Lower Colorado River Multi-Species Conservation Program

Balancing Resource Use and Conservation

An Investigation into Unused Trophic Levels in Hatchery Ponds for the Production of Endangered Bonytail (*Gila elegans*)

Fiscal Year 2008 Final Report

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION

April 2011

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National Park Service
Bureau of Land Management
Bureau of Indian Affairs
Western Area Power Administration

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Ducks Unlimited
Lower Colorado River RC&D Area, Inc.
The Nature Conservancy

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INTRODUCTION:

Dexter National Fish Hatchery and Technology Center (DNFH&TC) is located in the Pecos River Valley of southeastern New Mexico, 200 miles southeast of Albuquerque, 20 miles south of Roswell, and one mile east of Dexter on State Road 190. DNFH&TC is a US. Fish and Wildlife Service facility whose mission is to preserve broodstock and rear endangered fish species to meet recovery and implementation goals. Dexter has maintained a bonytail refuge population since 1981. This stock also serves as a genetic reserve population for captive breeding purposes. There are no other sources or spawning aggregations in any lake or stream and no other hatchery maintains BONY broodstock at this time. Given the age of the current broodstock, and the attrition rates over the past decade, Dexter built a new broodstock from 1999 to 2004. The new broodstock was first spawned in 2005 and currently contains 2,500 individuals. All production requests are met with offspring from this broodstock which is maintained in several ponds, due to its size. The DNFH&TC is actively propagating 7 other species of fish and maintaining refuge populations of an additional 9 species. During fiscal year 2008, 1.5 million fish were produced, cultured and stocked by the DNFH&TC; 245,000 of which were BONY, double the amount from the previous year's stocking. These production commitments are anticipated to continue for the next 10 years. One of the limiting factors effecting BONY production is the lack of additional rearing space. This study begins to examine alternative rearing strategies for young of year BONY, including rearing young of year fingerlings with the parent fish and combining and rearing several cohorts together.

PURPOSE:

Under the Lower Colorado River Multi-Species Conservation Program (LCR MSCP) Work Task C11, Bonytail Rearing Studies, the Bureau of Reclamation has been tasked to evaluate current and past attempts to rear BONY to 300mm in total length. This project will assist in identifying problem areas to be researched and evaluate cost-effective methods to reach and exceed the target stocking size.

OBJECTIVES:

Determine the effect that size variation amongst fish, cultured in the same pond may have on growth rate and survival of one year old BONY.

METHODS:

On April 4th, 2008 four 0.10 acre rubber lined ponds (8D, 9D, 10D and 11D) were prepared to receive 500 one year old BONY fingerlings each. This stocking density translates to 5,000 fish per surface acre. Standard fish culture methods were used which included the addition of super-phosphate and alfalfa pellets for phyto and zooplankton production, and filled with water two weeks prior to the addition of fish. BONY from the previous year's study were measured and separated into two size groups. Fish greater than 99mm total length were placed in one group and wire tagged on the left dorsal area, while fish less than 99mm were placed in a second group and left untagged in order to distinguish between the study groups. A total of five hundred one year old BONY were stocked in all four ponds using different ratios of each of the two groups, Table 1. Two ponds received 500 fish per pond that were less than 99mm (mean total length of 83mm). One of the remaining two ponds was stocked with 300 BONY from the group that was less than 99mm and 200 from the group that was greater than 99mm (mean total length of 106mm). The final pond was stocked with 400 bonytail from the group that was less than 99mm and 100 fish from the group that was greater than 99mm.

Table 1.Ponds used and fish stocking rates.

Pond #	Total fish stocked per pond	# of fish < 99mm in length	# of fish > 99mm in length
8D	500	500	0
9D	500	300	200
10D	500	500	0
11D	500	400	100

All four ponds were maintained using standard fish rearing protocols and the fish were fed a formulated Razorback diet at a rate of 2% of the total fish body weight per pond. On November 13th, 2008 the fish were harvested from the ponds and brought indoor for

enumeration, identification, and sorting. The fish were counted to determine survival, measured for growth and scanned to determine if they were wire tagged. Length and weight data were collected and total biomass and survival determined.

RESULTS:

A total of 1,906 BONY were harvested from the four study ponds in November of 2008 for a combined survival of 95%. Survival for wire tagged fish was 92% compared to 97% survival for non-wire tagged in the ponds with two size groupings of BONY as shown in Table 2. Survival from the ponds with only one size group was 96% and 97 % respectively. Average length increase was 160mm for ponds with one size class of fish (70-90mm) and an average increase of 152mm in ponds with mixed size classes of fish (70-90mm, and 100-120mm) Table 3. Daily growth rates were calculated in millimeters per /day and was comparable amongst all ponds, tagged and untagged fish. Average growth per/day for fish in ponds 8, 10 and 11D averaged .72mm and .62mm in pond 9D. Average weight gain was comparable amongst all ponds and between treatments and calculated at .52 grams per/day.

Table 2. Percent survival for tagged and untagged bonytail stocked into Dexter ponds.

Pond	Tagged	Untagged	Overall
8D	None tagged	96%	96%
9D (two size groups)	89%	98%	96%
10D	None tagged	97%	97%
11D (two size groups)	94%	94%	94%

Table 3. Average increase in total length and condition factors between ponds of tagged and untagged BONY fingerlings stocked with two different size groups compared to ponds with one size group.

Pond	Tagged	Untagged	Average length increase	Condition factor (k)
8D	------	161mm	161mm	1.02
9D(two size groups)	148mm	142mm	146mm	0.91
10D	------	160mm	160mm	0.94
11D(two size groups)	160mm	152mm	157mm	0.87

DISCUSSION:

This is the final year of a three year study to investigate methods of rearing BONY to 300mm in total length. This year's study differed from last years in that no adult BONY were used in the study and two different sizes of BONY were cultured together to try and determine if size variation amongst fish, effects growth rate and survival of one year old BONY. The increase in production commitments at the Dexter NFH&TC limited the amount of pond space available for this year's research, thus limiting this project to four ponds with no replication of treatments. No significant differences in growth and survival between treatments (single size fish versus two sizes) were observed. Ponds that were stocked with only one size group of fish (less size variation), resulted in fish that were slightly larger in average total length, while ponds that had greater size variation (two size groups of fish) were slightly smaller. The pond that had the highest variation in size (pond 11D) had the lowest survival of 94%, however without replicating this treatment it cannot be determined if it was a result of the higher level of size variation or other factors. Nonetheless an argument can be made that grading fish which is a common practice in fish culture facilities, assists in increasing uniformity and growth of BONY.

BUDGET

Expenditure Breakdown:

Staff Salaries	15, 665.00
Utilities	5,740.00
Fish Feed	1,000.00
Fish Culture Equipment & Supplies	2,847.00
21% overhead	5,303.00
TOTAL	**$30,555.00**