

**Physical factors that influence spatio/temporal
differences in benthic invertebrate availability
near the
Little Colorado River, Grand Canyon, AZ.**

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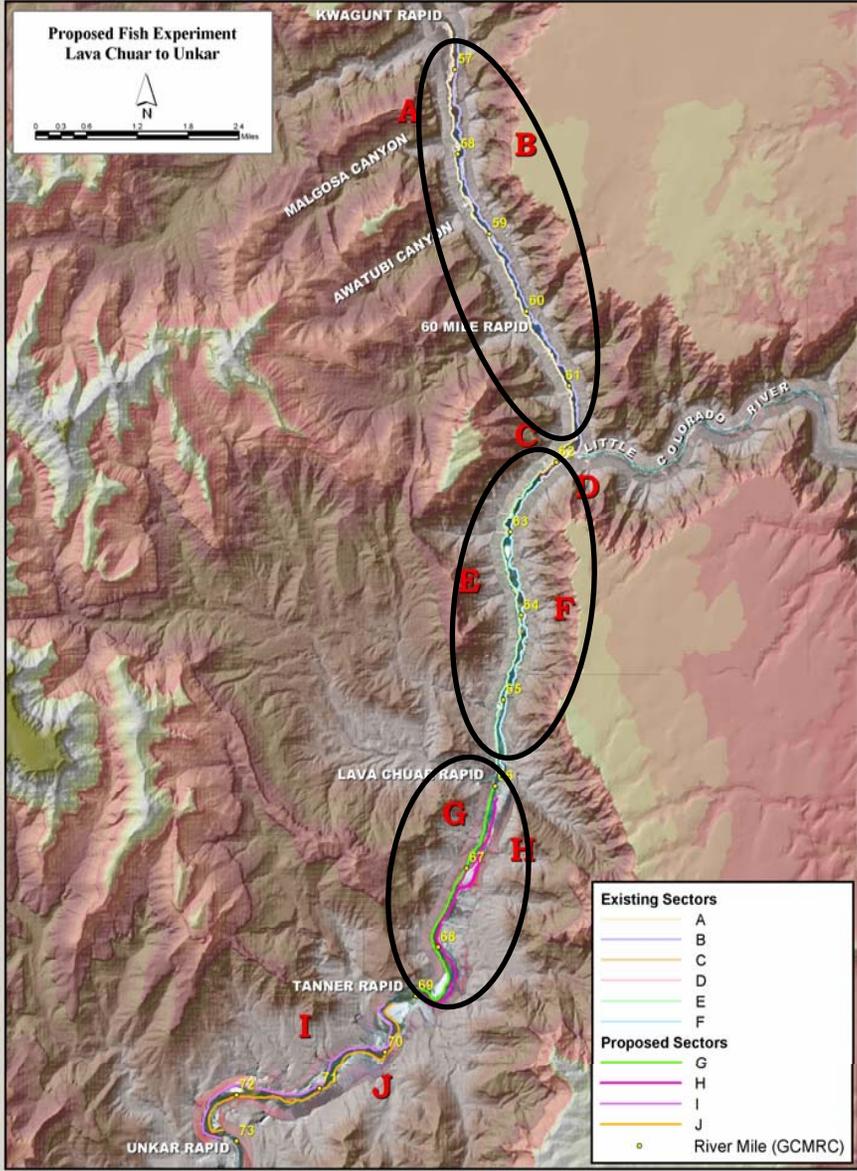
**Grand Canyon Monitoring and Research Center
&
EcoNatura**

MULTIPLATE SAMPLER



STUDY QUESTIONS

- What are the most abundant aquatic invertebrates on artificial substrate?
- Does density vary in relation to season?
- Does density vary in relation to location?
- Does density vary in relation to habitat type? (quality: flow / depositional environments)
- Does density vary in relation to suspended sediment?
- What is the colonization rate?



HABITAT ASSESSMENT

HABITAT TYPES

- Talus
- Cobble Bar
- Cliff

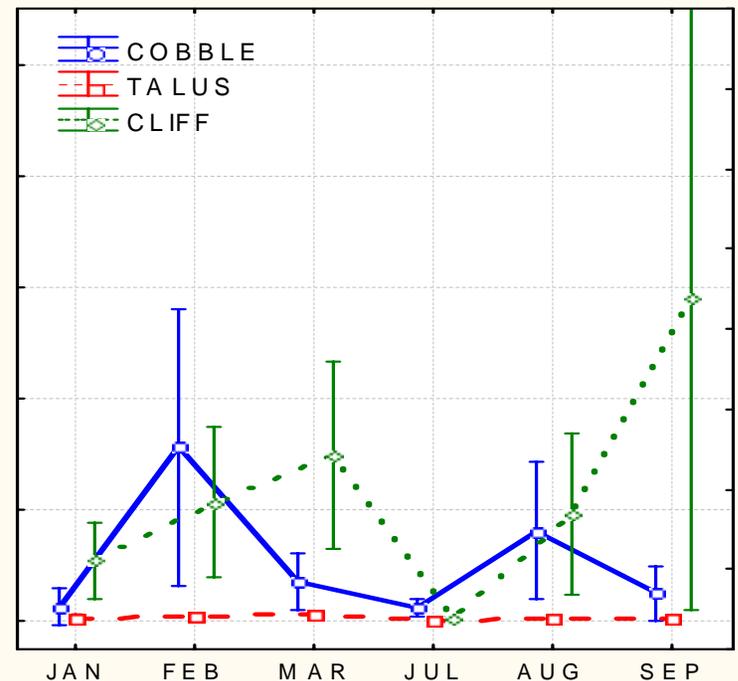
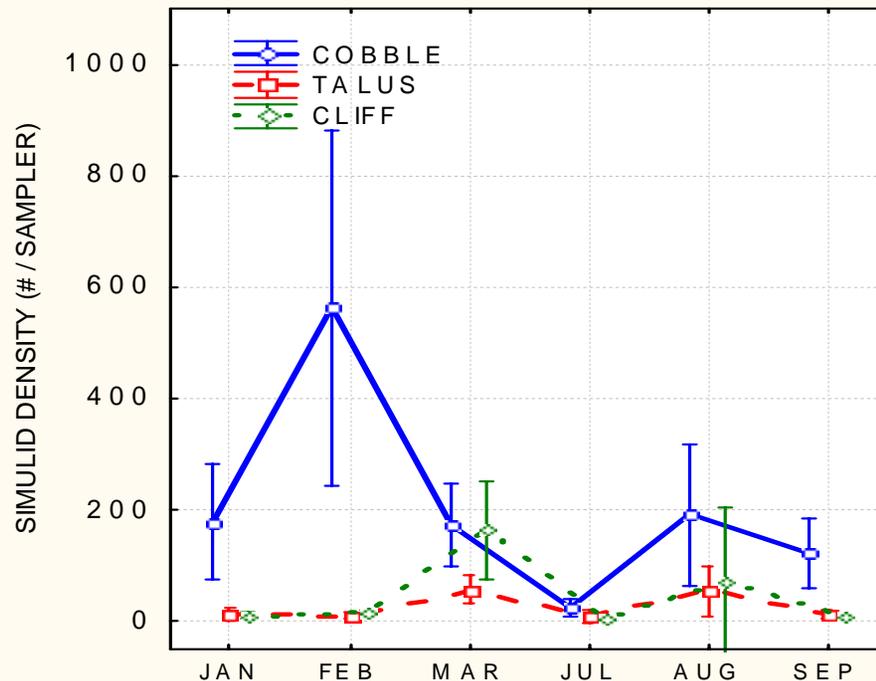


ANOVA TABLE

EFFECT	SS	df	MS	F	p
INTERCEPT	6,397,313	1	6,397,313	58.8514	0.0000
HABITAT	2,070,175	2	1,035,088	9.5222	0.0001
TIME	1,715,385	5	343,077	3.1561	0.0080
LOCATION	70,520	1	70,520	0.6487	0.4209
HABITAT * TIME	3,534,109	10	353,411	3.2512	0.0004
HABITAT * LOCATION	2,451,945	2	1,225,972	11.2782	0.0000
TIME * LOCATION	603,722	5	120,744	1.1108	0.3533
HABITAT * TIME * LOCATION	1,537,833	10	153,783	1.4147	0.1694
ERROR	68,048,019	626	108,703		

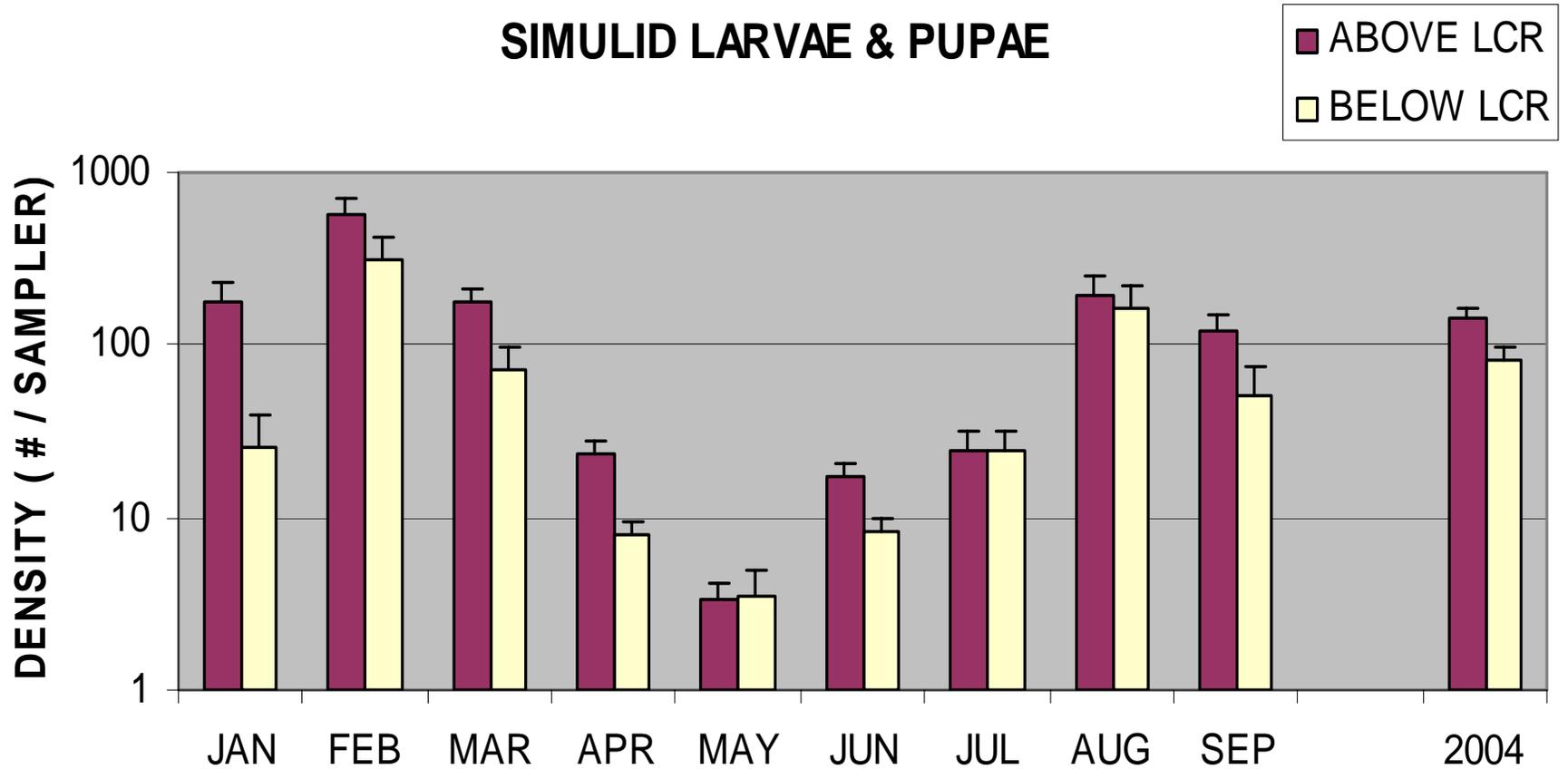
HABITAT ASSESSMENT - 2004

(Vertical bars denote 0.95 confidence intervals)



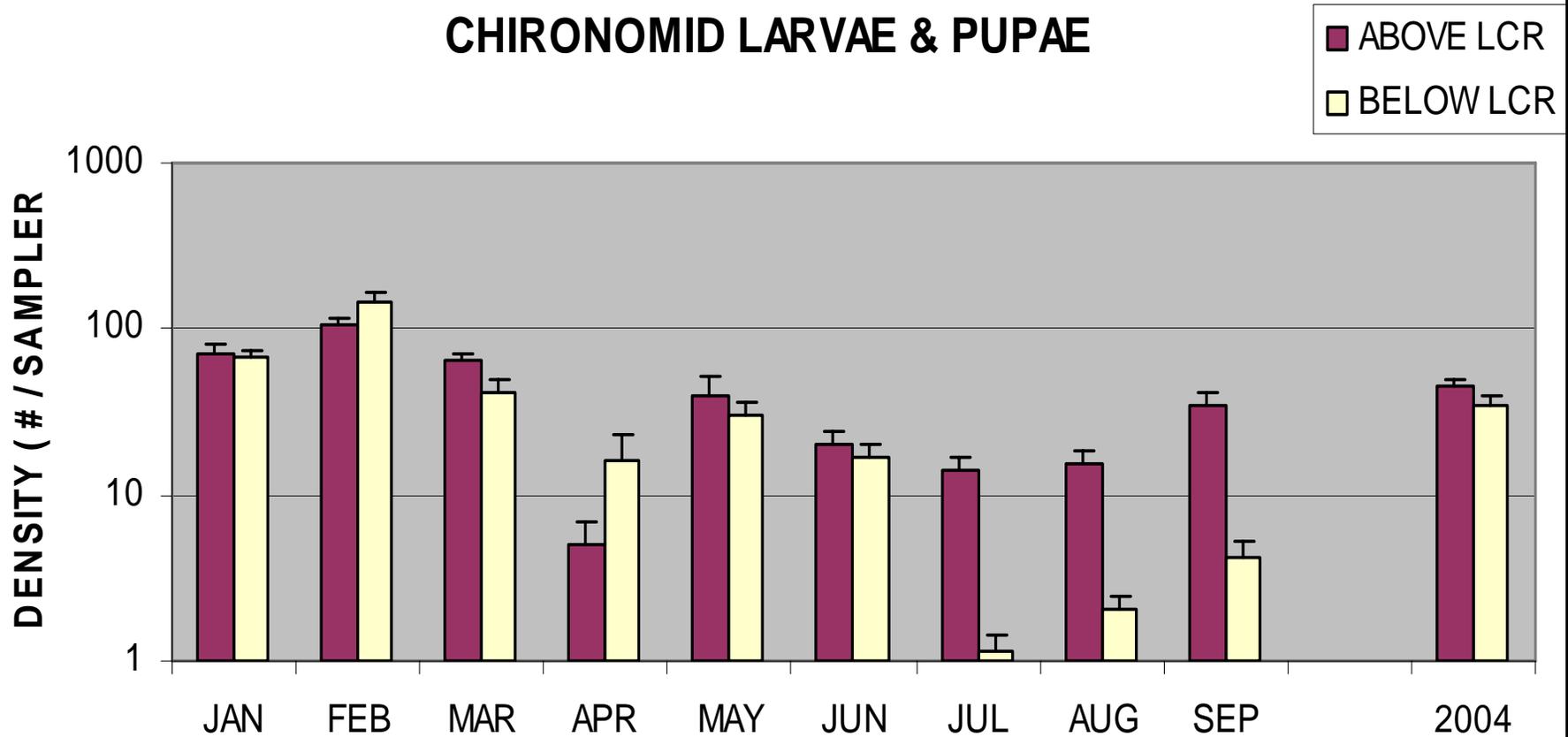
COBBLE BAR HABITAT

SIMULID LARVAE & PUPAE



COBBLE BAR HABITAT

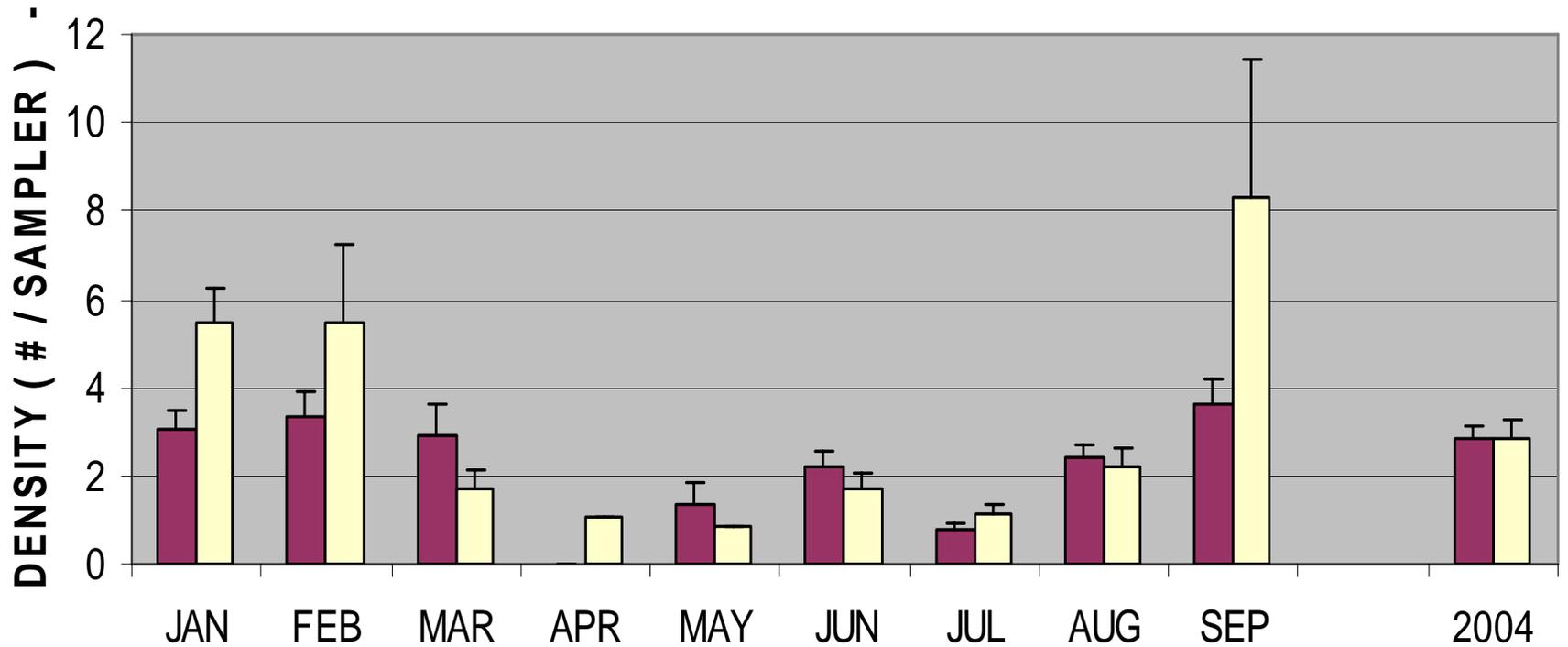
CHIRONOMID LARVAE & PUPAE



COBBLE BAR HABITAT

HYDROPTILIDAE (CADDIS FLIES)

■ ABOVE LCR
□ BELOW LCR



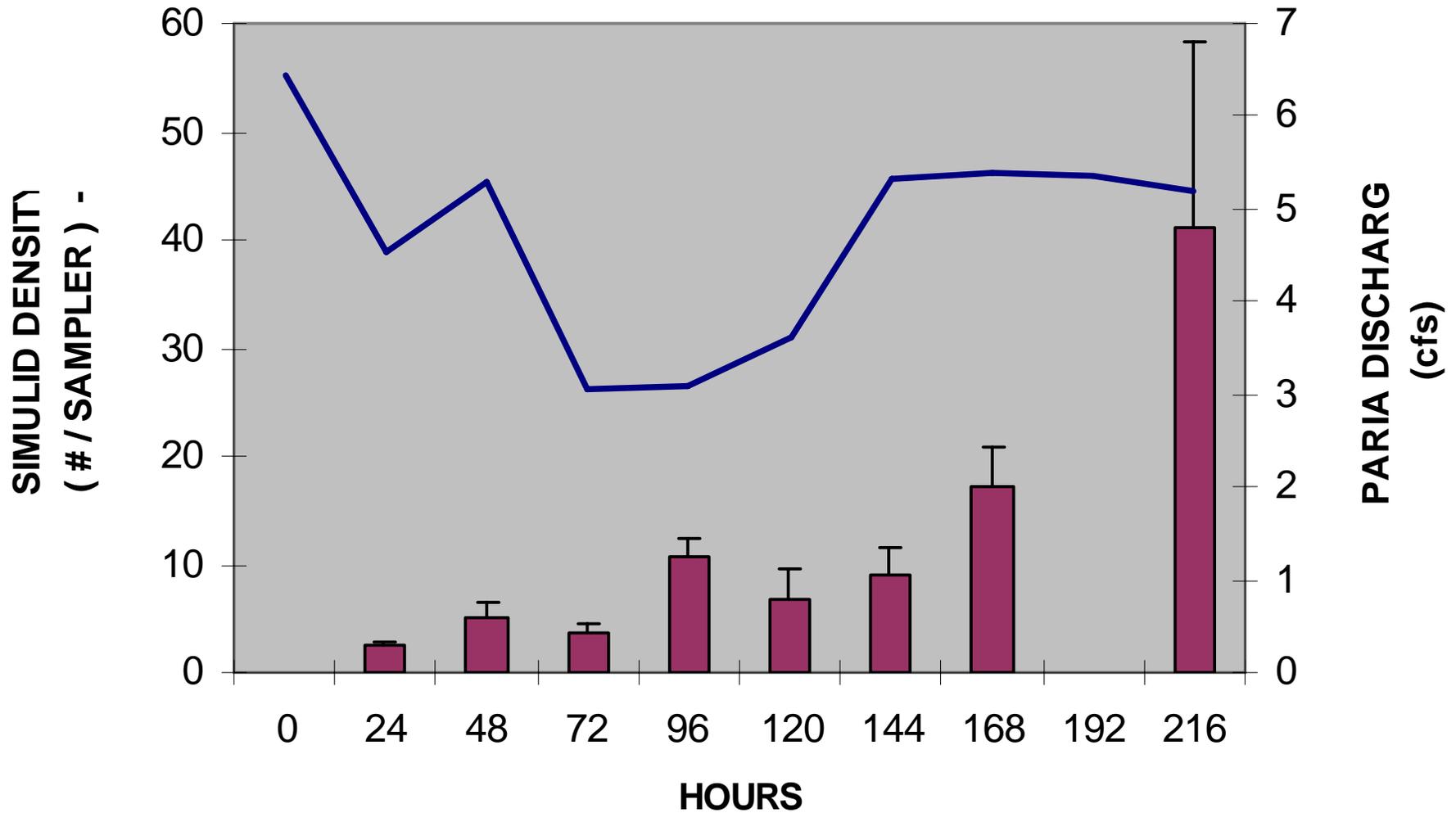
EXPERIMENTS

- COLONIZATION EXPERIMENT
- EMERGENCE EXPERIMENT
- RECIPROCAL TRANSLOCATION



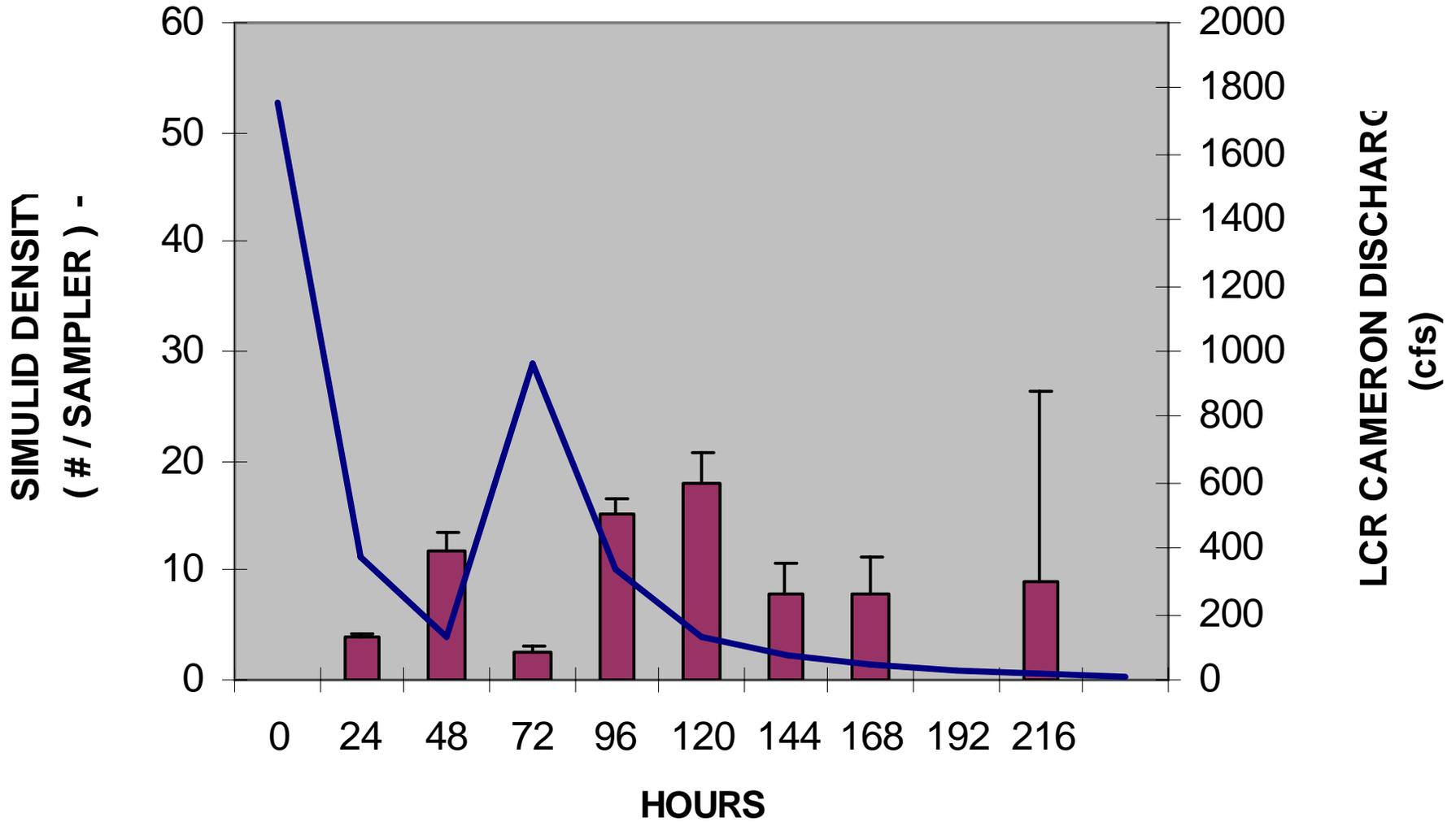
COLONIZATION EXPERIMENTS

2003 - COLONIZATION RATE 60 MILE COBBLE BAR

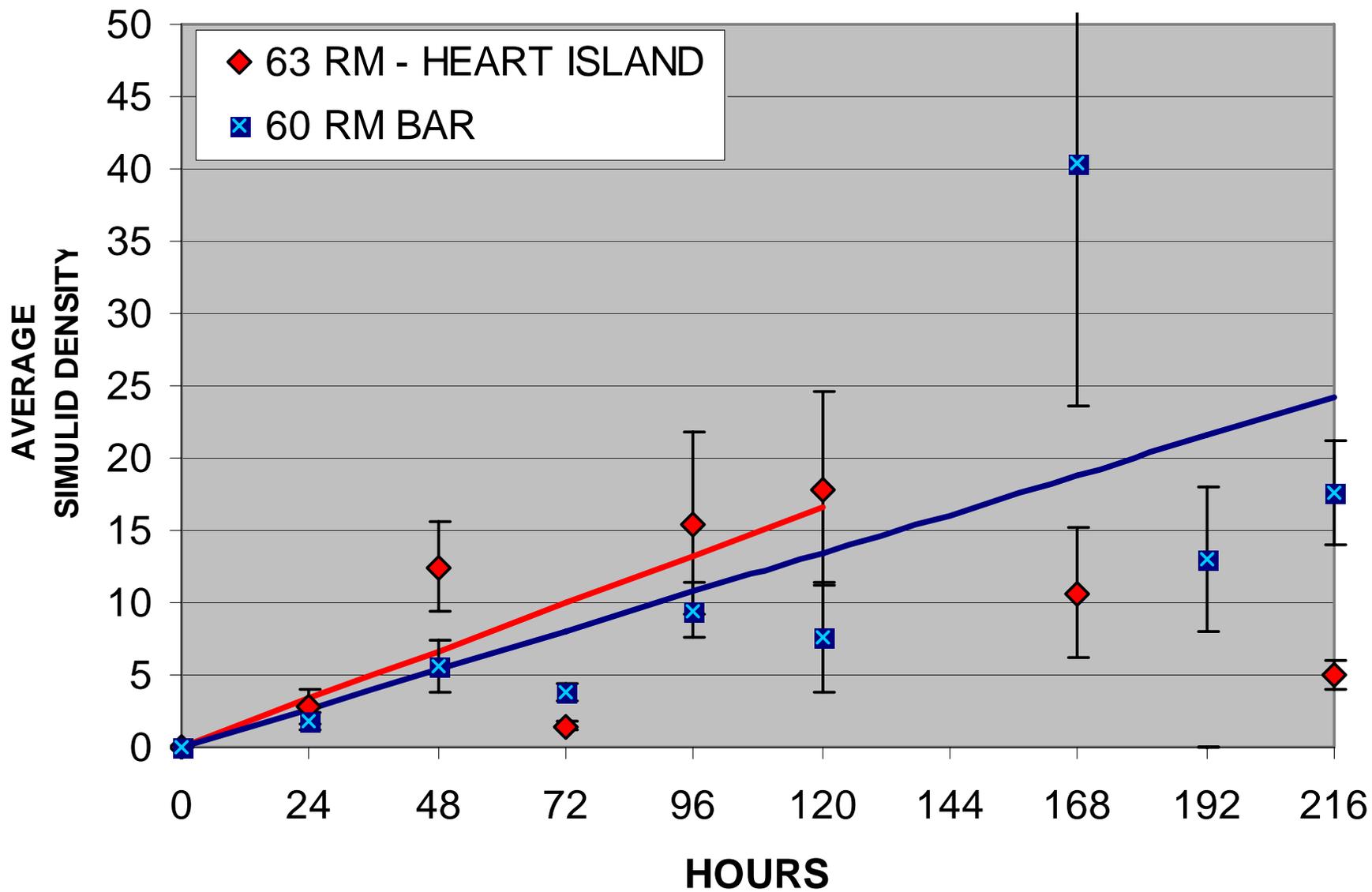


COLONIZATION EXPERIMENTS

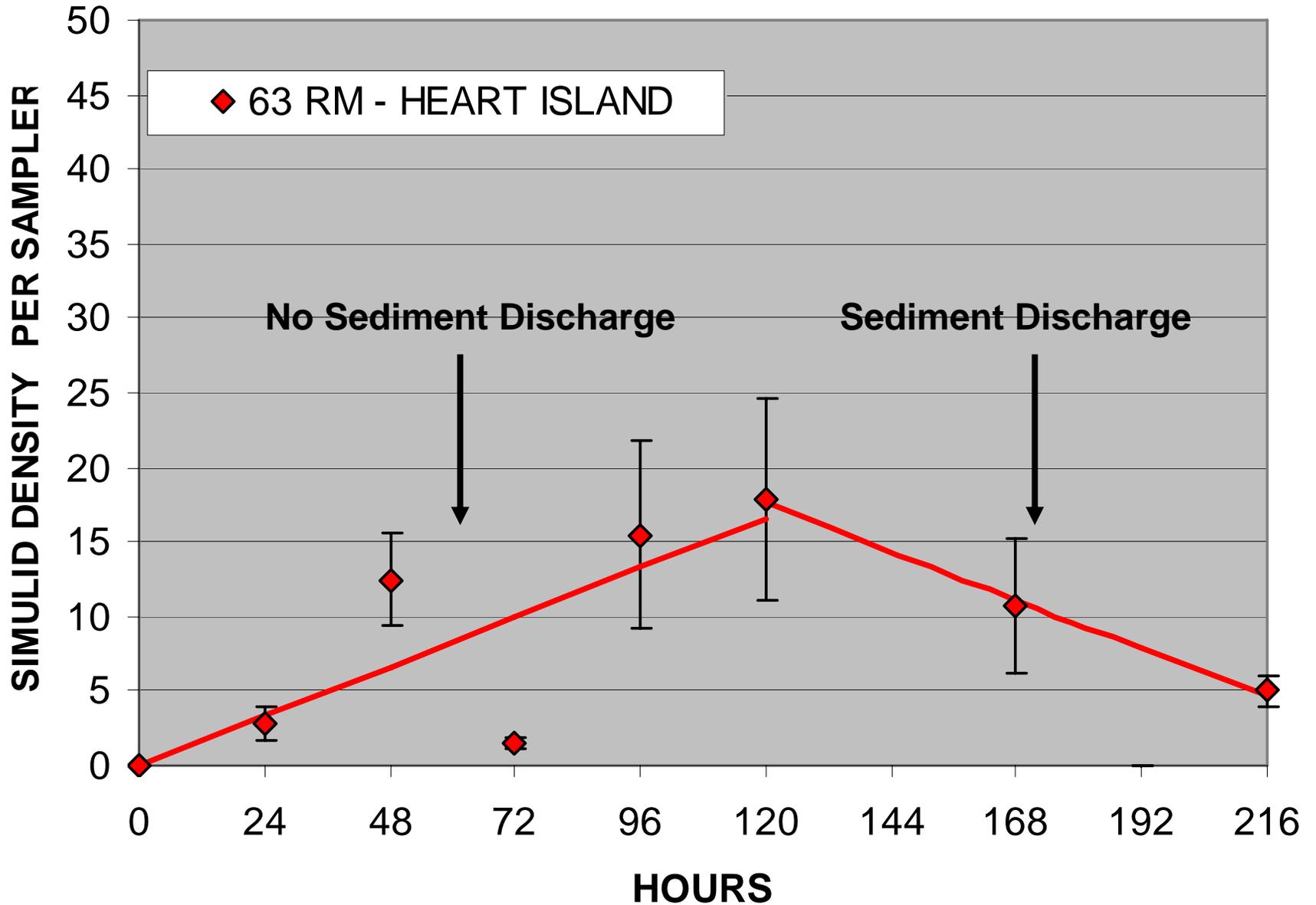
2003 - COLONIZATION RATE 63 MILE COBBLE BAR



HESTER - DENDY COLONIZATION RATE



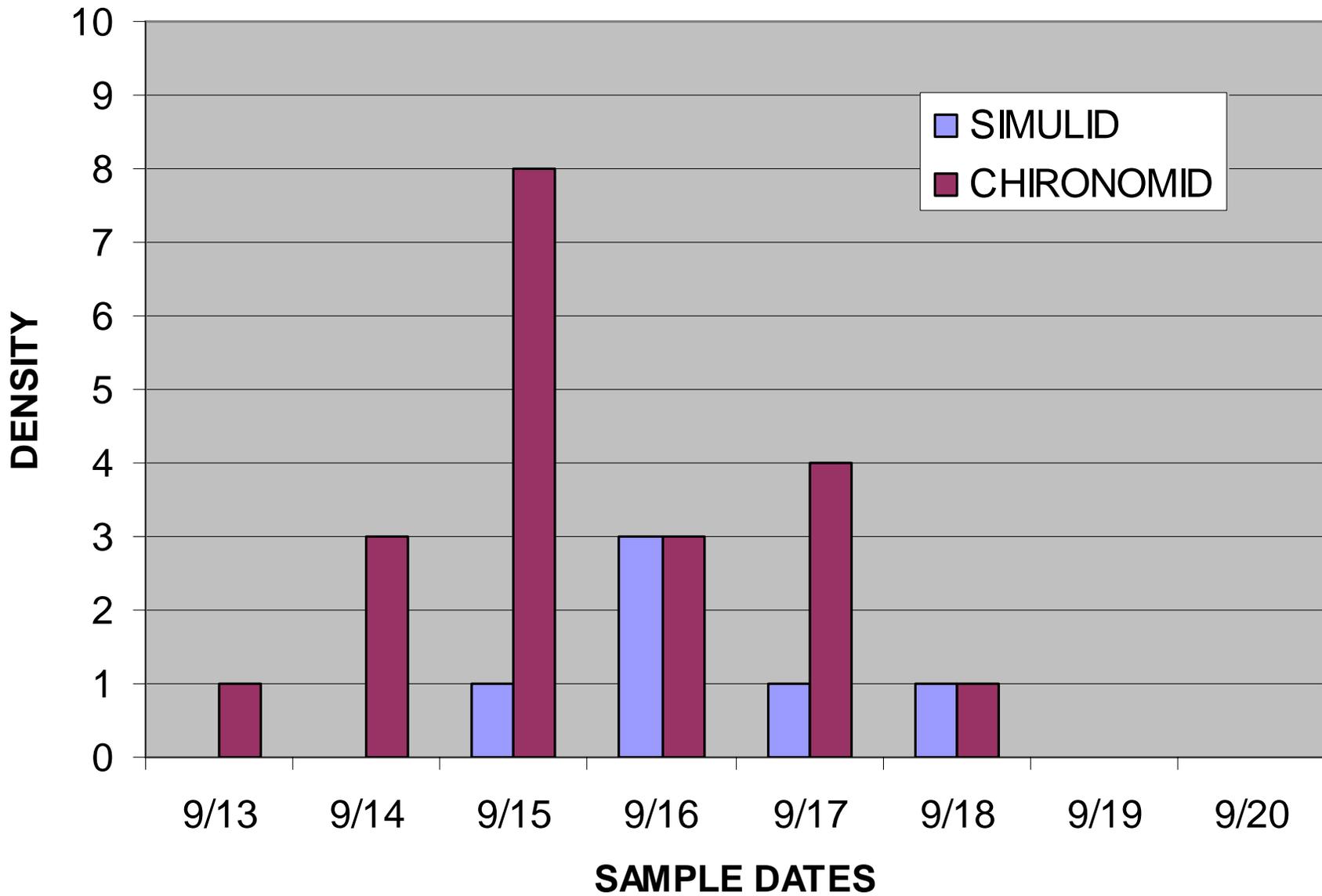
2004 - COLONIZATION RATE



Emergent trap experiment



EMERGENCE RATE



RECIPROCAL TRANSLOCATION EXPERIMENT

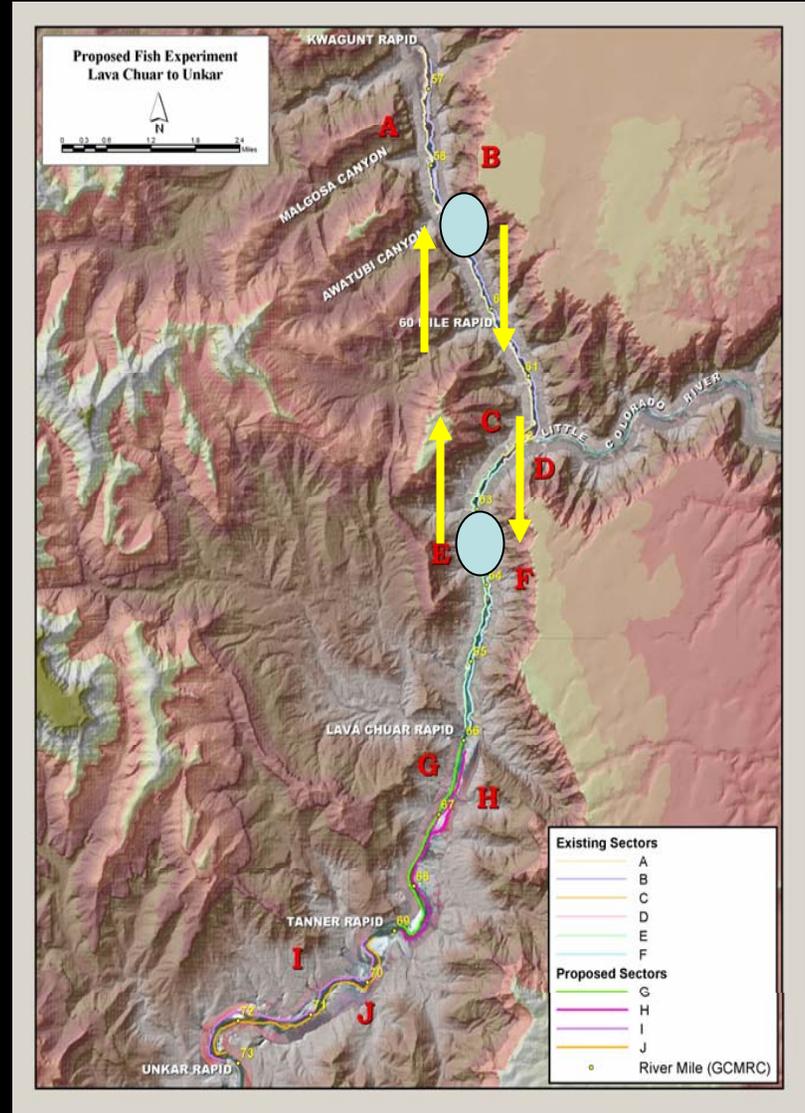


CONTROL

- PRIOR
- POST

TREATMENT (2)

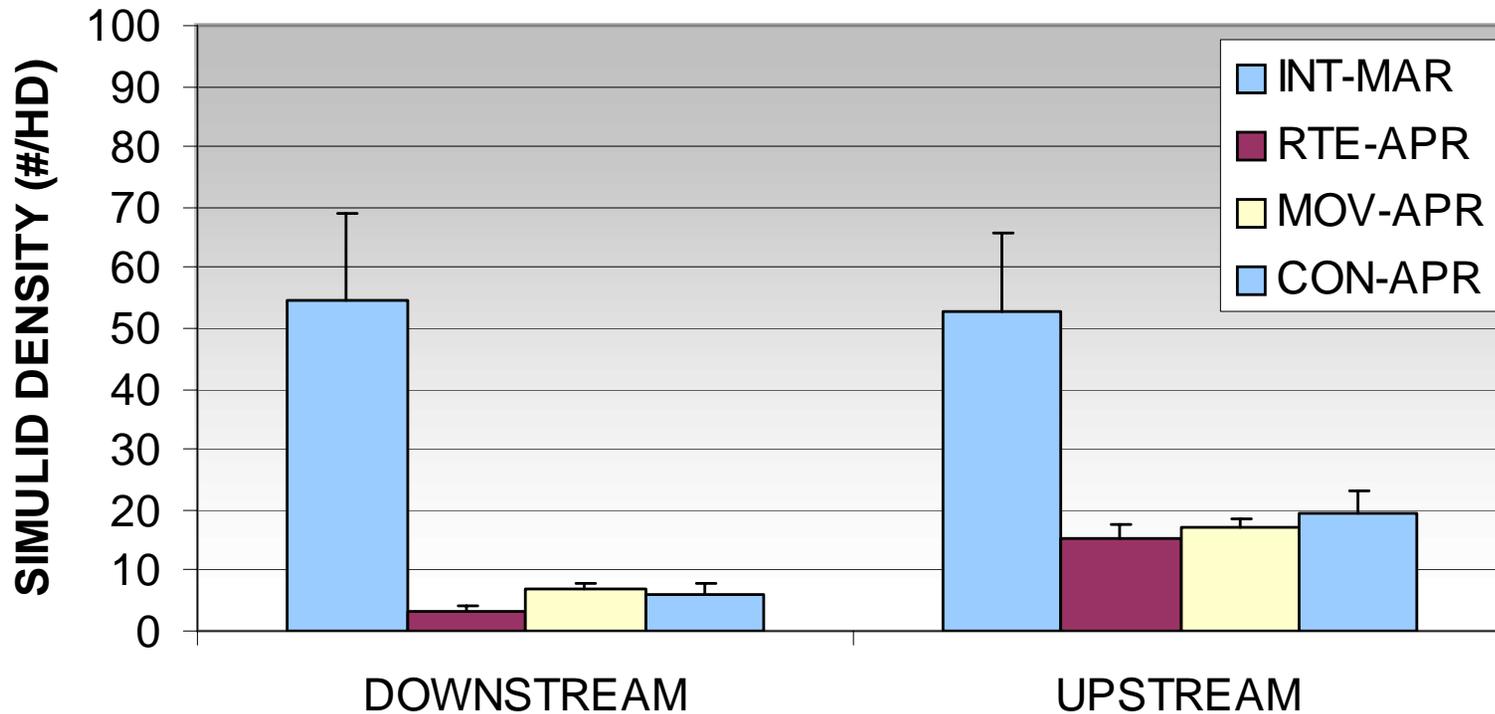
- MOVEMENT
- TRANSLOCATION





RECIPROCAL TRANSLOCATION EXPERIMENT

APRIL
RECIPROCAL TRANSLOCATION



CONCLUSION

- **Simuliids were the most abundant aquatic macro-invertebrate**
- **Densities varied seasonally**
- **Densities varied spatially**
- **Invertebrate densities differed among habitat types (cobble, talus, and cliff).**
 - **Strong interaction between habitat time and location & habitat type and time**
- **Colonization rates on average were 2.5 to 3.5 larvae per day**
- **Simulid densities and biomass were negatively correlated to sediment discharge from tributaries.**

