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Source: Journal of the Arizona-Nevada Academy of Science, 38(2) : 74-76

Published By: The Arizona-Nevada Academy of Science

URL: [https://doi.org/10.2181/1533-6085\(2006\)38\[74:EOPTLA\]2.0.CO;2](https://doi.org/10.2181/1533-6085(2006)38[74:EOPTLA]2.0.CO;2)

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EVALUATION OF PIT TAG LOSS AND TAG-INDUCED MORTALITY IN BLUEHEAD SUCKER (*CATOSTOMUS DISCOBOLUS*)

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ABSTRACT

Native Colorado River fishes in Grand Canyon are studied extensively using Passive Integrated Transponder (PIT) tags. Since 1991 over 7,000 bluehead suckers (*Catostomus discobolus*) have been PIT tagged in Grand Canyon, but few of these fish are ever recaptured. The combination of low recapture rates and no previous studies on tag retention or tag induced mortality led us to evaluate tagging methods for bluehead suckers. We held 18 bluehead suckers in a net pen for 2-6 days after PIT tagging to evaluate capture and tag-induced mortality. No tag loss was observed and only one fish died during the holding period. Lack of information on the life history of this species makes interpretation of low recapture rates difficult, but current handling and PIT tagging practices for bluehead sucker in Grand Canyon do not appear to be causing delayed mortality.

INTRODUCTION

Bluehead sucker (*Catostomus discobolus*) is one of four native fish that persist in the Colorado River in Grand Canyon. Although they are found throughout the Colorado River and its tributaries and are common in the Upper Colorado River Basin in Colorado, Utah and Wyoming (Sublette et al. 1990) little is known about their ecology and life history (Bezzlerides and Bestgen 2002). Over 7,000 bluehead suckers have been tagged with passive integrated transponder (PIT) tags in Grand Canyon from 1991 to 2004 as part of monitoring programs for native fish. Only 632 of these fish have ever been recaptured and only 349 of these recaptured fish were at large for more than 30 days. This represents a recapture percentage (8.8%) that is substantially lower for bluehead sucker than for flannelmouth sucker (*Catostomus latipinnis*) (28.2%) or humpback chub (*Gila cypha*) (50.1%). The low recapture rate of bluehead suckers in relation to the other native fish that are studied in Grand Canyon has evoked concern that current handling and PIT tagging methods may lead to high tag loss or handling/tagging induced mortality in bluehead suckers. Delayed mortality as a result of improper handling is often not immediately seen by researchers but can occur hours or days later and impact study results and defeat study purposes (Stickney 1983). We evaluated short-term tag retention and PIT tag induced mortality in bluehead suckers by holding them in a net pen in the Little Colorado River in for several days post tagging.

METHODS

Eighteen bluehead suckers (164-278 mm TL) were captured in hoop nets near Boulder Camp (RKM 1.9) on the Little Colorado River in Grand Canyon. These fish were caught during spring 2005 routine monitoring of native fish. All fish were handled according to standardized monitoring and PIT tagging protocols (Ward 2002) and then held for 2-6 days post tagging in mesh 1-m³ net pen in the Little Colorado River. Duration of the holding period was determined by when fish were caught in relation to the end of the sampling trip. All fish were PIT tagged with 134.2 KhZ PIT tags in the abdominal cavity on the left side of the fish. Half of the fish were PIT tagged below the pelvic girdle and half were PIT tagged above the pelvic girdle. Both tagging methods are used to tag bluehead suckers in Grand Canyon. Fish tagged below the pelvic girdle had the tag inserted toward the head of the fish and fish tagged above the pelvic girdle had the tag inserted toward the tail of the fish.

RESULTS

No tag loss was observed in any of the fish that were held. One bluehead sucker died in the holding pen (Table 1). This fish was dissected and no sign of internal damage or puncture of internal organs was evident. The fish did have a lesion near its anal opening and a fungal infection which covered the anal opening and anal fin. The fungal infection in combination with the stress of being held in the holding pen may have contributed to the death of

Table 1. Size and Status of bluehead suckers held in a net pen post tagging to evaluate PIT tag loss/mortality.

TL	PIT tag number	Days held	Tag placement in relation to pelvic girdle	Status at release
232	3D9.1BF1AC6396	5	Above	Alive
241	3D9.1BF22D58A8	2	Above	Dead
227	3D9.1BF1A0E2A0	3	Above	Alive
246	3D9.1BF1A0F387	3	Above	Alive
274	3D9.1BF1993D27	5	Above	Alive
198	3D9.1BF1AC56DD	3	Above	Alive
164	3D9.1BF22A7FC0	2	Above	Alive
184	3D9.1BF1A0E895	3	Above	Alive
290	3D9.1BF1A039BB	5	Above	Alive
278	3D9.1BF19927FF	4	Above	Alive
260	3D9.1BF1A0E08E	4	Below	Alive
225	3D9.1BF1A0D89B	4	Below	Alive
230	3D9.1BF1AC5937	6	Below	Alive
219	3D9.1BF1A0EEBE	6	Below	Alive
195	3D9.1BF1992B72	6	Below	Alive
208	3D9.1BF1D862C9	6	Below	Alive
227	3D9.1BF1D8B070	2	Below	Alive
213	3D9.1BF1A095DF	4	Below	Alive

this fish. Most of the pit tagging wounds had already begun to mend within a few days of tagging with the tagging wound sealed by a thin layer of tissue. Tagging either above or below the pelvic girdle did not appear to make a difference in survival although tagging above the pelvic girdle with the tag inserted toward the head of the fish appeared to have less incidence of initial bleeding, especially in smaller fish.

DISCUSSION

Laboratory experiments with bonytail chub (*Gila elegans*) indicate that most PIT tag induced mortality occurs during the first 2 days after tagging (Childs 2002) and any bluehead sucker that suffered a fatal tagging wound is likely to have died during the holding period. This field study was not extensive and sample sizes were low, but our results do suggest that tag loss or high mortality as a result of hoop netting and PIT tagging is not the cause of observed low recapture rates for bluehead suckers in Grand Canyon. Delayed mortality as a result of capture in trammel nets, which are also used extensively in Grand Canyon, remains unknown and needs further evaluation.

Bluehead suckers are commonly found in areas with higher velocities than other native fish (McAda 1977, Ward et al. 2003). These swift areas are difficult to sample effectively which may lead to low

recapture rates. The low number of PIT tagged bluehead suckers that are recaptured on an annual basis also reflects a much lower number of marked individuals (632 unique recaptured/7,165 unique fish tagged) than for flannemouth suckers (3,322/11,788) or humpback chub (9,568/19,096) so recaptures of bluehead suckers would be expected to be more rare. The bluehead sucker population in Grand Canyon may be large or movement patterns of bluehead suckers may lead to low recapture rates. Lack of information on the life history of this species makes interpretation of low recapture rates difficult, but current handling and PIT tagging practices for bluehead sucker in Grand Canyon do not appear to be causing delayed mortality.

ACKNOWLEDGMENTS

Grand Canyon Monitoring and Research Center provided essential logistical support for this research. We thank the many researchers and agencies that have been involved in collecting PIT tag data on Grand Canyon fishes since 1991. Randy Vanhaverbeke, Dewey Wesley and Melody Ward provided assistance with collecting and tagging fish.

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