DRAFT White Catfish (*Ictalurus catus*) Thermal Tolerance Analyses – Juvenile and Adult, Summer
March 2016

Introduction

Recommended summer chronic and acute thermal tolerance values for juvenile and adult white catfish and their justification are discussed below. The recommended tolerance values were developed in accordance with the "*DRAFT Methodology for Developing Thermal Tolerance Thresholds for Various Fish in Nevada – Juvenile and Adult, Summer*" (September 2015).

Chronic Thermal Tolerance Thresholds

Table 1 provides a summary of the range of chronic temperature tolerance values for white catfish for various lines of evidence. These values are based upon a review of 1 paper, the details of which are summarized in Attachment A.

NDEP's approach is to accept the EPA recommendations from Brungs and Jones (1977) unless the literature review provides a compelling reason to utilize other values. However in the case of white bass, EPA did not recommend a chronic thermal threshold for striped bass. Based upon the available information, NDEP recommends a chronic value of 32°C which is near the upper range of the tolerances taken from the literature. As discussed in the methodology, chronic temperature criteria are generally not set to ensure the most optimum conditions. In fact, Brungs and Jones (1977) recommends chronic criterion for a given fish species that is between the optimum temperature and the UUILT.

Table 1. Summary of Chronic Temperature Tolerances

Category	Temperature (°C)
Laboratory Optimal Growth Studies – Constant Temperature	
Optimum	29.6
Upper Optimum	33
Laboratory Temperature Preference Studies	
Average Preferences	30
Upper Preferences	33
Recommended Chronic Temperature Tolerance (MWAT)	**32**

Acute Thermal Tolerance Thresholds

Table 2 provides a summary of the range of acute temperature tolerance values for white catfish for various lines of evidence. These values are based upon a review of 1 paper, the details of which are summarized in Attachment B. As discussed in the methodology document, only the UILT values for acclimation temperature near the recommended chronic criterion (32°C) are to be included in the acute criterion development process. However, no UILT studies were performed for acclimation temperatures near 32°C. Therefore, no acute thermal tolerance is recommended for white catfish at this time.

Table 2. Summary of Acute Temperature Tolerances

Category	Temperature Tolerances (°C)	Potential Acute Criteria (°C)
Laboratory Lethal Studies – UILT		
Acclim. = 20°C	29.2 - 31	
Recommended Acute Temperature Tolerance (MDMT)		**None**

References

Brungs, W.A. and B.R. Jones. 1977. Temperature Criteria for Freshwater Fish: Protocol and Procedures. EPA-600/3-77-061. Environmental Research Laboratory, Duluth, Minnesota.

Kellogg, R.L. and J.J Gift. 1983. Relationship between optimum temperature for growth and preferred temperatures for the young of four fish species. Transactions of the American Fisheries Society 112:424-430.

Kendall, A.W. and F.J. Schwartz. 1968. Lethal temperature and salinity tolerances of the white catfish, Ictalurus catus, from the Patuxent River, Maryland. Chesapeake Science, Vol. 9, Issue 2, pp 103-108.

ATTACHMENT A
Detailed Summary of Chronic Thermal Tolerance Values for White Catfish, Juvenile and Adult, Summer

Table A-1. Chronic Temperature Tolerances – Laboratory Optimal Growth Studies

Reference	Age or Size	Acclim. Temp. (°C)	Optimum Growth Temperature		Upper Optimum Growth Temperature	
			Temp. (°C)	Comment	Temp. (°C)	Comment
Kellogg and Gift (1983)	Juvenile	26	29.6	Optimum growth temperature	32.7	Growth rate = 75% of optimum

Table A-2. Chronic Temperature Tolerances – Laboratory Preference Studies

Reference	Age or Size	Acclim. Temp. (°C)	Average Preference Temperature		Upper Preference Temperature		Final Preferendum	
			Temp. (°C)	Comment	Temp. (°C)	Comment	Temp. (°C)	Comment
Kellogg and Gift (1983)	Juvenile	Unknown	30		33	Upper range to temperature preferences for individual fish		

ATTACHMENT B
Detailed Summary of Acute Thermal Tolerance Values for White Catfish, Juvenile and Adult, Summer

Table B-1. Acute Temperature Tolerances – Laboratory Lethal Temperatures, UILT

Reference	Size or Age	Acclim. Temp. (°C)	Test Duration	Temperature (°C)	Comment
Kendall and Schwartz (1968)	194 – 255 mm	20	12-hour	29.2 - 31	