

Nevada Department of Wildlife



2010 Lake Mead Razorback
Sucker Augmentation

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Program Background

- Started in 2006
- Collect and rear 6,000 larvae
- Operate fish rearing facility
- Overton Wildlife Management Area
- Flow conditioning study



Larval Collection

<u>Source</u>	<u>2009</u>	<u>2010</u>
Echo Bay	7	635
Las Vegas Bay	1,497	210
Overton Arm	50	
Lake Mohave	3,225	5,448
BOR Fish Lab	1,100	1,291



Rearing Facility at Lake Mead Fish Hatchery

2009 Fish

- 4,960

2010 Fish

- 7,695

~ 1,200 fish from the 2009 year class will be PIT tagged and used for fall flow conditioning trials at the hatchery

Overton Wildlife Management Area

Razorback suckers stocked in Center Pond

<u>Cohort</u>	<u># of fish</u>	<u>Size Range (TL in mm)</u>
2005	823	125-225
2006	1,601	170-265
2007	2,901	180-260
2008	1,520*	150-402
Program Total	6,845	125-402

*1,080 were from summer flow conditioning trials

Evaluation of Rearing Razorback Suckers in Flowing Raceways at Lake Mead Fish Hatchery



Submitted to:

U.S. Bureau of Reclamation
Lower Colorado River Multi-Species Conservation Program
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Work Task C26

Introduction

Background

- Low survival of repatriated fish
- Reasons
 - Predation from nonnative predators
 - Alteration of habitat
 - Poor fitness for wild environment
- Increasing size of stocked fish to decrease predation rates
- Recent research has been geared towards investigating methods of captive enrichment
 - Avery (unpublished) suggested that exercised razorback suckers had a higher swimming stamina and dispersed less downstream than non-exercised fish
 - Mueller et al (2007) reported that razorback suckers exposed to flowing water had an increased swimming stamina and better predator escape skills

Objectives

- Design and construct flowing raceways
- Evaluate rearing protocols of razorback suckers reared in flowing conditions
- Evaluate how rearing razorback suckers in flowing raceways affects swimming stamina, growth, food-conversion efficiency, foraging ability, and disease treatment



Methods

- 1,122 fish from the 2007 and 2008 year classes (374 fish per treatment)
- Two treatments and one control
- 30 day experiment duration
- 12 hours with flow
- Tested pre- and post-trial swimming stamina
- Pre- and post-trial weights and TL
- Fish were fed 2% body weight per day

Treatment Raceway # 1

- Treatment 1 (TR 1)
- Low/variable velocity treatment
- Average velocity = 23 cm/s
- Two pumps connected to PVC manifold
- 12 PVC returns throughout raceway



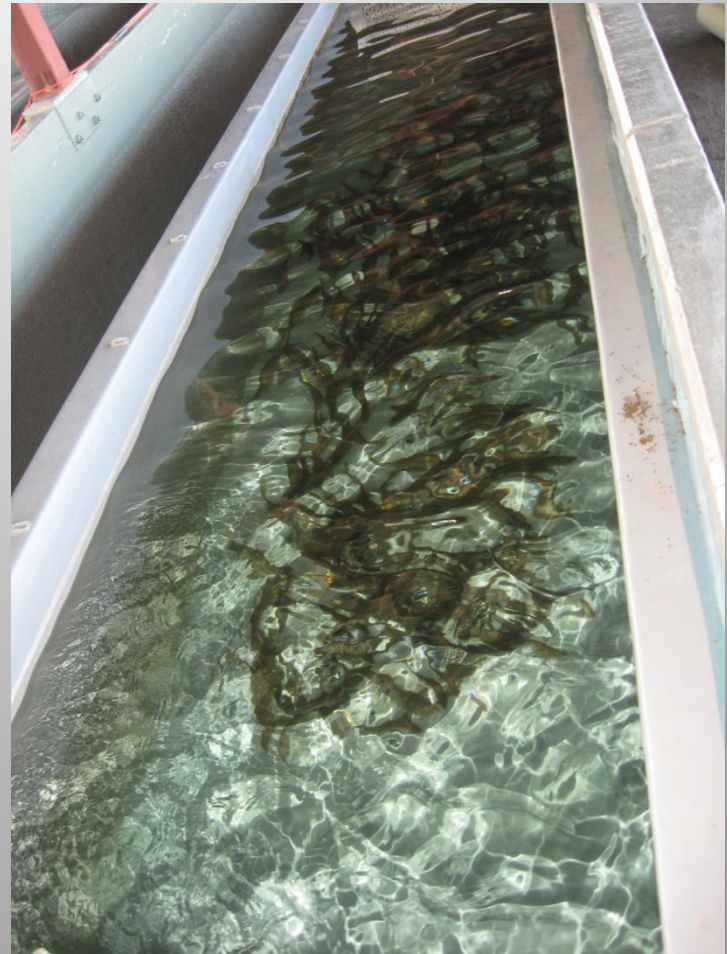
Treatment Raceway # 2

- Treatment 2 (TR 2)
- High velocity treatment
- Average velocity = 36 cm/s
- 4 pumps laid horizontally in opposite corners
- Counterclockwise current



Control Raceway

- No cinder blocks
- No pumps
- Immeasurable velocity

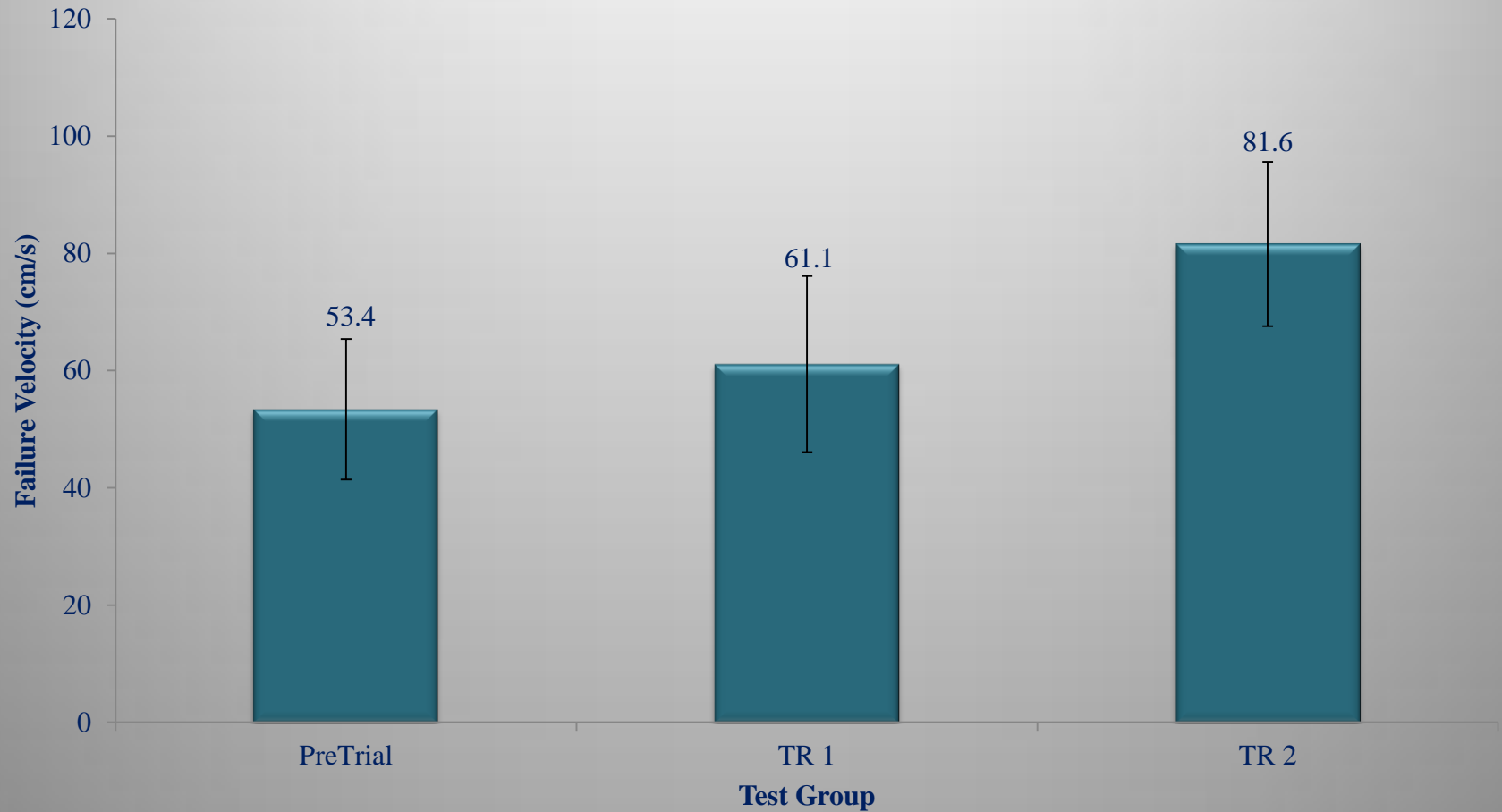


Swim Chamber Testing

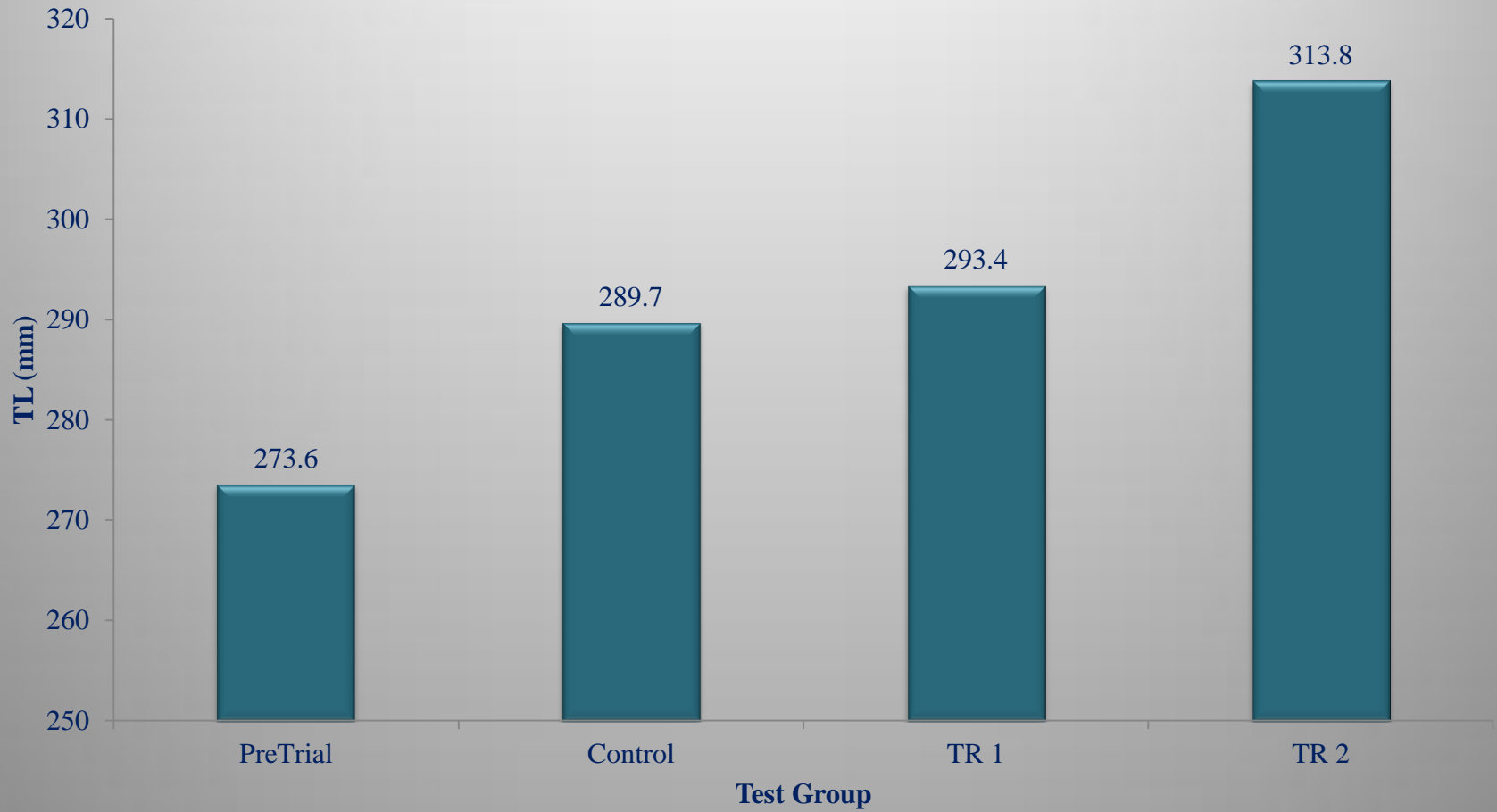
- One subsample (n = 19) was collected from the whole group (1,122 fish) prior to start of experiment for pre-trial testing
- One subsample (n = 19) was collected from each treatment for post-trial testing
- Subsamples were randomly collected and then moved to holding tank
- Each fish was acclimated in swim chamber for five minutes
- Fish were subjected to 12 cm/s for five minutes to acclimate to the flowing environment
- Flow was increased by 3 cm/s every one minute until fish was pinned against the screen
- Failure velocity and TL were recorded



Swim Chamber Results



Mean TL



Growth and Food-Conversion Rates

	<u>Pre-Trial</u>	<u>Control</u>	<u>TR 1</u>	<u>TR 2</u>
Fish/kg	4.27	3.92	3.65	2.73
Group Weight (kg)	89.3	94.3	96.8	129.6
kg gained		5.0	7.5	40.3
Food Conversion Rate		16.1	10.8	2

Difference in growth and food-conversion rates?

Disease

Columnaris disease outbreak in TR 1 and TR 2

- Bacterial infection caused by the bacteria *Flavobacterium columnare*
- Fish become more susceptible to columnaris disease when stressed
- Succumbed to disease due to stress from 24 hour flow, reduced flow to 12 hours

Treatment

- Turned off pumps during treatment
- Administered four day treatment of oxytetracycline at a dosage of 20 mg/L
- Pumps remained off until fish showed no signs of disease and normal feeding behavior resumed

Mortalities

- 11 in TR 1
- 31 in TR 2
- Did not replace fish

Summary

Flow Conditioning Study

- Swimming performance, growth, and food-conversion efficiency were highest among fish exposed to flowing water
- Treatment 2 appears to be the most suitable design for future flow conditioning efforts
- Conduct future flow conditioning trials with design similar to TR 2
- Post-stocking survival of flow conditioned fish?
- Predator avoidance of flow conditioned fish and non-flow conditioned fish?

2010 Lake Mead Razorback Sucker Augmentation

- Highest number of larvae were from Echo Bay
- Stocked 1,350 fish into Center Pond
- Center Pond survey will be conducted in November

Acknowledgments

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U.S. Bureau of Reclamation

Lower Colorado River Multi-Species Conservation Program

End

