July 2005
- Delineate upstream extent of HBC: November 2005