Harlequin Darter Biological Status Review Report

March 31, 2011

FLORIDA FISH AND WILDLIFE CONSERVATION COMMISSION
620 South Meridian Street
Tallahassee, Florida 32399-1600

Biological Status Review Report
for the
Harlequin Darter
(*Etheostoma histrio*)
March 31, 2011

EXECUTIVE SUMMARY

The Florida Fish and Wildlife Conservation Commission (FWC) directed staff to evaluate all species listed as Threatened or Species of Special Concern as of November 8, 2010 that had not undergone a status review in the past decade. Public information on the status of the harlequin darter was sought from September 17 to November 1, 2010. The three member Biological Review Group (BRG) met on November 18 and 19, 2010. Group members were John R. Knight (FWC lead), William Tate (U. S. Fish and Wildlife Service), and Howard Jelks (U. S. Geological Survey) (Appendix 1). In accordance with rule 68A-27.0012, Florida Administrative Code (F.A.C.), the BRG was charged with evaluating the biological status of the harlequin darter using criteria included in definitions in 68A-27.001, F.A.C., and following the protocols in the *Guidelines for Application of the IUCN Red List Criteria at Regional Levels (Version 3.0)* and *Guidelines for Using the IUCN Red List Categories and Criteria (Version 8.1)*. Please visit http://myfwc.com/wildlifehabitats/imperiled/listing-action-petitions/ to view the listing process rule and the criteria found in the definitions.

In late 2010, staff developed the initial draft of this report which included BRG findings and a preliminary listing recommendation from staff. The draft was sent out for peer review and the reviewers' input has been incorporated to create this final report. The draft report, peer reviews, and information received from the public are available as supplemental materials at http://myfwc.com/wildlifehabitats/imperiled/biological-status/.

The Harlequin Darter BRG concluded from the biological assessment that the harlequin darter, *E. histrio*, did not meet any listing criteria. They also, however, expressed concerns about the adequacy of the data currently available for making this evaluation. FWC staff therefore recommends that the harlequin darter be listed as a Species of Special Concern until more data can be collected.

This work was supported by a Conserve Wildlife Tag grant from the Wildlife Foundation of Florida. FWC staff gratefully acknowledges the assistance of the biological review group members and peer reviewers. Staff would also like to thank Dr. Joseph Mitchell who served as a data compiler on the species for this report.

BIOLOGICAL INFORMATION

Taxonomic Classification – This status report is for the harlequin darter, *Etheostoma histrio* (Jordan and Gilbert 1887), in Florida.

Life History References – Bass et al. (2004), Boschung and Mayden (2004), Steinberg et al. (2000), Etnier and Starnes (1993), Gilbert and Yerger (1992), Page (1983), Kuhajda and Warren (1989), Kuehne and Barbour (1983), Hubbs and Pigg (1972).

Geographic Range and Distribution – Harlequin darters are widely distributed in the lower Mississippi basin, predominantly below the fall line. Occasionally the species is distributed above the fall line (Ohio, Arkansas, Embarras, and Green rivers) (Kuehne and Barbour 1983). Specifically, harlequin darters range from Illinois, Indiana, and Kentucky, south to the Escambia River and west to Texas (Boschung and Mayden 2004, Etnier and Starnes 1993, Page 1983). In Florida, harlequin darters are only known from the Escambia River (Escambia/Santa Rosa counties). The species was first collected from Florida by Yerger and Suttkus (1962), and additional records are sporadic for the species (36 collection records 1962 to 2009). Harlequin darters are found in both the mainstem Escambia River and its tributaries. Collection records from the mainstem range from the Escambia River at the Florida/Alabama state line, south to the White River section of the Escambia (17.5 km ESE of Milton Florida) (Knight unpublished data). Harlequin darters are known to occur in the following tributaries; Big Escambia, Little Escambia, Pine Barren, Canoe, and Mitchell creeks.

Population Status and Trend – No population status or trend data are currently available for harlequin darters. The species appears to be declining in some areas on the periphery of its range, specifically in Alabama, Missouri, and Kentucky (Boschung and Mayden 2004, Kuehne and Barbour 1983). Bass et al. (2004) collected harlequin darters from only eight of the 171 locations sampled from the Escambia watershed between 2002 and 2004. Furthermore, only ten individuals were collected (four different locations) during sampling conducted from 2005 to 2008 (Knight and Katechis 2008). Harlequin darters are generally uncommon in museum collections, although it is not certain whether this indicates rarity or that the species' preferred habitats are difficult to sample (Boschung and Mayden 2004, Etnier and Starnes 1993).

Generation Length- Harlequin darters reach sexual maturity at age one, and the maximum age observed is four years (Boschung and Mayden 2004, Kuhajda and Warren 1989). Therefore the estimated generation time is 2.5 years. Since the estimated time for 3 generations is less than 10 years (the default minimum for IUCN assessment), a 10-year timeframe was used for this assessment.

Quantitative Analyses – There have been no population viability analyses (PVA) or other quantitative models conducted that include in their results a probability of extinction.

BIOLOGICAL STATUS ASSESSMENT

Threats – The Florida harlequin darter population is restricted to one watershed (Escambia), which makes the species susceptible to a catastrophic event within that watershed. Although additional populations are available within the tributaries of the Escambia River, which could potentially re-populate a mainstem population if such an event were to occur. Harlequin darters occur in the Escambia River (Conecuh River in Alabama), but that population is fragmented from a source population north of Point A dam (Point A Reservoir, Andalusia, Alabama).

Threats to harlequin darters include excessive snag removal (a spawning site preference) and impounding lotic water bodies (Bass et al. 2004, Boschung and Mayden 2004). Steinberg et al. (2000) indicated that high turbidity and excessive sediment loads may affect reproductive success of the species. Additional threats to harlequin darters include oil and coal exploration in areas where such activities occur (Warren and Cicerello 1982).

Population Assessment – Findings from the BRG are included in a Biological Status Review information table. The Harlequin Darter BRG concluded from the biological assessment that the harlequin darter, *E. histrio,* did not meet any of the listing criteria. They also, however, expressed concerns about the adequacy of the data currently available for making this evaluation.

LISTING RECOMMENDATION

Based on the lack of data for assessing this species, FWC staff recommends that the harlequin darter be listed as a Species of Special Concern until more data can be collected.

SUMMARY OF THE INDEPENDENT REVIEW

Comments were received from 4 reviewers; Dr. Lawrence Page (University of Florida), Dr. Brett Albanese (Georgia Department of Natural Resources), Dr. Steven Herrington (The Nature Conservancy), and Dr. Catherine Phillips (U.S. Fish and Wildlife Service). Appropriate editorial changes recommended by the reviewers were made to the report. No changes were recommended that would affect the findings or staff recommendations. All reviewers concurred with the staff recommendation to retain the harlequin darter as a Species of Concern in Florida, until distribution, status, and population trend information is available.

LITERATURE CITED

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Biological Status Review Information
Findings

Species/taxon: *Etheostoma histrio*
Date: 11/19/10
Assessors: Jelks, Tate, and Knight

Generation length: 2.5 years so timeframe used for evaluation was 10 years

Criterion/Listing Measure	Data/Information	Data Type*	Sub-Criterion Met?	References
*Data Types - observed (O), estimated (E), inferred (I), suspected (S), or projected (P). Sub-Criterion met - yes (Y) or no (N).				
(A) Population Size Reduction, ANY of				
(a)1. An observed, estimated, inferred or suspected population size reduction of at least 50% over the last 10 years or 3 generations, whichever is longer, where the causes of the reduction are clearly reversible and understood and ceased[1]	No population size data available. Number of captures, size of range, and distribution has recently increased.		N	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004)
(a)2. An observed, estimated, inferred or suspected population size reduction of at least 30% over the last 10 years or 3 generations, whichever is longer, where the reduction or its causes may not have ceased or may not be understood or may not be reversible[1]	No population size data available. Number of captures, size of range, and distribution has recently increased.		N	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004)
(a)3. A population size reduction of at least 30% projected or suspected to be met within the next 10 years or 3 generations, whichever is longer (up to a maximum of 100 years) [1]	No population size data available. Number of captures, size of range, and distribution has recently increased.		N	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004)
(a)4. An observed, estimated, inferred, projected or suspected population size reduction of at least 30% over any 10 year or 3 generation period, whichever is longer (up to a maximum of 100 years in the future), where the time period must include both the past and the future, and where the reduction or its causes may not have ceased or may not be understood or may not be reversible.[1]	No population size data available. Number of captures, size of range, and distribution has recently increased.		N	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004)
[1] based on (and specifying) any of the following: (a) direct observation; (b) an index of abundance appropriate to the taxon; (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat; (d) actual or potential levels of exploitation; (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites.				
(B) Geographic Range, EITHER				
(b)1. Extent of occurrence < 20,000 km^2 (7,722 mi^2) OR				
(b)2. Area of occupancy < 2,000 km^2 (772 mi^2)	Based on 2.59 sq km grid and known recent locations (42 grids). AOO was calculated as 123.7 sq km	E	Y	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004), and FWC GIS data
AND at least 2 of the following:				
a. Severely fragmented or exist in ≤ 10 locations	9 known locations, based on tributary and mainstem collections	O and E	Y	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004), and FWC GIS data
b. Continuing decline, observed, inferred or projected in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent, and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals	number of captures, size of range, and distribution has increased, recently	O and E	N	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004), and FWC GIS data

c. Extreme fluctuations in any of the following: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals	when present, only collected in low numbers (typically <10 individuals)	O and E	N	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004), and FWC GIS data
(C) Population Size and Trend				
Population size estimate to number fewer than 10,000 mature individuals AND EITHER	No data available		N	
(c)1. An estimated continuing decline of at least 10% in 10 years or 3 generations, whichever is longer (up to a maximum of 100 years in the future) OR				
(c)2. A continuing decline, observed, projected, or inferred in numbers of mature individuals AND at least one of the following:				
a. Population structure in the form of EITHER				
(i) No subpopulation estimated to contain more than 1000 mature individuals; OR				
(ii) All mature individuals are in one subpopulation				
b. Extreme fluctuations in number of mature individuals				
(D) Population Very Small or Restricted, EITHER				
(d)1. Population estimated to number fewer than 1,000 mature individuals; OR	No data available		N	
(d)2. Population with a very restricted area of occupancy (typically less than 20 km^2 [8 mi^2]) or number of locations (typically 5 or fewer) such that it is prone to the effects of human activities or stochastic events within a short time period in an uncertain future	Based on 2.59 sq km grid and known recent locations (42 grids). AOO was calculated as 123.7 sq km (9 known locations)	E	N	Knight and Katechis (2008), Knight et al (2010), Bass et al (2004), and FWC GIS data
(E) Quantitative Analyses				
e1. Showing the probability of extinction in the wild is at least 10% within 100 years	no data available		N	

Initial Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
No	
Is species/taxon endemic to Florida? (Y/N)	no
If Yes, your initial finding is your final finding. Copy the initial finding and reason to the final finding space below. If No, complete the regional assessment sheet and copy the final finding from that sheet to the space below.	
Final Finding (Meets at least one of the criteria OR Does not meet any of the criteria)	Reason (which criteria/sub-criteria are met)
No	

1	Biological Status Review Information Regional Assessment	Species/taxon: Etheostoma histrio
2		Date: 11/19/10
3		Assessors: Jelks, Tate, and Knight
4		
5		
6		
7		
8	Initial finding	Supporting Information
9		
10	2a. Is the species/taxon a non-breeding visitor? (Y/N/DK). If 2a is YES, go to line 18. If 2a is NO or DO NOT KNOW, go to line 11.	N
11	2b. Does the Florida population experience any significant immigration of propagules capable of reproducing in Florida? (Y/N/DK). If 2b is YES, go to line 12. If 2b is NO or DO NOT KNOW, go to line 17.	N
12	2c. Is the immigration expected to decrease? (Y/N/DK). If 2c is YES or DO NOT KNOW, go to line 13. If 2c is NO go to line 16.	
13	2d. Is the Florida population a sink? (Y/N/DK). If 2d is YES, go to line 14. If 2d is NO or DO NOT KNOW, go to line 15.	
14	If 2d is YES - Upgrade from initial finding (more imperiled)	
15	If 2d is NO or DO NOT KNOW - No change from initial finding	
16	If 2c is NO or DO NOT KNOW- Downgrade from initial finding (less imperiled)	
17	If 2b is NO or DO NOT KNOW - No change from initial finding	No change
18	2e. Are the conditions outside Florida deteriorating? (Y/N/DK). If 2e is YES or DO NOT KNOW, go to line 24. If 2e is NO go to line 19.	
19	2f. Are the conditions within Florida deteriorating? (Y/N/DK). If 2f is YES or DO NOT KNOW, go to line 23. If 2f is NO, go to line 20.	
20	2g. Can the breeding population rescue the Florida population should it decline? (Y/N/DK). If 2g is YES, go to line 21. If 2g is NO or DO NOT KNOW, go to line 22.	
21	If 2g is YES - Downgrade from initial finding (less imperiled)	
22	If 2g is NO or DO NOT KNOW - No change from initial finding	
23	If 2f is YES or DO NOT KNOW - No change from initial finding	
24	If 2e is YES or DO NOT KNOW - No change from initial finding	
25		
26	Final finding	no change

APPENDIX 1. Brief biographies of the Harlequin darter Biological Review Group members

Bill Tate is the US Fish and Wildlife Service biologist responsible for assisting Eglin Air Force Base's Jackson Guard unit in protecting the endangered Okaloosa darter . Through their efforts and his guidance this darter species has been managed successfully enough for the last decade that it qualified for down-listing from federally endangered to threatened this year. His expertise extends to all North Florida darters and many other benthic (therefore cryptic) freshwater species.

Howard Jelks received his undergraduate education at FSU, then went to UF for his master's degree. Howard has diverse experience from wetland plants, aquatic invertebrates, fish, and wading birds. He has studied these organisms from the estuaries of Apalachicola Bay, freshwater marshes of the Everglades, and streams of the Piedmont and Coastal Plain. Although he specializes in fishes, he classifies himself as a general naturalist/ecologist. How the dynamic environment structures biotic communities is his broad interest. Imperiled freshwater fishes are his speciality, but nonindigenous and marine taxa are also studied. For the past 16 years, he has been a leader of Okaloosa darter monitoring and recovery planning at Eglin Air Force Base in northwest Florida. He has developed skills in sampling design, database development, geographical information system and statistical analyses. He is an active member of the American Fisheries Society Endangered Species Committee and directs their website at http://fl.biology.usgs.gov/afs/index.html

John R. Knight II received his B.S. in Fisheries from the University of Georgia in 2000. After graduation, he accepted a position with the University of Georgia, Institute of Ecology and Georgia Museum of Natural History, where he primarily worked on research of Federally Endangered and Threatened fish species. He accepted a graduate research assistantship at Auburn University and completed his master's research in 2005. Later that year he accepted a position with FWC's Fish and Wildlife Research Institute (FWRI). For the past five and a half years, he has worked primary on developing monitoring strategies/techniques to effectively characterize fish communities from streams and rivers in Florida. Additional duties while working for FWRI include; biological comments on the effects of development on state and federally listed species, provided consultation for scientific permit applications, assisted USFWS with sampling for federally listed fish and mussel species, and worked on numerous interagency technical committees and partnerships within the state of Florida.

APPENDIX 2. Summary of letters and emails received during the solicitation of information from the public period of September 17 through November 1, 2010.

No information about this species was received during the public information request period.